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Introduction

Promoting sustainability is a major challenge for humanity. In the field of architecture, as the movement to promote sustainable architecture has spread worldwide since the late 1980s, BREEAM (Building Research Establishment Environmental Assessment Method) in the U.K. and LEED™ (Leadership in Energy and Environment Design) in North America, etc. A number of evaluation methods for the environmental performance of buildings have been developed and are attracting widespread interest.

In 2001, with the support of the Housing Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), a joint industry-government-academia project was launched, and since then, the Comprehensive Assessment System for Built Environment Efficiency (CASBEE) has been developed by the Research Committee for CASBEE. CASBEE, which can evaluate not only the environmental performance of buildings, but also earthquake resistance, reliability, and comfort, is positioned as an important national policy, and as of December 2024, 24 local governments nationwide have introduced a notification system using CASBEE. In April 2020, the Tokyo Metropolitan Government also started using CASBEE conjunction with their own notification system.

In recent years, global warming has become a particularly important issue internationally. On the other hand, curbing the ever-increasing energy consumption of private sectors has become a major issue. Against the backdrop of an increase in indoor heat stroke due to record-breaking heat waves in recent years and a nationwide power shortage caused by the Great East Japan Earthquake, attention is being paid to environmental measures that can achieve both high energy efficiency and comfort in buildings.

Since the development of the first tool in 2002, CASBEE for buildings has been continuously revised. In 2008, with the intention of encouraging efforts to reduce CO_2 emissions, which cause global warming, the CASBEE for New Construction (2008 Edition) was published, which explicitly incorporates $LCCO_2$ (Life Cycle Carbon Dioxide Emissions) assessment as evaluation of the degree of commitment for "measures to prevent global warming", various initiatives that contribute to the reduction of operating energy and the reduction of CO_2 (embodied CO_2) associated with the manufacture of construction materials. In addition, in 2010, with the aim of further disseminating and strengthening low-carbon measures, it was revised as "CASBEE for New Construction (2010 Edition)" to induce initiatives such as higher energy conservation, eco-materials, and longevity. It has been revised so that it can be used to evaluate buildings with high low-carbon performance, such as LCCM (Life Cycle Carbon Minus) houses.

In line with the revision of the overall energy conservation standards by the national government in 2013, the evaluation criteria for CASBEE were revised in 2014, and the existing CASBEE for New Building and CASBEE for New Construction (Brief Version) have been integrated, and were newly issued as CASBEE for Building (New Construction). In 2015, the "Act on Improvement of Energy Consumption Performance of Buildings (Building Energy Efficiency Act)" was promulgated, and in the 2016 revision, the scoring criteria were reviewed based on trends such as the labeling system for the energy consumption performance of buildings implemented based on the Building Energy Conservation Law and the mandatory compliance with the energy consumption performance standards for the year 2017. In 2021, CASBEE reflected the philosophy of the SDGs, which aim to improve the sustainability of the planet and humanity. Specifically, we have developed a "Built Environment SDGs Checklist" to easily self-evaluate various initiatives that contribute to the achievement of the SDGs embodied in architecture and to clarify them to related parties. The evaluation by the checklist is voluntary, but it is intended to be useful for your sustainability promotion activities.

In this revision, as a revision of the scoring criteria, we have strengthened the BEI and BEIm for large-scale non-residential use in accordance with the revision of the Building Energy Efficiency Act in April 2024, and expanded the evaluation of efforts to promote non-fossilization and commissioning efforts, as well as the use of renewable energy, which will be increasingly necessary in the future. In addition, the existing $LCCO_2$ assessment has been updated to comply with the newly developed J-CAT® tool for calculating whole-life carbon in buildings, and we have responded to the whole-life carbon (WLC) labeling related to the calculation of supply chain emissions (Scope 3), which is an issue as part of corporate information disclosure.

We expect that CASBEE will continue to be widely used in the planning, design, and construction of buildings, and that it will make a significant contribution to the promotion of sustainable architecture in our country.

Japan Sustainable Building Consortium (JSBC)

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PART I. Outline of CASBEE for Building Design (New Construction)

1. Framework for CASBEE for Building Design (New Construction)

1.1 What is CASBEE?

CASBEE (Comprehensive Assessment System for Built Environment Efficiency) is a method for the evaluation and rating the environmental performance of buildings. It is a comprehensive assessment of the quality of a building, evaluating features such as interior comfort and scenic aesthetics, in consideration of environmental practices which include using materials and equipment that save energy or achieve smaller environmental loads. The CASBEE assessment is ranked in five grades: Excellent (S), Very Good (A), Good (B+), Fairly Poor (B-) and Poor (C).

CASBEE includes, as shown in Figure I.1.1, different assessment tools depending on the size of the building subject to the assessment, such as housing, buildings, urban areas and cities, all of which are collectively called CASBEE Family.

CASBEE has been developed by a research committee established in 2001 as part of a joint industrial/government/academic project with the support of MLIT. The first assessment tool, CASBEE for Office, was completed in 2002, followed by CASBEE for New Construction in July 2003, CASBEE for Existing Building in July 2004 and CASBEE for Renovation in July 2005. The CASBEE assessment tools were developed on the basis of the following three principles: (1) Comprehensive assessment throughout the life cycle of the building, (2) Assessment of the "environmental quality of building (Q)" and "environmental load of building (L)" and (3) Assessment based on the newly-developed Built Environment Efficiency (BEE) indicator.

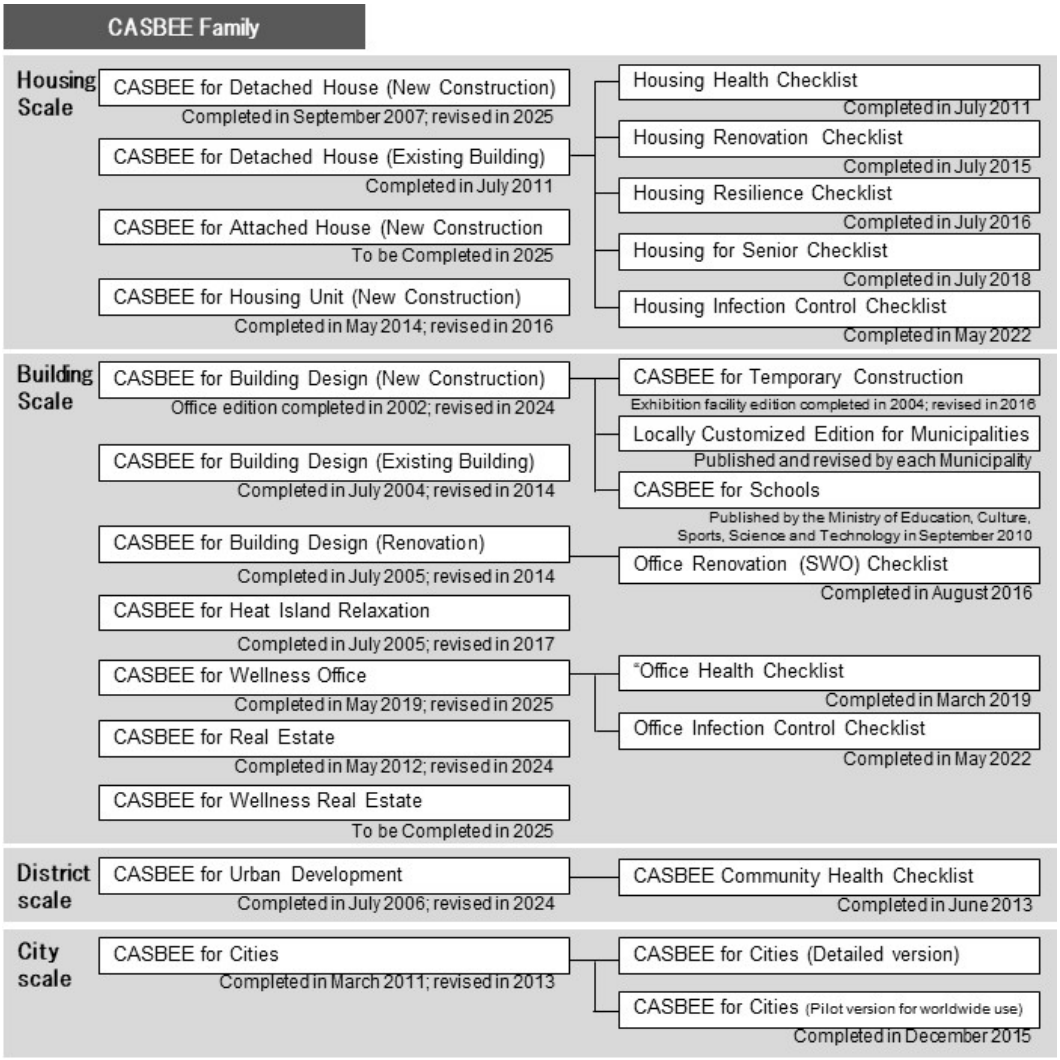

Figure I.1.1 Structure of the CASBEE family

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1.2 The position of CASBEE for Building Design (New Construction) within the four basic tools

CASBEE offers four basic tools for the planning, new construction, existing building and renovation stages of a building's life cycle.

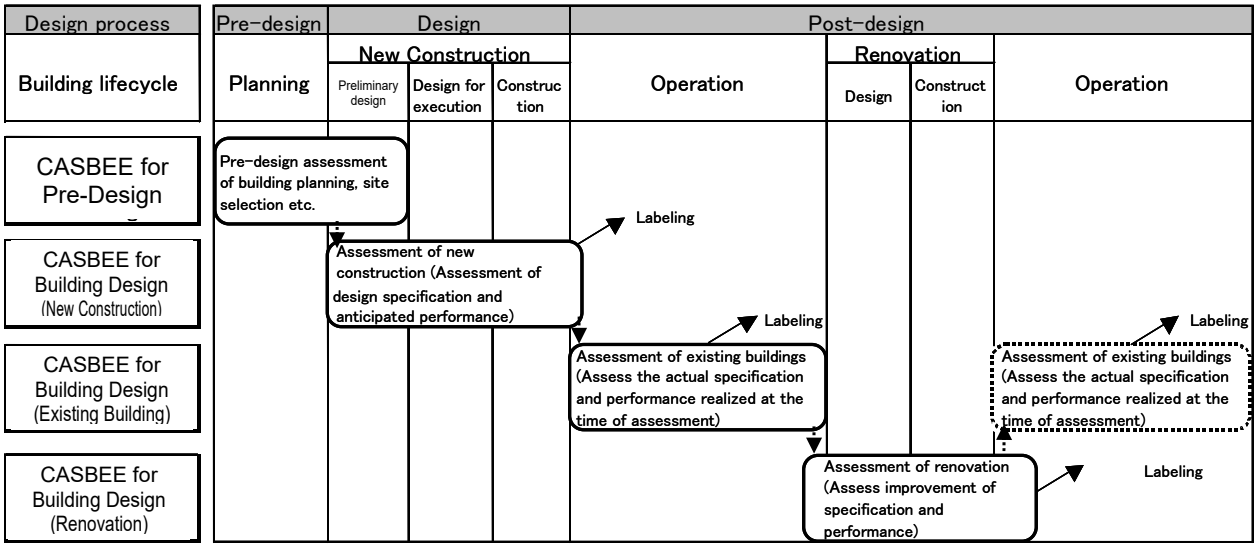

Figure I.1.2 Building life cycle and the four basic tools of CASBEE

CASBEE for Building Design (New Construction), also referred as “CASBEE-BD/NC,” is a tool for use with newly-constructed buildings. Therefore, the system is able to make assessments at each stage of a building's design and construction (preliminary design, execution design and construction completion), on the basis of target performance, design specification and forecast performance, enabling consideration of improvements at each stage. This tool could also be used for rebuilding, in which the existing structure is reutilized.
As CASBEE-BD/NC produces predictive assessments based on design specifications, the assessments results remain valid for three years past the completion of construction. After that period, if necessary, the building should be evaluated at that stage using the latest edition of CASBEE for Building Design (Existing Building).

1.3 Background of the development of CASBEE for Building Design (New Construction)

CASBEE-BD/NC, upon its development of the 2014 edition, integrates the existing tools: CASBEE for New Construction and CASBEE for New Construction (Brief Version), and takes over the functions of both tools. In other words, the new tools may be used for purposes of CASBEE for New Construction (Brief Version), which include setting environmental performance standards and design goals for buildings and preparation of documents for filing with local governments, as well as those of CASBEE for New Construction, which are, for example, detailed assessments of the actual implementation of environmental designs and obtaining third-party certification.

1.4 Introduction of the Built Environment SDGs at CASBEE

Amid growing interest in efforts to achieve the SDGs, which are international development goals, it is necessary to promote the dissemination of specific initiatives in the construction field as well. Therefore, from the 2021 edition, in addition to the evaluation by CASBEE-BD/NC, the "Built Environment SDGs Checklist" has been introduced into CASBEE to voluntarily self-verify efforts to achieve the SDGs. (See Part III for details.)

- Establishment of a "Built Environment SDGs Checklist" to voluntarily self-verify efforts to achieve the SDGs
- The degree of efforts to achieve each goal of the SDGs and the overall degree of contribution are displayed on the result display sheet.

The contents of the "Built Environment SDGs Checklist" will continue to be reviewed and examined in light of domestic and international trends surrounding the SDGs.

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2. Assessment Method

2.1 Buildings for assessment under CASBEE-BD/NC

CASBEE-BD/NC is applicable to all building types except for detached houses. The building classification consists of 8 purposes adopted in the energy conservation standards (including factories) and apartments, excluding detached houses.
The building types covered are broadly divided into "non-residential" and "residential." In particular, hospitals, hotels and apartments that fall in the residential category are buildings that include living or accommodation space for users (hereinafter referred to as <Dwelling and Accommodation Area>). Assessment of these buildings with residential building types is divided between <Dwelling and Accommodation Area> and other common sections (hereinafter referred to as <Entire Building and Common Area>).

Table I.2.1 Building types targeted for assessment (divided into non-residential and residential)

Classification	Building type	Types included
Non-residential	Offices	Offices, government buildings, post offices, computer & information center, etc.
	Schools	Elementary schools, junior high schools, high schools, universities, technical colleges, higher vocational school and other school types, research institutes
	Retailers	Department stores, supermarkets, convenience store, etc.
	Restaurants	Restaurants, canteens, cafes, etc.
	Halls	Auditoriums, halls, libraries, museums, bowling lanes, gymnasiums, theaters, movie theaters, pachinko parlors exhibition facilities, etc.
	Factories	Factories, garages, warehouses, spectator stands, wholesale markets, computer rooms, etc.
Residential	Hospitals	Hospitals, homes for elderly, welfare homes for the handicapped, etc.
	Hotels	Hotels, inn, etc.
	Apartments	Apartments (detached houses are not applied)

2.2 Approaches to scoring criteria

One characteristic of CASBEE is that it assigns separate scores for Q (Quality: Environmental quality of building) and L (Load: Environmental load of building) and ultimately gives an assessment of Built Environment Efficiency (BEE) as an indicator based on the results for Q and L. L is first evaluated as LR (Environmental load reduction of building). That approach is employed because "higher marks for improving load reduction quality" is easier to understand than "higher marks for load reduction" as an assessment system, just as "improvements in quality earn higher marks."
The scoring criteria were examined with a view to applicability to each building type of subject buildings through keeping the criteria simple as possible. The scoring criteria for each assessment score are based on the approaches below.

- Assessment on a five scale, Level 1 to 5 with Level 3 as the standard score.
- As a general rule, Level 1 is earned for satisfying the minimum conditions required by laws, regulations and other standards of Japan, such as Building Standard Law, and a building at what is judged to be a general, ordinary level earns 3.
- The ordinary level (Level 3) is a level corresponding to ordinary technical and social practices at the time of assessment.

2.3 Outline of the assessment system

(1) Scoring

The assessment items included in Q (environmental quality of building) and L (environmental load of building) should be according to the scoring criteria set for each level (Level 1-5). The points for each item are assigned as one point for Level 1 to five points for Level 5.
For apartments, hotels and hospitals (classified as "Residential"), the assessment is subdivided

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between <Dwelling and Accommodation Area> and all other sections <Entire Building and Common Area>. Different scoring criteria are applied for the <Dwelling and Accommodation Area> and the <Entire Building and Common Area>, depending on the assessment items. In obtaining assessment results for the building as a whole, the score for each item is weighted according to the share of floor area occupied by each part, to obtain the whole-building result.

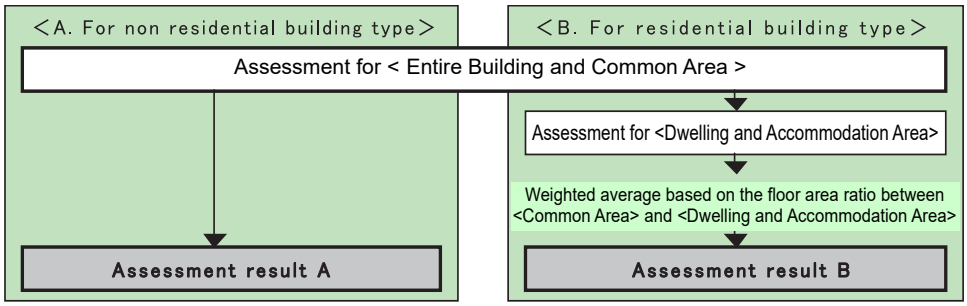

Figure I.2.1 Building assessment system including buildings for "Residential" and "Non-residential"

(2) Whole Life Carbon (WLC) calculation

- Standard calculation

WLC is used as an indicator for assessment of items under "LR3.1 Consideration of Global Warming." Calculation of WLC for a building is usually a very large task, but CASBEE uses an approximate calculation method (i.e. Standard Calculation) in order to simplify the process. Specifically, after setting GHG emissions from the standard building for each building use ("Level 3" for all evaluation items except LR1 Energy, and either BEI=1 or a primary energy consumption reduction rate of 0% in the "Act on Improvement of Energy Consumption Performance of Buildings (referred as the Building Energy Efficiency Act)"), at the construction stage, operation stage, repair, renewal, and demolition stage, WLC calculation can be carried out from the results of evaluation items (scoring level) related to GHG emissions more or less automatically. (Some additional inputs are necessary. See PART IV for details.)

1) Construction stage

Under "LR2 Resources & Materials," "Continuing use of existing structural frame, etc." and "Use of recycled materials" are evaluated. For these items, GHG emissions related to the manufacture of construction materials (embodied carbon) are approximated based on the usage rates of existing structural frames and blast furnace cement.

2) Operation stage

GHG emissions in the operational phase are estimated in a simple manner by using values such as the primary energy consumption ratio BEI (BEIm in cases of the Model Building Method) evaluated in "LR1 Energy" and the reduction ratio correspond to individual efforts in efficient operations.

3) Maintenance/Renewal/Demolition stages

The extended service life achieved through longevity improvement is evaluated in "Q2 Quality of Service." However, it is still difficult to estimate the future service life with the level of accuracy that may be used as a condition for calculating GHG. Therefore, excluding residential buildings, WLC shall be estimated, assuming the respective service life, as follows:

- Offices, hospitals, hotels, schools and halls: Fixed 60 years
- Retailers, restaurants and factories: Fixed 30 years
- Apartments: 30, 60 or 90 years, according to anti-deterioration grades under the Housing Performance Indicator system

- Individual calculation

When a highly-accurate WLC estimation is performed by an assessor based on detailed data and calculations, it is considered as an individual calculation and can be included in the assessment result. The individual calculation follows the life cycle assessment (LCA) methods made available to the public. The assessor must provide a detailed description of the calculation process, such as the method and the calculation assumptions used. Publicly available LCA methods include the LCA Guidelines for Buildings compiled by the Architectural Institute of Japan (published by Maruzen in 2024). Also, the description of the calculation process is submitted using the WLC Calculation Assumptions sheet provided with the CASBEE assessment software.

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(3) Assessment result

Assessment results are collated in two forms, the Score Sheet and the Assessment Results Sheet. First, the scoring results for each assessment item are tabulated on the Score Sheet. These are weighted using weighting coefficient for each assessment item to produce overall scores SQ1-SQ3 and SLR1-SLR3, specific to major categories Q1-Q3 and LR1-LR3. SQ and SLR are also calculated as scores for Q and LR.

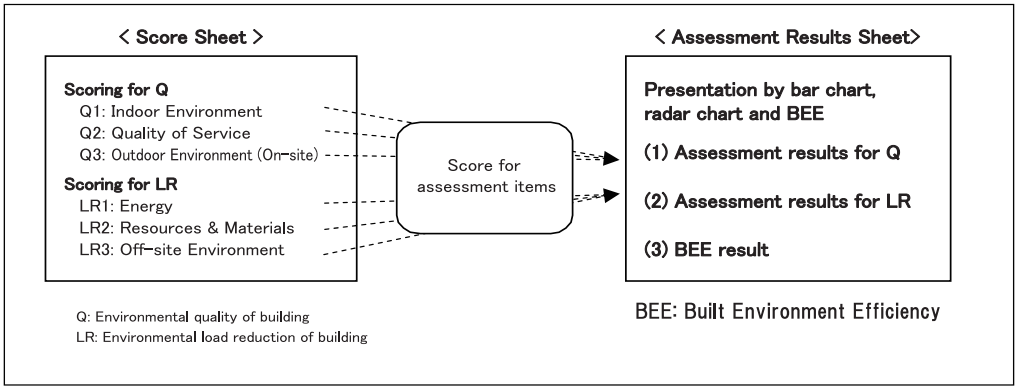

Figure I.2.2 Basic configuration of CASBEE

The Assessment Results Sheet presents assessment results for each category as radar charts, bar charts and numerical data for Q (environmental quality of building) and LR (environmental load reduction of building). The BEE (Built Environment Efficiency) result is also presented numerically and graphically, giving a multi-faceted and comprehensive grasp of the environmental characteristics of the evaluated building.

BEE is calculated from SQ and SLR, the scores for Q and LR, according to the formula below.

$$BEE = \frac{\text{Q: Environmental Quality of Building}}{\text{L: Environmental Load of Building}} = \frac{25 \times (SQ - 1)}{25 \times (5 - SLR)}$$

The graph points are plotted with Q values on the Y axis and L values on the X axis to determine the Built Environment Efficiency position, which enables Built Environment Efficiency ranking on five levels from S down to C as shown in Table I.2.2. Each rank corresponds to the assessment expressions used in Table I.2.2, and are also expressed as a number of stars for clarity.

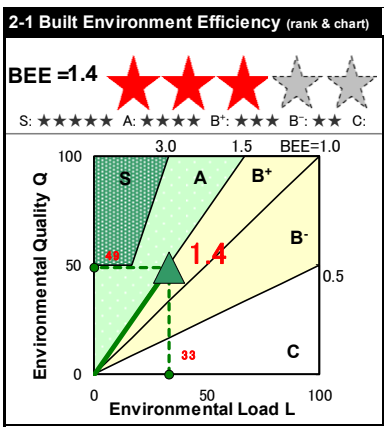

Figure I.2.3 Built environment efficiency ranking with BEE and red stars

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Table I.2.2 Correspondence between ranks based on BEE values and assessments

Ranks	Assessment	BEE value, etc.	Expression
S	Excellent	BEE = 3.0 or more and Q = 50 or more	★★★★★
A	Very Good	BEE = 1.5-3.0 BEE = 3.0 or more and Q is less than 50	★★★★
B+	Good	BEE = 1.0-1.5	★★★
B-	Fairy Poor	BEE = 0.5-1.0	★★
C	Poor	BEE = less than 0.5	★

2.4 Weighting Coefficient

Determining the weighting coefficient between evaluation fields requires not only scientific knowledge but also judgment based on the values of various stakeholders such as designers, building owners and managers, and government officials. In the 2003 edition, the weighting coefficients were determined through votes and case studies by experts of the CASBEE Research and Development Committee. In the development conducted a wide-ranging questionnaire survey of the designers, building owners and operators, related officials and others who would actually use the system was held (110 valid samples were received). Paired comparison judgments based on the responses were used in a hierarchical process to judge the importance of multiple items by an Analytic Hierarchy Process (AHP). Different weighting coefficients for detailed assessment levels are set for individual buildings, as appropriate for their types.
In developing the 2008 edition of CASBEE for New Construction, criteria considering global warming were added in LR3. Due to the social importance of such assessment, a new survey was conducted to further analyze weighting coefficients. From the results of 254 responses, application of the same coefficients as in the 2006 edition were determined, as shown in Table I.2.3. These values remain unchanged in the 2024 edition.

Table I.2.3 Weighting coefficients

Assessment Categories	Non-factory	Factory
Q1 Indoor Environment	0.40	0.30
Q2 Quality of Service	0.30	0.30
Q3 Outdoor Environment on Site	0.30	0.40
LR1 Energy	0.40	
LR2 Resources & Materials	0.30	
LR3 Off-site Environment	0.30	

2.5 Assessment of building complex

The assessment for buildings which combine two or more types is calculated as a weighted average of assessment results for each type of the building, according to the ratio of floor areas for each type. The scores for the building complex are calculated using the equation below, using the ratio between floor areas for each building type.

Score for building complex
=Σ (score for each building type x corresponding floor area ratio)

This equation can also be applied to building complex for different types on a single site, similar to a single building complex.
In the assessment of "LR1 Energy," the weighted average is obtained in terms of individual floor space ratios depending on the levels determined in accordance with the rating levels with respect to non-residential buildings, private and common spaces of residential buildings (evaluated depending on the Energy Saving Countermeasure Grades based on the BPI or the Housing Performance Indication System, and BEI, etc.).

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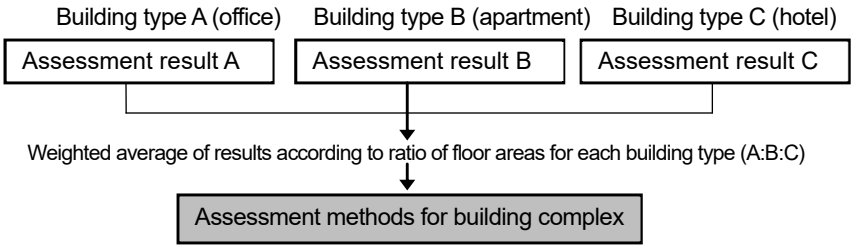

Figure I.2.4 Assessment methods for building complex (for a building combining three types)

2.6 Built Environment SDGs (optional)

Scoring will be conducted based on the "Built Environment SDGs Checklist." This evaluation is optional (see PART III for details).

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2.7 Assessment items of CASBEE-BD/NC

Q: Environmental Quality of Building

In a building such as that shown in table I.2.4, CASBEE-BD/NC takes the environmental quality of building as quality related to improving everyday amenity for users, and evaluates each item.

Table I.2.4 Assessment items in Q: Environmental quality of building ([ ] for CASBEE-BD/EB)

Q1. Indoor Environment	1. Sound Environment	1.1 Indoor Noise Level
		1.2 Sound Insulation
		1.3 Sound Absorption
	2. Thermal Comfort	2.1 Room Temperature Control
		2.2 Humidity Control
		2.3 Type of Air Conditioning System
	3. Lighting & Illumination	3.1 Daylight
		3.2 Anti-glare Measures
		3.3 Illuminance Level
		3.4 Lighting Controllability
	4. Air Quality	4.1 Source Control
		4.2 Ventilation
		4.3 Operation Plan
Q2. Quality of Service	1. Service Ability	1.1 Functionality & Usability
		1.2 Amenity
		1.3 Maintenance
	2. Durability & Reliability	2.1 Earthquake Resistance, Seismic Isolation, Seismic Control, & Vibration Control
		2.2 Service Life of Components
		[2.3 Appropriate Renewal]
		2.4 Reliability
	3. Flexibility & Adaptability	3.1 Spatial Margin
		3.2 Floor Load Margin
		3.3 System Renewability
Q3. Outdoor Environment (On-site)	1. Preservation & Creation of Biotope	
	2. Townscape & Landscape	
	3. Local Characteristics & Outdoor Amenity	3.1 Attention to Local Character & Improvement of Comfort
		3.2 Improvement of the Thermal Environment on Site

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Q1 Indoor Environment

Evaluate the indoor environment, which has a major impact on the health, comfort and intellectual productivity of occupants, as basic performance of the building. Research into the performance of indoor environments began before global environmental problems rose to prominence, and it already has a strong record and body of knowledge. POEM-O (Post Occupancy Evaluation Method Office) is one example. However, those evaluation methods were aimed to evaluate performance after completion of the building, or during its operation life. In contrast, this "CASBEE-BD/NC" has developed the indoor environment assessment methods previously used in the construction and environmental engineering fields. The aim was to make it as easy as possible to evaluate target values for performance (heat, illuminance and noise values, etc.) at the design and construction stages. In that process, aspects such as systems for operation, management, monitoring and control are evaluated as efforts to improve environmental performance.
CASBEE-BD/NC mainly evaluates performance based on design specifications.

1. Sound Environment

The assessment is carried out regarding the level of background noise, which is closely related to the level of comfort and ease of operation, the level of sound insulation in order to prevent noises from entering the living space, and the level of sound absorption in order to prevent noises generated indoors or coming in from outside from echoing.
In CASBEE-BD/NC, "indoor noise level" from facilities and equipment, "sound insulation" to prevent the propagation of sound from the outside, and "sound absorption" of sound that has entered the room and generated in the room are evaluated.

2. Thermal Comfort

Evaluate the setting, control and maintenance systems for interior temperature, humidity and air conditioning, and the related equipment.
CASBEE-BD/NC mainly evaluates environmental performance based on design concepts.

3. Lighting & Illumination

The assessment is carried out regarding the efficient utilization of natural light (Daylight use), measures against the glare of direct sunlight during the day (Glare countermeasures), the balance and level of brightness (Illuminance) and the control of brightness and positions of lights (Lighting control).
CASBEE-BD/NC mainly evaluates performance based on design specifications.

4. Air Quality

Evaluate the level of consideration given to selection of materials to maintain safe interior indoor air quality (IAQ), ventilation methods, construction methods and other aspects. This assessment item comprises three elements, Source Control, mainly avoidance of pollution-generating materials, Ventilation, with the aim of expelling released contaminants, and Operation Plan.
CASBEE-BD/NC mainly evaluates performance based on design specifications.

Q2 Quality of Service

Assessment of service functions to the users and owners of a building covers functional aspects that impact users' activities within the building, and others that are necessary for keeping the building itself in good condition in the long term.

1. Service Ability

Evaluate ease of movement and comfort. It is not easy to express such aspects as direct quantitative indices, so this assessment uses substitute indices such as floor area per occupant, ceiling height, adaptation to IT equipment, and availability of refreshment space, and consideration of maintenance. This assessment of functionality is an unprecedented characteristic, developed from the assessment of spatial elements under POEM-O. In contrast to POEM-O, which emphasized users' psychological reactions, this assessment mainly considers the physical performance of the indoor environment.
CASBEE-BD/NC mainly evaluates performance based on design specifications.

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2. Durability & Reliability

Evaluate the ability to maintain good operational condition over a long period of time.
First, the continuity of use of a building impaired due to damage to the building or the deterioration or loss of internal equipment performance in the event of a disaster, is considered as environmental factors for the space within virtual boundaries. Evaluate remedial measures for such issues under "2.1 Earthquake Resistance, seismic isolation, seismic control, and vibration control." In this category, the performance of earthquake resistance and protection of internal equipment in the event of an earthquake or strong wind are evaluated.
In "2.2 Service Life of Components," the service life is evaluated according to the type of renewal of the building, divided into frame materials, exterior wall finishing materials, major interior finishing materials, air conditioning and ventilation ducts, air conditioning and plumbing pipes, and major equipment and equipment.
"2.3 Appropriate Renewal" evaluates whether parts and components have been updated within their useful life ("2.3 Appropriate Renewal" is not applicable to CASBEEBD/NC). In addition, the suspension of building functions in the event of a disaster or accident is regarded as a problem, and the degree of functional maintenance of each facility in the event of a disaster is evaluated based on "2.4 Reliability". The following items (1) ~ (5) are evaluated, and the degree to which these functions can be maintained in the event of a disaster such as an earthquake is evaluated.
(1) Air conditioning and ventilation equipment, (2) Water supply and drainage, (3) Electrical equipment, (4) Machinery and piping support methods, (5) Communication and information equipment

3. Flexibility & Adaptability

Evaluate readiness for long-term use, including future renewals and changes of usage, in terms of the substitute functions allowance for load and allowance for space. Spatial Margin focuses on two aspects, allowance for story height and adaptability of floor layout evaluates consideration given to such renewal of building facilities in construction planning and equipment planning.

Q3 Outdoor Environment (On-site)

Q3 evaluates improvement of the environmental quality of the outdoor environment (on-site) and its surroundings, derived from efforts within the building and within the site. It comprises "Preservation & Creation of Biotope," "Townscape & Landscape" and "Local Characteristics & Outdoor Amenity." However, there is no assessment from the perspective of aesthetic and design characteristics. As quantitative assessment is difficult, the assessment method converts the existence of individual efforts, and their levels, into points, and uses the total point score to determine the level.

1. Preservation & Creation of Biotope

Evaluate efforts to conserve and create a natural habitat for wildlife. In CASBEEBD/NC, since plants are not fully grown, evaluate potential to sustain wildlife habitation.

2. Townscape & Landscape

Evaluate how well urban context and scenery have been considered. There are now many moves by national and regional governments to place legal regulations on scenery. This assessment should examine the level of consideration that has been given to rules for the urban context and scenery (urban context guidelines, etc.).

3. Local Characteristics & Outdoor Amenity

Make a wide-ranging assessment of efforts to preserve local characteristics and cultural heritage, community relations and amenity improvement in and around the property. Also evaluate measures to improve the thermal environment of the site as part of initiatives for alleviating the heat island effect (corresponding measures for outside the site are evaluated under "LR3.2.2 Heat Island Effect").

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LR: Environmental Load Reduction of Building

The aspects of environmental load reduction of building that are considered by CASBEE-BD/NC are largely narrowed down to energy consumption, resource consumption and diverse impact on the off-site environment (pollution, etc.), as shown in Table I.2.5 below, and evaluate each of these items.

Table I.2.5 Assessment items in environmental load reduction of building (LR)

LR1 Energy	1. Control of Heat Load on Building Envelopes	
	2. Natural Energy Utilization (Direct use)	
	3. Efficiency in Building Service System	
	4. Initiatives for Efficient Operation	4.1 Monitoring
		4.2 Operation & Management System
		4.3 Expanding adoption of non-fossil energy
		4.4 Promoting Commissioning
LR2 Resources & Materials	1. Water Resources	1.1 Water Saving
		1.2 Rain Water & Grey Water
	2. Reducing Use of Non-renewable Resources	2.1 Reducing Use of Materials
		2.2 Continuing Use of Existing Structural Frame, etc.
		2.3 Use of Recycled Materials as Structural Materials
		2.4 Use of Recycled Materials as Non-structural Materials
		2.5 Timber from Sustainable Forestry
		2.6 Reusability of Components and Materials
	3. Avoiding the Use of Materials with Pollutant Content	3.1 Use of Materials without Harmful Substances
		3.2 Avoidance of CFCs and Halons
LR3 Off-site Environment	1. Consideration of Global Warming	
	2. Consideration of Local Environment	2.1 Air Pollution
		2.2 Heat Island Effect
		2.3 Load on Local Infrastructure
	3. Consideration of Surrounding Environment	3.1 Noise, Vibration & Odor
		3.2 Wind/Sand Damage & Sunlight Obstruction
		3.3 Light Pollution

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LR1 Energy

Efforts to reduce the energy load caused by the operation of the building are classified into "1 Control of Heat Load on the Building Envelopes," "2 Natural Energy Utilization (Direct Use)," "3 Efficiency in Building Service System" and "4 Initiatives for Efficient Operation," which are all evaluated. Reductions in GHG emissions caused by energy consumption are to be evaluated under "LR3.1 Consideration of Global Warming."
The evaluation of "1 Control of Heat Load on the Building Envelopes" and "3 Efficiency in Building Service System" is based on the Building Energy Efficiency Act, and is evaluated by the Building PAL* Index (BPI), which is an index of the performance of the outer skin, and the Building Energy Index (BEI), which is an indicator of primary energy consumption.
In addition, "2 Natural Energy Utilization (Direct Use)" and "4 Initiatives for Efficient Operation," evaluate efforts which are not currently covered by the Building Energy Efficiency Act, such as the active use of renewable energy, the introduction of BEMS, the tuning and management of equipment systems during the operation of buildings, the expansion of the use of non-fossil energy, and commissioning initiatives. A wide range of initiatives related to energy conservation in buildings will be evaluated.

1. Control of Heat Load on Building Envelopes

The performance of the building envelope, which is closely related to the reduction of energy consumption for air conditioning, is evaluated by the Building PAL* Index (BPI) and BPIm (BPI for Model Building Method) in the Building Energy Efficiency Act. In apartment buildings, evaluation is conducted based on the equivalent grade in accordance with the "5-1 Thermal Insulation Performance Grade" of the Japan Housing Performance Indication System under the Act on Promotion of Housing Quality Assurance.

2. Natural Energy Utilization (Direct Use)

Efforts that directly use natural energy (energy-saving measures that do not use mechanical power, such as daylight use and ventilation) that cannot be evaluated by "1 Control of Heat Load on the Building envelopes" or "3 Efficiency in Building Service System" will be evaluated. The conversional use of renewable energy will be evaluated in accordance with "3. Efficiency in Building Service System."

3. Efficiency in Building Service System

Energy-saving measures for building facilities such as air conditioning, ventilation, lighting, hot water heaters, and elevators, as well as the promotion of ZEB through the use of renewable energy, are evaluated mainly based on the Building Energy Index (BEI) and BEIm (BEI for Model Building Method) under the Building Energy Efficiency Act, and the primary energy consumption reduction rate for houses. In addition, with regard to the use of renewable energy, some off-site renewable energy utilization efforts will also be evaluated.

4. Initiatives for Efficient Operation

It is important to continue to appropriately manage energy consumption after the start of operation of buildings in order to save energy. CASBEE-BD/NC evaluates the existence of a monitoring system for energy consumption, the operation and management system for energy, and efforts to improve quality and avoid risks in increasingly sophisticated design and construction, such as ZEB, in addition to efforts to expand the use of non-fossil energy such as renewable energy, which will be increasingly necessary in the future. In the case of apartment buildings, since the lifestyles of residents and the use of equipment have a significant impact on energy consumption, we will evaluate whether explanations on these equipment are given to residents.

LR2 Resources & Materials

In this section, "1 Water Resources," "2 Reducing Use of Non-renewable Resources" and "3 Avoiding the Use of Materials with Pollutant Content" are evaluated as ways of reducing the consumption of resources and materials through the life cycle of the building.
Various methods using existing environmental performance assessment tools are employed for evaluating the environmental load generated by the use of resources in buildings. However, they have their own assessment indices and no common standard method has been established. Therefor the development of CASBEE collected and analyzed the assessment indicators used by existing

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Japanese and foreign assessment tools in connection with the use of resources in buildings. The CASBEE assessment items were based on that analysis, so that the concepts are incorporated in a new group of assessment indicators that avoids redundancy.

1. Water Resources

Regard water shortage due to rapid use of large volumes of potable water as an environmental problem beyond the virtual enclosed space boundary and evaluate reduction of potable water usage, referring to whether or not there are efforts for saving water, using rain water, and reusing grey water.

2. Reducing Use of Non-renewable Resources

Regard depletion of non-renewable resources as an environmental problem beyond the virtual enclosed space boundary, and evaluate efforts to reduce consumption of such resources. Specifically, evaluate reduction in the resource usage volume itself under "2.1 Reducing Use of Materials," and the state of usage of reused and reusable materials and products under "2.2 Continuing Use of Existing Structural Frame, etc.," "2.3 Use of Recycled Materials in Structural Materials" and "2.4 Use of Recycled Materials as Non-structural Materials." Furthermore, evaluate use of renewable resources under "2.5 Timber from Sustainable Forests," and the ease of reuse and recycling at the demolition stage under "2.6 Reusability of Components and Materials," in order to evaluate indirect reduction in the use of non-renewable resources. Ability to improve climate change through resource usage efforts should be evaluated under LR3.

3. Avoiding the Use of Materials with Pollutant Content

To reduce the environmental load associated with use of resources, it is important to reduce the amount of the resources used, and also to reduce the use of materials that include pollutants. This item evaluates performance in reducing the emission of pollutants associated with the use of resources, under "3.1 Use of Materials without Harmful Substances" and "3.2 Avoidance of CFCs and Halons," and also improvements on issues such as ozone depletion.

LR3 Off-site Environment

LR3 Off-site Environment evaluates the efforts to reduce the impact that environmental loads generated in the building and its site that affects the global environment, local environment and surrounding area beyond site boundaries. Pollution of soil and groundwater is not classified as an assessment item, because with strict observance of the law there is little risk of such pollution by the building, and assessment is based on the assumption that laws and regulations are strictly observed.

1. Consideration of Global Warming

Evaluate the following GHG reduction initiatives using the quantitative WLC indicators:
(1) Efforts to reduce operating energy affecting climate change
(2) Use of existing structural frames and recycled construction materials, which contribute to the reduction of embodied carbon related to the manufacture of construction materials
(3) Efforts to extend building lifespan that contribute to WLC reduction
The assessment is based on the emission ratio (%) against the WLC (kg-CO_2/year-m^2) in terms of buildings having all assessment items (excluding LR1 Energy) other than this item at Level 3 equivalent (Reference Buildings) and either BEI=1 or a primary energy consumption reduction rate of 0%.

2. Consideration of Local Environment

Under "2.1 Air Pollution," evaluate the reduction of atmospheric pollutants emitted from buildings or from within the property. This includes measures such as the control of pollutants from the operation of building equipment and pollutants removal by plants.
Under "2.2 Heat Island Effect," evaluate efforts that contribute to mitigation of the heat island effect of surrounding areas. This includes enhanced airflow leaving the site, greening of the building, and reductions in solar absorption and artificial heat discharge. On-site mitigation of the heat island effect is evaluated under "Q3.3.2 Improvement of the Thermal Environment on Site." Efforts to reduce the environmental load imposed on local infrastructure facilities by the operation of the building are evaluated under "2.3 Load on Local Infrastructure." The four elements to consider are rain water runoff, sewage treatment, traffic volume and waste disposal.

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3. Consideration of Surrounding Environment

Under "3.1 Noise, Vibration and Odor," evaluate noise, vibration and odor generated during the operation of the building. Noise and vibration generated during the operation of the equipment are evaluated according to whether measures for source elimination and propagation control have been established. Assessment of odor is based on reduction measures for odors generated from chemical substances designated under the Offensive Odor Control Law and from organic waste.

Buildings that would occur wind hazards (e.g. large structure buildings) should be carefully considered during the design stage. Under "3.2 Wind/Sand Damage & Sunlight Obstruction," evaluate whether wind hazard control measures have been established for such buildings.

Also evaluate measures put into effect to limit impact of daylight obstruction on adjacent buildings and the surrounding area caused by the building. Additionally, assessment of sand and dust control measures is also performed for school buildings. Light pollution, such as light spillage from exterior lighting, billboard lighting, the building itself, and daylight glare reflecting off exterior walls, has become an important urban issue. Under "3.3 Light Pollution," evaluate measures to reduce the impact of light pollution based on the guidelines published by the Ministry of the Environment (MOE).

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3. Assessment Procedures

3.1 Composition of the assessment tool

CASBEE-BD/NC has been developed to allow simple data entry from general-purpose spreadsheet software for various usage of assessment result.

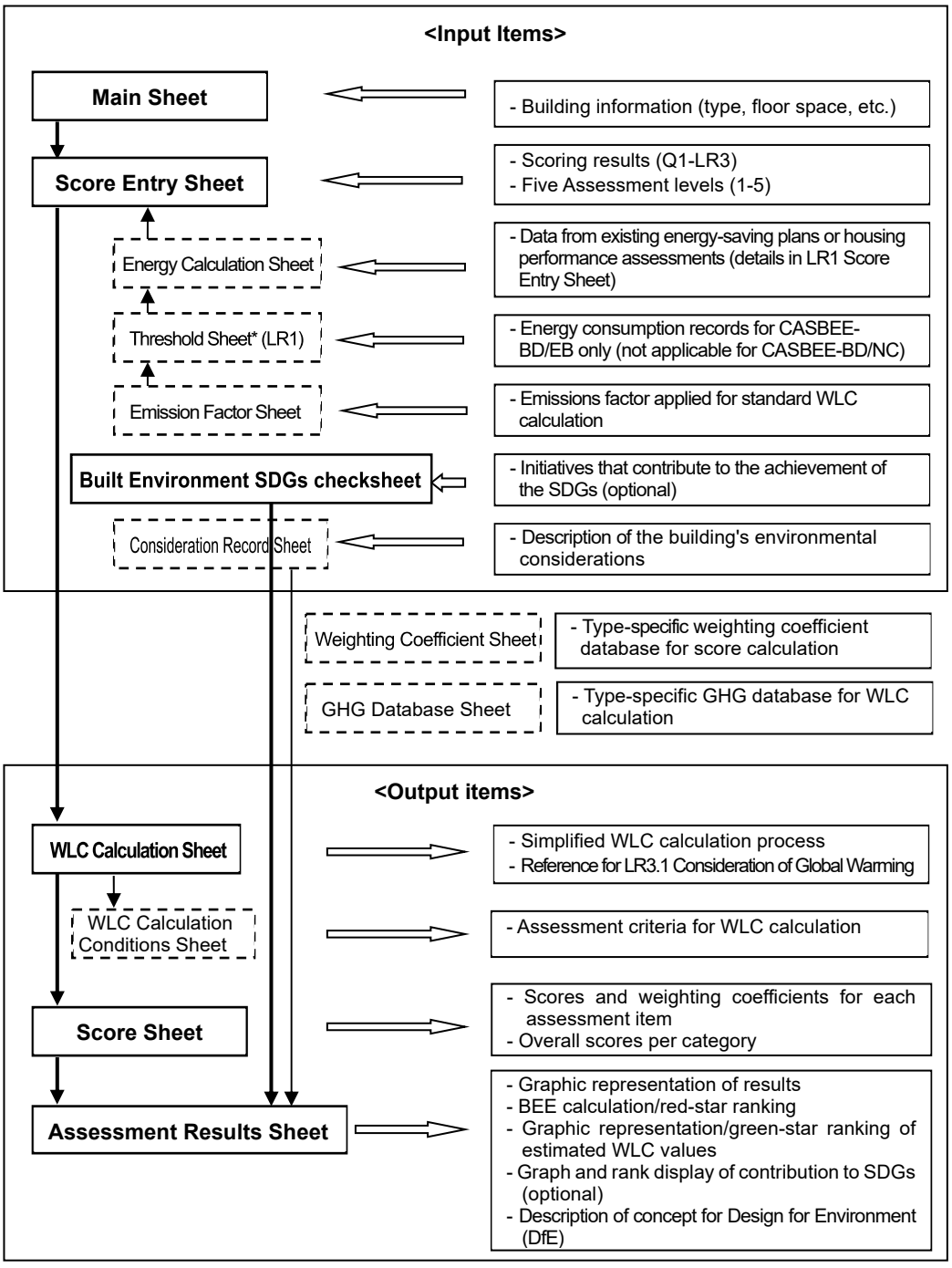

Figure I.3.1 Assessment sheet overview

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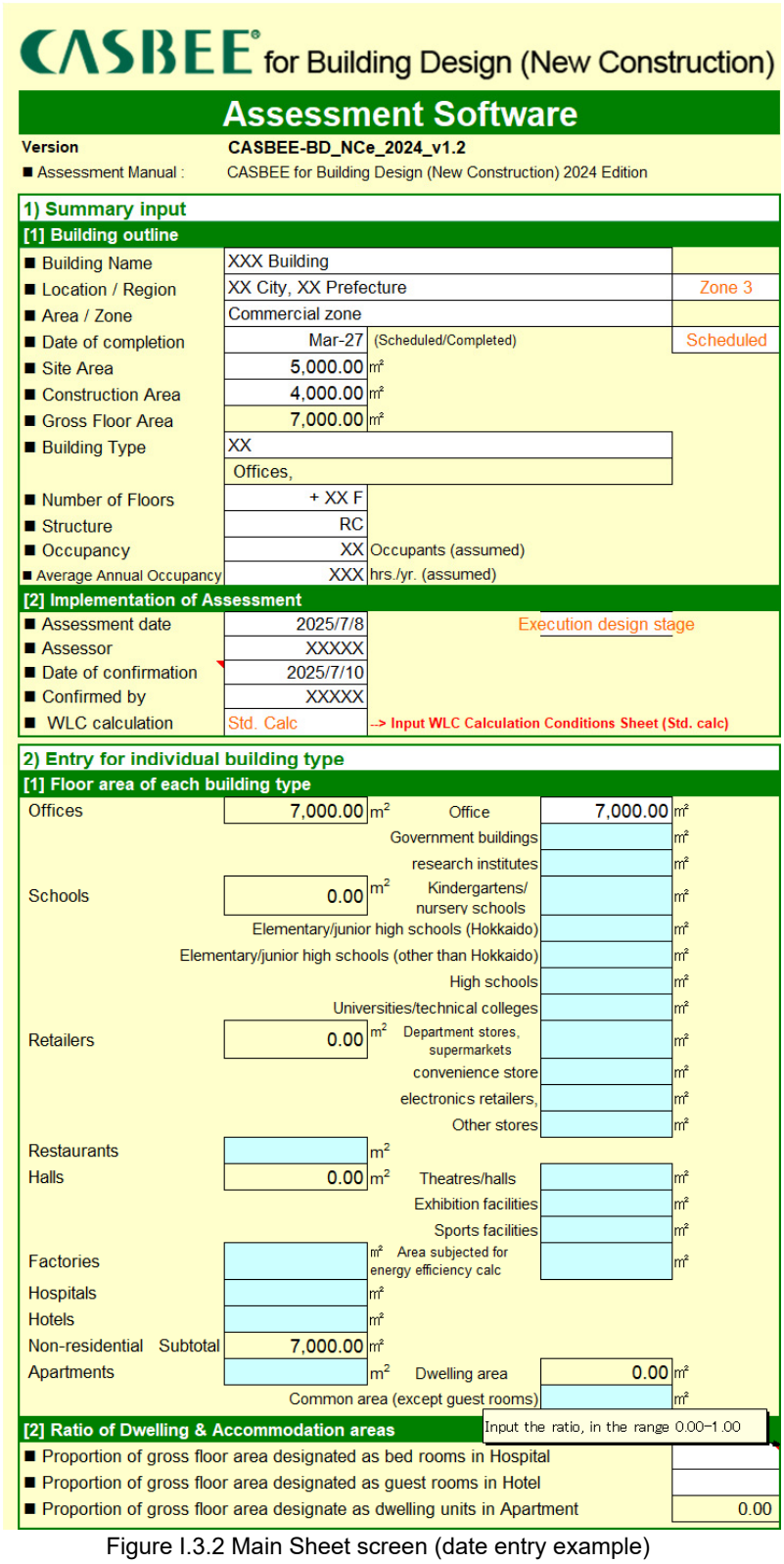
3.2 Main Sheet

Figure I.3.2 shows the Main Sheet. The Main Sheet is the sheet where the assessor makes the first input. Enter the information necessary for the assessment, such as basic information on the subject building (name, type, size, etc.). From the assessment of buildings with residential type buildings, enter the floor area ratio between <Entire Building and Common Area> and <Dwelling and Accommodation Area>.



CASBEE for Building Design (New Construction)

Assessment Software

Version	CASBEE-BD_NCe_2024_v1.2
■ Assessment Manual :	CASBEE for Building Design (New Construction) 2024 Edition

1) Summary input

[1] Building outline

■ Building Name	XXX Building		
■ Location / Region	XX City, XX Prefecture		Zone 3
■ Area / Zone	Commercial zone		
■ Date of completion	Mar-27	(Scheduled/Completed)	Scheduled
■ Site Area	5,000.00	m²	
■ Construction Area	4,000.00	m²	
■ Gross Floor Area	7,000.00	m²	
■ Building Type	XX Offices,		
■ Number of Floors	+ XX F		
■ Structure	RC		
■ Occupancy	XX	Occupants (assumed)	
■ Average Annual Occupancy	XXX	hrs./yr. (assumed)	

[2] Implementation of Assessment

■ Assessment date	2025/7/8	Execution design stage
■ Assessor	XXXXX	
■ Date of confirmation	2025/7/10	
■ Confirmed by	XXXXX	
■ WLC calculation	Std. Calc	--> Input WLC Calculation Conditions Sheet (Std. calc)

2) Entry for individual building type

[1] Floor area of each building type

Offices	7,000.00	m²	Office	7,000.00	m²
			Government buildings		m²
			research institutes		m²
Schools	0.00	m²	Kindergartens/ nursery schools		m²
			Elementary/junior high schools (Hokkaido)		m²
			Elementary/junior high schools (other than Hokkaido)		m²
			High schools		m²
			Universities/technical colleges		m²
Retailers	0.00	m²	Department stores, supermarkets		m²
			convenience store		m²
			electronics retailers,		m²
			Other stores		m²
Restaurants		m²			
Halls	0.00	m²	Theatres/halls		m²
			Exhibition facilities		m²
			Sports facilities		m²
Factories		m²	Area subjected for energy efficiency calc		m²
Hospitals		m²			
Hotels		m²			
Non-residential Subtotal	7,000.00	m²			
Apartments		m²	Dwelling area	0.00	m²
			Common area (except guest rooms)		m²

[2] Ratio of Dwelling & Accommodation areas — Input the ratio, in the range 0.00–1.00

■ Proportion of gross floor area designated as bed rooms in Hospital	
■ Proportion of gross floor area designated as guest rooms in Hotel	
■ Proportion of gross floor area designate as dwelling units in Apartment	0.00

Figure I.3.2 Main Sheet screen (date entry example)

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1) Summary input

(1) Building outline

Enter the basic information necessary for the assessment (name, type, scale, etc.). This information will be transferred to the Assessment Results Sheet.

Enter the average occupancy and the annual occupancy time where possible. These are for reference only and do not directly affect the CASBEE assessment.

Table I.3.1 Input items and examples of building outline for CASBEE-BD/NC

Entry item	Example	Entry item	Example
Building Name	XX Building	Gross floor	(square meter)
Location/Climate	XX City, XX Pref.	Building type	Office, school,
Area/Zone	Commercial area	(Building type) *3	City hall, college
Regional classification	Zone 6*1	Number of floors	+ XX F
Completion	2022.12	Structure	RC
Site area	(square meter)	Average	(number of people)
Construction area	(square meter)	Annual	(hours)

*1 Select the regional classification from among eight zones (1 to 8) in “Matters concerning calculation methods, etc. in the Ordinance regarding Building Energy Consumption Performance Standards, etc. (Ministry of Land, Infrastructure, Transport and Tourism Notification No. 265).”

*2 Gross floor area is automatically entered as the sum of the previously-entered floor space in all usage areas.

*3 Building type is automatically entered from the types selected in the column for the usage-specific floor area, based on the CASBEE building type categories. More specific information on the building type can be entered in the additional Building Type column above (optional).

(2) Assessment Implementation

Input the date of the assessment and the name of the assessor. If the contents of the assessment are checked by a different person, enter the date of the check and name of the checker in this column.

2) Entry for individual building type

(1) Building types

Select the most applicable building type name from those listed in Table I.3.2. Enter the gross floor area for each building type. Use 1) Summary input to enter more specific type for the building concerned. With respect to buildings whose purposes are offices, schools, stores and meeting places, the floor space is provided in terms of individual detailed purposes.

(2) Ratio of Dwelling and Accommodation Area

Enter the floor area ratio of <Entire Building and Common Area> and <Dwelling and Accommodation Area> when evaluating residential type building. (Input the value, in the range 0-1.0, for the proportion of wards in hospitals, guest rooms in hotels and residential portions in apartments. Make no input for buildings of non-residential use.)

3) Display of each sheet

The Assessment Results Sheet, Score Sheet and WLC Calculation Sheet can be selected in the output results column to display the sheet on the screen.

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Table I.3.2 Classification for entering total floor space by building purpose

Classification	Building type	Detailed purpose	Types included
Non-residential	Offices	Offices, government buildings	Offices, government buildings, post offices, computer & information center, etc.
	Schools	Kindergartens/nursery schools, elementary/junior high schools (Hokkaido), elementary/junior high schools (other than Hokkaido), high schools, universities/technical colleges, research institutes	Elementary schools, junior high schools, high schools, universities, technical colleges, higher vocational school and other school types
	Retailers	Department stores, supermarkets, convenience store, other stores, electronics retailers	Department stores, supermarkets, convenience store, electronics retailers, etc.
	Restaurants		Restaurants, canteens, cafes, etc.
	Halls	Theatres/halls, exhibition facilities, sports facilities, etc.	Auditoriums, halls, libraries, museums, bowling lanes, gymnasiums, theaters, movie theaters, pachinko parlors exhibition facilities, etc.
	Factories		Factories, garages, warehouses, spectator stands, wholesale markets, computer rooms, etc.
Residential	Hospitals		Hospitals, homes for elderly, welfare homes for the handicapped, etc.
	Hotels		Hotels, inn, etc.
	Apartments		Apartments (detached houses are not applied)

3.3 Score Entry Sheet

The Score Entry Sheet indicates an assessment standard list for individual purposes, in which a five-level assessment standard on a scale of Level 1 to Level 5 is described. The assessor marks in accordance with the list.

Table I.3.3 Main elements in Score Entry Sheet

Element	Description
Scoring	Choose level 1-5 (or Not Applicable) from pull-down menu.
Scoring Criteria	Display assessment criteria for each item.
Efforts to be evaluated	A scoring method used for some items. Efforts which should be considered for the environment are listed, and the score is determined by selecting the relevant effort or entering the number of evaluation points.
Weighting coefficients (default)	Displays weighting coefficients stipulated for the application (cannot be altered)
Outline of Environmental Efforts*	Describe the basis for scoring, such as the environmentally friendly methods and calculation methods adopted.
Columns of various index values *	In the quantitative evaluation criteria, enter the numerical values that will be the basis for scoring.

*Must be filled in if the score is above Level 3

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The input method for the Score Entry Sheet is as stated below.

1) Scoring criteria

As shown in Figure I.3.3, Score Entry Sheet displays a list of scoring criteria for each building type, and the assessor should assign points accordingly. "Entire Building and Common Area" should be scored for all types in common. However, for residential building, the Score Entry Sheets for Q1 and Q2 have scoring criteria and assessment columns for "Dwelling and Accommodation Area," and those should be used for scoring.

Scoring criteria are set for levels 1-5, and the number for the level (e.g. "3" for level 3) should be chosen from the pull-down menu in the assessment column. If it is not possible to apply the scoring criteria as they stand, due to individual conditions in the target building, "Not Applicable" can be selected for some assessment items (Items which can be excluded are listed in the commentary in the manual). If "Not Applicable" is selected, the excluded scoring items are assigned a weighting of "0" unless otherwise specified, and distributed according to the weighting of other scoring items.

In the outline of environmental efforts and the columns of various index values, describe the adoption method, calculation method, numerical value, etc. that are the basis for scoring (required for levels above Level 3).

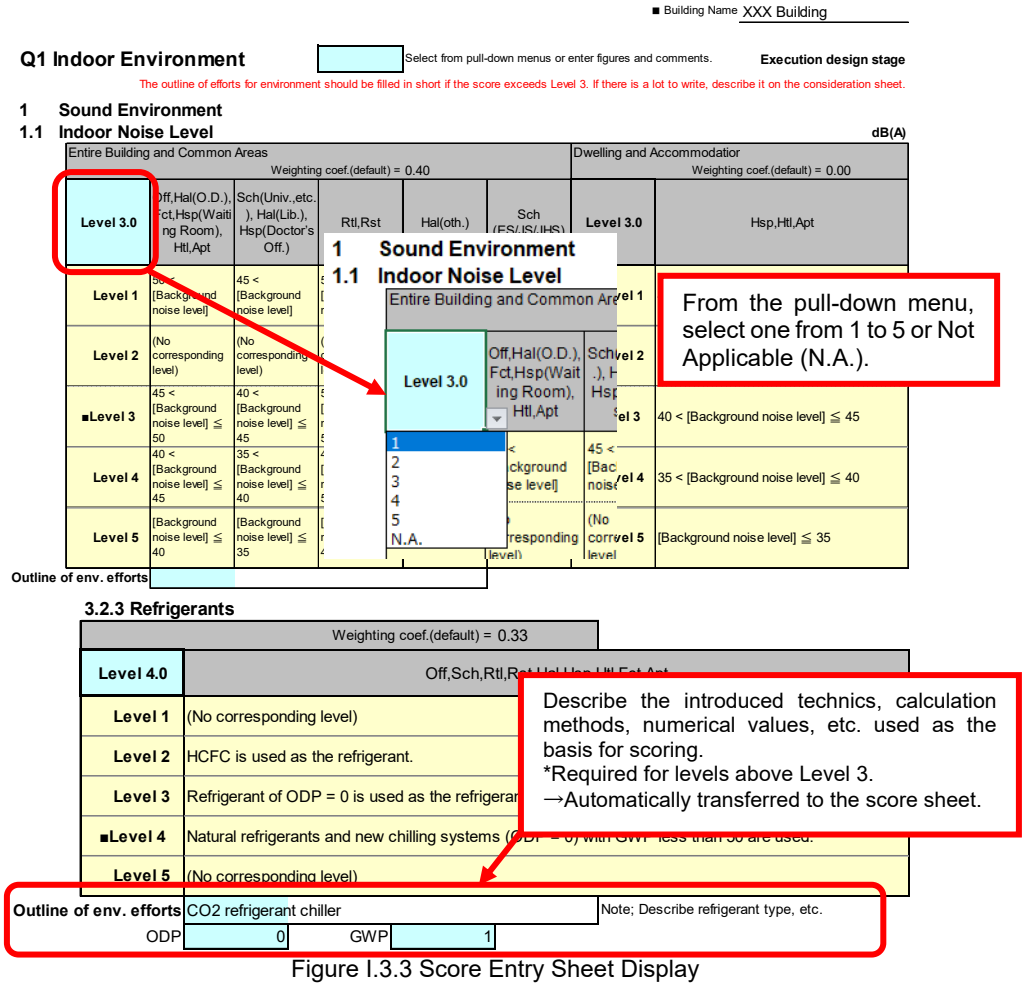

Figure I.3.3 Score Entry Sheet Display

2) Efforts to be evaluated

For some scoring items (particularly "Q3 Outdoor Environment (On-site)" and "LR3 Off-site Environment"), the score is determined by checking the levels of efforts indicated in the table of the efforts to be evaluated attached to the scoring criteria table. This information is listed under "Efforts to be evaluated," as a checklist of points to be considered in Design for Environment (DfE), or as a list of methods. Evaluate whether each of the listed efforts has been made, and score the item concerned according to the total number of points awarded (or the number of items).

In addition, enter the numerical value directly in the scoring field, if the evaluated building is not subject to evaluation for the item, or if requirements or conditions other than the total points are indicated as criteria.

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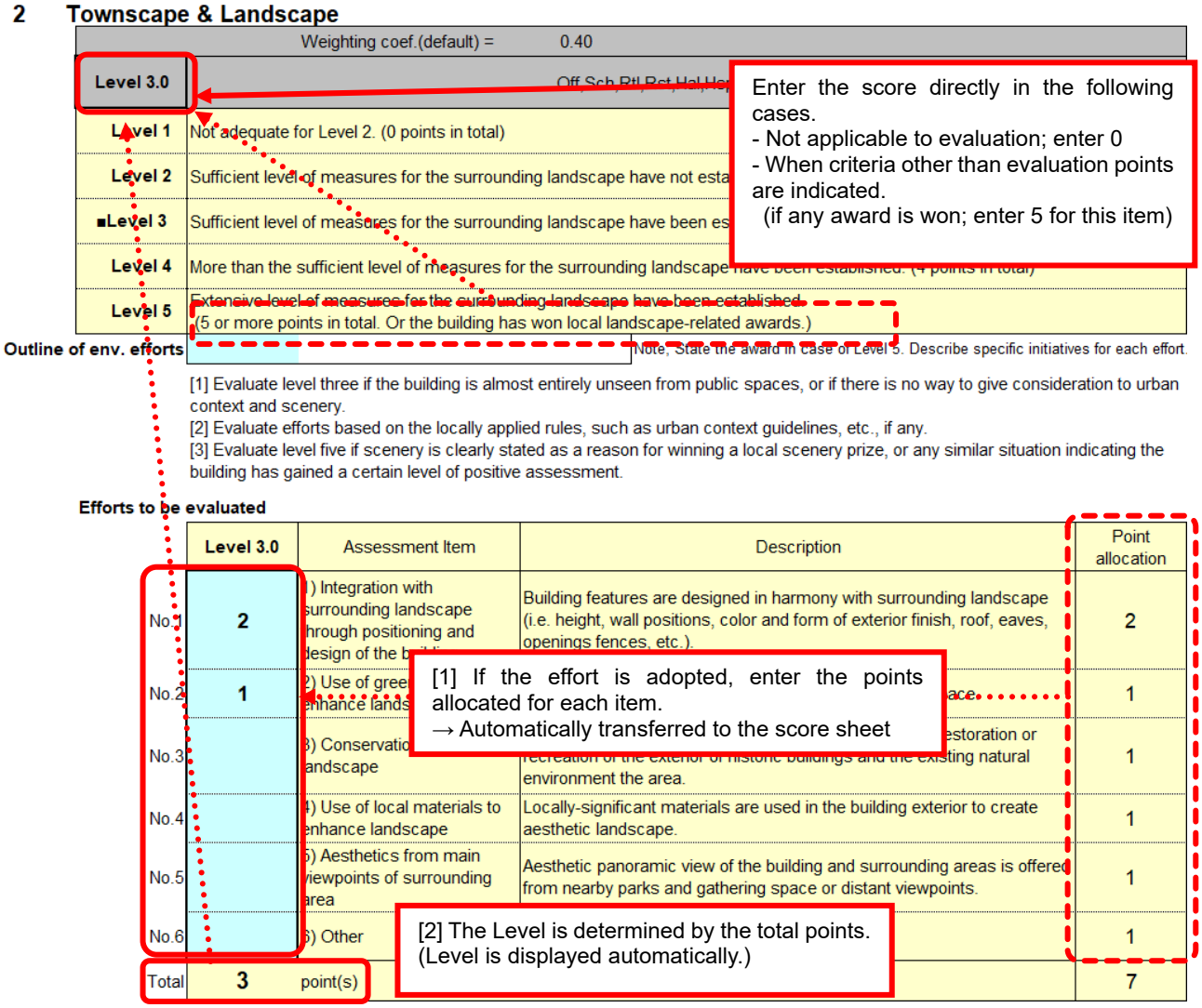

Figure I.3.4 Score Entry Sheet with method using "efforts to be evaluated"

3) Scoring method for LR1 Energy

In the scoring items of "LR1 Energy", indicators used to judge compliance with standards, such as BPI and BEI under the Building Energy Efficiency Act, are used as evaluation indicators for some items. In "1. Control of Heat Load on Building Envelopes," non-residential applications are evaluated using BPI or BPIm, and residential applications are evaluated in accordance with the Housing Performance Indication System under the House Quality Assurance Act. In "3. Efficiency in Building Service systems," non-residential applications are evaluated by BEI or BEIm, and residential applications are evaluated by primally energy consumption rate. In evaluating these two items, Input is made in the " Energy Calculation Sheet" shown in Figure I.3.5. Specifically, BPI or BPIm, standard primary energy consumption, design primary energy consumption, BEI or BEIm, etc., are entered.

4) Scoring for building complex

When evaluating a building complex, enter the average of the levels (points) for all applicable building types, weighted for relative floor areas of each complex. Obtain the area-weighted average for each assessment item, and select the corresponding values from the pull-down list in the Score Entry Sheet. The averaged results are rounded to the nearest whole integer. In cases when a detailed assessment is conducted such as when applying for a certification system, values including weight-averaged fractional values may be entered directly in the rating field.

For LR1 Energy, the Energy Calculation Sheet has fields to which values may be transcribed either from the energy saving plan or the housing performance assessment report in terms of buildings for residential and those for non-residential. The assessment of "1 Control of Heat Load on the Building Envelopes" and "3 Efficiency in Building Service System" are carried out based on the floor weighted average of the levels rated in all types as a whole building.

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■ **LR1 Data transcription from "Building Energy Consumption Performance Assurance Plan" etc.**

■Building Name XXX Building

1 Matters concerning the prevention of heat loss through exterior walls, windows, etc.

Other than Apt. **[BPI][BPIm] =** 0.97 Zone 3

Zone 1-7 Level 3.00
Zone 8 Level 3.00

Apt. **Housing Performance Indication Standard** Grade 4 equivalent *

* If multiple grades are mixed, evaluate based on the lowest grade.

	Floor area [m²]	Floor area ratio	
Other than Apt.	7,000.00	1.00	Level 3.0
Apt.	0	0.00	Level 3.0

LR1/1. Control of Heat Load on Buildin Level 3.0

2 Primary energy consumption performance

■ Transcription of BEI and other indicators

	Other than Apt.	Apt. **
[BEI＊] [BEIm＊] =	0.50	-
[BEI] [BEIm] =	0.25	-
[BEI+]=	0.20	

	Other than Apt.	Apt.
Prim. Ene. Cons. performance w/o renewables	Level 4.00	N.A.
Prim. Ene. Cons. Perf. incl. on-site renewables (	Level 5.00	N.A.
Prim. Ene. Cons. Perf. incl. on-site and off-site r	Level 5.00	—

** For apartments, enter the "primary energy consumption reduction rate" including common areas converted to BEI or BEI＊ (1 - "primary energy consumption reduction rate"). Evaluations are also acceptable with BEI and BEI＊ for dwelling areas only (common areas may be omitted).

Conditions for building types other than Apt.

Evaluated level 4 or higher with BEI+ Yes

Applicable if the on-site renewable energy is introduced, and the effectiveness is presented, and [BEI ＊] ≤ 0.5.

Overview of eligible off-site renewable energy ○○kW installed in ○○ City, used ○○GJ/yr, ←Fill in the details of [1] and [2] below.

For BEI+, it is necessary to confirm the effectiveness of off-site renewable energy, and the following points should be presented.
[1] Presentation of an overview of the evaluated "renewable energy power generation equipment/facilities" (location, capacity, specifications, etc.)
[2] Presentation of annual energy usage review materials (supply and demand balance review materials)
[3] Some kind of renewable energy facilities should be planned to be installed on site (Not applicable where there are no renewable energy facilities on site).

Conditions for Apt.

Evaluated level 4 or higher with BEI＊

Applicable only for buildings of more than 6 floors or when effect of introducing renewable energy is low due to reasons such as shade.

Reasons why effect of introduction is low

Evaluated based on specification std. BEI＊ = 0.80 equivalent

Floor area evaluated based on specification std. m² ←No input of floor area [m²] to be evaluated.

Floor area evaluated based on 0.00 m² N.A.

Level 2 (meeting "Standards for the prevention of heat loss through the exterior walls and windows of residential parts and standards for primary energy consumption" (MLIT Notification No. 266, revised in November 4, 2022). hereinafter referred to as the "Specification Standards")) and Level 4 (meeting "Certification Standards for the exterior walls and windows of residential parts and Certification Standards for Primary Energy Consumption" (MLIT Notification No. 1106, November 4, 2022. Hereinafter referred to as "Certification Specification Standards"). If the above levels are not met, select Level 1.

	Other than Apt.	Apt.
LR1/3. Efficiency in Building Service System	**Level 5.00**	**N.A.**

■ Input of Area subject to evaluation by Building type and BEI/BEIm settings, etc.

		Floor area [m²]	Floor area ratio	Level 1	Level 2	Level 3	Level 4	Level 5
Bldg. type [1]	Off, Sch	7,000.00	1.00	0.90	0.80	0.60	0.50	0.25
Bldg. type [2]	Rtl, Htl	0.00	0.00	0.90	0.80	0.70	0.50	0.25
Bldg. type [3]	Rst, Hal, Hsp	0.00	0.00	0.90	0.85	0.70	0.50	0.25
Bldg. type [4]	Fct	0.00	0.00	0.90	0.75	0.60	0.50	0.25
Bldg. type [6]	Other than Apt	7,000.00		0.90	0.80	0.60	0.50	0.25
Bldg. type [5]	Apt	0.00		1.10	1.00	0.90	0.80	0.50

3 Transcription of Primary energy consumption of the building, etc. (for WLC calculation)

Select the following if you do not use the calculation program for apartments (dwelling area).

Heating A

A: Method in which the entire dwelling unit is heated
B: Method in which only the living space is heated (Continuous heating)
C: Method in which only the living space is heated (Intermittent heating)
－: Other than above (or unknown)

Cooling b

a: Method in which the entire dwelling unit is cooled
b: Method in which only the living space is cooled (Intermittent cooling)
－: Other than above (or unknown)

■ Corridor type in common areas

outdoor corridor

outdoor corridor 522 MJ/yr-m²
indoor corridor 801 MJ/yr-m²

■ Result of the calculation program for apartment

* can be omitted. Guestrooms may be included in dwelling unit subtotal.

Primary energy consumption [MJ/yr]	Dwelling unit subtotal	Common area*	Guestrooms in common area* as dwelling unit	Total	
Floor area [m²] to be evaluated by calculation program				0	m²
A. Standard primary energy consumption				0	
B. Design primary energy consumption (subtotal including CGS effect)				0	excl. PV
C. Deduction related to CGS-generated electricity sales (enter negative value)				0	
D. Primary energy consumption of other equipment, such as home appliances				0	
E. Electric power generated (by CGS)				0	
F. Electric power generated (by PV)				0	incl. electricity sales
G. Design primary energy consumption (subtotal including CGS & PV effect)				0	incl. PV (in-house con
<Ref.> BEI＊	-	-	-	-	excl. PV
BEI	-	-	-	-	incl. PV (total generati

Note;
- "A" and "B" include primary energy of other equipment "D."
- "B" does not take into account reductions achieved through renewable energy "F". "G" takes into account "F" (in-house consumption).
- Electricity sold to others through Feed-in-Tariffs is excluded from the assessment.

For apartments, input the primary energy consumption, as this is necessary for calculating GHG emissions at operation stage. For buildings other than apartment, inputting primary energy consumption isn't needed since BEIs are used for GHG calculation at operation stage and for scoring "LR1/3. Efficiency in Building Service System."

Figure I.3.5 Energy Calculation Sheet (Input sample, extract)

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Primary energy consumption (standard calculation) used for calculating GHG at operation stage

[2] Building-related Initiatives

Other than Apt BEI※ = 0.50

GJ/yr

Eval. bldg.	Ref. bldg.
5,425.00	10,850.00

			Floor area ㎡	Prim. Energy Statistic data [MJ/yr-㎡]	GHG conversion coefficient kg-CO_{2eq}/MJ
Office	Office		7,000	1,550	0.04817
	Government buildings		0	0	0.04771
	Research institutes		0	0	0.05155
School	Kindergartens/ nursery sc		0	0	0.04879
	ES/JHS	Hokkaido	0	0	0.04763
		Other area	0	0	0.04776
	High schools		0	0	0.04896
	Universities/ colleges		0	0	0.05006
Retailers	Department, supermarket		0	0	0.04994
	Convenience store		0	0	0.04395
	Electronics retailers,		0	0	0.05118
	Other stores		0	0	0.04606
Restaurants			0	0	0.04862
Halls	Theatres/halls		0	0	0.04777
	Exhibition facilities		0	0	0.04819
	Sports facilities		0	0	0.04808
Factories			0	0	0.04395
Hospitals			0	0	0.05421
Hotels			0	0	0.05551
Non Apt.	Subtotal		7,000	10,850 GJ/yr	0.04817

■ Initiatives for Efficient Operation

	Level 3	Level 4	Level 5	Score weighted average	Reduction
4.1 Monitoring, 4.2 Operation & Management System	1.00	0.975	0.95	3.0	1.000

GJ/yr

Apt.

			Eval. bldg.	Ref. bldg.		Eval. bldg.	Ref. bldg.
Dwelling area (including guest rooms)						0.00	0.00
Evaluation based on Calculation Program	0.00 ㎡		0	0	GJ/yr		
Evaluation not based on Calculation Program	0.00 ㎡		1,099	1,099	MJ/yr-㎡		
Common area	BEI※ =	-					
	0.00 ㎡		#VALUE!	522	MJ/yr-㎡	0.00	0.00

[3] Above Initiatives + Other On-site Measures

Other than Apt. BEI = 0.25 — 2,712.50

Apt. Dwelling area — On-site measures 0.00 GJ/yr — 0.00

Common area BEI = -

0.00 ㎡ — #VALUE! — 522 MJ/yr-㎡ — 0.00

<Ref.>[4] Above Initiatives + Other Off-site Measures

Other than Apt. BEI+ = 0.20 — 2,170.00

Figure I.3.6 Energy Calculation Sheet (continued)

■ Result of the calculation program for apartment

* can be omitted. Guestrooms may be included in dwelling unit subtotal.

Primary energy consumption [MJ/yr]	Dwelling unit subtotal	Common area*	Guestrooms in common area* as dwelling unit	Total	
Floor area [㎡] to be evaluated by calculation program	**6,000**	**600**		6,600	㎡
A. Standard primary energy consumption	**4,032,000**	480,000		4,512,000	
B. Design primary energy consumption (subtotal including CGS effect)	**2,950,000**	432,000		3,382,000	excl. PV
C. Deduction related to CGS-generated electricity sales (enter negative value)	**0**			0	
D. Primary energy consumption of other equipment, such as home appliances	**1,062,000**	0		1,062,000	
E. Electric power generated (by CGS)	**0**			0	
F. Electric power generated (by PV)	**58,900**	0		58,900	incl. electricity sales
G. Design primary energy consumption (subtotal including CGS & PV effect)	**2,891,100**	0		2,891,100	incl. PV (in-house con
<Ref.> BEI※	0.64	0.90	-	0.67	excl. PV
Note; BEI	0.62	0.90		0.66	incl. PV (total generati

- "A" and "B" include primary energy of other equipment "D."
- "B" does not take into account reductions achieved through renewable energy "F". "G" takes into account "F" (in-house consumption).
- Electricity sold to others through Feed-in-Tariffs is excluded from the assessment.

For apartments, input the primary energy consumption, as this is necessary for calculating GHG emissions at operation stage. For buildings other than apartment, inputting primary energy consumption isn't needed since BEIs are used for GHG calculation at operation stage and for scoring "LR1/3. Efficiency in Building Service System."

Figure I.3.7 Primary energy consumption of Apartment, Energy Calculation Sheet (Input sample)

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3.4 Consideration Record Sheet

State points considered in Design for Environment (DfE), so that it is easy for a third party to gain an overview of environmental considerations in the evaluated building. The content of such statements is indicated in "3 Design Considerations" in the Assessment Results Sheet.
Make statements (free content) in each space for General, Q1-LR3 and Other in the Consideration Record Sheet. State the concept of the building as a whole in the General space, and make any statements related to assessment items in the relevant columns Q1-LR3. Use the Other column to describe other environment-oriented efforts not evaluated under Q1-LR3.

■ Considerations in environmental design ■ Building Name XX Building

Design Considerations	
General	Describe briefly comprehensive concept of environmental design of the building.
Q1 Indoor Environment	Describe briefly considerations for Q1 Indoor Environment of the building.
Q2 Quality of Service	Describe briefly considerations for Q2 Quality of Service of the building.
Q3 Outdoor Environment (On-site)	Describe briefly considerations for Q3 Outdoor Environment (On-site) of the building.
LR1 Energy	Describe briefly considerations for LR1 Energy of the building.
LR2 Resources & Materials	Describe briefly considerations for LR2 Resources & Materials of the building.
LR3 Off-site Environment	Describe briefly considerations for LR3 Off-site Environment of the building.
Other	Describe briefly considerations for other than 6 categories above that are not assessed in CASBEE, such as recycling activities at constriction site and preservation of historic buildings.

Figure I.3.8 Consideration Record Sheet

3.5 Emission Factor Sheet

Select the appropriate GHG emission factor for electricity use specific to the assessment objective form “Emission Factor Sheet.” The assessment software allows use of the most recent basic emission factor and alternative values. These values are based on Article 2-4 of the Ordinance on Calculation of Greenhouse Gas (GHG) Emissions from Business Activities of Specified Emitters. The assessor may also choose and apply other appropriate emission factor (optional).
Due to the full liberalization of electric power supply, the emission factors of some electric utility companies may not be disclosed at the time of evaluation.

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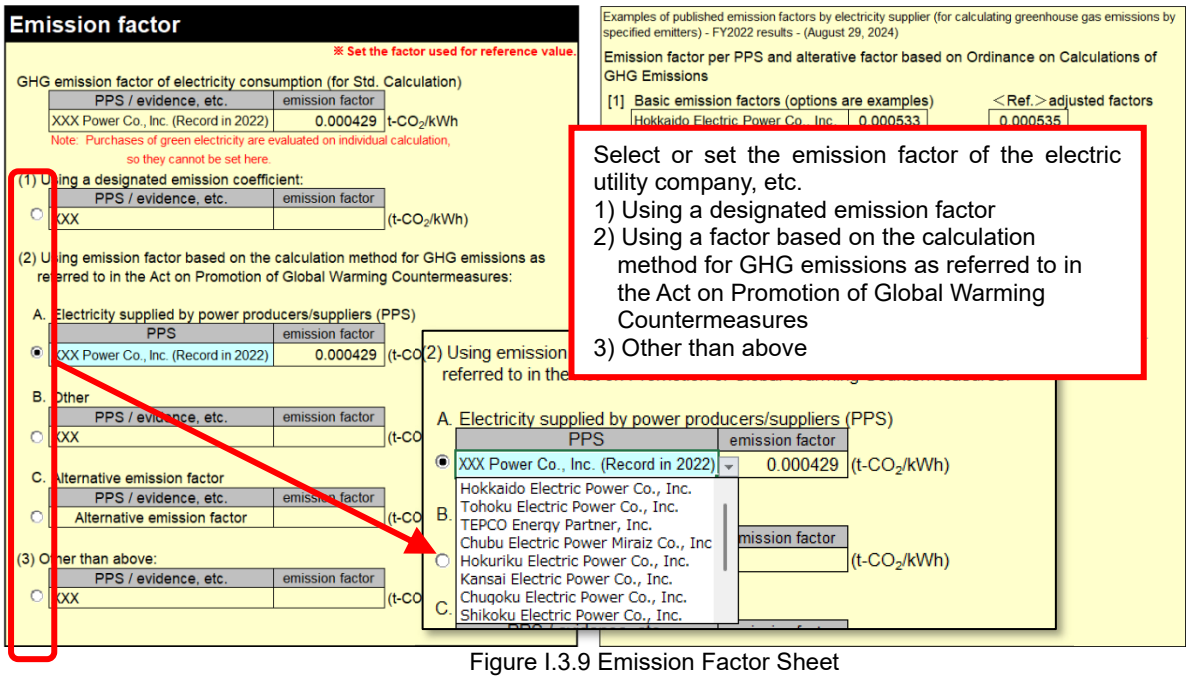

Figure I.3.9 Emission Factor Sheet

1) Using a designated emission factor:
Check the box in Item 1, describe reasons for your choice and enter the emission factor.

<Example>
Application for a subsidiary project (factors designated by the organizer), participation design/proposal competitions (designated by the organizer), submission under CASBEE for Municipality (designated by the municipality), etc.

2) Using a factor based on the calculation method for GHG emissions as referred to in the Act on Promotion of Global Warming Countermeasures :
Select the appropriate item below and enter the corresponding data*.

A: When use of electricity supplied by an electric utility company is expected, apply the basic emission factor set by the government.
→ Check the box in Item A and select the name of the electric utility company from the list. (When the company is not in the pull-down options, enter its factor in a separate field.)

B: If the use of electricity supplied by a party other than the above is assumed, enter an appropriate emission factor based on actual measurements, etc., with a factor equivalent to the factor in Item A.
→ Check the box in Item B and enter the emission factor and the name of the electric utility company.

C: When neither method A nor B applies, select an alternative factor established by MOE and METI.
→ Check the box in Item C.

*Note: The electric utility company-specific emission factors (basic factor/adjusted factor) and alternative factor are revised and published annually by the government. Check whether the values are current in the CASBEE assessment software. If the revisions are not reflected in the software, confirm the latest factors available on MOE website and enter the value in Item B Other.

3) Other:
Check the box in Item 3, describe the reasons for this choice and enter the emission factor.

3.6 WLC Calculation Sheet

Figure I.3.9 shows the Whole Life Carbon (WLC) calculation sheet. The sheet displays the automatic calculation process for WLC (standard calculation) based on data entered in the Score Entry Sheet and the Energy Calculation Sheet.

Under each category of the building's life cycle stages (i.e., construction, maintenance/renewal/demolition and operation), the reference value and GHG emissions of a building subject to the assessment are indicated in kg-CO_{2eq}/year-m^2.

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CASBEE for Building Design (New Construction)
XXX Building

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Whole Life Carbon Calculation Sheet（For Standard calculation）

						Evaluated Bldg.		Reference Bldg.
1. GHG Emissions Related to Construction								
1-1. Conversion of Assessment Results to GHG emission						kg-CO_{2eq}/yr-m^2		kg-CO_{2eq}/yr-m^2
Q2/2.2.1 Service Life of Structural Frame Mat	Floor area comp	Level 3	Level 4	Level 5	Score	GHG emission	Score	GHG emission
Office	1.00	18.03	18.03	18.03	3.0	18.03	3.0	18.22
School	0.00	18.33	18.33	18.33	3.0	18.33	3.0	18.59
Retailers	0.00	22.71	22.71	22.71	3.0	22.71	3.0	22.88
Restaurants	0.00	22.71	22.71	22.71	3.0	22.71	3.0	22.88
Halls	0.00	17.69	17.69	17.69	3.0	17.69	3.0	17.92
Factories	0.00	29.80	29.80	29.80	3.0	29.80	3.0	30.17
Hospitals	0.00	17.95	17.95	17.95	3.0	17.95	3.0	18.17
Hotels	0.00	19.50	19.50	19.50	3.0	19.50	3.0	19.72
Apartments	0.00	33.48	16.74	11.16	3.0	33.48	3.0	33.92
Structure of the evaluated building	RC							
LR2.2.2 Existing structural frame	0%						0%	
LR2.2.3 Recycled materials (Use of blast furnace cement)	20%						0%	

1-2. Addition of GHG emissions related to equipment installation (to [3])

	Installed capacity		GHG intensity		
Solar power generation system	100.00	kW	19.34	kg-CO_2eq/yr-kW	0.28
Battery	0.00	kWh	3.33	kg-CO_2eq/yr-kWh	0.00
Lifespan of evaluated building	60years	Office, assumed (same as 2-2)			

1-3. Subtotal	[2]	18.03	[1] 18.22
	[3]	18.31	

2. GHG Emissions Related to Repair, Renewal and Demolition								
2-1. Conversion of Assessment Results to GHG emission						kg-CO_{2eq}/yr-m^2		kg-CO_{2eq}/yr-m^2
Q2/2.2.1 Service Life of Structural Frame Mat	Floor area comp	Level 3	Level 4	Level 5	Score	GHG emission	Score	GHG emission
Office	1.00	20.11	20.11	20.11	3.0	20.11	3.0	20.11
School	0.00	14.59	14.59	14.59	3.0	14.59	3.0	14.59
Retailers	0.00	8.71	8.71	8.71	3.0	8.71	3.0	8.71
Restaurants	0.00	8.71	8.71	8.71	3.0	8.71	3.0	8.71
Halls	0.00	17.54	17.54	17.54	3.0	17.54	3.0	17.54
Factories	0.00	9.96	9.96	9.96	3.0	9.96	3.0	9.96
Hospitals	0.00	19.66	19.66	19.66	3.0	19.66	3.0	19.66
Hotels	0.00	22.25	22.25	22.25	3.0	22.25	3.0	22.25
Apartments	0.00	10.89	12.24	12.55	3.0	10.89	3.0	10.89

2-2. Addition of GHG emissions related to equipment installation (to [3])

	Installed capacity		GHG intensity		
Solar power generation system	100.00	kW	39.01	kg-CO_2eq/yr-kW	0.56
Battery	0.00	kWh	6.70	kg-CO_2eq/yr-kWh	0.00

2-3. Subtotal	[2]	20.11	20.11
	[3]	20.67	

3. GHG Emissions Related to Operation Energy						kg-CO_{2eq}/yr-m^2		kg-CO_{2eq}/yr-m^2
3-1. Building-related Initiatives [2]	Floor area m^2	Prim. Energy [GJ/yr] Ref. bldg. [1]	Eval. bldg. [2]	GHG conversion coef kg-CO_{2eq}/MJ		37.33	**Ref. bldg. [1]**	74.67
Building except Apt. area	7,000	10,850	5,425	0.048173		37.33		74.67
Apt. dwelling area (dwelling units total)	0	4,032	2,950	0.049591		0.00		0.00
Apt. Common area	0	0	0	0.043955		0.00		0.00
subtotal	7,000							
3-2. Above Initiatives + Other On-site Measures [3]			Eval. bldg. [3]			18.67		
Building except Apt. area	7,000		2,713	0.048173		18.67		
Apt. dwelling area (dwelling units total)	0		2,891	0.049591		0.00		
Apt. Common area	0		0	0.043955		0.00		
subtotal	7,000							
3-3. <Ref.> Above Initiatives + Other Off-site Measures [4]			Eval. bldg. [4]		[4]	14.93		
Building except Apt. area	7,000		2,170	0.048173		14.93		
Apt. (same GHG as [3])								

4. Calculation of WLC (Standard Calculation)	kg-CO_{2eq}/yr-m^2 GHG emission	kg-CO_{2eq}/yr-m^2 GHG emission
Construction	18.31	18.22
Repair, Renewal and Demolition	20.67	20.11
Operation	18.67	74.67
Total	57.64	113.00

Figure I.3.10 WLC Calculation Sheet (output example)

- WLC Calculation Conditions Sheet (standard calculation)

For assessments based on the standard calculation, WLC Calculation Conditions Sheet displays the assessment conditions applied in the WLC calculation, such as amount of key materials, environmental load units, GHG emission factor for energy, and other source data.

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■ WLC Calculation Conditions Sheet (Standard Calc) ■ Building Name XXX Building

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Items		Reference Building	Evaluated Building	Note
Building Overview	Building type	Offices,	Offices,	
	Gross floor area	7,000m²	7,000m²	
	Structure	RC	RC	
Life Cycle	Estimated service life	60years(Office,)	60years(Office,)	
Con-struction Stage	GHG emissions	18.22	18.31	kg-CO_{2eq}/yr-m²
	(Included GHG by installation of renewables)	–	0.28	kg-CO_{2eq}/yr-m²
	Embodied carbon calculation method	The standard calculation methods of "J-CAT®" by IBECs	Estimated by subtracting GHG reduction due to recycled material use from GHG of reference building	
	Reference for GHG emission intensity	AIJ-LCA intensity database by analytical data of the 2015 Industrial Input-Output Table	See reference building	
	Boundary	National and international final consumption.	See reference building	
	Quantities of Representative Materials			
	Regular concrete	0.70	0.56	m³/m²
	Blast furnace cement concrete	0.00	0.14	m³/m²
	Steel frame	0.10	0.10	t/m²
	Deck plate	0.00	0.00	m²/m²
	Reinforcing bars	0.08	0.08	t/m²
	Formwork	0.67	0.67	m²/m²
	□ □	○○	〃	kg/m²
	GHG emission intensities of Representative Materials			
	Regular concrete	315.84	〃	kg-CO_{2eq}/m³
	Blast furnace cement concrete	257.14	〃	kg-CO_{2eq}/m³
	Steel frame	1.41	〃	kg-CO_{2eq}/kg
	Steel frame (blast furnace)	1.41	〃	kg-CO_{2eq}/kg
	Reinforcing bars	1.00	〃	kg-CO_{2eq}/kg
	Formwork	7.45	〃	kg-CO_{2eq}/m²
	Deck plate	37.64	〃	kg-CO_{2eq}/m²
	Main recycled materials and usage			
	Blast furnace cement (structural use)	0%	20%	
	Existing frame materials (structural use)	0%	0%	
	Electric furnace steel (reinforcement)	0%	0%	
	Electric furnace steel (steel materials)	0%	0%	
Repair, Renewal/ Demolition Stage	GHG emissions	20.11	20.67	kg-CO_{2eq}/yr-m²
	(Included GHG by installation of renewables)	–	0.56	kg-CO_{2eq}/yr-m²
	Upgrade period (year)			
	Exterior	25years	25years	
	Interior	18years	18years	
	Building Service	15years	15years	
	Average repair rate (%/year)			
	Exterior	1%	1%	
	Interior	1%	1%	
	Building Service	2%	2%	
	Calc method for demolition-related GH	Assuming road transport distance of 30 km for demolition materials	See reference building	
Operation stage	GHG emissions			
	[1] Reference value/ [2] Building-related initiatives	74.67	37.33	kg-CO_{2eq}/yr-m²
	[3] Above + other on-site initiatives	–	18.67	kg-CO_{2eq}/yr-m²
	[4] Above + other off-site measures	–	14.93	kg-CO_{2eq}/yr-m²
	Reference	(a) Carbon offsetting with renewable energy certificates	–	
		(b) Carbon offsetting with green heat certificate	–	
		(c) Other carbon credit	–	
		(d) Difference between basic and adjusted emissions (obtained from the adjusted emission factor)	–	
	Calculation method for energy consumption	Average primary energy consumptions based on statistical value	Estimated based on energy conservation achieved with LR1-related measures	
	Primary energy consumption	14,882	5,604	GJ/yr
	GHG emission factors for energy			
	Primary energy Non-residential buildings	0.0482	See reference building	kg-CO_{2eq}/MJ
	Primary energy Residential buildings (Dwelling areas)	0.0496	See reference building	kg-CO_{2eq}/MJ
	Electricity	0.429	See reference building	kg-CO_{2eq}/kWh
	Gas	0.0456	See reference building	kg-CO_{2eq}/MJ
	Other fuels ( )	○○	See reference building	kg-CO_{2eq}/MJ
	Potable water			
		–	–	Out of scope
Other			"XX" is introduced as off-site measures	

Figure I.3.11 WLC Calculation Conditions Sheet (standard calculation)

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When the existing structural frame or blast furnace cement is used, enter the percentage utilization for each item. These values are reflected in the calculation of the GHG emissions under the construction stage category of the WLC Calculation Sheet.

Main recycled materials and usage			
Blast furnace cement (structural use)	0%	20%	
Existing frame materials (structural use)	0%	0%	
Electric furnace steel (reinforcement)	0%	0%	
Electric furnace steel (steel materials)	0%	0%	

Figure I.3.12 WLC Calculation Conditions Sheet (standard calculation):
Utilization of blast furnace cement and existing frame materials (%)

3.7 Score Sheet

Rating results entered into individual Score Entry Sheets are indicated in the score display fields in the Score Sheet. The " Summary for Design for Environment (DfE)" entered on the scoring sheet, such as the environmentally friendly methods and calculation methods adopted, is displayed.
The adopted initiatives listed in the "Initiatives to be evaluated" tables is also automatically transcribed from the Score Entry Sheets and displayed. In addition, various index values entered in the Score Entry Sheets as the basis for scoring are also automatically transcribed and displayed.

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CASBEE for Building Design (New Construction) 2

XXX Building

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Score Sheet Execution design stage

Assessment Categories	Summary of environmentally conscious efforts in design	Entire Building & Common areas		Dwelling & Accommodation		Total
		Score	weight	Score	weight	
Q: Environmental Quality of Building						**2.9**
Q1 Indoor Environment			**0.40**		-	**2.8**
1 Sound Environment		**2.2**	0.15	-	-	**2.2**
1.1 Indoor Noise Level	–	**1.0**	0.40	**3.0**	-	
1.2 Sound Insulation		**3.0**	0.40	-	-	
1 Sound Insulation of Openings	–	3.0	0.60	-	-	
2 Sound Insulation of Partition Walls	–	3.0	0.40	3.0	-	
3 Sound Insulation Performance of Floor Slabs (light-weight impact source)	–	3.0	-	3.0	-	
4 Sound Insulation Performance of Floor Slabs (heavy-weight impact source)	–	3.0	-	3.0	-	
1.3 Sound Absorption	–	**3.0**	0.20	**3.0**	-	
2 Thermal Comfort		**3.0**	0.35	-	-	**3.0**
2.1 Room Temperature Control		**3.0**	0.50	-	-	
1 Room Temperature	–	3.0	0.38	3.0	-	
2 Perimeter Performance	sample imput; Introduction of airflow windows	3.0	0.25	3.0	-	
3 Zoned Control	–	3.0	0.38	-	-	
2.2 Humidity Control	–	**3.0**	0.20	**3.0**	-	
2.3 Type of Air Conditioning System	–	3.0	0.30	3.0	-	
3 Lighting & Illumination		**3.0**	0.25	-	-	**3.0**
3.1 Daylighting		**3.0**	0.30	-	-	
1 Daylight Factor	–	3.0	0.60	3.0	-	
2 Openings by Orientation	–	-	-	3.0	-	
3 Daylight Devices	–	3.0	0.40	3.0	-	
3.2 Anti-glare Measures		**3.0**	0.30	-	-	
1 Daylight Control	–	3.0	1.00	**3.0**	-	
3.3 Illuminance Level	–	**3.0**	0.15	**3.0**	-	
3.4 Lighting Controllability	–	**3.0**	0.25	**3.0**	-	
4 Air Quality		**3.0**	0.25	-	-	**3.0**
4.1 Source Control		**3.0**	0.50	-	-	
1 Chemical Pollutants	–	3.0	1.00	3.0	-	
4.2 Ventilation		**3.0**	0.30	-	-	
1 Ventilation Rate	–	3.0	0.33	3.0	-	
2 Natural Ventilation Performance	–	3.0	0.33	3.0	-	
3 Consideration for Outside Air Intake	–	3.0	0.33	3.0	-	
4.3 Operation Plan		**3.0**	0.20	-	-	
1 CO2 Monitoring	–	3.0	0.50	-	-	
2 Control of Smoking	–	3.0	0.50	-	-	
Q2 Quality of Service		–	**0.30**	-	-	**3.0**
1 Service Ability		**3.0**	0.40	-	-	**3.0**
1.1 Functionality & Usability		**3.0**	0.40	-	-	
1 Provision of Space & Storage	–	3.0	0.33	3.0	-	
2 Use of Advanced Information System	–	3.0	0.33	3.0	-	
3 Barrier-free Planning	–	3.0	0.33	-	-	
1.2 Amenity		**3.0**	0.30	-	-	
1 Perceived Spaciousness & Access to View	–	3.0	0.33	3.0	-	
2 Space for Refreshment	–	3.0	0.33	-	-	
3 Décor Planning	–	3.0	0.33	1.0	-	
1.3 Maintenance Management		**3.0**	0.30	-	-	
1 Design that Considers Maintenance Management	–	3.0	0.50	-	-	
2 Securing Maintenance Management Functions	–	3.0	0.50	-	-	
2 Durability & Reliability		**3.0**	0.30	-	-	**3.0**
2.1 Earthquake Resistance, Seismic Isolation,	Seismic Control, & Vibration Control	**3.0**	0.50	-	-	
1 Earthquake-resistance	–	3.0	0.80	-	-	
2 Seismic Isolation, Seismic & Vibration Control	–	3.0	0.20	-	-	
2.2 Service Life of Components		**3.0**	0.30	-	-	
1 Service Life of Structural Materials	–	3.0	0.20	-	-	
2 Necessary Refurbishment Interval for Exterior Finishes	–	3.0	0.20	-	-	
3 Necessary Renewal Interval for Main Interior Finishes	–	3.0	0.10	-	-	
4 Necessary Renewal Interval for Air Conditioning and Ventilation Ducts	–	3.0	0.10	-	-	
5 Necessary Renewal Interval for HVAC and Water Supply and Drainage Pipes	–	3.0	0.20	-	-	
6 Necessary Replacement Interval for Major Equipment and Services	–	3.0	0.20	-	-	
2.4 Reliability		**3.0**	0.20	-	-	
1 HVAC System	–	3.0	0.20	-	-	
2 Water Supply & Drainage	–	3.0	0.20	-	-	
3 Electrical Equipment	–	3.0	0.20	-	-	
4 Support Method of Machines & Ducts	–	3.0	0.20	-	-	
5 Communications & IT Equipment	–	3.0	0.20	-	-	

Figure I.3.13 Score sheet screen (1/3)

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3	**Flexibility & Adaptability**			**3.0**	0.30	-	-	3.0
	3.1 Spatial Margin			**3.0**	0.30	-	-	
		1	Allowance for Floor-to-floor Height	–	3.0	0.60	3.0	-	
		2	Flexibility in Floor Layout	–	3.0	0.40	3.0	-	
	3.2 Floor Load Margin			–	**3.0**	0.30	**3.0**	-	
	3.3 System Renewability				**3.0**	0.40	-	-	
		1	Ease of Air Conditioning Duct Renewal	–	3.0	0.20	-	-	
		2	Ease of Water Supply and Drain Pipe Renewal	–	3.0	0.20	-	-	
		3	Ease of Electrical Wiring Renewal	–	3.0	0.10	-	-	
		4	Ease of Communications Cable Renewal	–	3.0	0.10	-	-	
		5	Ease of Equipment Renewal	–	3.0	0.20	-	-	
		6	Provision of Backup Space	–	3.0	0.20	-	-	
Q3	**Outdoor Environment on Site**			–	–	**0.30**	-	-	**3.0**
1	**Preservation & Creation of Biotope**			–	**3.0**	0.30	-	-	**3.0**
2	**Townscape & Landscape**			–	**3.0**	0.40	-	-	**3.0**
3	**Local Characteristics & Outdoor Amenity**				**3.0**	0.30	-	-	**3.0**
	3.1 Attention to Local Character & Improvement of Comfort			–	**3.0**	0.50	-	-	
	3.2 Improvement of the Thermal Environment on Site			–	**3.0**	0.50	-	-	
LR:	**Environmental Load Reduction of Building**					-		-	**3.6**
LR1	**Energy**			–	–	**0.40**	-	-	**4.0**
1	**Control of Heat Load on Building Envelopes**			–	**3.0**	0.20	-	-	**3.0**
2	**Natural Energy Utilization (Direct Use)**			–	**3.0**	0.10	-	-	**3.0**
3	**Efficiency in Building Service System**		Nearly ZEB certified		**5.0**	0.50	-	-	**5.0**
	Other than apartment				5.0	1.00	-	-	
	Apartment				-	-	-	-	
4	**Initiatives for Efficient Operation**				**3.0**	0.20	-	-	**3.0**
	Other than apartments				**3.0**	1.00	-	-	
		4.1	Monitoring	–	3.0	0.40	-	-	
		4.2	Operation & Management System	–	3.0	0.40	-	-	
		4.3	Expanding adoption of non-fossil energy	–	3.0	0.10	-	-	
		4.4	Promoting Commissioning	–	3.0	0.10	-	-	
	Apartments				-	-	-	-	
		4.1	Monitoring	–	3.0	-	-	-	
		4.2	Operation & Management System	–	3.0	-	-	-	
LR2	**Resources & Materials**			–	–	**0.30**	-	-	**3.2**
1	**Water Resources**				**3.0**	0.20	-	-	**3.0**
	1.1 Water Saving			–	**3.0**	0.40	-	-	
	1.2 Rainwater & Gray Water				**3.0**	0.60	-	-	
		1	Rainwater Use System	–	3.0	0.70	-	-	
		2	Gray Water Reuse System	–	3.0	0.30	-	-	
2	**Reducing Use of Non-renewable Resources**				**3.4**	0.60	-	-	**3.4**
	2.1 Reducing Use of Materials			–	3.0	0.10	-	-	
	2.2 Continuing Use of Existing Structural Frame, etc.			–	3.0	0.20	-	-	
	2.3 Use of Recycled Materials as Structural Materials		Blast furnace cement (structural use)		5.0	0.20	-	-	
	2.4 Use of Recycled Materials as Non-structural Materials			–	3.0	0.20	-	-	
	2.5 Timber from Sustainable Forestry			–	3.0	0.10	-	-	
	2.6 Reusability of Components and Materials			–	3.0	0.20	-	-	
3	**Avoiding the Use of Materials with Pollutant Content**				**3.0**	0.20	-	-	**3.0**
	3.1 Use of Materials without Harmful Substances			–	**3.0**	0.30	-	-	
	3.2 Avoidance of CFCs and Halons				**3.0**	0.70	-	-	
		1	Fire Retardant	–	2.0	0.33	-	-	
		2	Foaming Agents (Insulation Materials, etc	–	3.0	0.33	-	-	
		3	Refrigerants	CO2 refrigerant chiller	4.0	0.33	-	-	
LR3	**Off-site Environment**			–	–	**0.30**	-	-	**3.6**
1	**Consideration of Global Warming**		High energy performance, use of blast furnace cement		**4.9**	0.33	-	-	**4.9**
2	**Consideration of Local Environment**				**3.0**	0.33	-	-	**3.0**
	2.1 Air Pollution			–	**3.0**	0.25	-	-	
	2.2 Heat Island Effect			–	**3.0**	0.50	-	-	
	2.3 Load on Local Infrastructure				**3.0**	0.25	-	-	
		1	Reduction of Rainwater Discharge Loads	–	3.0	0.25	-	-	
		2	Sewage Load Suppression	–	3.0	0.25	-	-	
		3	Traffic Load Control	–	3.0	0.25	-	-	
		4	Reduction of Waste Treatment Load	–	3.0	0.25	-	-	
3	**Consideration of Surrounding Environment**				**3.0**	0.33	-	-	**3.0**
	3.1 Noise, Vibration & Odor				**3.0**	0.40	-	-	
		1	Noise	–	3.0	0.33	-	-	
		2	Vibration	–	3.0	0.33	-	-	
		3	Odor	–	3.0	0.33	-	-	
	3.2 Wind/Sand Damage & Sunlight Obstruction				**3.0**	0.40	-	-	
		1	Restriction of Wind Damage	–	3.0	0.70	-	-	
		2	Restriction of Sand and Dust	–	3.0	-	-		
		3	Restriction of sunlight obstruction	–	3.0	0.30	-	-	
	3.3 Light Pollution				**3.0**	0.20	-	-	
		1	Outdoor Illumination and Light that Spills from Interiors	–	3.0	0.70	-	-	
		2	Measures for Reflected Solar Glare from Building Walls	–	3.0	0.30	-	-	

Figure I.3.14 Score sheet screen (2/3)

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CASBEE for Building Design (New Construction) 2024 Edition — XXX Building

Efforts to be evaluated	Total	Total 2	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8	No.9	No.10	No.11	No.12	No.13
Q2 **Quality of Service**															
1.2.3 Décor Planning	2.0	-	Yes		Yes	-	-	-	-	-					
1.3.1 Design that Considers Maintenance Man	4.0		Yes	-	-	-	-	-	Yes	Yes	-	Yes	-	-	-
1.3.2 Securing Maintenance Management Fun	6.0		-	Yes	Yes	Yes	Yes	-	-	Yes	Yes	-	-	-	-
2.4.1 HVAC System	1.0		-	Yes	-	-	-								
2.4.2 Water Supply & Drainage	2.0	1.0	Yes	-	-	-	-	Yes	-						
2.4.3 Electrical Equipment	2.0	2.0	-	-	Yes	-	Yes	-							
2.4.5 Communications & IT Equipment	2.0		-	Yes	-	Yes	-	-							
Q3 **Outdoor Environment on Site**															
1 Preservation & Creation of Bio	7.0		-	-	2.0	1.0	-	1.0	1.0	-	1.0	1.0	-		
2 Townscape & Landscape	3.0		2.0	1.0	-	-	-	-							
3.1 Attention to Local Character & Improveme	2.0		1.0	-	1.0	-	-	-	-	-					
3.2 Improvement of the Thermal Environmen	9.0		2.0	-	-	-	2.0	2.0	1.0	2.0	-				
LR1 **Energy**															
2 Natural Energy Utilization (Direct Use)	-		-	-	-	-	-	-	-	-	-	-	-	-	-
4.1.4 Promoting Commissioning	1.0		Yes	-	-	Yes	-								
LR2 **Resources & Materials**															
1.2.2 Gray Water Reuse System			-	-	-	-	-	-	-	-					
2.1 Reducing Use of Materials	2.0		1.0	1.0	-										
2.3 Use of Recycled Materials as Structural Materials			-	1.0	-	-	-								
2.6 Reusability of Components and Materi	-		-	-	-	-									
3.1 Use of Materials without Harmful Substar	-														
LR3 **Off-site Environment**															
2.2 Heat Island Effect	12.0		1.0	1.0	2.0	-	1.0	1.0	2.0	3.0	1.0	-			
2.3.3 Traffic Load Control	2.0		-	1.0	-	1.0	-	-							
2.3.4 Reduction of Waste Treatment Loads	3.0		1.0	1.0	-	-		1.0	-						
3.2.2 Restriction of Sand and Dust	2.0		2.0	-											
3.3.1 Outdoor Illumination and Light that Spills	2.0		-	2.0											

Key indicators

Q1 Indoor Environment

2.1.2 Perimeter Performance
Window system SC 0.5 — window solar heat gain coef (η) -
U value — window system 4.0 — roof 2.0 — outer walls 2.0 — floor 2.0 [W/m2K]
Dwelling area — Window system U value - — perimeter UA value - — ηAC - — ηAH -

3.1.1 Daylight Factor
Daylight factor 1.7%

4.2.2 Natural Ventilation Performance
Valid opening area for natural ventilation 3.0%

Q2 Quality of Service

1.1.1 Provision of Space & Storage
Working space 6.0㎡ /person — Bedroom 8.0㎡ /bed — Single room 15.0㎡ — Twin room 22.0㎡

1.1.2 Use of Advanced Information System
Socket capacity 30.0 VA/㎡

1.2.1 Perceived Spaciousness & Access to View
Celling height 2.5 m

1.2.2 Space for Refreshment
Refreshment space 0.6% — Rest space 2.0%

2.2.1 Service Life of Structural Materials
Expected lifespar 25 yr.

2.2.2 Necessary Refurbishment Interval for Exterior Finishes
Expected necess 20 years

2.2.3 Necessary Renewal Interval for Main Interior Finishes
Expected necess 10 years

2.2.6 Necessary Replacement Interval for Major Equipment and Service
Expected necess 15 years

3.1.1 Allowance for Floor-to-floor Height
Floor height 3.2 m

3.1.2 Flexibility in Floor Layout
Wall length/area ratio 0.3

3.2 Floor Load Margin
Floor Load 3000 N/m2

Q3 Outdoor Environment on Site

1 Preservation & Creation of Biotope
Green area index 25% — Building green index 5%

3.2 Improvement of the Thermal Environment on Site
Open space 20% — horizontal projection areas 3% — appropriate ground surface 18% — paved surface 10%

LR1 Energy

1 Control of Heat Load on Building Envelopes
BPI/BPIm; 0.97 — Housing Performance Indication Standard Grade 4 equivalent

2 Natural Energy Utilization (Direct Use)
% of impact 0.0% — % of classrooms w/ adequate natural light 0.0% — % of dwellings w/ adequate natural light 0.0%
% of classrooms w/ adequate ventilation 0.0% — % of dwellings w/ adequate ventilation 0.0%

3 Efficiency in Building Service System
Solar power generation 100.0kW Solar heat .0kW Battery .0kWh

Other than apartment
BEI/BEIm; [BEI] [BEIm] 0.25 — [BEI×] [BEIm*] 0.50 — [BEI+] 0.20 — ○○kW installed in ○○ City, used ○○GJ/yr, etc.

Apartment
BEI with renewables 66% — w/o 67% — Evaluated based on specification std. -

LR2 Resources & Materials

1.2.1 Rainwater Use System
Rain water usage 0.0%

2.4 Use of Recycled Materials as Non-structural Materials
Designated Procurement Items by low - — Eco Mark Produc - — Designated Procurement Items by local governments -

2.5 Timber from Sustainable Forestry
Proportion of timber used 5.0%

3.2.1 Fire Retardant
ODP — GWP

3.2.2 Foaming Agents (Insulation Materials, etc.)
ODP 0 — GWP 1430

3.2.3 Refrigerants
ODP 0 — GWP 1

LR3 Off-site Environment

2.2 Heat Island Effect
Exposed area ratio 44% — Building spacing index Rw 0.20
appropriate ground surface — 29.0% — appropriate roof top surface 13.0% — appropriate exterior wall surface 11.0%
Exposed area Sb 40,000㎡ — Ws: Maximum width of the site perpendicular to the prevailing wind 200 m — Hb: Standard height 450 m
green area 300㎡ — water surface 300㎡ — evaporative material coverd area 300㎡ — high solar reflectance material covered 300㎡ — retroreflective material covered area 200㎡

Figure I.3.15 Score sheet screen (3/3)

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3.8 Assessment Results Sheet

The assessment results of Q (Environmental quality of building), LR (Environmental load reduction of building), BEE (Built Environment Efficiency) and WLC emission rates are shown in graph and numerical formats.

[Display contents]
1. Building outline

2. CASBEE Assessment results
2-1 Assessment results of BEE (Q/L)
2-2 WLC (Global Warming Impact Chart)
2-3 Radar Chart

2-4 Bar Chart
- Assessment results of Q
- Assessment results of LR

3. Design Considerations

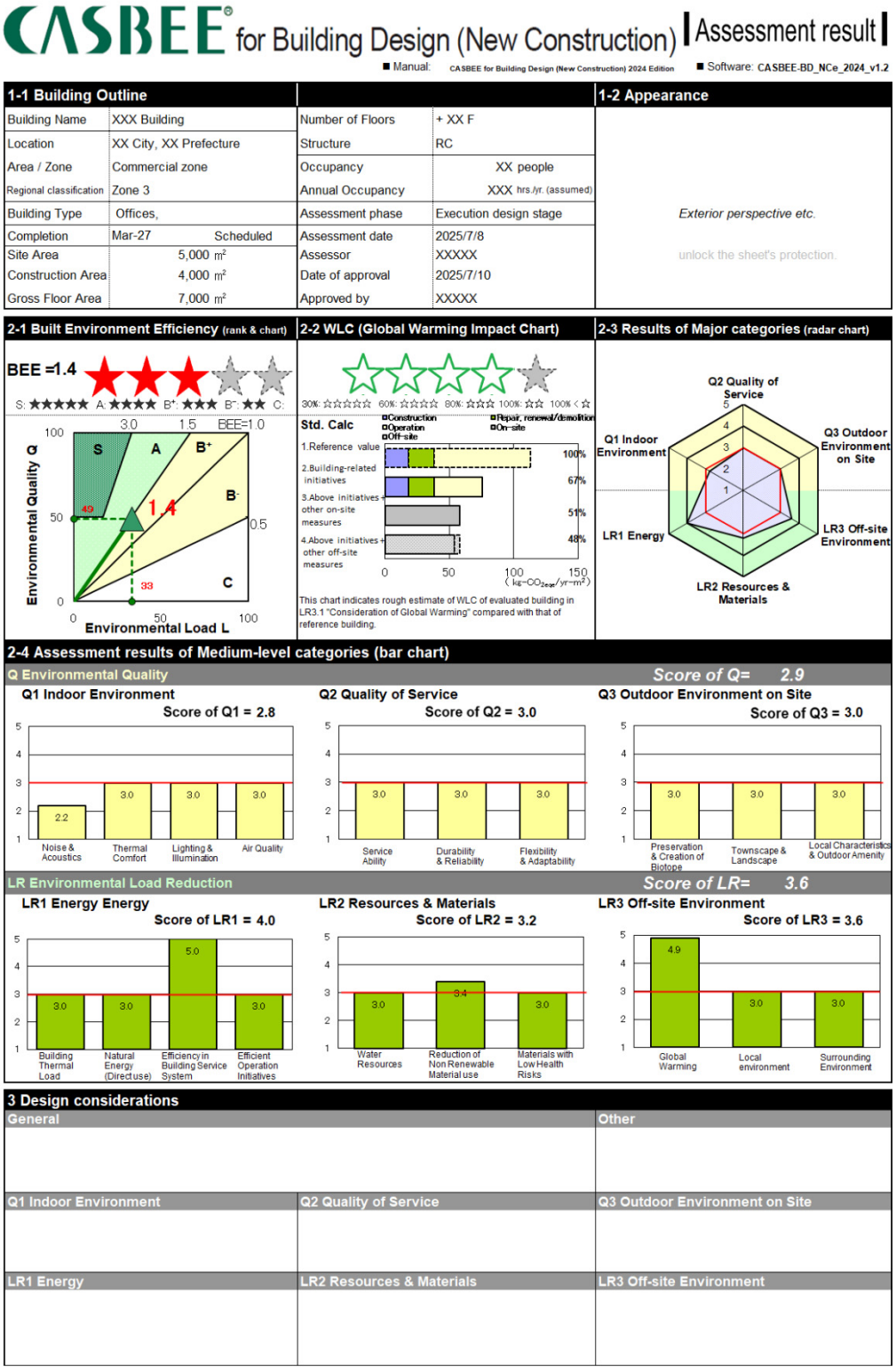

Figure I.3.16 Assessment Results Sheet for CASBEE-BD/NC
(output example, CASBEE assessment only)

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The details of the Assessment Results Sheet are shown below.

Table I.3.4 Content of the Assessment Results Sheet

Item			Content
1. Building outline			Description of targeted building
2. CASBEE assessment results			Graph presentation of assessment results
	2-1	BEE: Built Environment Efficiency (BEE ranking/chart)	Q and L evaluation results and BEE Rank indicated by red stars
	2-2	WLC (Global Warming Impact Chart)	WLC of reference building and evaluated building Rank indicated by green stars
	2-3	When only CASBEE evaluation is conducted, Evaluation of major CASBEE items When the Built Environment SDGs Checklist is scored, Evaluation results of the Built Environment SDGs Checklist	Radar charts for results in each category of CASBEE result or Bar graph display of the degree of efforts to achieve each goal of the SDGs and the overall degree of contribution
	2-4	Bar chart	Separate bar chart for results in each category
		Results under Q: environmental quality of building	
		Results under LR: environmental load reduction of building	
3. Design considerations			

1. Building outline
Shows the project summary information from the 1. Building outline entry of the Main Sheet, including building name and type, location, scale and structure.

2. Assessment results of CASBEE
The assessment results for environmental performance assessment items on the building itself are presented in this column. It shows graphs of the input results for the scoring items collated on the Score Sheet.
The indicated score for each assessment item is the value rounded to two decimal places. Unrounded values are used for calculating the score for each item.

2-1. BEE: Built Environment Efficiency
Built Environment Efficiency (BEE), which is calculated from the assessment results of Q (Environmental quality of building) and L (Environmental load of building), is shown here. The values for Q and L are derived from SQ (the total score for the Q categories) and SLR (the total score for the LR categories). First the numerator Q is defined as Q = 25(SQ-1) to convert the SQ (from 1 to 5) for the environmental quality of building into the Q scale of 0 to 100. Then the denominator L is defined as L = 25(5-SLR) to convert the SLR (from 1 to 5) for load reduction into the L scale of 0 to 100.
BEE is presented as a graph on the left of the table, with Q on the Y axis and L on the X axis, so that BEE is the gradient of the line joining the point with coordinates equal to the Q and L values to the origin (Q = 0, L = 0). The higher the Q value and the lower the L value, the steeper the gradient and the more sustainable the building is. CASBEE labels buildings with an overall environmental performance assessment rating ranging from C (Poor) through B-, B+, A and S (Excellent), corresponding to regions divided according to the line gradient. The ranks correspond to the assessment expressions shown in Figure I.3.17, using a number of red stars for clarity.

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2-2 WLC (Global warming impact chart)

The reference values and WLC for the evaluated building are indicated on a bar chart. The emission rate (%) for the assessment subject is displayed, relative to the reference value of WLC emission as 100%.

1. Reference value (WLC emissions of a standard building)
2. WLC emissions of subject building: assessment of building-related initiatives (e.g. energy efficiency improvement, use of ecological materials and extended building lifespan)
3. Assessment of above initiatives + other on-site measures (e.g. on-site solar power generation)
4. Assessment of above initiatives + off-site measures (e.g. procurement of renewable energy certificates and carbon credits)

   In the standard calculation, 4 is an informative value (as a result of using an off-site method evaluated by BEI +, details are displayed in PART IV).

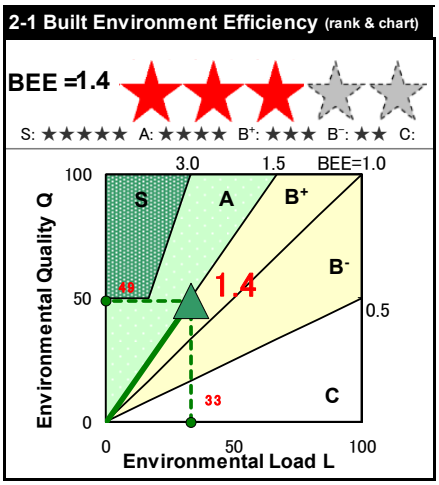

Figure I.3.17 Enlarged image of section 2-1 (BEE value and red star ranking)

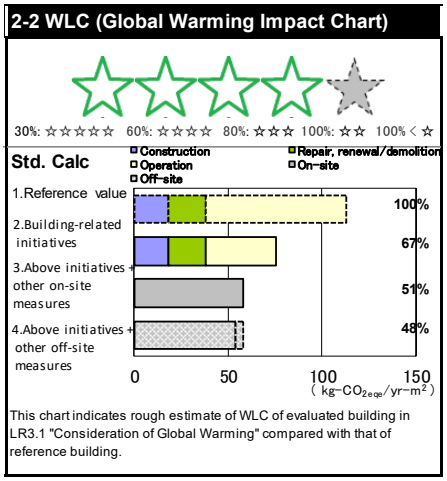

Figure I.3.18 Enlarged image of section 2-2 (WLC and green star ranking)

2-3 Radar Chart (in case of CASBEE evaluation only) / Built Environment SDGs Checklist Results (optional)

The points for the six major categories from Q1 to LR3 are shown together in a radar chart (Figure I.3.18) on the upper right of the second column, to give an immediate clear presentation of the characteristics of environmental considerations in the target building.

In addition, when the "Built Environment SDGs Checklist," which self-examines efforts to achieve the SDGs, is scored, the degree of efforts to each goal of the SDGs and the overall degree of contribution are visualized instead of the radar chart (see PART III for details).

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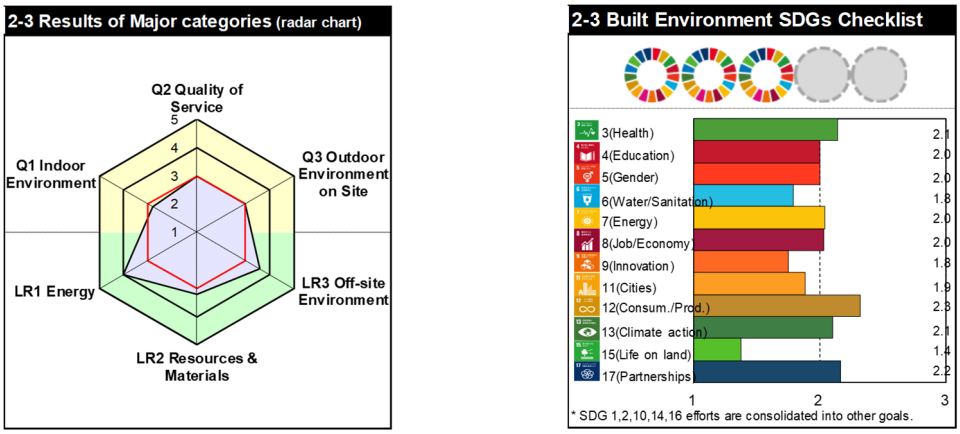

(a) Radar chart (in case of CASBEE evaluation only) (b) Built Environment SDGs Checklist Results

Figure I.3.19 Enlarged image of section 2-3

2-4 Bar Chart

Assessment results for Q (environmental quality of building) are presented as a bar chart per middle item on the upper column for each major category, "Q1 Indoor Environment," "Q2 Quality of Service" and "Q3 Outdoor Environment (On-site)." And the assessment results for LR (environmental load reduction of building) are presented likewise, for "LR1 Energy," "LR2 Resources & Materials" and "LR3 Off-site Environment."

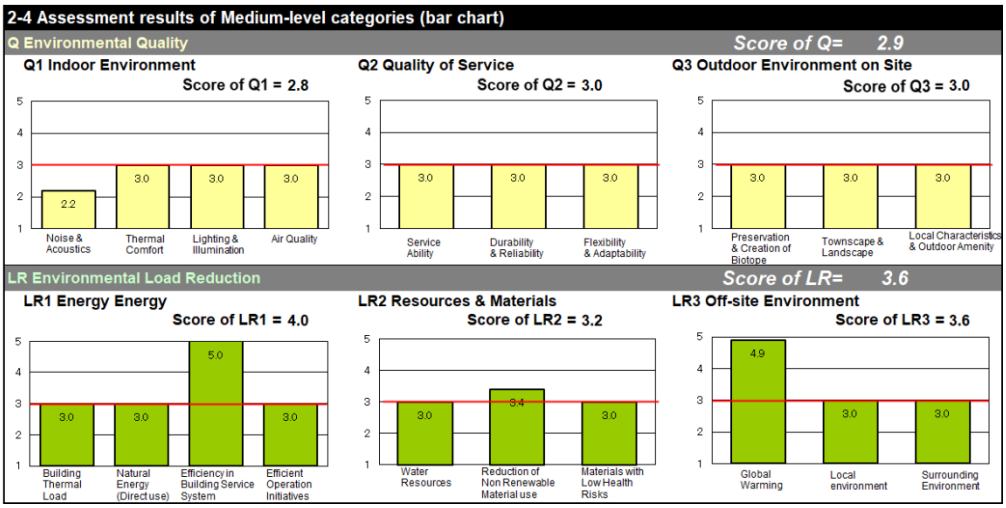

Figure I.3.20 Enlarged Image of Section 2-4 (sample Bar Chart)

3. Design Considerations

Indicate items considered in the Design for Environment (DfE), so that it is easy for a third party to gain an overview of environmental considerations in the evaluated building. The statements made in each space for General, Q1-LR3 and Other in the Consideration Record Sheet are displayed as they were input.

3 Design considerations		
General		**Other**
Describe briefly comprehensive concept of environmental design of the building.		Describe briefly considerations for other than 6 categories above that is not assessed in CASBEE-NC, such as recycling activities at constriction site and preservation of historic buildings.
Q1 Indoor Environment	**Q2 Quality of Service**	**Q3 Outdoor Environment on Site**
Describe briefly considerations for Q1 Indoor Environment of the building.	Describe briefly considerations for Q2 Quality of Service of the building.	Describe briefly considerations for Q3 Outdoor Environment on Site of the building.
LR1 Energy	**LR2 Resources & Materials**	**LR3 Off-site Environment**
Describe briefly considerations for LR1 Energy of the building.	Describe briefly considerations for LR2 Resources & Materials of the building.	Describe briefly considerations for LR3 Off-site Environment of the building.

Figure I.3.21 Design considerations

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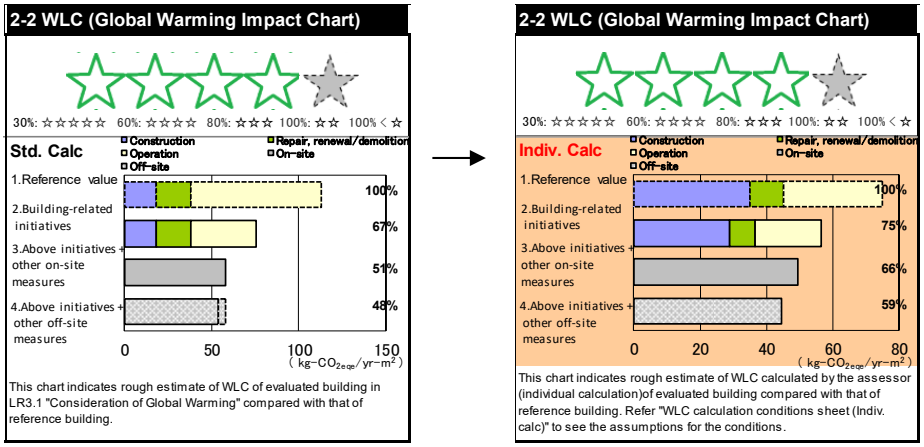
3.9 Notes concerning the CASBEE-BD/NC assessment software

In addition to the standard calculation, when assessors have gathered more detailed data and performed more accurate WLC calculations as individual calculations, CASBEE-BD/NC can be included as part of the assessment results. Specifically, the calculated values, along with the green star ranking, are shown under "2-2 WLC (Global Warming Impact Chart)" on the Assessment Results Sheet. The results of individual calculations are not reflected in "LR3.1 Consideration of Global Warming" and BEE.

In cases where WLC is obtained by individual calculation, please note the following.

1) On the Main Sheet, the assessor should select "Individual Calculation" in the WLC calculation column under 1) Summary input [2] Assessment implementation.
2) WLC calculation conditions must be clearly stated. In the software, calculation conditions are entered under "WLC Calculation Conditions Sheet (Individual Calculation)."
3) WLC values obtained by an individual calculation are entered by the assessor into the WLC Calculation Conditions Sheet (Individual Calculation). Under each category of the building's life cycle stages (i.e., construction, maintenance/renewal/demolition and operation), the reference value and GHG emissions of a building subject to the assessment are indicated in kg-CO_{2eq}/year-m^2.
4) WLC (Global Warming Impact Chart) based on individual calculation has a colored background on the graph to indicate clearly that the result does not come from the standard calculation.

For details regarding calculation for off-site initiatives, please refer to PART IV.



(a) Display of standard calculation results (b) Display of individual calculation results

Figure I.3.22 Examples of WLC (Global Warming Impact Chart) display based on individual calculation

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PART II. Scoring Criteria

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Note
- Where "no corresponding level" is written in a space in the scoring criteria table, it means that there is no scoring for that item at the level concerned. When the space is blank, it means that scoring is optional at intermediate levels.
- The following symbols indicated in individual assessment items represent purposes of buildings subject to the assessment. Where such symbol is indicated, an assessment of the corresponding item is required in terms of the building type.

■ Examples

Building type	Applicable	Not applicable
Offices	Off	Off
Schools	Sch	Sch
Retailers	Rtl	Rtl
Restaurants	Rst	Rst
Halls	Hal	Hal
Hospitals	Hsp	Hsp
Hotels	Htl	Htl
Apartments	Apt	Apt
Factories	Fct	Fct

For School,
- The evaluation of schools may be divided into Sch (E.S./J.H.S./ H.S), which is the evaluation criteria of elementary schools, junior high schools, and high schools, and Sch (Univ., etc.), which are the evaluation criteria of universities, etc. Select the appropriate criteria and evaluate accordingly.

For Halls,
- There may be two types of halls: Hal (Lib.), which is the evaluation standard for libraries, Hal (O.D.), which is the evaluation standard for outdoor facilities such as stadiums, and Hal (oth.), so in that case, select one of them as appropriate and evaluate it.

For Factories,
- In the evaluation of the indoor environment in Q1 and Q2 "1. Service Ability ", the evaluation is mainly for the office area (office, etc.), and the production area is not subject to evaluation. In the evaluation of LR1 energy, energy consumption in the production area of the factory, which is not included in the calculation according to the energy consumption efficiency standard, is not included in the evaluation.

For Hospitals, Hotels and Apartments,
- It is important to note that there are assessment items that apply to the building as a whole (Q3, LR1, LR2, LR3) and others (Q1, Q2) that are applied separately to the common properties and to the Dwelling and Accommodation Area of the building. Thus, for these three building types the user must carry out both assessment (1) of the <Entire Building and Common Area> and assessment (2) of the <Dwelling and Accommodation Area>.
- The common area is the outpatient waiting area for the sick, the doctor's office (which is a room in a general environment for examination and treatment, and does not cover the operating room or the examination room that requires a special environment), lobbies of the Hotels, entrance halls of the Apartments, etc., based on < Entire Building and Common Area > criteria
- Private areas are evaluated based on < Dwelling and Accommodation Area > criteria for bedrooms of Hospitals, guest rooms of hotels, and dwelling units of Apartments.

For common area of Hospitals,
- Assessment may cover both outpatient waiting rooms and doctor’s offices, or only one of the two, based on <Entire Building and Common Area> criteria. For items which evaluate both, evaluate each and use the weighted average, based on floor areas, as the assessment.

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1. CASBEE for Building Design (New Construction)

Q: Environmental Quality of Building

Q1 Indoor Environment

1. Sound Environment

1.1 Indoor Noise level

Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt

! Application condition For Sch (E.S./J.H.S./ H.S), evaluate classrooms only.
For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated. For Hal (oth.), evaluate building types that particularly require anti-noise measures, such as town hall, theaters and movie theaters, excluding the other building types.
For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices. Note that the assessment criteria differ between outpatient waiting rooms and doctor's offices.

Unit: dB(A)

<Entire Building and Common Area>		
Building type	Off· Hal (O.D.)· Fct· Hsp (Waiting Room)· Htl· Apt	Sch(Univ., etc.)· Hal (Lib.)· Hsp (Doctor's Off.)
Level 1	50 < [Background noise level]	45 < [Background noise level]
Level 2	(No corresponding level)	(No corresponding level)
Level 3	45 < [Background noise level] ≦ 50	40 < [Background noise level] ≦ 45
Level 4	40 < [Background noise level] ≦ 45	35 < [Background noise level] ≦ 40
Level 5	[Background noise level] ≦ 40	[Background noise level] ≦ 35
Building type	Rtl · Rst	Hal (oth.)
Level 1	55 < [Background noise level]	40 < [Background noise level]
Level 2	(No corresponding level)	(No corresponding level)
Level 3	50 < [Background noise level] ≦ 55	35 < [Background noise level] ≦ 40
Level 4	45 < [Background noise level] ≦ 50	30 < [Background noise level] ≦ 35
Level 5	[Background noise level] ≦ 45	[Background noise level] ≦ 30

Building type	Sch (E.S./J.H.S./ H.S)
Level 1	60 < [Background noise level]
Level 2	50 < [Background noise level] ≦ 60
Level 3	45 < [Background noise level] ≦ 50
Level 4	35 < [Background noise level] ≦ 45
Level 5	[Background noise level] ≦ 35

Unit: dB (A)

<Dwelling and Accommodation Area>	
Building type	Hsp · Htl · Apt
Level 1	45 < [Background noise level]
Level 2	(No corresponding level)
Level 3	40 < [Background noise level] ≦ 45
Level 4	35 < [Background noise level] ≦ 40
Level 5	[Background noise level] ≦ 35

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☐Commentary

Generally, indoor background noise is affected by the noise from service equipment for the building and external noise such as traffic. Evaluate the noise level based on these noise factors. Noise levels and corresponding intrusiveness and impact on conversation (in person and over the telephone) are shown in the "■Reference".

In assessment criteria for Sch (E.S./J.H.S./ H.S), each level corresponds to a specific guideline: Level 5 based on the WHO Environmental Noise Guideline (1995), level 3 based on the School Sanitation Standards (MEXT 2009 Directive 60) and level 1 based on the Grant Guidelines for Building Safe Schools (June 18, 2009; MEXT Policy 21, No. 6124).

For preliminary and execution design stages, evaluate the target noise level. Use actual measurement data for assessment after completion of construction.

For noise assessment after completion of the building, measure noise levels while service equipment is in operation during afterhours. A standard sound level meter can be used for steady noise. For fluctuating noise, use an integrating sound level meter to determine equivalent noise levels.

For an apartment building, measure noise levels with one measurement point per unit. Noise measurement is conducted in the room with the largest opening. Measure noise levels with no sound generated from TV sets or voices. If the building is equipped with a 24-hour ventilation system, measure noise levels with the system in operation.

■Reference: Allowable indoor noise levels

dB (A)	20	25	30	35	40	45	50	55	60
NC-NR	10～15	15～20	20～25	25～30	30～35	35～40	40～45	45～50	50～55
Intrusiveness	Silent ——— Very quiet ——— Not significantly noticeable — Perceived noise — Noise cannot be ignored								
Impact on conversation	A whispering voice is audible from 5 m away —— Possible from 10 m apart Telephone use (normal) —— Possible from 3 m apart Telephone use (bearable) —— Loud conversation (3 m) Telephone use (unbearable)								
Studios	Silent room	Announcement	Radio studio	Television studios	Miximg room	General offices			
Venues and halls		Music hall	Theater (medium)	Stage theaters	Movie theater and planetarium		Hotel lobbies		
Hospitals		Hearing test	Special sickrooms	Operating rooms and bedrooms	Examining room	Laboratories	Waiting rooms		
Hotels and residentials				Reading rooms	Bedrooms	Banquet halls	Lobbies		
General offices				Executive rooms and large meeting	Reception rooms	Meeting rooms			Typing and accounting
Public buildings				Auditorium	Museums	Library	Auditorium/gymnas	Indoor sports facilities	
Schools and				Music classroom	Chapels	Research rooms and classrooms		Corridors	
Commercial buildings					Music cafes	Bookshops	Banks and restaurants	Canteens	

■ Bibliography 2), 3), 4), 11)

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1.2 Sound Insulation

1.2.1 Sound Insulation of Openings

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition This item is not applicable, if there are no openings in the target room. For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated.
For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

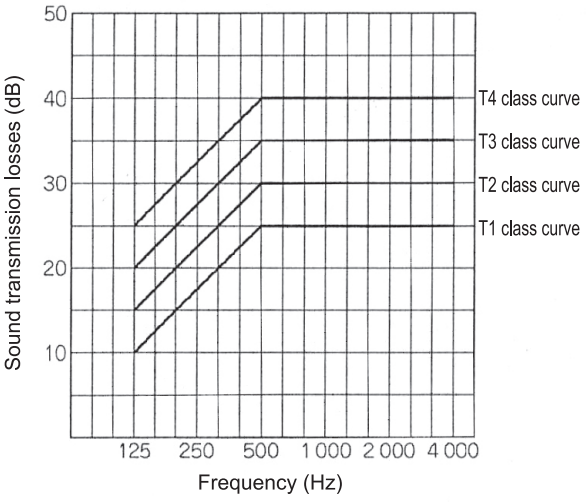
<Entire Building and Common Area>	
Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	Less than T-1
Level 2	(No corresponding level)
Level 3	T-1
Level 4	(No corresponding level)
Level 5	T-2 or higher

<Dwelling and Accommodation Area>	
Building type	Hsp・Htl・Apt
Level 1	Lower than T-1
Level 2	(No corresponding level)
Level 3	T-1
Level 4	(No corresponding level)
Level 5	T-2 or higher

☐Commentary

Evaluate sound insulation of building openings based on the performance levels of sash windows and other fixtures. The higher the performance, the more effective it is in preventing propagation of external noise (e.g. sound of traffic). In cases where multiple openings exist, evaluate based on the lowest performance level.
Sound insulation grade T is utilized as an assessment index. T classification is used in the assessment of sound insulation performance of sash windows and similar fixtures. Names and performance curves, based on the sound transmission loss at each frequency band, are standardized (see the diagram). In this method, the transmission loss value at each frequency is plotted on the sound insulation curve. Grade is determined by all values exceeding the corresponding classification curve.
In the basic design phase, the target performance is subject to the assessment.
■Bibliography 3)

■Reference: Sound insulation classification curves for sash windows, etc. (JIS A 4706)



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1.2.2 Sound Insulation of Partition Walls

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition For common areas of Hsp, evaluate only doctor's offices.

<Entire Building and Common Area>		
Building type	Off・Sch・Rst・Fct	Hsp (Doctor's Off.)
Level 1	Less than Dr-30	Less than Dr-35
Level 2	Dr-30	Dr-35
Level 3	Dr-35	Dr-40
Level 4	Dr-40	Dr-45
Level 5	Dr-45 or higher	Dr-50 or higher

<Dwelling and Accommodation Area>	
Building type	Hsp・Htl・Apt
Level 1	Less than Dr-40
Level 2	Dr-40
Level 3	Dr-45
Level 4	Dr-50
Level 5	Dr-55 or higher

☐Commentary

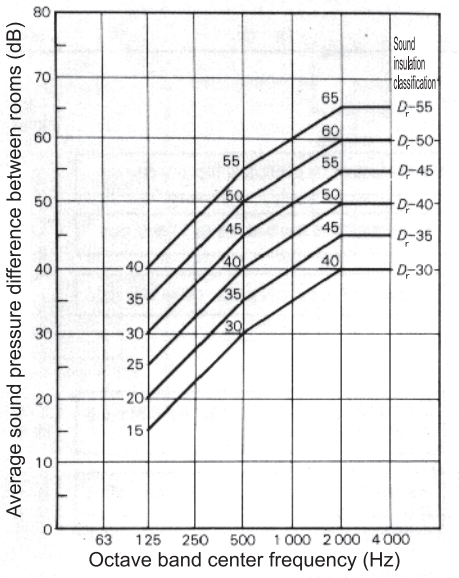
In assessing the sound insulation performance of partition walls, evaluate levels of sound insulation between rooms. Retail stores generally do not have partitions between sales areas. As such, this assessment is not applicable. Some building types under the meeting hall category are also excluded, as a higher sound insulation performance is required for partition walls in these buildings than in other general-use buildings.

Inter-room sound pressure level difference grade Dr value is utilized as an index for sound insulation between different rooms in the assessment. Dr values are used in the assessment of sound insulation performance of walls. Names and performance curves, based on the sound pressure difference between rooms at each frequency band, are standardized (see the diagram on the right). For this evaluation, apply either predictive values or the actual values obtained from the measurement.

When obtaining measurement data, follow the methods described in JIS A 1417: Field Measurement of Airborne Sound Insulation in Buildings. Determine the Dr value by applying the data to the classification curves provided in JIS A 1419-1 Assessment Method for Sound Insulation in Buildings and Building Elements (Part I: Airborne Sound Insulation Performance). Up to 2 dB below the standard curve is allowed at each frequency. When using predictive figures, the method referred to in the Information on Sound Insulation Design in Buildings (Architectural Institute of Japan, 1988) may be followed. In this case, the Dr-value is determined by applying the predictive sound pressure difference between rooms.

In the basic design phase, the target performance is subject to the assessment.

■Reference: Frequency characteristics and classification for airborne sound insulation performance (JIS A 1419-1)



■Bibliography 3)

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1.2.3 Sound Insulation Performance of Floor Slabs (light-weight impact source)

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

<Entire Building and Common Area>	
Building type	Sch
Level 1	Worse than Lr-65
Level 2	Lr-65
Level 3	Lr-60
Level 4	Lr-55
Level 5	Lr-50 or better

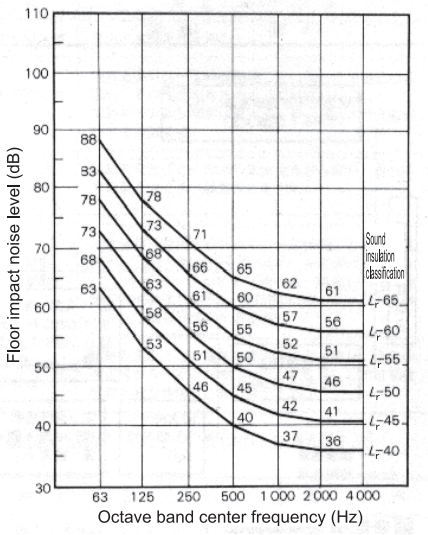
<Dwelling and Accommodation Area>	
Building type	Hsp・Htl・Apt
Level 1	Worse than Lr-55
Level 2	Lr-55
Level 3	Lr-50
Level 4	Lr-45
Level 5	Lr-40 or better

☐Commentary

Examples of lightweight impact sounds include chairs being dragged over the floor or hard lightweight objects (e.g. spoons, forks) dropped on the floor. Basic characteristics of lightweight impact sound insulation depend on the floor structure, but elasticity of the flooring materials significantly affects performance level.

Sound insulation grade Lr is utilized in the assessment. At the execution design stage and after completion of construction, apply the Lr-value classification as the performance indicator. Lr-value classification is used in assessment of sound insulation performance for floor impact sound. Names and performance curves, based on the sound level at each frequency band, are standardized (see the diagram on the right). For this evaluation, apply either predictive Lr-values or the actual measurement values.

■Reference: Frequency characteristics and classification for impact sound insulation performance of floors (JIS A 1419-2)



When obtaining measurement data, follow the methods described in JIS A 1418-1: Field Measurement of Floor Impact Sound Insulation in Buildings (Part I: Standard Light Impact Source). Determine the Lr-value by applying the data to the classification curves provided in JIS A 1419-2: Assessment Method for Sound Insulation in Buildings and Building Elements (Part II: Floor Impact Sound Insulation Performance). When using predictive figures, the method referred to in the “Floor Impact Sound Insulation Design in Buildings“ (Architectural Institute of Japan, 2009) may be followed. In this case, calculate the basic performance level using this method. Lr-values are then determined by applying these calculation results and impact sound reductions of the flooring materials, which are measured based on methods specified under JIS A 1440-1. We should note that ΔL grades indicated in product brochures for floor materials refer to the performance of individual members, which is different from the CASBEE standard Lr (the space performance).

In the basic design phase, the target performance is subject to the assessment.

■Bibliography 3)

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1.2.4 Sound Insulation Performance of Floor Slabs (heavy-weight impact source)

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

<Entire Building and Common Area>	
Building type	Sch
Level 1	Worse than Lr-65
Level 2	Lr-65
Level 3	Lr-60
Level 4	Lr-55
Level 5	Lr-50 or better

<Dwelling and Accommodation Area>	
Building type	Hsp・Htl・Apt
Level 1	Worse than Lr-60
Level 2	Lr-60
Level 3	Lr-55
Level 4	Lr-50
Level 5	Lr-45 or better

☐ **Commentary**

Examples of heavy impact sounds include noise generated in the room(s) by vibration from the floor above, due to a heavy but soft impact (e.g. child jumping). Basic characteristics of heavy impact sound insulation depend on the floor structure. Therefore, performance improvement using flooring materials is often difficult to achieve.

Sound insulation grade Lr may be obtained by measurements or use of predicted values.

When obtaining measurement data, follow the methods described in JIS A 1418-2: Field Measurement of Floor Impact Sound Insulation in Buildings (Part II: Standard Heavy Impact Source). Determine the Lr value by applying the data to the classification curves provided in JIS A 1419-2: Assessment Method for Sound Insulation in Buildings and Building Elements (Part II: Floor Impact Sound Insulation Performance). When using predictive figures, the method referred to in the “Floor Impact Sound Insulation Design in Buildings” (Architectural Institute of Japan, 2009) may be followed. In this case, calculate the basic performance level using this method. Lr-values are then determined by applying these calculation results and impact sound reductions of the flooring materials, which are measured based on the method specified under JIS A 1440-2. Characteristics of heavy impact sound insulation depend on several slab-related variables, including type, flexural rigidity, mass, and restraint conditions. Additionally, performance is also affected by flooring materials and acoustic absorption characteristics of the sound receiving room. Sound insulation performance levels for heavy impact (Reference 1) and Lr-value improvement data for each type of floor finish (Reference 2) are shown for reference. We should note that ΔL grades indicated in product brochures for floor materials refer to the performance of individual members, which is different from the CASBEE standard Lr (the space performance).

In the basic design phase, the target performance is subject to the assessment.

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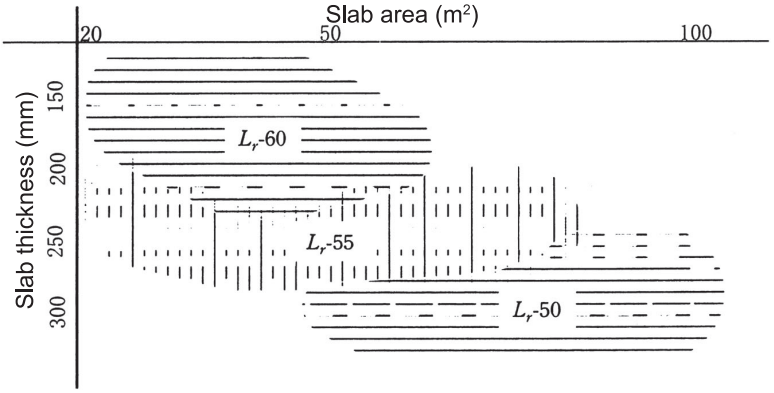
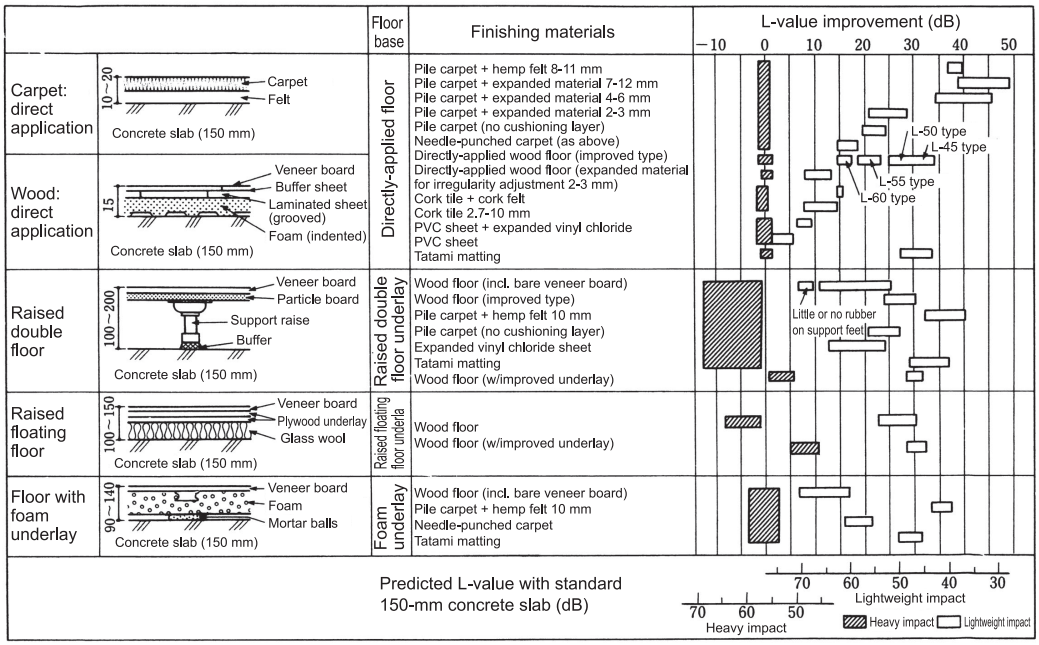
■Reference: Sound insulation classification for heavy impact on bare slab based on slab thickness and surface area values



■Reference 2: Lr-value improvement per floor finish



■Bibliography 3), 7)

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1.3 Sound Absorption

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated. For Hal (oth.), evaluate building types that particularly require anti-noise measures, such as town hall, theaters and movie theaters, excluding the other building types.

For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

<Entire Building and Common Area> <Dwelling and Accommodation Area>	
Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl
Level 1	Sound absorbing materials are not used
Level 2	(No corresponding level)
Level 3	Sound absorbing materials are used in one of the following areas (walls, floor or ceiling)
Level 4	Sound absorbing materials are used in two of the following areas (walls, floor or ceiling)
Level 5	Sound absorbing materials are used in all of the following areas (walls, floor or ceiling)

☐Commentary

In assessing the sound absorption performance, evaluate levels of sound absorption of a room which includes the interior finish materials.

The higher the level of in-room sound absorption, the more effective reverberation control is, so that a conversation can be easily carried out without voices being raised. Furthermore, noise propagated into or generated within the room is also attenuated, thereby improving the acoustic environment. An average rate of in-room sound absorption can be obtained based on the absorption rate of finishing materials. In this assessment, however, simply evaluate whether sound absorbing materials are used in walls, floor or ceiling.

The assessment criteria for the use of sound absorbing materials are as follows:

- Ceiling and floor: at least 70% of the area is covered with sound absorbing materials
- Walls: the total area which is covered with sound absorbing materials of all four walls account for more than 70% of the area of the largest wall.

The sound absorbent materials shall be those stipulated under JIS A6301, or other construction materials with the same or better sound absorption performance, but carpets or tatami matting are permitted as sound absorbent materials for floors. The following are examples of sound absorbent materials.

Table; Examples of sound absorbent materials

Ceilings	Walls	Floors
Rockwool-type sound absorbent ceiling material Glasswool-type sound absorbent ceiling material Gypsum board type sound absorbent ceiling material, etc.	Rockwool-type sound absorbent wall material Glasswool-type sound absorbent wall material, etc.	Carpet, tatami matting, etc.

■Bibliography 8)

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2. Thermal Comfort

2.1 Room Temperature Control

2.1.1 Room Temperature

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated.

For common areas of Hsp, evaluate the both outpatients waiting rooms and doctor's offices. Note that the assessment criteria differ between outpatient waiting rooms and doctor's offices

In the <Dwelling and Accommodation Area> of Apt, air-conditioning equipment is excluded from assessment if it is installed by occupants.

- Note; For levels where the scoring criteria are blank, in cases where it is difficult to determine between the above levels, select an intermediate level (e.g. level 2 or 4)

<Entire Building and Common Area>		
Building type	Off・Hal (O.D.)・Hal (Lib.)	Fct・Hsp (Waiting Room)・Htl・Apt
Level 1	Not adequate for Level 2.	Minimum equipment capacity to achieve room temperatures of 20˚C in winter and 28˚C in summer with some occupant discomfort
Level 2	Minimum equipment capacity to achieve temperatures of 20˚C in winter and 28˚C in summer with some occupant discomfort	
Level 3	Sufficient equipment capacity to achieve general room temperatures of 22˚C in winter and 26˚C in summer	Sufficient equipment capacity to achieve general room temperatures of 22˚C in winter and 26˚C in summer
Level 4		
Level 5	Sufficient equipment capacity to achieve room temperatures of 24˚C in both winter and summer	Sufficient equipment capacity to achieve room temperatures of 24˚C in winter and 24˚C in summer
Building type	Hsp (Doctor's Off.)	Sch (Univ., etc.)
Level 1	Minimum equipment capacity to achieve room temperatures of 21˚C in winter and 28˚C in summer with some occupant discomfort	The minimum equipment capacity is provided to achieve temperatures of 10˚C or more in winter and 30˚C or less in summer, which require tolerance of some discomfort
Level 2		
Level 3	Sufficient equipment capacity to achieve general room temperatures of 23˚C in winter and 26˚C in summer	Sufficient equipment capacity for achieving commonly-applied room temperatures of 20˚C in winter and 27˚C in summer
Level 4		
Level 5	Equipment capacity is provided to achieve temperatures of 24˚C in winter and 24˚C in summer.	Equipment capacity is provided to achieve temperatures of 24˚C in winter and 24˚C in summer.

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Building type	Sch (E.S./J.H.S./ H.S)	Rtl·Rst·Hal (oth.)
Level 1	(No corresponding level)	Minimum equipment capacity to achieve room temperatures of 18˚C in winter and 28˚C in summer with some occupant discomfort
Level 2	(No corresponding level)	
Level 3	Minimum equipment capacity to achieve room temperatures of 18˚C or higher in winter and 28˚C or lower in summer	Sufficient equipment capacity to achieve general room temperatures of 20˚C in winter and 26˚C in summer
Level 4	Sufficient equipment capacity to achieve room temperatures of 20˚C or higher in winter and 25˚C or lower in summer	
Level 5	Sufficient equipment capacity to achieve room temperatures of 22˚C or higher in winter and 24˚C or lower in summer	Sufficient equipment capacity to achieve room temperatures of 22˚C in winter and 24˚C in summer

<Dwelling and Accommodation Area>		
Building type	Hsp·Htl	Apt
Level 1	Minimum equipment capacity to achieve room temperatures of 20˚C in winter and 28˚C in summer with some occupant discomfort	Minimum equipment capacity to achieve room temperatures of 18˚C in winter and 28˚C in summer with some occupant discomfort
Level 2		
Level 3	Sufficient equipment capacity to achieve general room temperatures of 22˚C in winter and 26˚C in summer	Sufficient equipment capacity to achieve general room temperatures of 22˚C in winter and 26˚C in summer
Level 4		
Level 5	Sufficient equipment capacity to achieve room temperature of 24˚C in both winter and in summer	Sufficient equipment capacity to achieve room temperature of 24˚C in both winter and in summer

☐Commentary

Assessment levels are set as below:

Level 1: Mandatory level under the MEXT School Sanitation Standards (applicable to Sch (Univ., etc.))

Level 2: Level as referred to in the MLIT specifications[*1]

Level 3: Level as referred to in the MLIT specifications[*1], community-based standards, the Sanitation Standards for Tokyo Municipal Schools, general recommended values (applicable to Sch (Univ., etc.)) and the MEXT School Sanitation Standards (applicable to Sch (E.S./J.H.S./ H.S))

Level 5: POEM-O optimal level[*2]

*1 Room temperatures of 19 to 22˚C in winter and 26 to 28˚C in summer

*2 Room temperatures of 24 to 26˚C in summer and 22 to 24˚C in winter (for Rtl, Rst and Hal, 20 to 22˚C in winter)

Room temperature is one of the most representative indicators for an indoor thermal environment. As such, characteristics of an indoor thermal environment are determined largely by temperature settings for the room. In this assessment, evaluate the capacity of the air conditioning equipment to maintain comfortable room temperature levels under peak load conditions.

For an apartment, apply the target values for a representative room of the building (i.e. equivalent to the standard floor of an office building). In the basic design phase, the target performance is subject to the assessment.

■Bibliography 9), 10), 11), 12), 13), 14)

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2.1.2 Perimeter Performance

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated.

For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

- Note; For levels where the scoring criteria are blank, in cases where it is difficult to determine between the above levels, select an intermediate level (e.g. level 2 or 4)

<Entire Building and Common Area>	
Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	No attention has been paid to the infiltration of heat through window systems, outside walls, roof and floor (particularly piloti), and insulation performance is poor. (Window system SC*1: around 0.7, U*2 = 6.0 [W/m^{2}K], outer walls and others: U*2 = 3.0 [W/m^{2}K)]
Level 2	
Level 3	Attention has been paid to the infiltration of heat to the interior through windows, outside walls, roof and floor (particularly piloti), and there is no practical problem with insolation blocking and insulation performance. (Window system SC*1: around 0.5, U*2 = 4.0 [W/m^{2}K], outer walls and others: U*2 = 2.0 [W/m^{2}K])
Level 4	
Level 5	Close attention has been paid to the infiltration of heat to the interior through windows systems, outside walls, roof and floor (particularly piloti), and the building has the highest level of insolation blocking and insulation performance. (Window system SC*1: around 0.2, U *2= 3.0 [W/m^{2}K], outer walls and others: U *2= 1.0 [W/m^{2}K])

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<Dwelling and Accommodation Area>		
Building type	Hsp・Htl	Apt
Level 1	No attention has been paid to the infiltration of heat through window systems, outside walls, roof and floor (particularly piloti), and insulation performance is poor. (Window system SC*1: around 0.7, U*2 = 6.0 [W/m^{2}K], outer walls and others: U *2= 3.0 [W/m^{2}K])	Not adequate for Level 2.
Level 2		Requirements for Grade 3 in 5-1 Thermal Insulation Performance Grade of the Japan Housing Performance Indication Standard are satisfied.
Level 3	Attention has been paid to the infiltration of heat to the interior through windows, outside walls, roof and floor (particularly piloti), and there is no practical problem with insolation blocking and insulation performance. (Window system SC*1: around 0.5, U*2 = 4.0 [W/m^{2}K], outer walls and others: U *2= 2.0 [W/m^{2}K])	Requirements for Grade 4 in 5-1 Thermal Insulation Performance Grade of the Japan Housing Performance Indication Standard are satisfied.
Level 4		Requirements for Grade 5 in 5-1 Thermal Insulation Performance Grade of the Japan Housing Performance Indication Standard are satisfied.
Level 5	Close attention has been paid to the infiltration of heat to the interior through windows systems, outside walls, roof and floor (particularly piloti), and the building has the highest level of insolation blocking and insulation performance. (Window system SC*1: around 0.2, U*2 = 3.0 [W/m^{2}K], outer walls and others: U *2= 1.0 [W/m^{2}K])	Requirements for Grade 6 or above in 5-1 Thermal Insulation Performance Grade of the Japan Housing Performance Indication Standard are satisfied.

*1: SC represents (Insolation) Shading Coefficient, *2: U represents Thermal conductivity

☐Commentary

Evaluate ability to block thermal infiltration from the surroundings.

Evaluate whether window systems and exterior walls have been selected to exclude outside disturbances as far as possible, in order to maintain room temperature. Even with inferior perimeter performance, it is possible to meet the temperature setting at the thermostat position, provided the temperature setting is not unreasonable and the equipment has sufficient capacity, but if there are windows and walls that have extremely low or high surface temperatures there will be inconsistencies in temperature within the room. Vertical temperature difference and radiation from exterior walls and windows will cause localized discomfort to occupants. Also, the use of internal blinds, air barriers, airflow windows, double skins and other window systems should not be evaluated for their individual performance, but rather for the combined shading coefficient and heat transfer coefficient of the systems they form.

Assessments of Level 3 and below may be based on the set specification. Higher levels require confirmation of verified performance values based on sufficiently reliable materials including surveys, experiments and public institutions' approvals. Regarding the actual method for confirming the performance, refer to Reference 2).

In the basic design phase, the target performance is subject to the assessment.

The assessment of Apt is carried out in accordance with 5-1 Thermal Insulation Performance Grade in the assessment method provided in the Japan Housing Performance Indication Standard (revised in November 2022) prescribed under the Housing Quality Assurance Act (see Reference 4).

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■Reference 1: Consideration of regional differences
Window performance: Peak insolation varies by time and season, but there is little regional difference, so shading coefficient (SC) can be used for assessment without consideration of regional differences.
Outer wall performance: As values to indicate the impact of thermal loads on the interior, there is effective temperature difference in summer and room interior-exterior temperature difference in winter, but effective temperature difference depends on insolation and outer wall insulation performance, which means it is independent of regional differences. The room interior-exterior temperature difference in winter is influenced by differences in design outside air conditions, so it should be evaluated as below.

The scoring criteria consider the allowable values for uneven radiation and vertical temperature distribution, which are assessment items for the interior environment, with the temperature differences from the interior set temperature and the interior surface temperature of the outer wall substituted as judgement standards. There are three levels of temperature difference Δt, being level 5 (Δt <= 3˚C), level 3 (Δt <= 6˚C) and level 1 (Δt > 6˚C). It is calculated from the overall heat transfer coefficient U, interior temperature setting Tr, and winter design outdoor air temperature To for the region, in order to determine the level.
Temperature difference Δt [˚C] = (U/αi) x (Tr−To) αi: interior heat transfer coefficient (around 9 W/m^{2}K).
The perimeter normally comprises outer wall and window glass, so the level should be determined with reference to the transfer coefficients and the ratio of areas between wall and window.
The content of the table is based on the assumption of a typical combination of 24˚C as the indoor temperature setting of and outside air temperature of 0˚C.

■Reference 2: Performance confirmation method
Exterior wall: If the existing material composition can be confirmed, allow calculation-based checking and assessment of performance values (from set specifications).
Windows: If multilayer glass (Low-e glass, etc.) is used, the glass performance can be used as it stands as the performance value, so the glass and blind specifications can be checked and the assessment based on the manufacturer catalog values or the values used in the PAL calculation. (Windows in an ordinary office can be evaluated on the set specification.)
It is, however, difficult to evaluate window systems, such as airflow windows and double skins, which function as systems and raise the performance of the building skin.
[1] If the performance of the window system was confirmed in experiments or related materials including technical reports issued by public institutions before the construction is completed, the assessment is deemed possible based on a survey for confirming whether the appropriate air flow is secured during operation in accordance with the design plan.
[2] If there is no basis for assessment,
Thermal conductivity: It is possible to calculate thermal conductivity by measuring the airflow volume, the difference between interior and exterior air temperatures, and the amount of heat conduction, using heat flow meters.
Shading coefficient: It is difficult to measure shading coefficient accurately at the direct measurement level (refer to "Standardization of Performance Measurement Systems for Building Services Systems," SHASE), so if there is no assessment data and performance cannot be confirmed, it is not possible to go beyond calculation of performance value (minimum performance value) using the specifications of the components, excluding effects such as air movement.

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■Reference 3: Commentary on perimeter performance

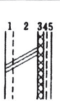
Heat penetration from the outside must be minimized in order to maintain a comfortable internal environment. The overall heat transfer coefficient U, which represents the level of heat flow for a given temperature difference, and shading coefficient SC, which represents the entry of daylight to the interior, are of reference as indicators for perimeter performance. The smaller the values of overall heat transfer coefficient U and shading coefficient SC, the better the entry of heat is being suppressed.

(1) Overall heat transfer coefficient U

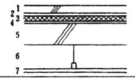
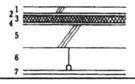
Example values of overall heat transfer coefficient for exterior walls, roofs, floors and other elements are presented below.

(Quoted from "Standards and Procedures for Building Equipment Design" (partially modified), MLIT.)

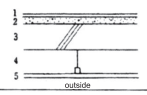
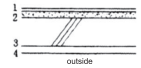
Examples of heat transfer coefficient U for walls

No.	Exterior wall	Material	t (mm)	U W/m²℃ Thickness of RC 150	180
1		1. Additional concrete 2. RC 3. Mortar (Same for multi-layer patterned spraying)	20 20	3.71	3.47
2		1. Additional concrete 2. RC 4. Air layer 5. Gypsum board (Same for multi-layer patterned spraying	20 12	2.50	2.38
		3. Polystyrene foam	25 30	0.97 0.87	0.96 0.86
3		1. Additional concrete 2. RC 4. Air layer 5. Gypsum board (Same for multi-layer patterned spraying)	20 12×2	2.20	2.11
		3. Polystyrene foam	25 30	0.93 0.83	0.91 0.82

Examples of heat transfer coefficient U for roof

No.	Roof structure	Ceiling material	t (mm)	U W/m²℃
1	1. Additional concrete 80 2. Asphalt 5 3. Polystyrene foam 25 4. Asphalt 5 5. RC 130 6. Air layer 7. Ceiling material 	Gypsum board	9	0.90
		Gypsum board Rockwool accoustic board	9 9	0.80
		Gypsum board Rockwool accoustic board	9 12	0.77
2	1. Additional concrete 80 2. Asphalt 5 3. Polystyrene foam 50 4. Asphalt 5 5. RC 130 6. Air layer 7. Ceiling material 	Gypsum board	9	0.58
		Gypsum board Rockwool accoustic board	9 9	0.53
		Gypsum board Rockwool accoustic board	9 12	0.52

Examples of heat transfer coefficient U for floors exposed to outside air

No.	Floor structure exposed to outside air	Ceiling material exposed to outside air	t (mm)	U W/m²℃
1	1. Vinyl floor tiles 3 2. Mortar 27 3. RC 120 4. Air layer 5. Ceiling materfal 	Aluminum sheet	0.8	2.57
		Steel sheet	0.4	2.57
2	1. Vinyl floor tiles 3 2. Mortar 27 3. RC 120 4. Ceiling material 	Rockwool spraying	10	2.20
			15	1.88
		Polystyrene foam	15	1.48
			20	1.25
			25	1.08
			30	0.95
			50	0.65

(2) Shading coefficient SC and heat transfer coefficient U for window systems

These are approximate values of shading coefficient and heat transfer coefficient, based on differences in the glass used.

- 3 mm glass : Shading coefficient SC = 1.0, heat transfer coefficient around 6.0 (W/m^{2}K)
- Transparent multi-pane glass, High-performance single-pane glass: Shading coefficient SC = 0.8-0.6, heat transfer coefficient around 4.0-5.0 (W/m^{2}K)
- High-performance multi-pane glass: Shading coefficient SC = 0.5, heat transfer coefficient around 3.0 (W/m^{2}K).

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■Reference 4: Assessment by using the standards for the average perimeter heat transfer coefficient (U_A) and the average solar heat gain coefficient for cooling season (η_{AC})

- For each level of the table, according to Regional Classification*, each value shall be less than or equal to the standard value.

Table: Criteria based on the standards for the average perimeter heat transfer coefficient (U_A) and the average solar heat gain coefficient for cooling season (η_{AC})

	Standard value U_A of the average perimeter heat transfer coefficient [W/ m^2K]							
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Level 1	$0.54 < U_A$	$0.54 < U_A$	$1.04 < U_A$	$1.25 < U_A$	$1.54 < U_A$	$1.54 < U_A$	$1.81 < U_A$	—
Level 2	0.54	0.54	1.04	1.25	1.54	1.54	1.81	—
Level 3	0.46	0.46	0.56	0.75	0.87	0.87	0.87	—
Level 4	0.4	0.4	0.5	0.6	0.6	0.6	0.6	—
Level 5	0.28	0.28	0.28	0.34	0.46	0.46	0.46	—
	Standard value η_{AC} of average solar heat gain coefficient for cooling season							
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Level 1	—	—	—	—	$4.0 < \eta_A$	$3.8 < \eta_A$	$4.0 < \eta_A$	—
Level 2	—	—	—	—	4.0	3.8	4.0	—
Level 3	—	—	—	—	3.0	2.8	2.7	6.7
Level 4	—	—	—	—	3.0	2.8	2.7	6.7
Level 5	—	—	—	—	3.0	2.8	2.7	5.1

Above these standards for the average perimeter heat transfer coefficient (U_A) and the average solar heat gain coefficient for cooling season (η_{AC}), it is required to meet the standards for measures to prevent the occurrence of condensation according to the grade and regional classification.

* The area classification here is in accordance with the regional classification provided in the Ordinance on Setting Building Energy Consumption Performance Standards, etc. (Ordinance No. 1 of 2016 of the METI and MLIT).

■Bibliography 9), 10), 11), 12), 13), 14), 15)

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2.1.3 Zoned Control

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated.

For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

- Note; For levels where the scoring criteria are blank, in cases where it is difficult to determine between the above levels, select an intermediate level (e.g. level 2 or 4)

<Entire Building and Common Area>	
Building type	Off・Hal (O.D.)・Hal (Lib.)・Fct・Hsp・Htl
Level 1	No distinction is made between orientation directions, or between perimeter and interior, and only one air conditioning system is planned*, which must be switched between heating and cooling for each season
Level 2	
Level 3	There is air conditioning zoning* that differentiates between orientation directions, between perimeter and interior, and between internal load distributions. The air conditioning system can provide either heating or cooling separately to each zone.
Level 4	There is air conditioning zoning at around the standard of level 3*, and the system also allows selection between cooling and heating for each zone.
Level 5	There are separate air conditioning systems for each orientation direction, and for perimeter and interior*, allowing more detailed zoning (broadly, zones of 40 m^2 or less). The air conditioning system can provide either heating or cooling separately to each zone.
Building type	Rtl・Rst・Hal (oth.)
Level 1	There is no zoning of heating and cooling within a single floor, and a single-circuit air conditioning system is planned. Switching between heating and cooling is required for the selection of air conditioning modes.
Level 2	
Level 3	Each floor is divided into multiple zones according to their thermal loads, and the air conditioning system is planned to allow either heating or cooling in each zone.
Level 4	There is air conditioning zoning at around the standard of level 3, and the planned system also allows selection between cooling and heating for each zone.
Level 5	Each floor is divided into many small zones for individual sales areas or tenants, and the air conditioning system is planned to allow either heating or cooling in zone units.

* In cases where airflow windows are used to make the space perimeterless, or in small offices with little depth, the first half of the description, concerning the distinction between perimeter and interior, may be ignored.

<Dwelling and Accommodation Area> Inapplicable

☐Commentary

Evaluate whether a finely-zoned air conditioning system is used to eliminate temperature variations and create a comfortable environment in the interior.

Furthermore, even if the applicable system is not adequate, a high level can be evaluated if operation is managed manually, or receives planned consideration, and the internal environment is maintained with an adequate degree of success.

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[Examples of air conditioning systems corresponding to each level]
Level 1: Single duct system, two-pipe FCU system (no zoning, switching between heating and cooling).
Level 3: Single duct system, two-pipe FCU system (zoning grade assessment, switching between heating and cooling).
Level 4: Double duct system (4 pipes for AHU), four-pipe FCU system, task/ambient air conditioning system (evaluate both the zoning grade and simultaneous heating and cooling).
Level 5: Multi-unit heat pump system (simultaneous heating and cooling), double duct system (4 pipes for AHU), and four-pipe FCU system level with more detailed zoning than levels 3 and 4 (zones of around 40 m^2).

2.2 Humidity Control

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition
For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated.
For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).
In the <Dwelling and Accommodation Area> of Apt, air-conditioning equipment is excluded from assessment if it is installed by occupants.
- Note; For levels where the scoring criteria are blank, in cases where it is difficult to determine between the above levels, select an intermediate level (e.g. level 2 or 4)

<Entire Building and Common Area>		
Building type	Off・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt	
Level 1	Not adequate for level 3.	
Level 2		
Level 3	Humidification equipment is available, and equipment capacity is generally sufficient to keep humidity to 50% in summer and 40% in winter.*1	
Level 4		
Level 5	Humidification and dehumidification equipment is available, and equipment capacity is sufficient to keep humidity in the range 45-55%.*2	
	Sch (Univ., etc.)	Sch (E.S./J.H.S./ H.S)
Level 1	Not adequate for level 3.	Not adequate for level 3.
Level 2		
Level 3	Humidification equipment is also available, and equipment capacity is generally sufficient to keep humidity to 40-70% in winter and 50-65% in summer.	Sufficient equipment capacity to achieve general indoor humidity of 30 to 45% in winter and 55 to 80% in summer.
Level 4		
Level 5	Humidification and dehumidification equipment is available, and equipment capacity is sufficient to keep humidity in the range 45-55%.	Sufficient equipment capacity with humidifier/dehumidifier to achieve humidity of 45 to 55%.

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<Dwelling and Accommodation Area>		
Building type	Hsp・Htl	Apt
Level 1	Not adequate for level 3.	No consideration given.
Level 2		(No corresponding level)
Level 3	Sufficient equipment capacity with humidifier to achieve general humidity of 50% in summer and 40% in winter.	Appropriate ventilation functions are provided, and anti-condensation measures have been taken on elements that can act as heat bridges, such as insulation reinforcement, humidity barriers and permeable layers.
Level 4		Dehumidification functions are provided, and anti-condensation measures have been taken on elements that can act as heat bridges, such as insulation reinforcement, humidity barriers and permeable layers.
Level 5	Humidification and dehumidification equipment is available, and equipment capacity is sufficient to keep humidity in the range 45-55%.	Dehumidification and humidification functions are provided and set to a comfort range of 45-55%, and anti-condensation measures have been taken on elements that can act as heat bridges, such as insulation reinforcement, humidity barriers and permeable layers.

*1 In winter it will be relieved somewhat from the maximum level.
*2 Normal air conditioning equipment is assumed to provide dehumidification by refrigeration coil in summer, and humidification by humidifier in winter.

☐Commentary

Evaluate according to the set target value for humidity. Dehumidification and humidity control intended to provide comfort in summer, and humidification for health reasons in winter are regarded as important services.

Level settings are based on the following sources.

Level 1: Satisfy 40-70% of standards stipulated in the Law for Maintenance of Sanitation in Buildings (Building Sanitation Law), based on "Sanitation Management Standards for Buildings" of MEXT (applicable to Sch (Univ., etc.))

Level 3: An equivalent level as referred to in the MLIT specifications, community-based standards, the Sanitation Standards for Tokyo Municipal Schools, general recommended values (applicable to Sch (Univ., etc.)) and the MEXT School Sanitation Standards (applicable to Sch (E.S./J.H.S./ H.S))

Level 5: POEM-O comfort zone: 45-55%.

In the basic design phase, the target performance is subject to the assessment.

■Bibliography 9), 10), 11), 12), 13), 14), 15)

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2.3 Type of Air Conditioning System

Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt

! Application condition

For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated.

For common areas of Hsp, evaluate the both outpatients waiting rooms and doctor's offices. Note that the assessment criteria differ between outpatient waiting rooms and doctor's offices.

In the <Dwelling and Accommodation Area> of Apt, air-conditioning equipment is excluded from assessment if it is installed by occupants.

- Note; For levels where the scoring criteria are blank, in cases where it is difficult to determine between the above levels, select an intermediate level (e.g. level 2 or 4)

<Entire Building and Common Area>		
Building type	Off · Sch · Rtl · Rst · Hal · Fct · Hsp (Waiting Room) · Htl · Apt	Hsp (Doctor's Off.)
Level 1	The air conditioning system was planned with no particular consideration for the vertical temperature distribution and airflow speed in occupancy zone.	Air conditioning system designed without specific consideration of vertical temperature variation and air flow in occupied areas
Level 2		
Level 3	The air conditioning system is normal, but the air supply and extraction plan considered the vertical temperature distribution and airflow speed in occupancy zone.	The air conditioning system is normal, but the air supply and extraction plan considered the vertical temperature distribution and airflow speed in occupancy zone, and the partitions in the doctor's office.
Level 4		
Level 5	The air conditioning system* was chosen to mitigate the vertical temperature distribution and airflow speed in the room.	The air conditioning system*1 was chosen to mitigate the vertical temperature distribution and airflow speed in occupancy zone, and to consider the partitions of the doctor's offices.

<Dwelling and Accommodation Area>		
Building type	Hsp · Htl	Apt
Level 1	The air conditioning system was planned with no particular consideration for the vertical temperature distribution and airflow speed in occupancy zone.	Air conditioning system designed without specific consideration of vertical temperature variation and air flow in air-conditioned occupied areas, or of temperature difference between air-conditioned and non-air-conditioned areas
Level 2		
Level 3	The air conditioning system is normal, but the air supply and extraction plan considered the vertical temperature distribution and airflow speed in occupancy zone.	Air conditioning system designed in consideration of vertical temperature variation and air flow in air-conditioned occupied areas, or of temperature difference between air- conditioned and non-air-conditioned areas
Level 4		
Level 5	The air conditioning system* was chosen to mitigate the vertical temperature distribution and airflow speed in occupancy zone.	Air conditioning system designed to in consideration of minimizing vertical temperature variation and air flow in air-conditioned occupied areas, or the temperature difference between air-conditioned and non-air-conditioned areas

* This refers to, for example, ceiling and floor radiant heating and cooling systems, or floor-vented systems, etc.

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☐Commentary

Evaluate whether the air conditioning was chosen to mitigate the vertical temperature distribution and airflow speed (residual wind speed) in the room.

The design stage of air conditioning equipment involves consideration of various air conditioning methods to choose the system that will best avoid causing localized discomfort to room occupants.

Therefore, it is not possible to name an air conditioning system that will always create a comfortable environment, but the air conditioning system should be evaluated on the basis of past results existing experience and design policies. The space for which vertical temperature distribution and airflow speed are evaluated should be the occupancy zone, and the evaluated points should be the vertical temperature distribution and airflow speed in the space occupied by humans. The temperature difference evaluated should be that between heights of 0.1 m and 1.7 m (around 2.0 m) with zone of uniform temperature as the target standard.

In the basic design phase, the target performance is subject to the assessment.

[Examples of air conditioning systems corresponding to each level]

The system types below are not categorized by air conditioning types, such as single-duct, but by the venting methods.

Level 1: Methods which do not allow free design of airflow forms in the interior, such as cassette-type interior units, extensive use of dampers with poor diffusion, such as line diffusers, etc.

Level 3: Diffusion methods which employ dampers with good diffusion, such as anemostat or pan types.

Level 5: Cooling/heating system equipped with floor diffusers or radiant ceiling panels to minimize vertical temperature variation and air flow that cause occupant discomfort, or an air conditioning system with appropriate diffusers and layout to achieve performance of vertical temperature variation of approximately 2˚C or less and an air flow rate of 0.15 m/s.

■Bibliography 9), 10), 11), 12), 14)

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3. Lighting & Illumination

3.1 Daylight

3.1.1 Daylight Factor

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

For Halls, only library is applicable for this item. For Hal (Lib.), evaluate the reading room only.
For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

<Entire Building and Common Area>	
Building type	Off・Sch・Hal (Lib.)・Fct・Hsp・Htl・Apt
Level 1	[Daylight factor] < 1.0%
Level 2	1.0% ≦ [Daylight factor] < 1.5%
Level 3	1.5% ≦ [Daylight factor] < 2.0%
Level 4	2.0% ≦ [Daylight factor] < 2.5%
Level 5	2.5% ≦ [Daylight factor]

<Dwelling and Accommodation Area>		
Building type	Hsp・Htl	Apt
Level 1	[Daylight factor] < 0.5%	[Daylight factor] < 0.5%
Level 2	0.5% ≦ [Daylight factor] < 0.75%	0.5% ≦ [Daylight factor] < 1.0%
Level 3	0.75% ≦ [Daylight factor] < 1.0%	1.0% ≦ [Daylight factor] < 1.5%
Level 4	1.0% ≦ [Daylight factor] < 1.25%	1.5% ≦ [Daylight factor] < 2.0%
Level 5	1.25% ≦ [Daylight factor]	2.0% ≦ [Daylight factor]

☐Commentary

Daylight factor is the ratio of outdoor illuminance (full-sky illuminance) to the illuminance of a measurement point in the room, excluding direct daylight. It is an indicator of the potential for use of daylight. Daylight is always variable, but a stable value can be obtained for daylight factor, because it is a ratio.

Utilizing the height of the central desktop surface in the room concerned as the calculation point, the calculation is carried out based on the size and position of the opening in terms of 2 calculation charts: "Cases in which windows on the wall are subject to the assessment" and "Cases in which skylight windows are subject to the assessment." Reference 1 is the chart for a window in a wall, and Reference 2 is for toplights and other forms. The types of rooms for evaluation are expected to be standard administrative Off, classrooms in Sch, and lobbies and other common areas in Apt, Hsp and Htl.

In order to simplify the procedure as much as possible, the calculation of the daylight factor in this section utilizes the direct daylight factor and adopts a method that treats the configuration factor as the daylight factor equivalent. The transmittance of windows and the reflectance of the ceiling are not taken into consideration. If other methods (see "Daylight Lighting Calculation Methods", bibliography 16) have been employed for detailed examination, the resulting values can be used.

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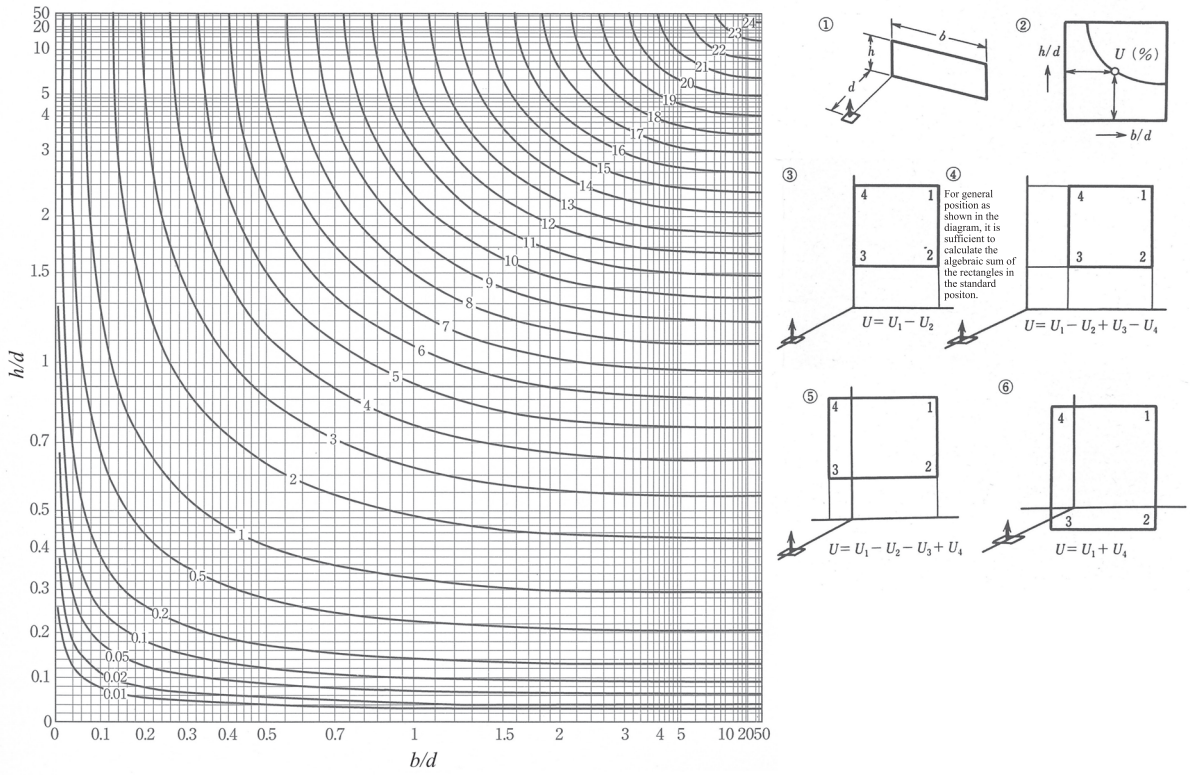
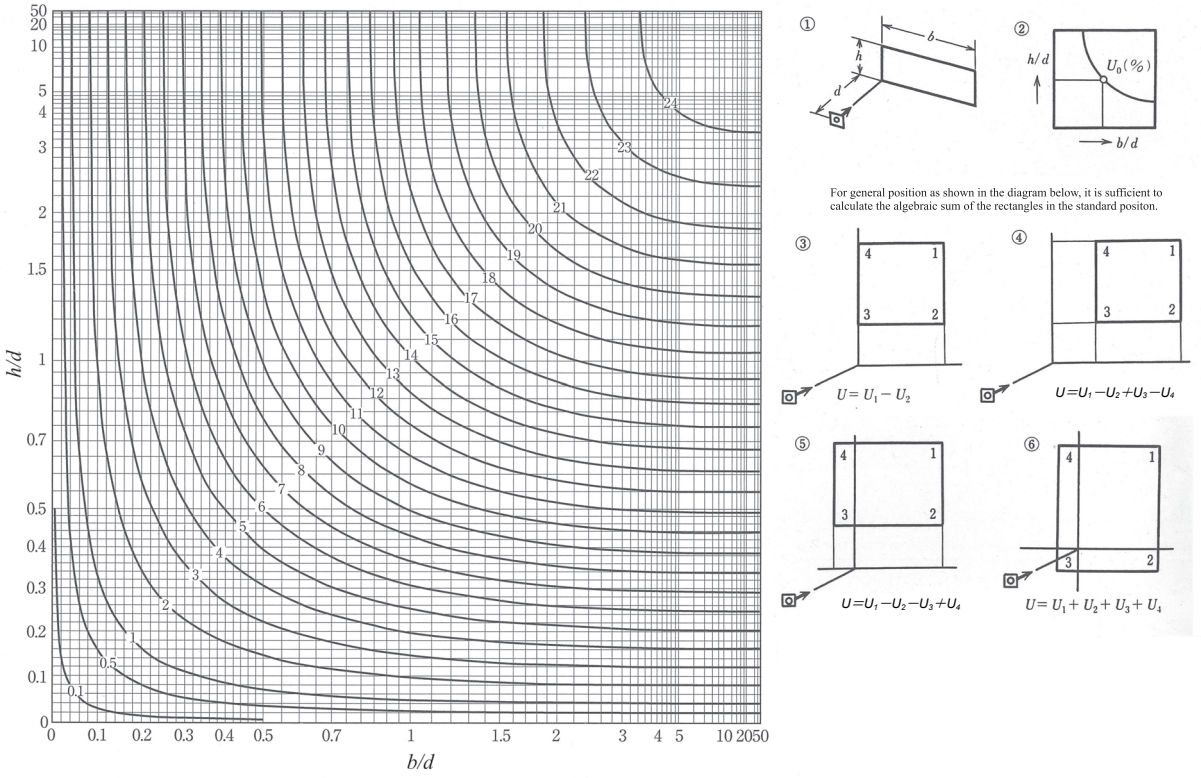
■Reference 1: Calculation chart for a window in one wall



■Reference 2: Calculation chart for a skylight



■ Bibliography 17)

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■Reference 3: Calculation method for the daylight factor used in reference 1 and 2

It is extremely difficult to find an accurate value of daylight factor by calculation, so here we have used a method employing the three-dimensional angular projection factor, which is relatively easy to find. The three-dimensional angular projection factor is the proportion occupied by the projected area S" on the base circle of a face with a given three-dimensional angle within the area of that base circle. It can be regarded as being broadly equal to daylight factor. The three-dimensional angular projection factor U can be expressed by the following formula.

$$U = \frac{S''}{\pi \cdot r^2} \times 100 \quad (\%)$$

Where

U: Three-dimensional angular projection factor ≒ daylight factor (%)

r : Radius of the base circle (normally r = 1)

π : Pi

S'': Area of S projected onto the base circle

Reference figures 1 and 2 are graphs from which values for three-dimensional angular projection factor, which is an approximation for daylight factor, can be read directly. They express the cases in which the light source and the illuminate surface are perpendicular and parallel to each other. Thus, the chart in Reference 1 can be used to find the daylight factor on a horizontal surface such as a floor or desk top when the light source is a window in a wall, and the chart in Reference 2 does the same for a toplight.

To find daylight factor, use b (window width), d (distance from the window, and h (window height) to find b/d on the horizontal axis, and h/d on the vertical axis, then read the value at the intersection.

However, the calculation method varies according to the positional relationship between the window and the measurement face. The diagrams next to the graph represent the differences in calculation method depending on the measurement position. In the diagrams on the right, U = U1 + U4, and the daylight factor is the total of the two areas.

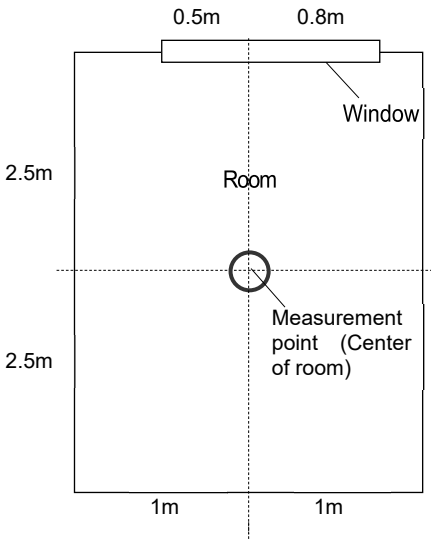
Calculating the daylight factor for area U1 in the diagram on the right

b1/d1 = 0.8/2.5 = 0.32, and h1/d1 = 1.55/2.5 = 0.62, so reading from the graph, U1≒1.4.

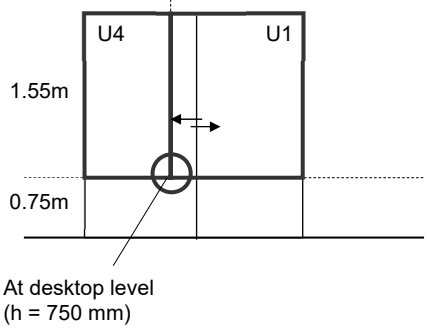
Similarly for U4, b4/d4 = 0.5/2.5 = 0.2, and h4/d4 = 0.62, so U4 ≒ 0.9.

Therefore, the calculated daylight factor is

U = 1.4 + 0.9 = 2.3.



▲Plan



▲Elevation
(Image view from inside the room)

Similarly, if the positional relationship between the window and the measurement plane differs, the calculation method for the total value can understood from the diagrams.

Even when the window and the measurement plane are parallel, as in Reference 2, the method is the same as above. The measurement plane is the height of the desk top, and the measurement position is in the center of the room.

For a dwelling within Apartments, calculate for the room with the largest openings (the living room, etc.).

■Bibliography 16), 17), 18)

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3.1.2 Openings by Orientation

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition
Not applicable other than Apt.

<Entire Building and Common Area> Inapplicable

<Dwelling and Accommodation Area>	
Building type	Apt
Level 1	No south-facing windows
Level 2	(No corresponding level)
Level 3	South-facing windows
Level 4	(No corresponding level)
Level 5	South and east-facing windows

☐Commentary
Evaluate whether the positions (orientations) of openings make efficient use of daylight.
For a dwelling with the most common room layout on the standard floor, make a total assessment of the one dwelling. The Housing Performance Indication System calculates numerical opening ratio in each direction, but for this assessment it will be sufficient to say whether there are openings in each direction.
■Bibliography 15)

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3.1.3 Daylight Devices

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

For Halls, only library is applicable for this item. For Hal (Lib.), evaluate the reading room only.
For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

<Entire Building and Common Area>		
Building type	Off・Sch・Fct	Rtl・Rst・Hal (Lib.)・Hsp・Htl・Apt
Level 1	(No corresponding level)	(No corresponding level)
Level 2	(No corresponding level)	(No corresponding level)
Level 3	There are no daylight devices.	There are no daylight devices.
Level 4	There is one type of daylight device.	(No corresponding level)
Level 5	There are two or more types of daylight device, or they have advanced functions.	There are some daylight devices.

<Dwelling and Accommodation Area>	
Building type	Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	There are no daylight devices.
Level 4	(No corresponding level)
Level 5	There are some daylight devices.

☐Commentary

Evaluate the openings according to the planned installation of daylight devices.
Daylight devices optimally utilize daylight in addition to windows installed in the exterior walls. Specifically, such devices include light harvesting or guiding devices which carry light into the room interior, such as light shelves, light ducts, light condensers and optical fibers. Devices with advanced functions, for example, devices which have the two functions of collecting light and guiding it to the interior of a room, such as those which combine light condensers and optical fibers.
Buildings in which daylight devices are widely used are highly rated. However, we should note that effects of daylight devices are more likely to be expected in rooms with a low daylight factor, and therefore, with a low feasibility of lighting.
For top window (toplights and high side lights), if they were provided with the deliberate intention of using daylight they can be considered as daylight devices, but in the residential and accommodation portions of Hsp, Htl and Apt, the assessment applies to a representative private area of the standard floor, so toplights cannot be evaluated when present only on the top floor. For the <Entire Building and Common Area>, toplights and high side lights are evaluated if they were deliberately provided for the purpose of using daylight in common portions.

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3.2 Anti-glare Measures

3.2.1 Daylight Control

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

<Entire Building and Common Area>	
Building type	Off・Sch (Univ., etc.)・Fct・Hsp・Htl・Apt
Level 1	No countermeasures.
Level 2	Glare is controlled with screens, awnings and eaves.
Level 3	Glare is controlled with blinds, or by a combination of any two among screens, awnings and eaves.
Level 4	Glare is controlled with blinds, together with any of one among screens, awnings and eaves.
Level 5	Glare is controlled with automatically-controlled blinds.
Building type	Sch (E.S./J.H.S./ H.S)
Level 1	No countermeasures.
Level 2	(No corresponding level)
Level 3	Glare is controlled with screens, awnings and eaves.
Level 4	Glare is controlled with blinds or any combination of two or more fixtures including curtains, screens, awnings and eaves
Level 5	Glare is controlled with blinds and at least one other fixture, including curtains, screens, awnings and eaves

<Dwelling and Accommodation Area>	
Building type	Hsp・Htl・Apt
Level 1	No countermeasures.
Level 2	(No corresponding level)
Level 3	Glare is controlled with curtains, screens, awnings and eaves.
Level 4	Glare is controlled with blinds, or a combination of any two among curtains, screens, awnings and eaves.
Level 5	Glare is controlled with blinds, together with any of one among curtains, screens, awnings and eaves.

☐Commentary

The assessment is carried out regarding glare countermeasures at window portions exposed to direct daylight or high brightness from outside, focusing on whether there are eaves around the opening, awnings (shading tents and window shades), screens, curtains, sunblinds, shading and the like. Buildings are highly rated when they have a high degree of control over direct sunlight according to the position of the sun (sunshine control performance) or brightness control performance. Especially in terms of rooms having a high daylight factor, the daylight control needs to be taken into consideration. Moreover, daylight devices that also have daylight control effects such as a light shelf may be evaluated with respect to both aspects.

Further, automatically regulated blinds and the like include those that control the angle of individual blades of a sunblind depending on the position of the sun, and those that adjust the transmittance of windows automatically according to the temperature and other factors in order to control the level of brightness.

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For evaluating housing portions of Apartments, most curtains, screens, awnings, blinds, shades and similar elements are installed by the residents, but curtains, but curtains should be included in assessment if there are installed curtain rails (boxes). For eaves (including balconies), a condition for assessment is that they should be present on all floors.

3.2.2 Reflection Control

This category is excluded from assessments in CASBEE-BD/NC.

3.3 Illuminance Level

Off・Sch・Rtl・Rst・**Hal**・Fct・Hsp・Htl・Apt

! Application condition

For Halls, only library is applicable for this item. For Hal (Lib.), evaluate the reading room only.
For common areas of Hsp, evaluate the both outpatients waiting rooms and doctor's offices. Note that the assessment criteria differ between outpatient waiting rooms and doctor's offices.
In the <Dwelling and Accommodation Area> of Apt, lighting equipment is excluded from assessment if it is installed by occupants.

<Entire Building and Common Area>			
Building type	Off・Hal (Lib.)・Hsp (Doctor's Off.)・Fct	Sch	Hsp(Waiting Room)
Level 1	(No corresponding level)	[Illuminance] < 300 lx	[Illuminance] < 150 lx
Level 2	[Illuminance] <300 lx, or 1,000 lx ≦ [Illuminance]	(No corresponding level)	(No corresponding level)
Level 3	Overall lighting system: 300 lx ≦ [Illuminance] < 500 lx; In cases of the task/ambient lighting system or its equivalent, and the task illuminance is more than 300 lx and less than 500 lx, or the ambient illuminance is less than 1/3 or more than 2/3 of the task illuminance	300 lx ≦ [Illuminance] < 500 lx, or 750 lx ≦ [Illuminance]	150 lx ≦ [Illuminance]
Level 4	Overall lighting system: 500 lx ≦ [Illuminance] < 1,000 lx; In cases of the task/ambient lighting system or its equivalent, the task illuminance is more than 500 lx and less than 1,000 lx, and the ambient illuminance is more than 1/3 and less than 2/3 of the task illuminance	500 lx ≦ [Illuminance] < 750 lx	Equivalent to level 3 and 100 lx ≦ [vertical illuminance] for walls
Level 5	In cases of the task/ambient lighting system or its equivalent, -the task illuminance is more than 500 lx and less than 1,000 lx, and -the ambient illuminance is more than 1/3 and less than 2/3 of the task illuminance, and -the illuminance of vertical surfaces of the walls is 100 lx or more and the reflectance is 30% or more, or horizontal surfaces of the ceiling is 100 lx or more and the reflectivity is 50% or more.	(No corresponding level)	(No corresponding level)

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Building type	Htl	Apt
Level 1	[Illuminance] < 100 lx	[Illuminance] < 100 lx
Level 2	(No corresponding level)	(No corresponding level)
Level 3	100 lx ≦ [Illuminance]	100 lx ≦ [Illuminance]
Level 4	(No corresponding level)	Equivalent to level 3 and 100 lx ≦ [vertical illuminance] for walls
Level 5	(No corresponding level)	(No corresponding level)

<Dwelling and Accommodation Area>		
Building type	Hsp	Htl・Apt
Level 1	[Illuminance] < 150 lx	[Illuminance] < 100 lx
Level 2	(No corresponding level)	(No corresponding level)
Level 3	150 lx ≦ [Illuminance]	100 lx ≦ [Illuminance]
Level 4	Equivalent to level 3 and a [vertical illuminance] for walls of 100 lx or higher	(No corresponding level)
Level 5	(No corresponding level)	Equivalent to level 3 and individual controls of multiple devices*

* In the assessment of balanced illuminance contrast, evaluate the average illuminance value of the task and ambient zones.

☐Commentary

The assessment focuses on the indoor brightness on desktop surfaces (approximately 80 cm above the floor), according to the illuminance of horizontal surfaces (Lux).

In cases where facility use is limited to daytime hours, such as Sch, apply lux values based on a minimum daylight level.

Level 3 and Level 4 given to Off, Hal (Lib.), Hsp (Doctor's Off.) and Fct are evaluated based on, in cases of general lighting, the illuminance of horizontal surfaces on the desktop surface inside the room. In cases of the task/ambient lighting system (a system in which a necessary level of brightness for visual working spaces is secured by task lighting and in terms of non-visual working spaces, lighting having a lower level of illuminance compared to the one used for the visual working spaces is provided with ambient lighting) or its equivalent (a system in which the task illuminance may be adjusted according to the work contents or preferences of the user), the assessment is based on the level of task illuminance and ambient illuminance. Level 4 is given when the appropriate range of task illuminance and ambient illuminance is provided. Level 3 is given when the level of illuminance does not fall within such range. Level 5 is given when the appropriate range of illuminance in the task/ambient lighting system or its equivalent is provided as well as when the lighting plan aims to secure brightness by illuminating the walls and the ceiling, which occupy a large proportion of the field of view, with a certain amount of illuminance on each surface with a certain reflectance or higher. *1.

In this assessment, task illuminance level is the horizontal illuminance on desk surfaces and ambient illuminance level is the horizontal illuminance of non-task areas surrounding task zones (approximately 80 cm above the floor).

For the <Entire Building and Common Area> of Hsp (waiting rooms) and Apt and <Dwelling and Accommodation Area> of Hsp, level 4 is awarded where the lighting system provides an appropriate horizontal illuminance and also allows individual on/off controls of multiple lighting devices*2. For the <Residential and Accommodation Properties> of Apt, evaluate based on the most principal room of the unit.

Furthermore, when using an overall lighting system, illuminance exceeding 1,000 lx for Off and 750 lx for Sch is considered too high, and not appropriate. For a task/ambient lighting system where illuminance does not correspond to level 4 and 5, award level 3 with respect to illuminance balance.

*1 Evaluation of the vertical illuminance of walls and horizontal illuminance of ceilings in level 4 to 5 using an illuminance distribution map is recommended. Such illuminance distribution diagram may be derived by using any of the commercial or free software.

*2 In hotels and apartments, a system that creates a detailed illuminance environment specific to in-room activities by placement of multiple devices with low power consumption is referred to as a multi-lighting system in the Technical Guidelines for Housing Illumination.

■Bibliography 20), 21), 22), 23), 24)

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3.4 Lighting Controllability

Off・Sch・Rtl・Rst・**Hal**・Fct・Hsp・Htl・Apt

! Application condition

For Hal (oth.), only museums and exhibition facilities are applicable, and only the exhibition rooms will be evaluated.

For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

In the <Dwelling and Accommodation Area> of Apt, lighting equipment is excluded from assessment if it is installed by occupants.

<Entire Building and Common Area>		
Building type	Off・Sch (Univ., etc.)・Rtl・Hal (oth.)・Fct・Hsp・Htl・Apt	Sch (E.S./J.H.S./ H.S)
Level 1	Lighting control is not zoned and no control panel/devices are available for adjustment	Lighting control is not zoned in accordance with illuminance levels and learning methods
Level 2	(No corresponding level)	(No corresponding level)
Level 3	Lighting control per four-task unit is available or control panel/devices are available for adjustment	Lighting control is zoned in accordance with illuminance levels and learning methods, and on/off control by the occupants is available
Level 4	(No corresponding level)	(No corresponding level)
Level 5	Lighting control per task unit is available and adjustment via computer terminal/remote control or automatic control is available	Level 3 is satisfied and automatic lighting adjustment is partially available

<Dwelling and Accommodation Area>		
Building type	Hsp	Htl・Apt
Level 1	No lighting control is available	No lighting control is available
Level 2	(No corresponding level)	(No corresponding level)
Level 3	Lighting control per multi-bed unit is available or control panel/devices for adjustment are available	Control panel/devices are available for broad lighting adjustment for the entire room
Level 4	(No corresponding level)	(No corresponding level)
Level 5	Detailed lighting control per bed is available	Detailed lighting control per multi-zone unit is available via computer terminal/remote control OR automatic control system

☐Commentary

Lighting controllability refers to the level of control over brightness, color, temperatures and lighting positions in a room by on/off switching and light adjustment. In this assessment, evaluation is based on the minimum area in a room for which lighting control is available and on methods of control (manual/automatic). A higher assessment level is awarded for detailed lighting control or automatic control systems.

In Off, a task unit refers to an area consisting of connected desks for a single task, or a single span where the task boundary is difficult to determine based on desk layout. In Apt, a multi-zone unit is used for an area where partial lighting is available in accordance with the location and movements of occupants. For Hsp, level 1 is awarded where lighting can only be turned on/off or adjusted for the whole area despite the need for partial lighting control.

For Sch (Univ., etc.), assessment criteria equivalent to Off are applied, assuming large-capacity classrooms. Sch (E.S./J.H.S./ H.S) have smaller classrooms. As such, evaluate lighting control systems based mainly on daylight control.

In the basic design phase, the target performance is subject to the assessment.

■Bibliography 24)

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4. Air Quality

4.1 Source Control

- Note; Cutting off pollutants at source is a sure and effective way of maintaining healthy indoor air. Thus, the first consideration is to minimize the emission of pollutants from the building and its equipment. In that sense, source control is more important than ventilation and operation plan and management.
  The most effective method for maintaining healthy indoor air is to totally minimize the emission of pollutants from the building and its equipment, but in many cases that ideal must be balanced against cost and design considerations to permit some level of emission. In such cases, adequate ventilation can be planned to improve the air quality. Rather than conveniently relying on operation and management or automatic control, it is important to give careful consideration to the baseline quality of the outside air, the volume of outside air, zoning and other issues. It is also important to give the occupants some degree of scope for controlling their own ventilation.

4.1.1 Chemical Pollutants

Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt

! Application condition

For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated.

For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

<Entire Building and Common Area>	
Building type	Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	Satisfies the Building Standard Law.
Level 4	The Building Standard Law is satisfied and building materials not regulated under the Building Standard Law (i.e. materials not included in its directives and materials with JIS/JAS F-4 star rating) are used in at least 70% of the total area of floors, walls, ceilings and attics.
Level 5	The Building Standard Law is satisfied and building materials not regulated under the Building Standard Law (i.e. materials not included in its directives and materials with JIS/JAS F-4 star rating) are used in at least 90% of the total area of floors, walls, ceilings and attics; most material used has a low level of formaldehyde and other VOC emissions.

<Dwelling and Accommodation Area>	
Building type	Hsp · Htl · Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	Satisfies the Building Standard Law.
Level 4	The Building Standard Law is satisfied and building materials not regulated under the Building Standard Law (i.e. materials not included in its directives and materials with JIS/JAS F-4 star rating) are used in at least 70% of the total area of floors, walls, ceilings and attics.
Level 5	The Building Standard Law is satisfied and building materials not regulated under the Building Standard Law (i.e. materials not included in its directives and materials with JIS/JAS F-4 star rating) are used in at least 90% of the total area of floors, walls, ceilings and attics; most material used has a low level of formaldehyde and other VOC emissions.

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☐Commentary

Evaluate whether adequate measures have been taken to avoid air pollution by chemical pollutants. Since the 1980s, Sick Building Syndrome has become a major problem in Europe and North America. It was triggered by changes in the materials used in buildings and a rapid reduction in the volume of air ventilation, which was intended to save energy in offices. In Japan the existence of the Law for Maintenance of Sanitation in Buildings Building Environmental Health Law has prevented Sick Building Syndrome from becoming such an extreme phenomenon. Instead, Sick House Syndrome has become a major problem in houses which rely on natural ventilation, and the problem has even emerged in "sick schools." The Ministry of Health, Labor and Welfare (MHLW) has responded by publishing concentration guideline values for chemical pollutants and pursuing various avenues of research, leading to the revision of the Building Standard Law.

For this assessment, an ordinary level of design that satisfies the Building Standard Law, which is mainly derived from consideration of chemical pollutants, receives a level 3 score. More strenuous efforts will be awarded higher scores. Level 4 will be awarded in cases where nearly all construction materials not subject to regulation under the Building Standard Law (construction materials not covered by directives and having F☆☆☆☆ JIS/JAS standard rating) throughout (at least 70% by area of floors, walls, ceilings and ceiling voids) are used. Level 5 requires a level closer to perfection, using construction materials not subject to regulation under the Building Standard Law (construction materials not covered by directives and having F☆☆☆☆ JIS/JAS standard rating) throughout (at least 90% by area of floors, walls, ceilings and ceiling voids). The materials must also have low emission levels of VOCs other than formaldehyde.
Calculate ceiling void area as below.

Area of ceiling void = Area of wall surface facing the ceiling void
+ Area of ceiling material facing the ceiling void*
+ Area of the roof or underside of the next floor
* Doubled because the ceiling material on the room interior side is also counted

■Bibliography 25), 26), 27), 28), 29), 30)

4.1.2 Asbestos

This is excluded from assessment in CASBEE-BD/NC.

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4.2 Ventilation

4.2.1 Ventilation Rate

Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt

! Application condition

For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated.

For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

<Entire Building and Common Area>		
Building type	Off · Sch (Univ., etc.) · Rtl · Rst · Hal · Hsp · Htl · Fct · Apt	Sch (E.S./J.H.S./ H.S)
Level 1	Not adequate for level 3.	(No corresponding level)
Level 2	(No corresponding level)	(No corresponding level)
Level 3	For rooms equipped with a centrally-controlled air mixing system, a ventilation rate of 25 m^3/h per person or higher; or if not centrally controlled, a ventilation rate as required in the Building Standard Law (including measures for sick house syndrome) and the Law for Maintenance of Sanitation in Buildings.	Ventilation rate required in the Building Standard Law (including measures for sick house syndrome) and the School Sanitation Standards.
Level 4	For rooms equipped with a centrally-controlled air mixing system, a ventilation rate of 30 m^3/h per person or higher; or if not centrally controlled, a ventilation rate 20% higher than required in the Building Standard Law (including measures for sick house syndrome) and the Law for Maintenance of Sanitation in Buildings.	Ventilation rate that is 20% higher than required in the Building Standard Law (including measures for sick house syndrome) and the School Sanitation Standards.
Level 5	For rooms equipped with a centrally-controlled air mixing system, a ventilation rate of 35 m^3/h per person or higher; or if not centrally controlled, a ventilation rate 40% higher than required in the Building Standard Law (including measures for sick house syndrome) and the Law for Maintenance of Sanitation in Buildings.	Ventilation rate that is 40% higher than required in the Building Standard Law (including measures for sick house syndrome) and the School Sanitation Standards.

<Dwelling and Accommodation Area>	
Building type	Hsp · Htl · Apt
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	For rooms equipped with a centrally-controlled air mixing system, a ventilation rate of 25 m^3/h per person or higher; or if not centrally controlled, a ventilation rate required in the Building Standard Law (including measures for sick house syndrome) and the Law for Maintenance of Sanitation in Buildings.
Level 4	For rooms equipped with a centrally-controlled air mixing system, a ventilation rate of 30 m^3/h per person or higher; or if not centrally controlled, a ventilation rate 20% higher than required in the Building Standard Law (including measures for sick house syndrome) and the Law for Maintenance of Sanitation in Buildings.
Level 5	For rooms equipped with a centrally-controlled air mixing system, a ventilation rate of 35 m^3/h per person or higher; or if not centrally controlled, a ventilation rate 40% higher than required in the Building Standard Law (including measures for sick house syndrome) and the Law for Maintenance of Sanitation in Buildings.

☐Commentary

Evaluate according to whether there is an adequate volume of ventilation.

Level 3 satisfies the ventilation rates required in the Building Standard Law, the Law for Maintenance of Sanitation in Buildings and the School Sanitation Standards. Level 4 is awarded when a centrally-controlled air mixing system with a ventilation rate that satisfies the SHASE-S102-2003 Ventilation Standard and Commentary (generally 30 m^3/h or higher per person) is installed. A higher level is

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awarded when air quality improvement measures are actively undertaken. While this assessment is based on ventilation rates, a localized air exhaust system at pollution sources is also important in practice. In an office building, for example, zones which generate pollutants (e.g. cafeteria, graphic production area, printing room) require a fully-segregated ventilation system.
■Bibliography 25), 31)

4.2.2 Natural Ventilation Performance

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition
Level 3 is awarded in cases where only mechanical ventilation is available, with fixed windows and no valid opening for natural ventilation.
For Halls, only library is applicable for this item. For Hal (Lib.), evaluate the reading room only.

<Entire Building and Common Area>		
Building type	Off・Sch (Univ., etc.)・Hal (Lib.)・Fct	Sch (E.S./J.H.S./ H.S)
Level 1	Not adequate for level 3.	Not adequate for level 3.
Level 2	(No corresponding level)	(No corresponding level)
Level 3	Fixed windows and no valid opening for natural ventilation; or fixed windows and valid opening area for natural ventilation of less than 25 cm^2/m^2; or openable windows and valid opening area for natural ventilation of at least 1/50 of the total floor space of an occupied room.	Valid opening area for natural ventilation of at least 1/20 of the total floor space of an occupied room.
Level 4	Fixed windows and valid opening area for natural ventilation of at least 25 cm^2/m^2; or openable windows and valid opening area for natural ventilation of at least 1/30 of the total floor space of an occupied room; or where in-room air quality improvement is expected with use of outdoor air cooling system which can use more than double the required outdoor air volume.	Valid opening area for natural ventilation of at least 1/15 of the total floor space of an occupied room.
Level 5	Fixed windows and valid opening area for natural ventilation of at least 50 cm^2/m^2; or openable windows and valid opening area for natural ventilation of at least 1/15 of the total floor space of an occupied room; or valid opening area for natural ventilation is equivalent to Level 4, and in-room air quality improvement is expected with use of outdoor air cooling system that can use more than double the required outdoor air volume.	Valid opening area for natural ventilation of at least 1/10 of the total floor space of an occupied room.

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<Dwelling and Accommodation Area>		
Building type	Hsp·Htl	Apt
Level 1	Not adequate for level 3.	Not adequate for level 3.
Level 2	(No corresponding level)	(No corresponding level)
Level 3	Fixed windows and no valid opening for natural ventilation; or fixed windows and valid opening area for natural ventilation of less than 50 cm^2/m^2; or openable windows and valid opening area for natural ventilation of at least 1/20 of the total floor space of an occupied room.	Area of openable windows at least 1/10 of floor space of occupied room.
Level 4	Fixed windows and valid opening area for natural ventilation of at least 50 cm^2/m^2; or openable windows and valid opening area for natural ventilation of at least 1/15 of the total floor space of an occupied room; or where in-room air quality improvement is expected with use of outdoor air cooling system which can use more than double the required outdoor air volume.	Area of openable windows at least 1/8 of floor space of occupied room.
Level 5	Fixed windows and valid opening area for natural ventilation of at least 100 cm^2/m^2; or openable windows and valid opening area for natural ventilation of at least 1/10 of the total floor space of an occupied room; or valid opening area for natural ventilation is equivalent to Level 4, and in-room air quality improvement is expected with use of outdoor air cooling system that can use more than double the required outdoor air volume.	Area of openable windows at least 1/6 of floor space of occupied room.

☐Commentary

Evaluate whether enough openable windows are provided.

It is basically a precondition that air conditioning and ventilation equipment should provide the necessary volume of outside air. Nevertheless, there are still cases where the usage of a room causes pollutant emission to temporarily exceed expectations, or where the pollutant concentration is no problem, but occupants' physical condition or other factors make them want to temporarily improve air quality by bringing in outside air. Opening windows to bring in natural ventilation is important, as it gives occupants the power to control ventilation for their own needs at will. Smoke vents are designed to operate on natural ventilation, so if they can be opened and shut easily and the occupants can use that at will at any time, they can be regarded as natural ventilation openings for this purpose. Furthermore, an outdoor air cooling system is mainly intended for energy efficiency. However, level 4 is awarded when the system can also be used to improve in-room air quality.

In assessing openable windows referred to in residential sections, evaluate the area of non-fixed windows for Apt. In this way the area of sliding windows does not need to be halved. Also, assessment of an Apt building is based on a representative dwelling unit. Evaluate individual rooms in the unit and award the appropriate level based on the room with the lowest performance. For other building types, evaluate the entire standard floor or another representative floor.

■Bibliography 32), 33)

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4.2.3 Consideration for Outside Air Intake

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

Exclude from assessment if there is no ventilation equipment in the building.

For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated.

For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

<Entire Building and Common Area>	
Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also oriented away from extraction vents or positioned at least 3 m away.
Level 4	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also positioned at least 6 m away from extraction vents.
Level 5	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also oriented away from extraction vents and positioned at least 6 m away.
Building type	Apt
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site.
Level 4	(No corresponding level)
Level 5	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also oriented away from extraction vents or positioned at least 3 m away.

<Dwelling and Accommodation Area>	
Building type	Hsp・Htl
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also oriented away from extraction vents or positioned at least 3 m away.
Level 4	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also positioned at least 6 m away from extraction vents.
Level 5	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also oriented away from extraction vents and positioned at least 6 m away.

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Building type	Apt
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site.
Level 4	(No corresponding level)
Level 5	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also oriented away from extraction vents or positioned at least 3 m away.

☐Commentary
Outside air intakes should be designed to take in the best outside air available. Pollution sources should be taken to mean cars, factories, waste heat and air collected from adjacent buildings or the subject building, cooling towers, garbage collection areas, and other sources based on other circumstances specific to the site concerned. Consider also the positional relationships between waste air vents and outside air intakes on each floor and in each dwelling of the subject building. Exclude from assessment if there is no ventilation equipment in the building (window ventilation).
■Bibliography 34)

4.3 Operation Plan

4.3.1 CO_2 Monitoring

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition
Exclude from assessment if the Law for Maintenance of Sanitation in Buildings does not apply to the subject building.
For Hal (Lib.), evaluate the reading room only. For Hal (O.D.), evaluate the various administrative offices. For Hal (oth.), as for museums and exhibition facilities, only the exhibition rooms will be evaluated.

<Entire Building and Common Area>	
Building type	Off・Sch・Rtl・Rst・Hal・Fct
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	The system is based on manual measurement, with the minimum necessary level of recording.
Level 4	The system is based on manual measurement, a management manual, etc. has been provided for properly maintaining air quality, and it functions effectively.
Level 5	The system has constant central monitoring of CO_2. Also, a management manual, etc. has been provided for properly maintaining air quality, and it functions effectively.

<Dwelling and Accommodation Area> Inapplicable

☐Commentary
Evaluate whether a system has been instituted for properly maintaining air quality, and whether the system functions effectively. Under the Law for Maintenance of Sanitation in Buildings, CO_2 monitoring is to consist of regular manual monitoring, but that should be regarded as minimum management. There are variations over time and between seasons in the quality of indoor and outside air, and temporary malfunctions of the equipment can also occur. Therefore, a constant monitoring system for CO_2 is desirable wherever possible.
■Bibliography 35)

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4.3.2 Control of Smoking

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition; For common areas of Hsp, evaluate only outpatient waiting rooms.

<Entire Building and Common Area>	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp(Waiting Room)・Htl
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	There is a minimum level of measures, such as smoking booths, to avoid exposing non-smokers to smoke.
Level 4	(No corresponding level)
Level 5	Smoking is confirmed to be prohibited in the entire building. Alternatively, there is an adequate level of measures, such as smoking booths, to avoid exposing non-smokers to smoke.

<Dwelling and Accommodation Area> Inapplicable

☐Commentary

Evaluate whether thorough measures have been taken to avoid passive smoking.

Tobacco smoke contains many pollutants, including nicotine, carbon monoxide and particulates, causing the problem of passive smoking of smoke from smokers and their cigarettes. At the same time, there is the problem of the odor of tobacco smoke. Therefore, as a minimum measure there should be smoking booths with direct extraction of smoke to the outside, with no recirculation to other indoor spaces. For level 5, smoking must be prohibited in the entire building, or, if there are smoking booths, they must be entirely isolated from other spaces, including via ceiling voids, to prevent any smoke dispersion to other space, with a constant negative pressure maintained in them.

■Bibliography 35)

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Q2 Quality of Service

1. Service Ability

1.1 Functionality & Usability

1.1.1 Provision of Space & Storage

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

<Entire Building and Common Area>	
Building type	Off・Fct
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	Working space* per person is at least 6 m^2.
Level 4	Working space* per person is at least 9 m^2.
Level 5	Working space* per person is at least 12 m^2

* Working space refers to floor area allocated within the effective floor area of the office for ordinary workers to go about their daily duties. It does not include common spaces such as canteens, medical rooms, conference rooms, meeting rooms, private executive offices, filing rooms, space for refreshment (see 1.2.2) and similar spaces. Therefore, the working space includes meeting spaces (spaces for day-to-day discussions), OA equipment spaces, management spaces, circulation spaces, etc.

<Dwelling and Accommodation Area>		
Building type	Hsp	Htl
Level 1	Not adequate for level 3.	Not adequate for level 3.
Level 2	(No corresponding level)	(No corresponding level)
Level 3	Private rooms at least 8 m^2/bed, multi-bed rooms at least 6 m^2/bed.	Single room at least 15 m^2, twin room at least 22 m^2.
Level 4	(No corresponding level)	Single room at least 22 m^2, twin room at least 32 m^2.
Level 5	Private rooms at least 10 m^2/bed, multi-bed rooms at least 8 m^2/bed.	Single room at least 30 m^2, twin room at least 40 m^2.

☐Commentary

The primary aspect of interior service ability functionality and ease of use concerns spaciousness and storage capacity. The spaciousness used here as an assessment indicator is not necessarily directly linked to functionality and storage space, but its effects, such as giving more freedom in layout of fixtures and allowing enough space for storage, can easily be imagined. Level 3 is the bare minimum currently required by related regulations in normal circumstances, while level 5 is regarded as extremely spacious, with reference to past examples.

Use the effective measurements (internal dimension) to calculate the area subject to assessment.

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1.1.2 Use of Advanced Information System

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

<Entire Building and Common Area>	
Building type	Off・Fct
Level 1	Not adequate for level 2.
Level 2	Measures such as OA floors* accommodate layout changes, and electrical sockets for OA equipment have at least 30 VA/m^2 socket capacity. In addition, optical fiber is routed into the building for communications.
Level 3	Measures such as OA floors accommodate layout changes, and electrical sockets for OA equipment have at least 30 VA/m^2 socket capacity. Also, level 2 is satisfied for communications, and communications lines with capacity for one data communications device per 8 m^2 (one phone, one PC) is routed onto each floor.
Level 4	Measures such as OA floors accommodate layout changes, and electrical sockets for OA equipment have at least 40 VA/m^2 socket capacity. Also, level 3 is satisfied for communications, lines for multiple communications carriers are routed into the building, and space is provided for each communications carrier to lay cables onto each floor.
Level 5	Measures such as OA floors accommodate layout changes, and electrical sockets for OA equipment have at least 50 VA/m^2 socket capacity. Also, level 4 is satisfied for communications, Gigabit communications lines are routed onto each floor, and tenant EPS is ensured for communications between floors.

<Dwelling and Accommodation Area>	
Building type	Htl・Apt
Level 1	Not adequate for level 2.
Level 2	Communications lines able to carry telephone and broadcasting are routed into each dwelling or guest room.
Level 3	Level 2 is satisfied, and Internet services not adequate for level 4 are provided.
Level 4	Each dwelling or guest room is equipped with a communications environment able to use 100 Mbit-class broadband.
Level 5	Each dwelling or guest room is equipped with a communications environment able to use Gbit-class broadband.

* OA floors refer to raised-access system floors. Structures with equivalent functions can be included in this category.

☐Commentary

In a highly computerized society, the installation of IT equipment is essential for all functional space in buildings. Measures in offices should go beyond just increasing the capacity of the sockets. As much consideration as possible should be given to the building and its services to facilitate the addition of IT equipment, and the relocation of such equipment for layout changes. Level 3 is the level currently demanded in normal circumstances, while level 5 requires a more active approach. For communications in office buildings, level 3 or better requires vertical cabling within the building, and level 5 requires capacity for Gigabit communications. The communications media corresponding to these levels are optical fiber and LAN cables. Guidelines for optical fibers have been written by the NPO Optical Fiber Promotion Council.

Since June 2005, it has become permissible to install optical fiber cable within service shafts.

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1.1.3 Barrier-free Planning

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

<Entire Building and Common Area>		
Building type	Sch (Public E.S./ Public J.H.S)・Rtl・Rst・Hal・Hsp・Htl (building with a total floor space of more than 2,000 m^2)	Off・Sch (Except Public E.S./Public J.H.S)・Fct・Apt AND Sch (Public E.S./ Public J.H.S)・Rtl・Rst・Hal・Hsp・Htl (building with a total floor space of less than 2,000 m^2)
Level 1	Not adequate for level 3.	Not adequate for level 3.
Level 2	(No corresponding level)	(No corresponding level)
Level 3	The building satisfies the standard for easing building use (the minimum level) under the Barrier-free Building Law.	At least half of the building satisfies the standard for easing building use (the minimum level) under the Barrier-free Building Law.
Level 4	The building satisfies the standard for easing building use (the preferred level) under the Barrier-free Building Law.	The building satisfies the standard for easing building use (the minimum level) under the Barrier-free Building Law.
Level 5	The building exceeds the standard for easing and guiding building use (the preferred level) under the Barrier-free Building Law, achieving the universal design level.	The building satisfies the standard for easing building use (the desirable level) under the Barrier-free Building Law.

<Dwelling and Accommodation Area> Inapplicable

☐Commentary

Functional building must be open to all people who have the possibility of using it.

The Barrier-free Building Law (Act on Promotion of Smooth Transportation, etc. of Elderly Persons, Disabled Persons, etc.) sets mandatory minimum standards for easing and guiding building use (the preferred level) for all Rtl, Rst, Hal, Hsp, Htl, and similar facilities of 2,000 m^2 or more that are used by the general public.

As a mandatory goal to work towards, there is also the standard for easing and guiding building use (the preferred level), which is intended to allow the use of the building without significant impediment. For this item, evaluate compliance with the Barrier-free Building Law in the Entire Building and Common Area.

When determining whether at least half of the building satisfies criteria specified in the Building Standards for Mobility Facilitation, use the criteria checklist to determine if at least half of the items are applicable by the appropriate consideration during building planning.

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1.2 Amenity

1.2.1 Perceived Spaciousness & Access to View

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

<Entire Building and Common Area>		
Building type	Off・Fct	Rtl・Rst
Level 1	Not adequate for level 3.	Not adequate for level 3.
Level 2	(No corresponding level)	(No corresponding level)
Level 3	Ceiling height of at least 2.5 m in office space and windows provide all occupants with sufficient awareness of the outside environment.	Ceiling height at least 3.0 m in sales area.
Level 4	Ceiling height of at least 2.7 m in office space and windows provide all occupants with sufficient awareness of the outside environment.	Ceiling height at least 3.3 m in sales area.
Level 5	Ceiling height of at least 2.9 m in office space and windows provide all occupants with sufficient awareness of outside the environment.	Ceiling height at least 3.6 m in sales area.
Building type	Sch (Univ., etc.)	Sch (E.S./J.H.S./ H.S)
Level 1	Not adequate for level 2.	Not adequate for level 3.
Level 2	Ceiling height of at least 2.7 m in classrooms.	(No corresponding level)
Level 3	Ceiling height of at least 3.0 m in classrooms.	Ceiling height at least 2.7 m in most classrooms.
Level 4	Ceiling height of at least 3.1 m in classrooms.	(No corresponding level)
Level 5	Ceiling height of at least 3.2 m in classrooms.	Ceiling height exceeding 2.7 m in classrooms.

<Dwelling and Accommodation Area>	
Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	Ceiling height at least 2.3 m in Dwelling and Accommodation Area.
Level 4	Ceiling height at least 2.5 m in Dwelling and Accommodation Area.
Level 5	Ceiling height at least 2.7 m in Dwelling and Accommodation Area.

☐Commentary

Buildings should be evaluated from the point of view that spaces that are perceived as spacious by their users and offer them good views are psychologically comfortable. Evaluate flat ceiling height, taking beam shape into account. The ceiling height indicator used here is not necessarily directly explanatory of comfort, but it appears to be effective in imparting various benefits, such as a sense of space and openness. Level 3 is the bare minimum currently required by related regulations in normal circumstances, while level 5 is regarded as extremely high, with reference to past examples.

If an elementary school has multiple ceiling heights specific to grades, the ceiling height of the highest grade can be applied.

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1.2.2 Space for Refreshment

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

- Note; When refreshment space is divided from working space by partitions, plants or other elements, it must be excluded from the working space floor area evaluated in “1.1.1 Provision of Space & Storage.”

<Entire Building and Common Area>		
Building type	Off・Fct	Rtl
Level 1	(No corresponding level)	(No corresponding level)
Level 2	There is no refreshment space.	Not adequate for level 3.
Level 3	Refreshment space is less than 1% of the working space.	Rest space is at least 2% of the sales floor area.
Level 4	Refreshment space is at least 1% of the working space.	Rest space is at least 3% of the sales floor area
Level 5	Refreshment space accounts for at least 1% of the working space and refreshment equipment such as a vending machine is provided.	Rest space is at least 4% of the sales floor area.

☐Commentary

Office work is often highly stressful, and with the increasing use of IT there is more time spent concentrating on the computer screen. The ability to go for relaxation and refreshment is essential for comfortable office life. Space for refreshment in offices generate new vitality in occupants. Many users spend extended periods in retail facilities, so a generous allowance of rest space for them would enhance their comfort.

Levels of multi-tenant buildings may be determined as to whether their facility planning and other related factors are on the premise of providing refreshment space (including sports facilities, outdoor terrace spaces, etc.) as well as other refreshment equipment such as vending machines.

The refreshment space includes sports facilities, outdoor terrace spaces and the like. The vending machines refer to facilities that provide drinks and snacks effective for refreshment. Other services and systems that would provide similar functions shall also be included in the assessment.

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1.2.3 Décor Planning

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

For common areas of Hsp, evaluate the both outpatient waiting rooms and doctor's offices (assessment criteria are common to both).

<Entire Building and Common Area>	
Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	Two of the efforts to be evaluated are addressed.
Level 4	Three of the efforts to be evaluated are addressed.
Level 5	Four of the efforts to be evaluated are addressed.
<Dwelling and Accommodation Area>	
Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	Two of the efforts to be evaluated are addressed.
Level 4	Three of the efforts to be evaluated are addressed.
Level 5	Four of the efforts to be evaluated are addressed.

Efforts to be evaluated

No.	Description
1	The concept of the building as a whole is well defined, and specific efforts to reflect the concept are made at the décor planning stage. (For example, shifting to natural and ecological materials in a building with an ecological theme).
2	The functions required of the building have been clarified, and specific measures to encourage those functions are indicated at the décor planning stage. (For example, in Hotels and similar facilities, the interior is perceived as living space, and natural materials such as wood and stone are introduced in deliberate efforts to produce a living room-like atmosphere).
3	Specific measures were taken during décor planning to integrate the lighting design (e.g. effective use of indirect lighting specific to activity type, décor planning in consideration of color temperatures of a light source, etc.).
4	Mockups and interior perspectives are used to verify the décor planning in advance.

☐Commentary

There is no general standard for interior planning, so it is very difficult to evaluate this item. However, it is an essential assessment item for the creation of attractive and pleasant spaces. Evaluate whether or not there are specific efforts here that consider the concept or functions of the entire building.

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1.3 Maintenance

- Note; Under the Law for Maintenance of Sanitation in Buildings (Building Sanitation Law), specified buildings are subject to the Sanitation Management Standards for Buildings. Standards require that the specified buildings include measures to maintain a healthy environment, such as air conditioning and water supply management systems. Furthermore, buildings not included in the specified building category but which have many users are also required to have management systems equivalent to the specified buildings. In this assessment, maintenance includes cleaning management (i.e. cleaning inside and outside the building) and public health management (i.e. air environment, water supply/drainage, pest control, waste disposal), as referred to in the Sanitation Management Standards for Buildings.

1.3.1 Design That Considers Maintenance

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

<Entire Building and Common Area>	
Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	Building plan includes insufficient level of consideration of maintenance. (Not adequate for level 3.)
Level 3	Building plan includes standard level of consideration of maintenance. (3-5 of the efforts to be evaluated are addressed.)
Level 4	Building plan includes higher-than-standard level of consideration of maintenance. (6-8 of the efforts to be evaluated are addressed.)
Level 5	Building plan includes excellent level of consideration of maintenance. (More than 9 of the efforts to be evaluated are addressed.)

<Dwelling and Accommodation Area> Inapplicable

Efforts to be evaluated

Category	Description
I. Interior finishes	1) Interior walls use finish methods, materials, paints or coatings that are highly dirt resistant.
	2) Floors use finish methods, materials, paints or coatings that are highly dirt resistant.
II. Décor design	3) The design and structure of floors enables washing with water.
	4) Design of interior walls and floors avoids creating dust traps and places to leave objects.
	5) The first and second doors of windbreak lobbies are distanced so that they are not open at the same time, or are otherwise designed to prevent the entry of dust, etc.
	6) Floor materials with very different maintenance methods are not placed close together.
III. Exterior finishes	7) Exterior walls and glass are designed with highly dirt resistant construction materials, or with finishes such as weather-resistant paint and hydrophilic properties.
IV. Facade design	8) Exterior walls are designed to maintain clean surface conditions by preventing water pooling and wet-dry effects from rain water by using rain flashing.
	9) Measures have been applied to prevent damage from the droppings of birds (pigeons, crows, starlings, etc.).
	10) Metal parts exposed on the exterior are plated or otherwise treated against corrosion.
V. Décor & exterior space design	11) Movement routes, including outdoor spaces and management areas, are designed to eliminate steps as far as possible (steps not exceeding around 5 mm).
VI. Other	12) Wall-mounted urinal and urinal are adopted.
	13) Efforts have been made in areas other than the above, with consideration for maintenance.

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☐Commentary

The evaluation method for each effort is shown below.

1) Judging from the design documents, choose at least one from 1. Toilets, 2. Elevator halls, 3. Escalators, 4. Rest and smoking rooms, 5. Waste handling spaces, and count that as an effort if consideration has clearly been given to it consistently throughout the building.
- Dirt-prone walls are generally finished in materials that are porous and water-absorbent or water-soluble (for example, cloth wall coverings and water-based paints). However, even if porous and water absorbent materials are used, effort can be judged to have been made if structural measures have been taken to avoid dirt, or if a dirt-preventive coating is applied. Also, avoid using construction materials that are extremely susceptible to deterioration, such as mud walls, plaster and diatom earth, or, if such materials are used, make sure the structure allows easy replacement.

2) Judging from the design documents, choose at least one from 1. Toilets, 2. Rest and smoking rooms, 3. Food handling spaces, 4. Waste handling spaces, and count that as an effort if consideration has clearly been given to it consistently throughout the building.
- Dirt-prone floors are generally finished in materials that are porous and water-absorbent or water-soluble, mainly carpet, concrete and natural stone. However, even if these materials are used, effort can be judged to have been made if the materials have a water-repellent treatment or dirt-resistant coating. Also, avoid using construction materials that are extremely susceptible to deterioration, such as wood and sandstone, or, if such materials are used, make sure the structure allows easy replacement.

3) Judging from the design documents, effort can be judged to have been made if such consideration has clearly been given consistently throughout the building.
- The design and structure that allow washing with water assume daily dry cleaning using a wet mop. However, there should be no gaps or joints on the floor surface so it does not remain wet when very polluted or after regular cleaning. In the case of double floors, the materials must permit the use of water, and wiring, etc. must be waterproofed.

4) Judging from the design documents, effort can be judged to have been made if such consideration has clearly been given consistently throughout the building.
- For design to avoid dust traps and placement of objects, evaluate avoidance of protrusions and indentations wherever possible, and the use of curved finishing between walls and floor, and wall-mounted or movable structures for toilets and other fixtures.

5) Judging from the design documents, the basis for windbreak lobbies with primary and secondary doors should be to provide a space of at least 1 m in which the automatic doors will not detect movement within the lobby. If the space is less than 1 m, but the windbreak lobby has manual doors, the placement of windbreak walls, etc. can be counted as an effort.

6) Judging from the design documents, effort can be judged to have been made if such consideration has clearly been given consistently throughout the building.

[Reference examples for the assessment]

a) When floor materials for which a large amount of water should not be used for cleaning (flooring, cork, and natural fiber carpet) and those for which a large amount of water may be used for cleaning (vinyl, plastic sheets, stone, and tile carpet) are used in combination, regardless of the size of the area subject to construction, the washing water is expected to soak in from between the joints, which would cause various problems to the floor such as warps, stains and changes in color. However, if the possibility of the infiltration of washing water is taken into consideration, and the joint strip is made as wide as possible (about 5 cm), such efforts shall be included in the assessment.

b) When multiple floor materials, all of which allow water use for cleaning (vinyl, plastic sheets, stone and tile carpet), are used, if different materials are used in combination alongside each other for an extremely small space (about 30 to 50 m^2), since each material requires a different cleaning method, cleaning cycle and detergent, we cannot say that the actual maintenance and management is adequately taken into account. Therefore, ideally, when constructing the floor, a small number of materials should be used to cover as much space as possible.

In addition, the Manual for Facilities Development According to the Ordinance for Town Development in Welfare City Tokyo (revised in October 2023) indicates that the combined use of multiple floor materials that have a wide range of slip resistance (more than 0.2 in C.S.R.) should be avoided since a sudden change of slip resistance may involve the considerable risk of slipping or tripping over.

https://www.fukushi.metro.tokyo.lg.jp/documents/d/fukushi/02_kenchikubutu2kyoudouigai

7) Judging from the design documents, effort can be judged to have been made if consideration has clearly been given consistently throughout the facade design of the building.
- The design should include prevention of acid rain effects and other measures appropriate to the characteristics of the local area of the building (e.g. proximity to the sea, cold climate region).
- Unless the building is located in an area where weather resistance is particularly desirable, when high-level antifouling building materials or paints are used for the outer wall surfaces or glass portions that would save the trouble of cleaning the outer walls as much as possible, such efforts shall be taken into account in the assessment.

8) Judging from the design documents, effort can be judged to have been made if consideration has clearly been given consistently throughout the facade design of the building.

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- With respect to efforts made in the building design, if the building is designed to stay clean and avoid moisture (i.e., weathering at the opening portions or a sloping skylight that would drain rain water), such efforts shall be taken into account in the assessment.
  The difference between (7) and (8) is that the former refers to the use of stain-resistant materials and the latter refers to the stain-resistant structure.

9) Judging from the design documents, effort can be judged to have been made if consideration has clearly been given consistently throughout the cladding design for places where equipment concerned with the Sanitation Management Standard for Building contacts the outside of the building.
   - For example, avoid the installation of structural elements above water tanks where birds could shelter from rain, rest and make nests.

10) Judging from the design documents, effort can be judged to have been made if consideration has clearly been given consistently throughout the facade design of the building.
   - Metal elements such as external staircases, air conditioning equipment stands and ladders which are only painted are difficult to protect from corrosion in the long term. It is preferable to use stainless steel, or to apply anti-corrosion treatments such as plating.

11) Judging from the design documents, effort can be judged to have been made if consideration has clearly been given consistently throughout the décor design and exterior space design within the area under the management of the building.
   - A great deal of transportation of goods, devices and equipment is involved in maintenance and management; buildings designed to have as few steps or bumps as possible are rated highly in the assessment.
   - With respect to designs that have as few steps and bumps as possible, the JIS T9251 standard (2001) for guide blocks for the visually impaired (*1) specifies that the degree of unevenness should be up to 5 mm.

12) Judging from the design documents, if consideration is clear in common with the entire building, it will be an initiative.

13) Unusual efforts not included in 1)-12) above items should be evaluated as one point.
   - When evaluating "Other" efforts, state in the assessment software what kind of effort has been made, and attach documentation clearly comprehensible to a third party.

■Bibliography 51)

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1.3.2 Securing Maintenance Functions

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

Level 3 is awarded to all buildings with a total floor space of 500 m^2 or less.

<Entire Building and Common Area>	
Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	Insufficient level of measures has been taken to ensure functionality of maintenance system. (0-8 of the efforts to be evaluated are addressed.)
Level 3	Standard level of measures has been taken to ensure functionality of maintenance system. (4-6 of the efforts to be evaluated are addressed.)
Level 4	Higher than standard level of measures has been taken to ensure functionality of maintenance system. (7-9 of the efforts to be evaluated are addressed.)
Level 5	Extensive level of measures has been taken to ensure functionality of maintenance system. (More than 10 of the efforts to be evaluated are addressed.)

<Dwelling and Accommodation Area> Inapplicable

I. Efforts to be evaluated for specified buildings in the Law for Maintenance of Sanitation in Buildings

Description
[1] Adequate space has been used for cleaning staff rooms, relative to the floor area.
[2] Adequate space has been used for cleaning equipment rooms, relative to the floor area.
[3] The cleaning equipment rooms have washing areas with drainage channels to safe drainage facilities.
[4] Space is planned for washing and drying mops and rags, for the sake of hygiene.
[5] Adequate space has been provided for sorting waste, materials for recycling, and bulky garbage items, relative to the floor area, and an easy way to move those materials outside has been planned.
[6] Cleaning sinks are installed for each toilet, or for each floor.
[7] Cleaning equipment for each type of floor material has been anticipated, and the layout of electrical receptacles (numbers and spacings) for use in cleaning work has been planned accordingly.
[8] Design ensures that maintenance work can be performed safely on exterior glass and walls, air supply and vent holes, light fixtures and other fixtures in high places.
[9] Suitable levels of lighting for cleaning purposes can be set.
[10] Valves and other devices requiring day-to-day adjustment are installed in positions which allow convenient operation.
[11] Inspection access holes for equipment concealed in ceiling voids are of the necessary sizes for inspection.
[12] Equipment that is not in private areas can be accessed from common areas for maintenance.
[13] Other than the above, points related to securing maintenance functions have been identified and implemented.

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II. Efforts to be evaluated for non-specified buildings in the Law for Maintenance of Sanitation in Buildings

Description
[1] Storage space for cleaning materials is included in the design.
[2] Sink for cleaning materials with safe drainage is installed. * Hospital buildings secure, in addition to the above, a space in which washing machines for cleaning materials are installed, depending on the number of beds.
[3] Areas cleaned with water (e.g. washrooms, garbage storage, kitchens) are designed with a 2% gradient.
[4] Adequate space for waste material storage and removal is included in the design.
[5] Dedicated sinks or water taps are installed.
[6] Power outlets for outside/hallway cleaning are included in the design.
[7] Safety of maintenance activities in high places (e.g. exterior glass, vents, lighting fixtures) is addressed in the design.
[8] Water traps under all sinks in washrooms, hot water rooms, and kitchens can be removed for cleaning.
[9] Devices requiring day-to-day adjustment (e.g. valves) are installed in positions which allow convenient operation.
[10] Inspection access holes for equipment concealed in ceiling voids are of the necessary sizes for inspection.
[11] Equipment that is not in private areas can be accessed from common areas for maintenance.
[12] Other than the above, points related to securing maintenance functions have been identified and implemented.

☐Commentary

For this assessment, evaluate the basic measures for achieving a high level of maintenance.
Verify that established measures correspond to the assessment criteria. Assessment levels are determined by the total number of applicable measures taken.
Note that separate assessment criteria are applied to specified buildings as referred to in the Law for Maintenance of Sanitation in Buildings and other types of buildings.

I Efforts to be evaluated for specified buildings in the Law for Maintenance of Sanitation in Buildings

[1] Judging from the design documents, judge an effort to have been made if the area is at least 0.2% of the floor area.
The staff room refers to the area for the cleaning personnel to rest, take a short nap, change clothes, conduct administrative work, or store personal items. Space shared with other occupants of the building for similar use can also be applied.
- The list of management room areas surveyed in 56 buildings in "10 Rules of Design and Construction for Better Maintenance," (Bibliography 52) found the average area of cleaning staff rooms to be 0.15% of floor area.

[2] Judging from the design documents, judge an effort to have been made if the area is at least 0.2% of the floor area.
In buildings where space provided for storage of cleaning equipment or maintenance is inadequate, cleaning materials may have to be delivered in smaller quantities and more frequently, thus increasing transportation-related load.
- In "10 Rules of Design and Construction for Better Maintenance," (Bibliography 52), it is found the average area of the room for cleaning materials to be 0.12% of floor area. Cleaning equipment rooms are used to store cleaning chemicals and similar substances, so it is preferable that they be in negative pressure.

[3] Judge from design documents.
- A cleaning utensils storage area requires a space for washing cleaning utensils after use. It also needs to have drainage facilities connecting to the sewer or a septic tank, through which the washing water is properly drained.

[4] Judge from design documents whether space has been provided for washing machines.
- A space, in which washing machines are installed, proportional to the building area, is also taken into account in the assessment.

[5] Judging from the design documents, judge an effort to have been made if the area is at least 0.3%

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of the floor area.

- Calculate space requirements for waste, recyclable materials and bulky garbage based on the amounts of such materials anticipated in guideline standards set independently by local authorities on installation areas of storage facilities for garbage and recyclables. According to the standard installation area guidelines in some municipalities in Tokyo including Minato Ward, Shinjuku Ward and Shinagawa Ward, the ratio of a storage space to the total floor space shall be 0.29% for 50,000 m^2, taking an office building as an example. (Bibliography 53)

[6] Judge from design documents.

- Performing cleaning work efficiently requires provision of cleaning sinks for every set unit of area, to shorten movement times and distances. Judge whether a cleaning sink has been installed for each toilet (meaning each group of male/female/multi-purpose toilets).

[7] Judge from design documents.

- Use of extension cables to compensate for lack of electrical receptacles increases hazards such as cables melting from overheating and people tripping over cables. It is important to be careful not to interrupt users' ongoing activities inside the building by providing electric outlets in a different power system at regular intervals for maintenance and management purposes. As electric cords for cleaning devices are usually about 8 m to 15 m long, if a private electric outlet in an independent power system is located within at least a diameter of about 30 m in common passageways, such effort shall be taken into account in the assessment.

[8] Judge from design documents.

- Do not use designs that make work difficult, such as exterior glazing and walls with curves or extreme setbacks from the parapet, and design for safe work by installing a rooftop gondola system in buildings of 10 floors or more. Also judge whether design allows work from the ceiling down with hoist equipment for cleaning and replacing the bulbs, etc. in light fixtures in high places.

[9] Judge from lighting design documents.

- Lighting for cleaning should not use all lights, to save energy, but a minimum level is required to enable safe work, and for checking the results of cleaning, so judge whether a suitable level of lighting has been set for cleaning.
  The JIS general lighting standard provisions Z9110-2010 (Bibliography 23) state that the recommended level of illuminance in corridors shall be 100 lx. Further, the JIS general lighting standard provisions Z9110-2011, which supplement the previous edition, state that the range of illuminance in consideration of power saving shall be between 150 lx and 75 lx. Therefore, the desired illuminance is at least 75 lx, the lowest level of the illuminance range.

[10] Judge from design documents.

- For efficient maintenance, valves and other adjustment devices should be positioned where they are easy to operate.

[11] Judge from design documents.

- Adequate space must be provided for tasks such as replacing filters and adjusting humidifiers in equipment installed in ceiling voids.

[12] Judge from design documents.

- For efficient maintenance, a plan is required that allows the work to proceed without impeding the activities of residents.

[13] Unusual efforts not included in items [1]-[12] above should be evaluated as one point.

- When evaluating "Other" efforts, state in the assessment software what kind of effort has been made, and attach documentation clearly comprehensible to a third party.
- "10 Rules of Design and Construction for Better Maintenance" recommends that general construction and service engineers, the management company and others should participate from the building concept planning and basic design stages, providing advice on maintenance aspects, to assist effective maintenance and energy saving after completion of the building.

Ⅱ Efforts to be evaluated for non-specified buildings in the Law for Maintenance of Sanitation in Buildings

[1] Evaluate based on design documents if the described space is included.
In buildings where space provided for cleaning equipment storage and maintenance is inadequate, cleaning materials may have to be delivered in smaller quantities and more frequently, thus increasing transportation-related load. Therefore, building design should include appropriate space for this purpose.

- A dedicated room or locked storage space is recommended in order to prevent unauthorized access or accidental food contamination by cleaning supplies.

[2] Evaluate based on design documents.

- Space for washing the cleaning equipment after use is secure, and the drainage system connects to sewage line or septic tanks where cleaning liquid and waste water can be properly treated.
- Especially in hospitals, from the aspect of in-hospital infection countermeasures, the number of cleaning brushes and cloths required is higher than other buildings. Therefore, a space for

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washing and drying such cleaning utensils that is proportional to the number of beds is definitely required. For example, a hospital accommodating 200 beds would require at least 2 compact-size (4.5 kg) washing machines.

[3] Evaluate based on design documents if a gradient of approximately 2% is provided for the described areas.
- The sanitation maintenance manual for large cooking facilities (Bibliography 54) states that the building structure should include an appropriate slope (about 2/100 degrees) and drain pipes (having about an ascent of 2/100 to 4/100 degrees) in the portion where water is used on the floor, so that the water is easily drained away.

[4] Evaluate based on design documents if the described space is included.
- A dedicated room or locked storage space is recommended in order to prevent pest damage and to protect the environment of surrounding areas.

[5] Evaluate based on design documents.
- Dedicated sinks placed at a regular interval (every floor) facilitates efficient execution of cleaning tasks by shortening travel time and distance.

[6] Evaluate based on design documents.
- Due to change of functions of buildings that occur over time, availability of power outlets for cleaning equipment tends to become an issue. As such, system-specific power outlets must be included in the building design.

[7] Evaluate based on design documents.
- Exterior glass and walls must be designed to facilitate smooth and safe execution of cleaning tasks. Also, evaluate whether ease of tasks such as cleaning lighting fixtures and bulb changes is addressed in the building design.

[8] Evaluate based on design documents.

[9] Evaluate based on design documents.
- Devices requiring adjustment (e.g. valves) must be appropriately positioned to facilitate an efficient maintenance.

[10] Evaluate based on design documents.
- Adequate space to perform filter changes or humidifier adjustment for equipment in ceiling space must be provided.

[11] Evaluate based on design documents.
- Building design must facilitate efficient maintenance by securing access to equipment without impeding occupant activities.

[12] Award one point to other measures not described above.
- Describe the measures in this category in the assessment software and provide documentation that is understandable to third parties.
- In "10 Rules of Design and Construction for Better Maintenance," (Bibliography 53) it is recommended that collaboration of general construction and service engineers and building management companies begin at the concept planning and primary design stages. Their perspectives provide insight into effective maintenance and energy-efficient systems for proper building operation.

■Bibliography 21), 52), 53), 54), 55)

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2. Durability & Reliability

2.1 Earthquake Resistance, Seismic Isolation, Seismic Control, & Vibration Control

2.1.1 Earthquake-resistance (Resistance to building breakage)

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch (Univ., etc.)・Rtl・Rst・Hal・Hsp・Htl・Fct・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	The building's earthquake resistance meets the requirements of the Building Standard Law.
Level 4	The building's earthquake resistance exceeds the requirements of the Building Standard Law by a 25% margin.
Level 5	The building's earthquake resistance exceeds the requirements of the Building Standard Law by a 50% margin. Alternatively, damage control design has been used.
Building type	Sch (E.S./J.H.S./ H.S)
Level 1	(No corresponding level)
Level 2	The building's earthquake resistance meets the requirements of the Building Standard Law.
Level 3	The building's earthquake resistance exceeds the requirements of the Building Standard Law by a 25% margin.
Level 4	(No corresponding level)
Level 5	The building's earthquake resistance exceeds the requirements of the Building Standard Law by a 50% margin. Alternatively, damage control design has been used.

☐Commentary

For this assessment, evaluate continuity of use of buildings based on the building's seismic capacity (resistance to building breakage in the event of an earthquake).

The idea of levels is described as follows:

- For buildings other than Sch (E.S./J.H.S./ H.S)
  Level 3 is equivalent to the seismic capacity that satisfies requirements under the Building Standard Law. Level 1 and 2 are not applicable in practice as they would represent violations of the law. Using the Housing Quality Assurance Act as reference, a 25% or greater increase in seismic capacity compared to level 3 earns a level 4, and a 50% or greater earns a level 5.
- For Sch (E.S./J.H.S./ H.S)
  The Research Study Concerning Earthquake Resistance and Other Related Matters in Educational Facilities (1999 brief version), an appendix to the Promoting Improvement of Earthquake Resistance of Educational Facilities (Notice from the director-general of educational facilities dated April 20, 1999), indicates that it is desirable to consider enhancement of the seismic design force (by 1.25 times). Accordingly, buildings that have a 25% increase in the earthquake resistance prescribed under the Building Standard Law shall be rated as Level 3, and those whose earthquake resistance meets the level required in the Act shall be rated as Level 2. As to Level 5, the same rules as for buildings other than schools (elementary, junior high and high schools) shall apply.

In cases where design includes damage control systems by seismic control, level 5 is awarded on the basis that a high seismic capacity level is assumed. The damage control systems include use of seismic isolation devices such as elasto-plastic dampers and low-yield steels.

Seismic isolation and seismic / vibration damping devices that are mainly intended to protect internal equipment by reducing the impact of seismic motion and strong winds, not to avoid building breakage, are excluded in this category and evaluated under “2.1.2 Seismic Isolation, Seismic & Vibration Control”.

When determining increased seismic capacity, refer to the following:

(1) Allowable stress design
The judgment is based on the importance factor, seismic story shear coefficient Ci, and other related

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elements.
When the building proceeds to the secondary design, and the degree of increase is different in the primary design and secondary design, the assessment is based on the secondary design.

(2) Limit load-bearing calculation
Evaluate based on the increase in external force.
When the building proceeds to the secondary design, the assessment shall include both the damage boundary and safety limit.

(3) Time-history response calculation
Analyze the values of seismic ground motion or the inter-story deformation angles. Award level 4 when values exceed the level required in the Building Standard Law by 25%, and level 5 when values exceed 50%. In addition, if seismic isolation is used and the resistance of the building to breakage can be determined, it will be evaluated in the same way.
Further, input values of the seismic motion in accordance with the method prescribed in the Ministry of Construction Notification No. 1461 in 2000 or its equivalent are rated as Level 3. Further, the inter-story deflection angle of 1/100, a value which is often used as a guide for seismic motions occurring in extremely rare situations, is rated as Level 3.

Perform the assessment in consultation with the structural engineer, as some of the building's structural calculation data are required for calculation.

2.1.2 Seismic Isolation, Seismic & Vibration Control (Internal Equipment Protection)

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	No device to suppress shaking is used.
Level 4	A device to suppress shaking has been introduced, and internal equipment is partially protected in the event of an earthquake or strong wind.
Level 5	A seismic isolation system is used.

☐Commentary

This item evaluates measures against the deterioration or loss of the performance of internal equipment due to shaking caused by earthquakes and strong winds, making it impossible to maintain the function of the building. Specifically, it is the protection of internal equipment and fixtures in the event of an earthquake or strong wind. The level is set based on the extent to which internal equipment is protected in the event of an earthquake or strong wind by introducing a device that suppresses shaking, such as seismic isolation, seismic control, and vibration control equipment. In other words, if the area of protection is the entire building, level 5 is awarded, and if it is only a part of the building, level 4 is given. As an example of a partial countermeasure, only the server room is partially isolated (Here, those that are mainly controlled against earthquakes are referred to as "seismic control", and against other objects, such as strong winds, are referred to as "vibration control").
In addition, vibration damping elements, such as elastoplastic dampers, which mainly contribute to the earthquake resistance of buildings, should be evaluated under the category of "2.1.1 Earthquake resistance (resistance to building breakage)" as damage control design rather than this item.
When designers evaluate this item, they must refer to parts of the structural calculation records, so consultation with the structural engineer is advised.

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2.2 Service Life of Components

- Note; In this assessment, service life does not refer to the social lifespan of construction materials. For example, the social lifespan of building materials used in a project which operates for a short time ends at the time when the project is terminated and the building is no longer used. Service life refers to the expected period of life which ends when the material or equipment breaks down or loses its required physical functions.
  In achieving the target performance set in the building plan, it is also important to ensure accurate construction. For this assessment, it is assumed the building and the systems were constructed with sufficient accuracy. However, lower grades (level) are given if the intended performance is not realized when the building is in operation.

2.2.1 Service Life of Structural Materials

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	Level equivalent to Grade 1 of “3-1. Durability Grade (Structural Frame, etc.)” in the Japan Housing Performance Indication Standards
Level 4	Level equivalent to Grade 2 of “3-1. Durability Grade (Structural Frame, etc.)” in the Japan Housing Performance Indication Standards
Level 5	Level equivalent to Grade 3 of “3-1. Durability Grade (Structural Frame, etc.)” in the Japan Housing Performance Indication Standards

☐Commentary

In this assessment, evaluate the service life of structural materials, not of the structure itself.
Award appropriate levels in accordance with the grades in the assessment standards for wood, steel frame and concrete structures (MLIT Notification No. 1347 issued in 2001, Notification No.781 revised in November 2019) regarding Section 3. Reduction of Deterioration in the Japan Housing Performance Indication Standards, under the Housing Quality Assurance Act.
The Japan Housing Performance Indication System was developed for residential buildings only; however, for this assessment, it was determined to be applicable to other building types since the Building Standard Law stipulates a minimum level of concrete cover depth that satisfies equivalent level for the Grade 1 of “Durability Grade (Structural Frame, etc.)” in the Japan Housing Performance Indication Standards .
Fiber reinforcement is not included in this category as it is intended mainly to prevent building collapse caused by explosion or rupture in the event of fire.

■Reference: Japan Housing Performance Indication Standard “3-1. Durability Grade (Structural Frame, etc.)”

Durability Grade (Structural Frame, etc.)	The level of measures to prolong the period before replacement of materials used in structural skeletons etc. or other large-scale refurbishment work is required.
Grade 3	Measures have been applied as necessary to extend the period before large-scale refurbishment work is required to three generations (around 75-90), under normally-expected natural conditions and maintenance.
Grade 2	Measures have been applied as necessary to extend the period before large-scale refurbishment work is required to two generations (around 50-60), under normally-expected natural conditions and maintenance.
Grade 1	Measures stipulated under the Building Standard Law have been applied.

For more details, refer to the assessment standards under the Japan Housing Performance Indication Standard.

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2.2.2 Necessary Refurbishment Interval for Exterior Finishes

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	Less than 10 years
Level 2	10 years or more, less than 20 years
Level 3	20 years
Level 4	21 years or more, less than 30 years
Level 5	30 years or more

☐Commentary

In this assessment, repair intervals of exterior wall finishes refers to the intervals at which the walls no longer function properly and repair work requiring scaffolding is carried out.

Ideally, service life of components should be determined by a thorough investigation by the assessor with regard to material lifespan categorically based on the building life cycle plan and should be verified by the manufacturers. Alternatively, however, service life values for exterior walls and curtain walls specified in Appendix 1 can be applied. Further, Appendix 1 consists of 2 parts. In the assessment, figures provided by the Government Buildings Department shall be used. However, in cases where no applicable figures are available, those provided by the BELCA or the Architectural Institute of Japan indicated in the Reference Table may be used instead. As such, the assessor is required to specify the name of the standard being applied and the reasons for such selection.

In cases where the targeted material is not included in Appendix 1, or specific external elements causing deterioration exist (e.g. coastal location with high likelihood of salt damage), verify individually with manufacturers and other sources.

When multiple components are used, evaluate based on the shortest repair interval.

■Bibliography 55)

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2.2.3 Necessary Renewal Interval for Main Interior Finishes

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl	Apt
Level 1	Less than 5 years	Less than 10 years
Level 2	5 years or more, less than 10 years	10 years or more, less than 15 years
Level 3	10 years	15 years
Level 4	11 years or more, less than 20 years	16 years or more, less than 25 years
Level 5	20 year or more	25 years or more

☐Commentary

In this assessment, renewal intervals of interior finishes refer to the intervals at which reinstallation of finishing materials or replacement of surface components occur.

Ideally, service life of components should be determined by a thorough investigation by the assessor with regard to material lifespan, categorically based on the building life cycle plan and should be verified by the manufacturers. Alternatively, however, the service life values for floors, interior walls and ceilings specified in Appendix 1 can be applied. Further, Appendix 1 consists of 2 parts. In the assessment, figures provided by the Government Buildings Department shall be used. However, in cases where no applicable figures are available, those provided by the BELCA or the Architectural Institute of Japan indicated in the Reference Table of Appendix 1 may be used instead. Some items on the lists have multiple values. As such, the assessor is required to specify the name of the standard being applied and the reasons for such selection.

In cases where the targeted material is not included in Appendix 1, or specific external elements causing deterioration exist (e.g. coastal location with high likelihood of salt damage), verify individually with manufacturers and other sources.

When multiple components are used, evaluate based on the shortest renewal interval.

In assessing Hsp, Htl and Apt, evaluate based on the major occupied rooms in the building. (i.e. bedrooms, or doctor's offices if larger, guest rooms, dwelling units).

2.2.4 Necessary Renewal Interval for Air Conditioning and Ventilation Ducts

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	Zinc-plated steel sheet used almost throughout.
Level 4	Exposed exterior ducts, kitchen venting ducts, high-humidity venting ducts and similar applications that would have shorter service lives than other applications when made from zinc-plated steel sheet are made from stainless steel or Galvalume to extend service life. Alternatively, appropriate provision has been made for drainage of internal condensation.
Level 5	At least 90% of exposed exterior ducts, kitchen venting ducts, high-humidity venting ducts and similar applications that would have shorter service lives than other applications when made from zinc-plated steel sheet are made from stainless steel or Galvalume to extend service life.

☐Commentary

This item evaluates the longevity of air conditioning and ventilation ducts.

The assessment method is based on the countermeasures used in duct specifications to lengthen the lifespan of ducts likely to have reduced service lives if they were built with standard specification (zinc-plated steel, etc.).

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2.2.5 Necessary Renewal Interval for HVAC and Water Supply and Drainage Pipes

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	D or better used in almost all the top three main building types.
Level 4	C or better used in at least two of the top three main building types.
Level 5	B or better used in at least two of the top three main building types, and E is not used.

□Commentary

This item evaluates the longevity of HVAC and water pipes for water supply and drainage.
The method is to evaluate the materials and jointing methods used in the top three main building types, and the degree of lifespan extension achieved.
The top three building types are the ones with the largest total weights of pipe in the building, and those should be evaluated. In buildings with only water supply and drainage, apply the above with two building types in place of three, and with one in place of two.
Refer to "Techniques to improve the Durability of Building Services" Building Maintenance & Management Center (1986) to judge types B-D.
First, determine the service life of pipe types B-D based on material and usage. Second, if the method to connect the pipes improves the grade, apply the higher results. However, if the method shows a lower grade, apply the first grade. If pipe material or connection method not included in the list is used, verify with manufacturers and evaluate based on equivalent usage and method.

■Reference: Assessment criteria for air conditioning and plumbing pipes

Pipe system type		Type										Reference: joining method											
		Sanitation					A/C			Steam		Other		Screwed		Welded				Soldered		Mechanically-jointed			Other	
Pipe materials	Code	Water supply	Hot water supply	Sewage drain	Misc. drainage	Air venting	Cooling water	Hot and cold water	Hot water	Air supply	Water circulation	Fire extinguishing	Oil supply	Plated joints	Pipe-end core	Wrapping flange	Material welding	Electrical welding	TIG welding	Hard solder	Soft solder	Rubber water stop	Pull out resistant	No-hub joint	Adhesive	Lead caulking
Cast-iron pipe for water system	CIP	A		A	A																	B		B		A
Carbon-steel pipe for plumbing (white)	SGP	D		C	C	B	E	D	D			C		E				C				C	C	C		
Carbon-steel pipe for plumbing (white)	SGP							E	E	D	E	D	C					C				C	C			
PVC-lined steel pipe	VLP	B	C				C								E	A						C	C			
Polyethylene powder-lined steel pipe	PLP	B	C				C								E	A						C	C			
Stainless steel pipe for general plumbing	SUS	C	C				B	C	C		C							C	B			C	C			
Copper pipe	CUP	C	D	C	C			C	C			A				A				B	C	C	C			
Lead pipe for drainage	LP			C	C	B										A					A					
Rigid PVC pipe	VP	B		A	A		B										B							C	C	
Heat-resistant PVC pipe	HT		B	B	B	A		B	B								B								C	
Polyethylene pipe for water pipe	PEP	B															B						C		C	

*1 Expected service life: A: 60 years or more, B: 40 years or more, C: 30 years or more, D: 20 years or more, and E: 15 years or more
*2 Assumed setting: use in a general office building
*3 Based on interior conditions only; anticorrosion performance of pipe exterior not considered
*4 Based on pipe performance only; specific water treatment not considered
*5 Copper tubes used for refrigerant pipes shall be set as C. (See Appendix at the end of this manual.)

Source: Service Life Improvement Technology for Building Equipment, published by Building Maintenance & Management Center in 1986 (*5 was added).

■ Bibliography 56),

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2.2.6 Necessary Replacement Interval for Major Equipment and Services

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	Less than 7 years
Level 2	7 years or more, less than 15 years
Level 3	15 years
Level 4	16 years or more, less than 30 years
Level 5	30 years or more

□解 説

In this assessment, evaluate the repair and replacement intervals of main service equipment.
Main service equipment refers to the following devices:

- For building types other than Apt, this refers to major equipment and services necessary for the building to function, specifically power receiver and transformer equipment, generators, boilers, chillers, air conditioners, water tanks, pumps and other equipment.
- For Apt, it refers to the devices necessary for people to live in the building, such as water heaters, room air conditioning, water tank and pumps.

Base data for renewal intervals for main service equipment are not yet complete. As such, a legal service life of 15 years is considered as level 3 in this category, 16 to 30 years as level 4, and 30 years or more as level 5.

Evaluate using the following approach:

- Identify the renewal interval of the devices most extensively used for each main service equipment based on the number of units and equipment capacity.
- Of such devices, determine the level based on the device with the shortest interval.
- Base the evaluation on the service life values for electrical equipment and mechanical equipment specified in Appendix 1.

Appendix 1 consists of 2 parts. In the assessment, figures provided by the Government Buildings Department shall be used. However, in cases where no applicable figures are available, those provided by the BELCA or the Architectural Institute of Japan indicated in the Reference Table may be used instead. Some items on the lists have multiple values. As such, the assessor is required to specify the name of the standard being applied and the reasons for such selection.
In cases where subject materials are not included in Appendix 1, or specific external factors causing deterioration exist (e.g. coastal location with high likelihood of salt damage), verify individually with manufacturers and other sources.
In assessing service equipment not included in Appendix 1 with no specific external factors causing deterioration, evaluate renewal intervals based on a typical office building operation (approximately 250 operation hours per month).
In cases where renewal work can reasonably be expected to take place when the device with the shortest service life reaches its renewal time, apply its service life value as a representative value. When the renewal of the device with the shortest service life can be postponed until other work becomes necessary, use its service life value as the work time and apply it as a representative value.
■Bibliography 55)

2.3 Appropriate Renewal

Inapplicable under CASBEE-BD/NC

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2.4 Reliability

2.4.1 HVAC System

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Hal・Fct・Hsp・Htl (building with a total floor space of more than 2,000 m^2)	Sch・Rtl・Rst・Apt (building with a total floor space of more than 2,000 m^2)
Level 1	Not adequate for Level 3.	Not adequate for Level 3.
Level 2	(No corresponding level)	(No corresponding level)
Level 3	One of the efforts to be evaluated is addressed. Alternatively, there is no centralized HVAC system.	One of the efforts to be evaluated is addressed. Alternatively, there is no centralized HVAC system.
Level 4	Two of the efforts to be evaluated are addressed.	(No corresponding level)
Level 5	More than three of the efforts to be evaluated are addressed.	More than two of the efforts to be evaluated are addressed.

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt (building with a total floor space of less than 2,000 m^2)
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	Not adequate for Level 4.
Level 4	One of the efforts to be evaluated is addressed.
Level 5	More than two of the efforts to be evaluated are addressed.

Efforts to be evaluated

No.	Efforts to be evaluated
1	Circuits are divided according to the importance of their ventilation equipment, and more important circuits are given priority in operation after a disaster. Also, ways of running the ventilation with reduced load capacity have been examined.
2	Dispersion and duplication of heat source types (electricity, gas, etc.), with backups.
3	Countermeasures (such as suspended pipes) have been taken to ensure that overall function can continue even when the building is partially damaged by an earthquake.
4	Circuits are divided according to the importance of their air conditioning equipment, and more important circuits are given priority in operation after a disaster. Also, ways of running the air conditioning with reduced load capacity have been examined.

☐Commentary

In this category, the reliability of air conditioning and ventilation systems is evaluated based on the number of reliability improvement measures that have been established.

Assessment is intended for operation management systems for air conditioning and ventilation equipment that covers multiple occupied rooms. Buildings with no such centrally-controlled operation system are awarded level 3.

Most buildings with a gross floor area of less than 2,000 m^2 are equipped with multi-split air conditioning systems. In these cases, redundancy measures for air conditioning systems and key electrical systems for areas such as a small-sized computer section earn additional points.

Measures not listed but which are equivalent to items in the criteria can be included in the assessment.

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2.4.2 Water Supply & Drainage

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Hal・Hsp・Htl・Fct・Apt	Rtl・Rst
Level 1	Not adequate for Level 2.	Not adequate for Level 2.
Level 2	One of the efforts to be evaluated is addressed.	One of the efforts to be evaluated is addressed.
Level 3	Two of the efforts to be evaluated are addressed.	Two of the efforts to be evaluated are addressed.
Level 4	Three of the efforts to be evaluated are addressed.	(No corresponding level)
Level 5	More than four of the efforts to be evaluated are addressed.	More than three of the efforts to be evaluated are addressed.

Efforts to be evaluated

No.	Efforts to be evaluated
1	Water-saving equipment is used. This is limited to cases where it is used on a majority of the installed equipment. Water-saving devices are those approved as Eco Mark products, or those equivalent to water-saving equipment that is the approval standard for Eco Mark products (Toilet bowls: approx. 6 L/use, urinals: approx. 4 L/use).
2	Plumbing systems are separated as far as possible to reduce the portions that become unserviceable in the event of a disaster.
3	The building has a pit for temporary waste water storage, in case mains sewerage is unavailable after a disaster.
4	The building has two separate tanks, one for water reception and one elevated tank.
5	Planning enables the use of well water, gray water, etc.
6	The building is equipped with a simple filtration system allowing conversion of rain water to potable water in the event of a disaster (Not applied to Rtl and Rst).
7	A faucet is provided in the water tank so that the water may be used for drinking in case of a power outage due to a disaster.

☐Commentary

In this category, the reliability of water and sanitation systems is evaluated based on the number of reliability improvement measures that have been established.

Unlike assessment under "LR2.1.1 Water Conservation," the use of water-saving devices described in Item 1 of this section is assessed with respect to effective use of potable water in the event of a disaster. Also, a partitioned water receiving tank described in Item 4 is not counted as two units. If only one of the receiving tanks and/or elevated water tanks is to be installed, it is necessary to install two tanks each.

Measures not listed but which are equivalent to items in the criteria can be included in the assessment.

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2.4.3 Electrical Equipment

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt (building with total floor space of more than 2,000 m^2)
Level 1	Not adequate for Level 3.
Level 2	(No corresponding level)
Level 3	One or two of the efforts to be evaluated are addressed.
Level 4	Three of the efforts to be evaluated are addressed.
Level 5	More than four of the efforts to be evaluated are addressed.
Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt (building with total floor space of less than 2,000 m^2)
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	Not adequate for Level 4.
Level 4	One of the efforts to be evaluated is addressed.
Level 5	More than two of the efforts to be evaluated are addressed.

Efforts to be evaluated

No.	Description
1	Emergency generator is installed.
2	Uninterruptible power supply system is installed
3	Redundant power receiving system for key service equipment is installed.
4	(Not applicable to buildings with a total floor space of less than 2,000 m^2) Measures described in Item A and B below have been established in order to avoid power outages or damage to data network caused by flooding in power supply equipment or precision machinery (in apartments, circuit breakers, distribution boards, etc.), or Item C applies. A. Power supply equipment and precision machinery are not installed below ground level. B. Water blocking devices (e.g. waterproof doors and panels, raised mounds, dry ditches) and drainage system (e.g. pumps, etc.) are installed to prevent flooding below ground level. C. No danger of flooding.
5	Wiring is installed for lighting and other equipment available when connected to a power-supply car.
6	Power supply is secured from two different substations.

☐Commentary

In this category, the reliability of electrical systems is evaluated based on the number of reliability improvement measures that have been established.

As with assessment under "2.4.1 Air Conditioning and Ventilation System," most small-sized buildings are equipped with emergency generators and an uninterruptible power supply system for areas such as a small computer section. In these cases, such measures earn additional points.

Measures not listed but which are equivalent to items in the criteria can be included in the assessment.

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2.4.4 Support Method of Machines & Ducts

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct・Apt
Level 1	Not adequate for level 3.
Level 2	(No corresponding level)
Level 3	Earthquake resistance class* B (Human safety is assured and secondary damage prevented after a major earthquake). Or, the design lateral seismic coefficient KH is more than 1.0 after conducting the dynamic analysis.
Level 4	Earthquake resistance class A (In addition to Class B, important functions can be secured without major repairs). Or, the design lateral seismic coefficient KH is more than 1.5 after conducting the dynamic analysis.
Level 5	Earthquake resistance class S (In addition to Class A, all functions can be secured without major repairs). Or, the design lateral seismic coefficient KH is more than 2.0 after conducting the dynamic analysis.

* Concept of "earthquake resistance class" is quoted from "Design and Construction Guidelines for Earthquake Resistance in Building Services, 1997 Edition."

☐Commentary

Support methods for machinery and ducts are also important factors in improving reliability by maintaining functionality in the event of a disaster. In this assessment, evaluate the reliability of such supporting methods.

Level 3, a standard requirement level equivalent to Class-B seismic performance or the design lateral seismic coefficient KH=1.0, is awarded when machinery and duct support measures ensure prevention of injury to occupants in the event of a disaster. Level 4, equivalent to Class-A seismic performance or if the design lateral seismic coefficient KH is more than 1.5, is awarded when such support measures ensure not only occupant safety but also prevent key machinery and ducts from falling and facilitate continuous operation. The highest standard, level 5, equivalent to Class-S seismic performance or if the design lateral seismic coefficient KH is more than 2, applies when all machinery and ducts in the building are protected from falling and continuous operation is ensured.

Refer to Seismic Design and Construction Guidelines for Buildings Service Systems, for specific criteria for Class B, A and S.

■Bibliography 57), 58)

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2.4.5 Communications & IT Equipment

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct・Apt
Level 1	Not adequate for Level 2.
Level 2	One of the efforts to be evaluated is addressed.
Level 3	Two of the efforts to be evaluated are addressed.
Level 4	Three of the efforts to be evaluated are addressed.
Level 5	More than four of the efforts to be evaluated are addressed.

Efforts to be evaluated

No.	Description
1	Communications methods are diversified, using optical fiber cable, metal cable, cellular telephone network, PHS network and others.
2	Connections are made from two telephone exchanges to secure two communications links.
3	Countermeasures Item A and B below have been taken or Item C applies, in order to avoid damage to data networks due to water percolation into precision machinery (main wiring such as MDF and optical fiber Ethernet). A. Installation of precision machinery below ground is avoided. B. Devices to prevent the groundwater percolation (waterproof doors, waterproof panels, embankments, dry ditches) and drainage equipment (pumps, etc.) are installed. C. No danger of water percolation.
4	Communicative measures prioritized in case of a disaster have been taken, or community emergency radio systems are installed.
5	Disaster information is available through a cable TV or other channels in the event of a disaster.
6	An uninterruptible power supply system is installed for network devices.

☐Commentary

In this category, the reliability of communications cables is evaluated based on the number of reliability improvement measures that have been established.

Measures not listed but which are equivalent to items in the criteria can be included in the assessment.

Measures that can be prioritized include wired communication and public telephones in the event of a disaster.

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3. Flexibility & Adaptability

3.1 Spatial Margin

3.1.1 Allowance for Floor-to-floor Height

Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt

! Application condition

For Hsp, Htl and Apt, evaluate <Dwelling and Accommodation Area>, as main occupied rooms on a standard floor are often located in residential or accommodation areas of the building.

For Hsp, evaluate main occupied rooms on a standard floor (mainly bedrooms) under the criteria of <Dwelling and Accommodation Area>. Also evaluate main occupied rooms on a standard floor (mainly doctor's offices) under the criteria of <Entire Building and Common Area>.

<Entire Building and Common Area>	
Building type	Off · Sch · Rtl · Rst · Fct · Hsp (building with total floor space of more than 2,000 m^2)
Level 1	Less than 3.3 m
Level 2	3.3 m or more, less than 3.5 m
Level 3	3.5 m or more, less than 3.7 m
Level 4	3.7 m or more, less than 3.9 m
Level 5	3.9 m or more
Building type	Off · Sch · Rtl · Rst · Fct · Hsp (building with total floor space of less than 2,000 m^2)
Level 1	Less than 3.1 m
Level 2	3.1 m or more, less than 3.3 m
Level 3	3.3 m or more, less than 3.5 m
Level 4	3.5 m or more, less than 3.7 m
Level 5	3.7 m or more

<Dwelling and Accommodation Area>		
Building type	Hsp · Htl	Apt
Level 1	Less than 3.3 m	Less than 2.7 m
Level 2	3.3 m or more, less than 3.5 m	2.7 m or more, less than 2.8 m
Level 3	3.5 m or more, less than 3.7 m	2.8 m or more, less than 2.9 m
Level 4	3.7 m or more, less than 3.9 m	2.9 m or more, less than 3.0 m
Level 5	3.9 m or more	3.0 m or more

☐Commentary

In this category, evaluate whether the floor-to-floor height is sufficient to facilitate potential change in building use, system changes and/or system reinforcement, or for occupant comfort.

In assessing Off, Hsp, Htl and Apt, evaluate floor-to-floor height of a standard floor. For other building types, evaluate the average value of the entire building.

Determine levels according to the following criteria:

Level 1: Changing building types and equipment is extremely difficult.
Level 2: Changing building types and equipment is difficult.
Level 3: Changing building types and equipment is moderately difficult.
Level 4: Changing building types and equipment is relatively easy.
Level 5: Changing building types and equipment is easy.

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3.1.2 Flexibility in Floor Layout

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct・Apt

! Application condition

For Hsp, Htl and Apt, evaluate <Dwelling and Accommodation Area>, as main occupied rooms on a standard floor are often located in residential or accommodation areas of the building.

For Hsp, evaluate main occupied rooms on a standard floor (mainly bedrooms) under the criteria of <Dwelling and Accommodation Area>. Also evaluate main occupied rooms on a standard floor (mainly doctor's offices) under the criteria of <Entire Building and Common Area>.

- Note; Wall length/area ratio is calculated by the following equation. If the calculation subject is a non-residential building type, calculate for one standard floor. For residential building types, take the main occupied rooms.

$$\text{Wall length/area ratio} = \frac{\text{Length of perimeter walls [m] + length of bearing walls [m]}}{\text{Exclusive area [m}^2\text{]}}$$

<Entire Building and Common Area>	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Fct
Level 1	0.7 ≦ [Wall length/area ratio]
Level 2	0.5 ≦ [Wall length/area ratio] < 0.7
Level 3	0.3 ≦ [Wall length/area ratio] < 0.5
Level 4	0.1 ≦ [Wall length/area ratio] < 0.3
Level 5	[Wall length/area ratio] < 0.1

<Dwelling and Accommodation Area>	
Building type	Hsp・Htl・Apt
Level 1	0.7 ≦ [Wall length/area ratio]
Level 2	0.5 ≦ [Wall length/area ratio] < 0.7
Level 3	0.3 ≦ [Wall length/area ratio] < 0.5
Level 4	0.1 ≦ [Wall length/area ratio] < 0.3
Level 5	[Wall length/area ratio] < 0.1

☐Commentary

In this category, evaluate the flexibility in the floor layout based on the wall length/area ratio.

The wall length/area ratio indicates a fixed degree of a particular area. Lower values indicate a higher flexibility in the floor layout.

Determine levels according to the following criteria:

Level 1: Scope for planning equipment and spaces is extremely limited by the building structure.
Level 2: Scope for planning equipment and spaces is limited by the building structure.
Level 3: There is freedom for planning equipment and spaces.
Level 4: There is ample freedom for planning equipment and spaces.
Level 5: There is a high level of freedom for planning equipment and spaces.

■Calculation method for non-residential building types

(1) Equipment spaces (PS, EPS, EV shafts) should be considered to be "areas for which room configuration cannot be altered to accommodate future usage," and excluded from the exclusive area.

(2) The walls of equipment spaces (PS, EPS, EV shafts) could become constraints on "areas for which room configuration can be altered to accommodate future usage (exclusive area)," so enter the length of such walls adjoining exclusive areas into the calculation as "length of load-bearing walls."

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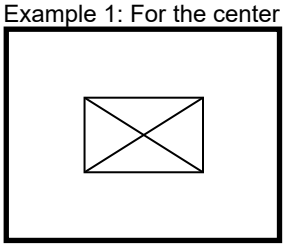
(3) The walls around courtyards surrounded by the building should be entered in the calculation as exterior walls.

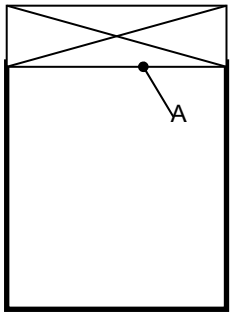
Example 1: For the center core



- Deduct the center core portion from the exclusive area.
- If the center core is surrounded by load-bearing walls, count them as load-bearing walls.
- Count other load-bearing walls, if there are any.
- The length of peripheral walls is the shaded area on the diagram on the left.

* The core is the portion containing staircases, elevators and other elements.

Example 2: For a side core



- Deduct the side core portion from the exclusive area.
- If there are load-bearing walls, count those in area A as load-bearing walls.
- Count other load-bearing walls, if there are any.
- The length of peripheral walls is the shaded area on the diagram on the left.

■Calculation method for residential building types

(1) Columns with attached walls (regardless of whether they are load-bearing walls) or free-standing interior columns should be added to the numerator as the long side x 3 (a x 3).

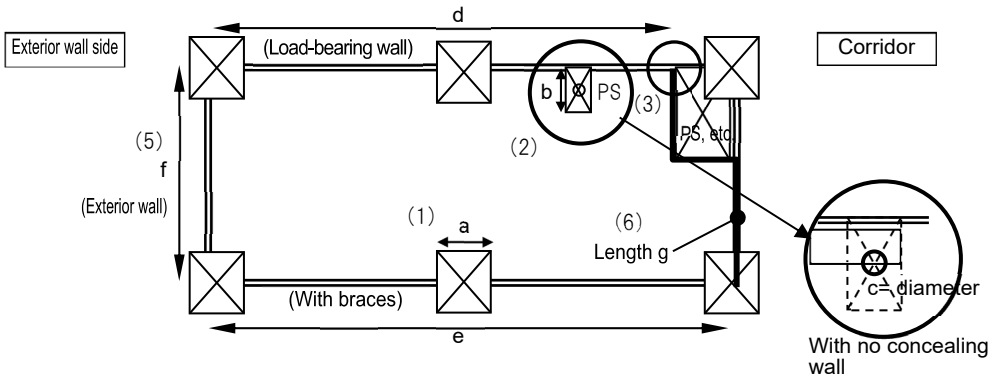
(2) For apartments, include water supply and drainage pipes in exclusive areas. The calculation method for PS with attached walls or free-standing interior PS is to add the long side x 3 (b x 3) for walls to conceal pipes, or the diameter x3 (c x 3) of the fattest pipe if there is no concealing wall, to the numerator.

(3) If there is PS (or MB) facing outside, count the point of contact with the PS (or MB) as the end of the load-bearing walls (d).

(4) In walls with braces installed, add the distance between centers (e) to the numerator as load-bearing wall. Conversely, do not count party walls that are not load bearing.

(5) Judge the length of exterior walls by the center-to-center length (f).

(6) If there is an open corridor, add the length of the wall side of the corridor as length of exterior wall. However, if there is PS (MB) facing the corridor, add the length of contact between the PS (MB) and the exclusive area, and the lengths of walls of other areas on the corridor side, as shown in the diagram below (g). If there is a middle corridor do not add the length on the corridor side to the length of exterior wall.



Reference diagram for residential building types (Example of an apartment with an open corridor)

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3.2 Floor Load Margin

Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt

! Application condition

For Hsp, Htl and Apt, evaluate <Dwelling and Accommodation Area>, as main occupied rooms on a standard floor are often located in residential or accommodation areas of the building.

For Hsp, evaluate main occupied rooms on a standard floor (mainly bedrooms) under the criteria of <Dwelling and Accommodation Area>. Also evaluate main occupied rooms on a standard floor (mainly doctor's offices) under the criteria of <Entire Building and Common Area>.

<Entire Building and Common Area>			
Building type	Off · Rtl · Rst · Hal (fixed seatings) · Fct · Hsp	Hal (non-fixed seatings)	Sch
Level 1	(No corresponding level)	(No corresponding level)	(No corresponding level)
Level 2	Less than 2,900 N/m^2	Less than 3,500 N/m^2	Less than 2,300 N/m^2
Level 3	2,900 N/m^2 or more, less than 3,500 N/m^2	3,500 N/m^2 or more, less than 4,200 N/m^2	2,300 N/m^2 or more, less than 2,900 N/m^2
Level 4	3,500 N/m^2 or more, less than 4,500 N/m^2	4,200 N/m^2 or more, less than 5,200 N/m^2	2,900 N/m^2 or more, less than 3,500 N/m^2
Level 5	4,500 N/m^2 or more	5,200 N/m^2 or more	3,500 N/m^2 or more

<Dwelling and Accommodation Area>	
Building type	Hsp · Htl · Apt
Level 1	(No corresponding level)
Level 2	Less than 1,800 N/m^2
Level 3	1,800 N/m^2 or more, less than 2,100 N/m^2
Level 4	2,100 N/m^2 or more, less than 2,900 N/m^2
Level 5	2,900 N/m^2 or more

☐Commentary

The building's floor load margin is evaluated to consider the potential for future changes of building type.

If the values specified in administrative ordinances for imposed loads are used, they provide a higher margin of safety than other loads, even for abnormal and unevenly distributed loads, such as during remodeling. Therefore, rather than considering ample allowance for such short-term situations, evaluate whether there is potential for conversion to other building types in future.

For offices, retailers, restaurants, halls, hospitals (common properties), factories and schools, the allowable load for rooms specified under Article 85 of the Order for Enforcement of the Building Standard Law is considered to be level 3. A 20% or greater increase in the allowable load compared to level 3 earns level 4, and a 50% or greater increase earns level 5.

The permissible load for the room concerned, as stated for buildings incorporating Dwelling and Accommodation Area (Hsp, Htl, Apt) in article 85 of the enforcement regulations for the Building Standard Law is set as level 2. One rank higher for offices is set as level 5. This allowance for load leaves potential for conversion to other uses. In practice, level 2 or below will be applicable to very few cases. Level 4 is a value interpolated between levels 3 and 5.

In this category, relevant level is given only when the same premium value (level 4: 20%, level 5: 50%) is set for the principal beams, pillar or foundation ((B) in the table below) and the value for seismic force calculation ((C) in the table below).

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Table: the allowable floor load specified under Article 85 of the Order for Enforcement of the Building Standard Law

Objects of Structural Calculation	(A)	(B)	(C)
Types of rooms	When calculating the structure of the floor	When calculating the structure of beams, pillar or foundations	When calculating seismic forces
1) Living rooms in residential buildings, or Bedrooms in non-residential buildings, including hospital.	1,800	1,300	600
2) Office rooms	2,900	1,800	800

Unit: N/m^2

3.3 System Renewability

- Note; Evaluate system renewability per category with respect to versatility in potential change in building use.
  In this category, repair work refers to replacement of components with the same dimension and specification, while renewal work refers to replacement of components with different specifications as part of a system upgrade.

3.3.1 Ease of Air Conditioning Duct Renewal

Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt

Building type	Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt
Level 1	Air conditioning ducts cannot be replaced or repaired without damaging structural elements.
Level 2	In some cases the air conditioning ducts can be replaced or repaired without damaging structural elements, if spare sleeves are used, but that method cannot be applied to all ducts.
Level 3	Space and routes for future use (future replacement work) have been provided, so that nearly all air conditioning ducts can be replaced or repaired without damaging structural elements. Alternatively, there is no central air conditioning equipment.
Level 4	Exterior air conditioning ducts are used or ceiling space provided so that ducts can be replaced or repaired without damaging either structural elements or surface finishes.
Level 5	ISS*, equipment floor installation or other measures allow easy replacement or repair of air conditioning ducts without damaging surface finishes.

* ISS: Interstitial Space System. System that architecture and facilities are integrated.

☐Commentary

In this category, evaluate the renewability of the air conditioning ducts.

Evaluate the specifications for the parts which support the main functions corresponding to the building's function (main parts of the air conditioning pipes themselves).

Cases where there is no plan for renewal of air conditioning ducts, and ducts cannot be replaced or repaired without partial demolition of structural elements such as beam, columns and bearing walls, result in new repair works and generation of solid waste. Such cases are assigned level 1, the lowest level.

If replacement or repair work can be carried out without damage to surface finishes, level 4 or level 5 is assigned, depending on the ease of the work. Buildings with no central air conditioning equipment are assigned level 3.

Buildings where space and routes for future use (future replacement work) have been provided, so that nearly all air conditioning ducts can be replaced or repaired without damaging structural elements, are assigned level 3.

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3.3.2 Ease of Water Supply and Drain Pipe Renewal

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	Repair and replacement are not possible without damaging structural elements and finishes.
Level 2	Repairs can be made without damaging structural elements, but replacements cannot.
Level 3	Repairs can be made without damaging structural elements and finishes, but replacements cannot.
Level 4	Repairs and replacements can be made without damaging structural elements.
Level 5	Repair and replacement are possible without damaging structural elements or finishes.

☐Commentary

In this category, evaluate the renewability of the water pipes.

Evaluation is based on specifications of sections which provide key functions required for each type of building use (i.e. the main sections of the building's plumbing system).

Cases where there is no plan for renewal of water supply and drainage pipes, and the pipes cannot be repaired or replaced without partial demolition of structural elements such as beams, columns, load-bearing walls, exterior walls and floor slabs result in new repair works and generation of solid waste. Such cases are assigned level 1, the lowest level. In this case, repair means works to replace water supply and drainage pipes with new pipes of the same dimensions and specifications, while renewal means upgrades, etc. to replace pipes with others of different specifications.

Award level 3 if repair is possible without damaging structural elements and finishes, but renewal is not. Award level 4 or level 5 if spaces and routes have been provided for future use, facilitating renewal, choosing between the two levels according to the amount of repair and waste generation from elements other than water supply and drainage pipes.

Determine levels according to the details of pipe types and positions as shown in the table next page. All criteria from main riser pipes to exterior wall joints for the same level must be satisfied (if these vary, award the lowest level that applies). In cases where special measures have been established (e.g. modified pipe specifications), determine levels solely on such measures.

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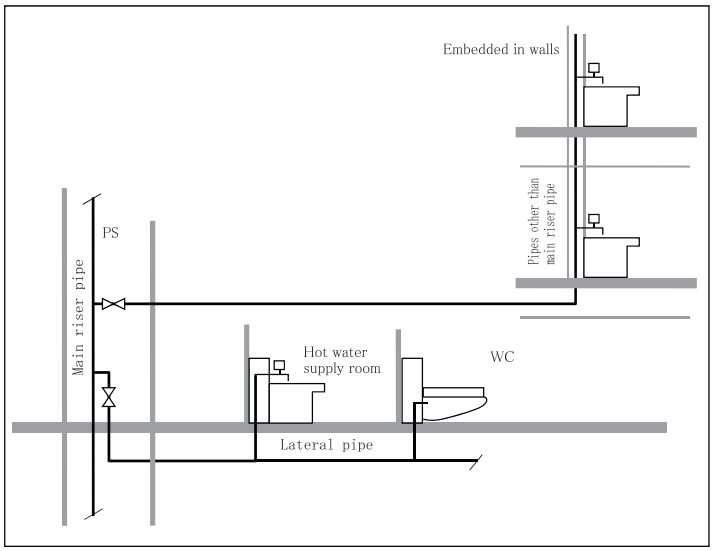
Table: Examples of specifications for water supply and drainage pipes

Level	Pipe types and positions					Evaluation reference			
	Method 1: Determine the level at which all criteria are satisfied * If results vary, award the lowest level that applies * Ignore these criteria if evaluated in Method 2.				Method 2: Determine the level based on this item alone * Applies only when used in more than half of the corresponding area.	Degree of potential damage to building materials during repair		Degree of potential damage to building materials during renewal	
	Main riser pipe	Other pipes	Lateral pipe	Exterior wall joint	Pipe specifications, etc.	Structural material	Finishes	Structural material	Finishes
1	Through-slab (excl. piping in pipe shaft)	Embedded in walls (RC, etc.)	Embedded in structure (slab)	Sleeved	(N/A)	High*2	High	High	High
2	In pipe shaft	Embedded in walls (LGS, etc.)	Embedded in cinder concrete	Sleeved	(N/A)	Low*1	High	High	High
3	In pipe shaft	In pipe shaft	In ceiling voids of the downstairs	Sleeved	(N/A)	Low	Low	High	High
4	Spare space	Spare space	In ceiling void of same floor (gyptone boards, rockwool acoustic ceiling panels) or Inside raised floor space	Spare sleeve	(N/A)	Low	Low	Low	High
5	Spare space or Mechanical void	Spare space or Mechanical void	In ceiling voids of same floor or ISS or under floor pipe space	Spare sleeve or Through-panel	Unit-type plumbing or washroom system plumbing	Low	Low	Low	Low

*1 "Other pipes" stands for those that constitute a separate system diverging from the main pipe (in cases where a riser pipe system serving as a sub riser pipe exists).

*2 The degree of potential damage to structural and finishing materials is indicated in "high" and "low" terms of whether solid waste is generated or new repair work required (excluding handling of the pipes necessary for system operation).



Figure; Main riser pipe, other pipes and lateral pipe samples

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3.3.3 Ease of Electrical Wiring Renewal

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	Wiring cannot be replaced or repaired without damaging structural elements.
Level 2	(No corresponding level)
Level 3	Wiring can be replaced or repaired without damaging structural elements.
Level 4	(No corresponding level)
Level 5	Wiring can be replaced or repaired without damaging structural elements or surface finishes.

☐Commentary

In this category, evaluate the renewability of the electrical wiring.
Evaluation is based on specifications of sections which provide key functions required for each type of building use (i.e. the main sections of the building's wiring system).
Award level 3 when renewal or repair work can be carried out without damage to the structural components.

3.3.4 Ease of Communications Cable Renewal

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	Communications cables cannot be replaced or repaired without damaging structural elements.
Level 2	(No corresponding level)
Level 3	Communications cables can be replaced or repaired without damaging structural elements.
Level 4	(No corresponding level)
Level 5	Communications cables can be replaced or repaired without damaging structural elements or surface finishes.

☐Commentary

In this category, evaluate the renewability of the communications cables.
Evaluation is based on specifications of the sections which provide key functions required for each type of building use (i.e. the main sections of the building's communications cables).
As with Section 3.3.3 above, award level 3 when renewal or repair work can be carried out without damage to the structural components.

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3.3.5 Ease of Equipment Renewal

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct・Apt
Level 1	No machine hatches or routes to accommodate replacement of major service equipment are provided, and building functions cannot be maintained through replacement and repair.
Level 2	(No corresponding level)
Level 3	Machine hatches or routes to accommodate replacement of major service equipment are provided, but building functions cannot be maintained through replacement and repair.
Level 4	A temporary space to accommodate replacement of major service equipment is secured, and building functions can be maintained through replacement and repair.
Level 5	Machine hatches or routes to accommodate replacement of major service equipment are provided, and building functions can be maintained through replacement and repair.

☐Commentary

Evaluate for non-generation of solid wastes and new repair requirements, and the ability to maintain building functions during renewal and repair, using backup equipment.

In this category, the ability to maintain the building's functionality during renewal or repair work refers to when worker access to system routes or machine hatches does not cause disruption in other service functions and when backup devices for use during the work are installed (including multiple devices with divided service loads which can be used as backups during the work).

Evaluate level 3 if there are routes and machine hatches that accommodate renewal and repair, but some destruction of simple partition walls, etc. is required.

The term "major equipment" refers to the following equipment.

(1) For building types other than Apt, this refers to major equipment and services necessary for the building to function, specifically power receiver and transformer equipment, generators, boilers, chillers, air conditioners, water tanks, pumps and other equipment.

(2) For Apt, it refers to the devices necessary for people to live in the building, such as water heaters, room air conditioning, water tank and pumps.

3.3.6 Provision of Backup Space

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	There is no planned provision of space for backup equipment.
Level 4	There is planned provision of space for backup equipment.
Level 5	(No corresponding level)

☐Commentary

In this category, evaluate whether adequate backup space is provided.

Evaluate the specifications for the parts which support the main functions corresponding to the building's function (main building service systems).

If the plan for equipment replacement or repair works secures space to install backup equipment, the building's functions can be maintained while the replacement or repair takes place. Therefore, if plans have been made for securing backup space, the assessment is level 4.

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Q3 Outdoor Environment on Site

- Note; In the assessment under Section Q3, evaluate each criterion based on the point scoring system. Use the total points in a five-level assessment. Most items included in Section Q3 are assessed qualitatively. As such, provide detailed descriptions and additional comments on actual measurements actually in effect in the "Summary for Design for Environment (DfE)" column included in the scoring software.

<Scoring method>

- If the planned content actually applies to the content of each of the efforts to be evaluated, add the corresponding points. And the total points determine the level of the assessed building according to the points shown for each level.
- In the "Other" column, points can be added in case of the efforts that do not appear in the Efforts to be evaluated table. When scoring the "Other" column, describe the efforts in the "Summary for Design for Environment (DfE)" column of the software.

1. Preservation & Creation of Biotope

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	No consideration has been given to the conservation and creation of habitat, and efforts are inadequate. (0-3 points in total)
Level 2	Some consideration has been given to the conservation and creation of habitat, but efforts are still somewhat inadequate. (4-6 points in total)
Level 3	Consideration has been given to the conservation and creation of habitat, and a standard level of efforts are being carried out. (7-9 points in total)
Level 4	Consideration has been given to the conservation and creation of habitat, and a relatively high level of efforts are being carried out. (10-12 points in total)
Level 5	Thorough consideration has been given to the conservation and creation of habitat, and a high level of efforts have been carried out. (13 or more points in total)

Efforts to be evaluated

Assessment Item	Description	Point
I. Identification of local characteristics and biotope plan policy	1) Local characteristics of the site and surrounding areas regarding habitat are identified and an appropriate biotope plan policy has been established	2
II. Conservation and restoration of biological resources	1) Biological resources on site are protected or restored (e.g. flora and fauna, topsoil, wetland area composition)	2
	2) Inapplicable under CASBEE-BD/NC	—
III. Use of Green Space	1) Green areas account for 10% or more but less than 20% of the total outside property area and mid/high trees are planted. (1 point) Green areas account for 20% or more but less than 50% of the total outside property area. (2 points) Green areas account for 50% or more of the total outside property area. (3 points)	1-3
	2) Building greenery index is measured at 0.05 or higher but less than 0.2. (1 point) Building greenery index is measured at 0.2 or higher. (2 points)	1-2

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IV. Quality of Green Space	1) Appropriate measures are taken against invasive species that adversely affect the ecosystems of Japan and local communities.	1
	2) The greenery plan facilitates conservation of native/local species.	1
	3) The greenery plan is appropriate for site and building characteristics.	1
	4) The greenery plan facilitates conservation of natural areas inhabited by small animals.	1
V. Management and use of biological resources	1) Equipment necessary for the maintenance of green areas at the building operation stage have been installed, and management policies have been established.	1
	2) Inapplicable under CASBEE-BD/NC	—
	3) Inapplicable under CASBEE-BD/NC	—
	4) An environment and facilities have been provided in which building users and local people can encounter living creatures and enjoy nature.	1
VI. Other	1) Independent efforts other than the above evaluated items have been implemented to protect and create habitat.	1

☐Commentary

Under this item evaluate the content of efforts made for each of six assessment items (I-VI) for whether consideration has been given to conservation and creation of habitat by the building (the site as a whole, including the building and exterior areas), with a view of protecting and restoring the national natural environment and securing biodiversity. The term "habitat" used here refers to areas supporting plant growth and inhabitation of small wild animals (biotopes).

I. Identification of site characteristics and setting of plan policies

Conservation of the local habitat requires setting conservation goals suitable for the local characteristics of the site, and consideration of conservation policies and related efforts to achieve such goals. From that standpoint, evaluate this item as to whether the habitat-related local area characteristics of the planned site have been identified, and whether the plan policies for conservation and creation of habitat are suitable for the above characteristics.

After understanding the characteristics of the site, including the status of existing (or once existed) biological resources on the site and in the surrounding area, the status and policy regarding biodiversity in the region, and the position of the site in the regional ecological network†1 consisting of "cores" such as parks and green spaces and "corridors" such as rivers, etc., it is important to indicate the policy of the greening plan on the site, from the viewpoint of contributing to the improvement of biodiversity and the formation of an ecological network.

Award 2 points when an appropriate biotope plan policy has been clearly established based on the local characteristics of the site and surrounding areas. No points are awarded when such characteristics are not identified or reflected in the plan.

Furthermore, as the spatial scope and targets under assessment in this category vary greatly, establish an appropriate assessment area for the building site.

†1 For future visions, targets, and measures related to the conservation of green spaces in the region, including ecological networks, the promotion of greening, and the conservation of biodiversity, etc. the "Green Master Plan" formulated by prefectural governments, the "Basic Green Plan" formulated by municipalities, and the "Biodiversity Regional Strategy" formulated by prefectural governments and municipalities can be used as references.

†2 Source: Ministry of Land, Infrastructure, Transport and Tourism "Urban Greening Database" website （https://www.mlit.go.jp/toshi/park/toshi_parkgreen_tk_000081.html）

†3 Source: Ministry of the Environment, "Biodiversity" website (https://www.biodic.go.jp/biodiversity/index.html)

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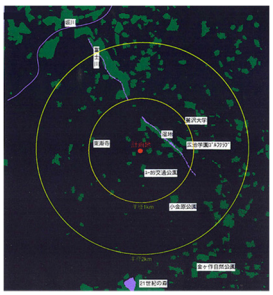
Table: Status of Formulation of the Green Master Plan, etc.

	Number of prefectures and municipalities that have already been established	Remarks
Green Master Plan (Prefectural Regional Green Space Plan)	24 Prefectures	As of the end of March, 2023†2 Source:" Future Policies for the Formulation of a Green Master Plan" (Notice of the Director of the City Planning Division, Urban Affairs Bureau, Ministry of Construction, May 1984)
Green Basic Plan	697 Municipalities	As of the end of March, 2023†2 Source: Urban Green Spaces Act
Biodiversity Regional Strategy	47 Prefectures, 20 Ordinance Designated Cities, 146 Municipalities excluding above	As of January 1st, 2024†3 Source: Basic Act on Biodiversity

Provide documentation that supports the relation between the local characteristics of the site and the biotope plan policy. Minimum documentation requirements for third-party verification are as follows:

<Supporting documents>
- Aerial photograph of the site and surrounding area
- Topographic or land usage map covering the photographed area
- Baseline information on existing biotopes and source information (if independent research is carried out, include details of research methods, etc.)
- Plan policy statement that reflects the identified characteristics

<Examples of efforts>
Eco Village Matsudo



Green zone analysis: vibrant green areas are scattered in a 5-km radius around the site (images provided by Taisei Corporation)

Site design was based on ecological planning which included water, vegetation and wind elements based on an extensive environmental analysis. Characteristics of local ecosystems and wind environment are also reflected. Green zone analysis of a 5-km radius around the site found open biotopes consisting of a large green spaces and bodies of water, a linear biotope formed by wetlands along the Fuji River and island biotopes formed by trees belonging to shrines and temples, green slopes and small parks. Site design included a tree sanctuary and a dragonfly pond as point biotopes with the long-term goal of enhancing an extensive ecological network.
An ongoing follow-up study after completion of construction found increased sightings of birds and insects in the area.

II. Conservation and restoration of biological resources

Trees and wetlands on the building site, as well as nutrient-rich topsoil comprised of compost and other organic matter, are local, established ecological elements. As such, handling of these resources should be given priority in the building's biotope conservation plan. From this perspective, this section evaluates the environmental protection measures of such resources on the building site with respect to conservation and restoration.

- Conservation refers to measures to maintain biological resources already existing on the site. In addition to measures to preserve the existing conditions, evaluate resource relocation (replanting) within the site.
- Restoration refers to measures to recreate biological resources within the site that were lost during construction. Also evaluate measures to restore biological resources within the site which were assumed/confirmed to have existed prior to building construction.
- Measures to relocate (or recreate) local biological resources from surrounding areas to the building site are also included in the evaluation.

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Provide documentation that supports the conservation and restoration status of the site. Minimum documentation requirements for a third-party verification are as follows:

<Supporting documents>
- Aerial photograph/topographical map indicating past and present land uses of the site and surrounding areas
- Descriptions of biological resources targeted in conservation/restoration measures, plan objectives and details
- Descriptions of current status and locations, as well as planned locations, of biological resources targeted in conservation measures, with an up-to-date photograph
- Descriptions of current status and locations, as well as planned locations, of biological resources targeted in restoration measures, with a photograph

<Examples of efforts>
Case Studies of Preservation of Biological Resources
Aoyama Gakuin University, Sagamihara Campus
Zelkova and other existing tall trees were preserved or relocated to achieve environmental conservation effects.

<Examples of efforts>
Case Study of Restoration (Regeneration) of Biological Resources
The Kansai-Kan of the National Diet Library
The hills and woods that form the original scenery have been restored (recreated) through rooftop planting and tree planting, particularly of blue Japanese oak and quercus serrata.

III. Securing the amount of greenery

Evaluate the efforts to green the site under this item, which considers efforts to provide an amount of greenery, according to the amount of greenery in the exterior of the site and of the building. Assessment in this category includes vegetation targeted in conservation/restoration measures under the previous section and new trees and plants added to the site. Refer to Appendix 2 "Calculation of Tree Canopy Size and Green Area" to determine sizes of exterior and building green spaces.

[1] Exterior green space: evaluate based on the exterior green space index obtained with the following formula: Award 1 point where exterior planting index is 10% or more but less than 20% and medium/high trees are planted. Exterior planting index is 20% or more, but less than 50%, earns 2 points, while 50% or more earns 3 points.

$$\text{Exterior planting index} = \frac{\text{Exterior planting area (Horizontal projected area of medium and tall trees + area planted with low trees and ground cover etc.)}}{\text{Exterior are}} \times 100\ (\%)$$

- For exterior planting area, in case where the horizontal projection area of medium/tall tree canopies and the area planted with low trees and ground covering overlap, apply both area values.
- Exterior area = site area – building area (including areas of supplementary facilities)

[2] Building green space: evaluate rooftop and wall greenery based on the building planting index[*3] obtained from the following formula. Award 1 point to a building planting index of 5% or more, but less than 20%. A building planting index of 20% or more earns 2 points.

$$\text{Building planting Index} = \frac{\text{Building planting area (total roof planting + wall planting)}}{\text{Building area}} \times 100\ (\%)$$

- Regarding the calculation for the rooftop greenery area, in cases where the horizontal projection area of medium/tall tree canopies and the area planted with low trees and ground covering overlap, apply both area values.
- Building area = Horizontal projected area of areas occupied by the building (legal construction area)

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IV. Quality of green space

High quality green space contributes to habitat conservation and creation, and improved sustainability. From this standpoint, this category evaluates measures to promote the healthy growth of plants and development of green space that supports local biodiversity. Specifically, assess measures which facilitate biological stability of green space (e.g. planting native species, selecting appropriate tree types, attracting small animals such as birds to the area, etc.). Such stability creates sustainable biological resources and eases management burdens (e.g. reduction in agrichemicals).

Award one point each for the following types of measures: [1] measures against invasive species that adversely affect ecosystems, [2] planting native species, [3] selecting appropriate tree types, and [4] creating a natural habitat for small animals. Determine levels based on the total points where multiple measures listed above are established.

<Examples of efforts>

[1] Measures against invasive species that adversely affect ecosystems

In selecting plants to be used for greening and animals to be introduced by oneself, it is important not to use non-native species that cause damage to Japanese and regional ecosystems or have an unfavorable impact on biodiversity. Therefore, the selection of plants for greening is evaluated when all of the following are addressed.

1. The applicant has not introduced the non-colonization alien species listed in the "List of Alien Species for Prevention of Ecosystem Damage"[†4] indicated by the Ministry of the Environment.
2. The applicant has not introduced any of the industry-controlled alien species on the list. Or, in the case of introduction, appropriate management should be carried out in accordance with the "precautions for use" indicated for each species.
3. If there is a list of alien species (blacklist) [†5] independently established by the local government based on the "Biodiversity Regional Strategy", etc. The applicant must not introduce the listed alien species on its own, or implement appropriate management in accordance with the precautions indicated for each species.

[†4] Abbreviation for the “List of alien species that may cause damage to Japan's ecosystems” Please refer to the Ministry of the Environment's Alien Species Act website. (https://www.env.go.jp/nature/intro/2outline/iaslist.html）

[†5] Hyogo Prefecture “Responding to Invasive Species That Adversely Affect Biodiversity” etc. For a list by Hyogo Prefectures, please refer to the "Alien Species" page on the Hyogo Prefecture's biodiversity-related website "Hyogo Biodiversity Plaza".（https://www.kankyo.pref.hyogo.lg.jp/jp/environment/leg_240/leg_2820）

[2] Conservation of native species

Evaluate whether trees compatible to the local geographic characteristics are used in development of the building's green space. Ideally, seedlings should also be native to the area and produced locally with a traceable production process.

- To identify native species, refer to the following process:

1. Refer to a national zoning map to verify the area of the building site.
2. Identify its prefectural authority.
3. Confirm existing plants in the area and identify native species based on published plant-related data for the prefecture. Exclude woodland areas.
4. Based on the published plant-related data for the prefecture, confirm characteristics of the native species identified above.
5. Select suitable native species based on the environmental characteristics of the building site and the green plan policy.
6. Develop green space according to specific characteristics of the selected species.

- Data used for buildings in Tokyo, Chiba, Saitama and Shizuoka areas are shown below as examples for the above process:

1. Published data that indicate native and native species as guidelines, etc., by local governments based on regional biodiversity strategies, etc.
   - Saitama Prefecture "Criteria for Selecting Greening Trees in Consideration of Biodiversity Conservation" (2nd edition, March 2022)
   - Tokyo Metropolitan Government, "Guidelines for Selection of Native Species at Planting" (May 2014), etc.

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2. Map displaying the target area
   - National zoning map
3. Published data that identify types of trees compatible with the local geographic characteristics
   - Plant data for prefecture zone
4. Published data that identify native species of the targeted area
   - Botanical journals
5. Published data that identify the suitable planting environments
   - Landscape Handbook, Japan Institute of Landscape Architecture (Ghihodo Shuppan, 1978)
   - Garden Trees and Green Space Planting, Ryo Iijima and Toshihiro Ahiru (Seibundo Shinkosha Publishing, 1974)
   - Encyclopedia of Green Environment, Japan Society of Re-vegetation Technology (Asakura Publishing 2005)
6. Local plant data sources
   - Japan Greenery R&D Center
   - Universities, national or prefectural research institutes, etc.

<Example of local plant use>
Japan Highway Public Corporation (highway slope greenery)
Former Japan Highway Public Corporation (currently NEXCO East, NEXCO Central and NEXCO West) created green spaces using local plants on slopes created as part of highway structures. Specifically, seeds from trees native to the areas surrounding the highways were collected and cultivated in containers at nurseries operated by the corporation for two to three years. These second-generation seedlings that contained the area's unique heritage and genetic characteristics were then planted to create green highway slopes.

Aeon Mall Kusatsu
Aeon Mall Kusatsu, built by Lake Biwa, has extensive green space initiatives including planting approximately 68,000 local trees and reintroducing native cogon grass and Elymus humidus, which were previously harvested at the building site prior to construction, to newly-developed biotopes on the site.

[3] Creation of green space appropriate for the planting conditions
- Adaptation to daylight conditions (suitable layout of sun trees and shade trees, etc.).
- Adaptation to space available for growth (planting in spaces that can accommodate future tree growth, etc.).
- Adaptation to growth infrastructure (provision of adequate soil or pots for plants to grow in, etc.).
- Adaptation to environmental pressures (introduction of plants able to resist wind, salt, etc.).

[4] Secure habitat for small animals and birds
- Layout of green space to provide continuity with surrounding habitat.
- Provision of nesting and hiding areas.
- Design of green space with consideration for the introduction of feed plants.
- Provision of green space and water space that encourages natural behavior.

<Case Studies of Provision of Habitat for Small Wild Animals>
Osaka Gas experimental group housing – Next21
This project provides over 1,000 m^2 of three-dimensional space by the deliberate greening of terraces, verandahs and common walkways, as well as rooftops, to attract migrant birds from Osaka castle park, which is approximately 1.5 km to the north. Many wild birds visit the site, and the habitat supports a large insect population. Indigenous plants have also been observed there.

V. Management and use of habitat
Proper management of green space etc. at the building operation stage is essential for maintenance of healthy habitat, and it is important to give thorough consideration in advance, at the planning and design stages, to habitat management and related measures. From that perspective, this item evaluates the efforts for the maintenance of conserved or created habitat.
Award one point if facilities necessary for the maintenance of green space, such as irrigation facilities,

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and a plan is in place for maintenance of such facilities, and one point if facilities have been provided for enjoying close contact with nature.

<Examples of efforts>
[1] Setting up equipment and management policies for the maintenance of green spaces, etc.
- Appropriate installation of irrigation equipment: Efforts to install automatic irrigation equipment in green spaces, etc.
- Provision of planting infrastructure, such as suitable soil volume: Investigate the characteristics of the trees to be planted on the site (root spread, depth, etc.) and secure the ground in a state where plants can grow normally, etc.
- Annual process plan for supervision patrols, tree pruning, grass cutting, etc.
- Policies for the implementation of countermeasures against insect pest damage: Measures for pest and disease countermeasures for on-site plantings etc., referring " Integrated Pest Management (IPM) Practice Guidelines" published by Ministry of Agriculture, Forestry and Fisheries and other.
- Planning for organism monitoring etc., reflected in management: The planting management on the site, etc., is planned to reflect countermeasures against the environmental changes, by doing survey in which specific species (indicator species) such as representative organisms that are susceptible to environmental changes are selected on the site, and changes in the environment around the site are grasped by surveying the growth status over a long period of time using the same survey method each time.

[4] Provision of facilities for enjoying close contact with nature
- Installation of nature observation trails for observing plants and animals, and exhibition facilities.
- Installation of flowerbeds and tree planting areas that can be used by building users.
- Installation of facilities providing information on nature, and provision of information about organisms etc. through regular events or other channels.
- Installation of plant nameplates and benches.

<Examples of efforts>
Case Study of Management and Use of Habitat
Globe Court Omiya Minami-Nakano

Vegetable patches and fruit orchards were built with a view to coexistence with nature and the community, and dwellings are joined by wooden planters, pergolas and other means. Residents participate voluntarily in proposing ways of building their environment, and in forming project teams for maintaining and improving the environment in biotopes and the central pond. Resident-led environmental improvement efforts are still continuing.

VI. Other
Unusual efforts not included in I to V above items should be evaluated as one point.
When evaluating "Other" efforts, state in the assessment software what kind of effort has been made, and attach documentation clearly comprehensible to a third party.

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2. Townscape & Landscape

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

- Evaluate level 3 if the building is almost entirely unseen from public spaces, or if there is no way to give consideration to urban context and scenery.
- Evaluate level 5 if scenery is clearly stated as a reason for winning a local scenery prize, or any similar situation indicating the building has gained a certain level of positive assessment.

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	Not adequate for Level 2. (0 point in total)
Level 2	Sufficient level of measures for the surrounding landscape have not established. (1-2 points in total)
Level 3	Sufficient level of measures for the surrounding landscape have been established. (3 points in total)
Level 4	More than the sufficient level of measures for the surrounding landscape have been established. (4 points in total)
Level 5	Extensive level of measures for the surrounding landscape have been established. (The building has won local landscape-related awards. Or 5 or more points in total)

Efforts to be evaluated

Assessment Item	Description	Point
1. Integration with surrounding landscape through positioning and design of the building	Building features are designed in harmony with surrounding landscape (i.e. height, wall positions, color and form of exterior finish, roof, eaves, openings fences, etc.).	2
2. Use of green space to enhance landscape	Aesthetic landscape is created by the building's green space.	1
3. Conservation of historic landscape	Historic landscape is maintained through conservation, restoration or recreation of the exterior of historic buildings and the existing natural environment the area.	1
4. Use of local materials to enhance landscape	Locally-significant materials are used in the building exterior to create aesthetic landscape.	1
5. Aesthetics from main viewpoints of surrounding area	Aesthetic panoramic view of the building and surrounding areas is offered from nearby parks and gathering space or distant viewpoints.	1
6. Other	Describe other measures	1

☐Commentary

Local landscape offers a sensory experience of the environment that encompasses the interaction of nature, buildings and people in the area, thus creating a sense of community for both residents and visitors. In the time of globalization, it has become an important cultural medium (social asset) for the expression of local individuality. As such, this category evaluates reduction of the negative impact of the building (including its outside areas) on the surrounding landscape as well as contributions to enhance landscape aesthetics. In this regard, note that the level of aesthetics is not evaluated in CASBEE. Therefore, the visual superiority of buildings and the surrounding environment is not included in the scope of this assessment.

Assessing landscape aesthetics poses the question of who (occupants/users, passersby, etc.) and where (short-, mid-, long-distant views) the viewpoints should be based. In this section, apply the following approach.

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Firstly, evaluate the fundamental aesthetic element, that is, whether the building's location and shape are in harmony with the surrounding area. Then evaluate whether the building contributes to enhancement of landscape in terms of improvement of local green space, heritage conservation and the active use of local materials in the building exterior design. Furthermore, measures to improve aesthetics of the panoramic view of the building and surrounding areas from main viewpoints are also included in the assessment. Evaluate the building as level three if it is almost entirely unseen from public spaces, or if there is no way to give consideration to urban context and scenery. Further, evaluate as level five if scenery is stated as a reason for winning a local scenery prize, or any similar situation, indicating the building has gained a certain level of positive assessment.

The following are examples of matters that should generally be considered and specific measures which could be used for forming good scenery.
State the specific content of the efforts to be evaluated, and append documents that will be comprehensible to a third party.

[1] Harmonize the positioning and form etc. of the building with nearby urban context.
The building's location and shape are the most fundamental elements in integration with the surrounding landscape. Insufficient consideration of these elements creates difficulty in enhancing landscape even with excellent architectural details. In this category, evaluate whether the building's location and shape are in harmony with the surrounding area based on the following criteria:

1. Consider the positions of wall lines of adjacent buildings with a view to consistency of wall lines in the urban context.
2. Consider how the building will look from roads, and take measures to avoid creating an oppressive atmosphere, such as reducing the number of floors in roadside portions of the building.
3. Bear in mind that low-rise portions have a more approachable "human scale" when composing the form of the building.
4. Consider roads and other public spaces, and take steps to create an impression of openness from those areas.
5. Consider the skyline formed with surrounding building groups.
6. Make the esthetic design of building rooftops, openings, walls etc. harmonize with the urban context.
7. Consider the effect of the building's color on the surrounding scenery.
8. Avoid harming the urban scenery with the size and coloration of the building itself, or with billboards etc.
9. If there is equipment on the roof or top of the building, consider how it is viewed from the surroundings.

<Examples of efforts>
Examples of building layouts and forms that harmonize with urban context
Globe Court Omiya Minami-Nakano
Arranging blocks with visual depth when seen from the main road reduces the oppressive atmosphere created on the road.

Apartment blocks seen from the approach plaza (Photographer: Isao Saito)

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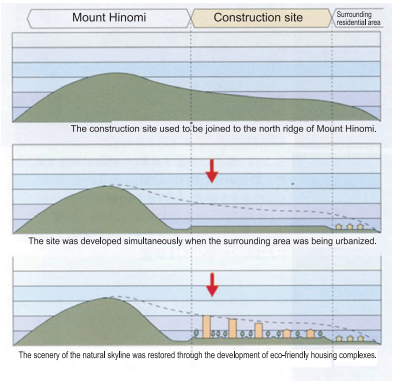
Shimonoseki, Ichinomiya prefectural housing

Placing high-rise blocks on the north side and reducing height to three floors on the east and southwest sides, adjacent to existing residential areas, mitigated the oppressive effect on those adjacent residential areas and restored the original scenery of the natural skyline.



(Diagrams provided by Yamaguchi prefecture Department of Civil Engineering, Housing Section)

[2] Use of green space to enhance landscape

In this category, evaluate measures which offer a soothing green landscape which integrates the planting of trees around the building in order to contribute to the enhancement of the area's natural landscape.

1. Trees are planted along the streets to provide continuity of the green landscape
   For example, efforts to plant the exterior of buildings to maintain the amount of greenery in the surrounding parks and roadsides, etc.
2. Tree selection is based on symbolic significance and integration with existing trees on adjacent properties and streets
   For example, efforts to plant the same type of trees on the site as those planted along the surrounding roadside, and to plant trees that will serve as symbols of the site, etc.
3. Large-sized parking space facing the public roads is landscaped with trees, water features, etc.
   For example, if there is a certain amount of space on the site, efforts to plant tall trees in that area, or to install water facilities such as ponds and streams.
   Water facilities in this evaluation item are limited to those that are carried out for the conservation of the natural environment.

<Examples of efforts>

Case Study of Use of Green Space to Form Good Scenery

Green space along roads in a commercial district (Shinjuku)

There is a mixed wood of sakura, quercus serrata and carpinus tschonoskii in the middle of the business district. Together with flagstones and undergrowth, it creates a refreshing scene in early spring. (Keio Plaza Hotel)

Green space along roads in a commercial district (Shirogane)

Small but vivid flowers and foliage of horse chestnut trees color the street, creating a soothing atmosphere that signals the onset of spring.

Green space along roads in an apartment (Yoyogi)

The blazing foliage of the maple trees, placed on corners as symbols of the building, give a feeling of the seasons.

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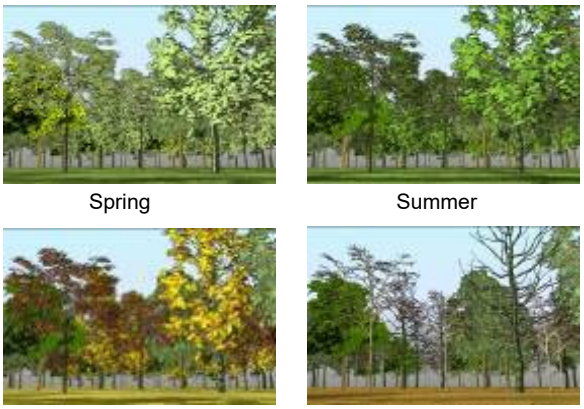
Metropolitan Forest (Nagoya)

A scenic simulation was used to vary ratios of evergreen to deciduous trees, forming a wide range of forest scenery while maintaining a set tree density. For areas such as parking lots, where greenery even in winter is important, the ratio was seven evergreens to three deciduous trees, while the ratio was reversed in areas of bright forest comprising mostly scrub trees. (Noritake no Mori)



Spring Summer

Autumn Winter

(Images provided by Taisei Corporation)

[3] Conservation of historic landscape

Evaluate conservation measures for historic landscapes that reflect local history and culture.

1. Historic structures which have contributed to forming the scenery of the region are partially preserved.
2. Existing trees on street corners are preserved for continuity in local scenery.
3. Existing plants, landforms, springs are preserved, restored or recreated in order to conserve historic landscape.

[4] Formation of good scenery with materials of local character

"Materials of local character" are those that are traditionally used locally, or associated with the site.
There are examples of exterior wall materials traditionally available in a region being used to make the design harmonize better with the existing urban context. Such materials have relaxed tones and easily become familiar. It is preferable to choose colors that will harmonize with the surroundings. In recent years there has been a trend away from primary colors, and more relaxed earth tones are commonly selected.

1. Locally-significant materials such as stones, roof tiles and lumber are used effectively in the building exterior to create an aesthetic landscape.

[5] Aesthetics from main viewpoints† of the surrounding area

Evaluate the measures to enhance aesthetics from the viewpoints identified in the landscape base plan of the area that includes the building. In cases where no such plan exists, initiatives based on self-established viewpoints can be assessed. Specify the policy and details of such initiatives including descriptions of view point selection, target view areas and building characteristics.
(Reference: "Landscape Portal Site" Ministry of Land, Infrastructure, Transport and Tourism website, Bibliography 73)

[6] Other

Award one point for independent measures other than the above assessment items.
When evaluating "Other" efforts, state in the assessment software what kind of effort has been made, and attach documentation clearly comprehensible to a third party.

■Bibliography 73)

† A view point refers to a specific location that provides an opportunity for viewing the landscape. Generally, it is a point from which an aesthetic panoramic view is offered such as a hilltop, bridge, or a location that involves many people as observers such as a station or wide street. Creating an aesthetic panoramic view from such visual points means conservation and creation of areas that offer excellent views in the community, thus enhancing public benefit of the landscape. Viewpoints are established based on a comprehensive analysis of positional relationship with the target area (view angle and distance), landforms, background views and the number of visitors. It is important to develop a building plan that includes consideration of views from such locations with an appropriate verification process.

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3. Local Characteristics & Outdoor Amenity

3.1 Attention to Local Character & Improvement of Comfort

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	No efforts have been made for local characteristics and outdoor amenity. (0 points in total)
Level 2	Efforts based on local characteristics and outdoor amenity are inadequate. (1 point in total)
Level 3	Efforts based on local characteristics and outdoor amenity are at a standard level. (2-3 points in total)
Level 4	Efforts based on local characteristics and outdoor amenity are at a relatively high level. (4 points in total)
Level 5	Efforts based on local characteristics and outdoor amenity are thorough and extensive. (5 or more points in total)

Efforts to be evaluated

Assessment Item	Description	Point
I. Continuation of unique local character, history and culture	[1] Conservation of historic built spaces etc. Historic interior and exterior spaces building remains preserved, restored or regenerated, contributing to local culture. (Do not evaluate if measures here overlap with areas evaluated under urban context and scenery.)	1
	[2] Use of locally-significant materials Local materials are partially used in the building's structure, interior finishes or exterior space. (Do not include measures evaluated under the local landscape section.)	1
II. Local contribution through provision of functional spaces and facilities	[1] Local contribution by provision of space Structural measures such as provision of alcoves, piloti and eaves are used to provide amenity for people using urban spaces, in the form of places to shelter from rain or wait for people. Or, space is provided in plazas, paths and side streets to provide amenity for people using the local area, in the form of rest areas and similar spaces.	1
	[2] Local contribution by provision of facilities and functions Part of the building is equipped to provide public facilities and functions, such as meeting rooms, community halls and exhibition spaces, community centers, and community use of schools, contributing to greater activity in the community.	1
III. Formation of rich intermediate zones linking the building interior and exterior	[1] Formation of rich intermediate zones linking the building interior and exterior Open spaces that allow the passage of wind and light, such as courtyards, terraces, balconies, sun rooms, roofed plazas, light and air voids, and atria are skillfully linked to interior spaces. Or, in areas where private and public spaces intersect, such as around entrances and balconies, light and air voids, flower beds, pergolas, deep balconies and similar elements have been built to form rich intermediate spaces which give a lived-in atmosphere.	1

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IV. Consideration for crime prevention	[1] Consideration for crime prevention Crime prevention performance is considered, so that in spaces outside the building, such as plazas, trees are placed to avoid blocking lines of sight, nocturnal lighting and security cameras are installed, windows are placed where they will be useful for crime prevention, and other measures are used. Or, if there are no plazas or pedestrian walkways, consideration is given to crime prevention in the form of avoiding the creation of blind spots, such as blind alleys and paths out of lines of sight, placing windows where they will be useful for crime prevention, and other measures. Or, if there are boundary barriers around the site, crime and disaster prevention are considered, in the form of fences or low hedges which afford clear lines of sight, rather than continuous walls or similar barriers which block lines of sight.	1
V. Participation of building users etc.	[1] Participation of building users etc. User satisfaction assessments (POE) are used to involve building users in the design process for cooperative housing etc. Or, residents and occupants work directly on plant management and cleaning activities and formulate operation plans, and are otherwise participating in the maintenance of the building.	1
VI. Appropriate maintenance and management of outdoor facilities, etc.	[1] Inapplicable under CASBEE-BD/NC	—
VII. Other	[1] Other (State content)	1

☐Commentary

The goal under this item is to evaluate efforts such as continuation of local history, contribution to city and district amenities, activities and vitality, formation of rich intermediate spaces on the plot, local crime prevention and participation by building users, for the sake of a living environment with a high level of local amenity.

I. Continuation of unique local character, history and culture

There are many historical and cultural resources which reflect the unique way of life of a region or community. It is important that the building plan should discover such resources and reflect them in various forms while building a modern environment. Local memory, which has been built up in the long course of history on that land, is an important environmental asset, which should be passed down as it is told between generations. Assess how that kind of local context is picked up and reflected in plans.

Examples include the preservation, restoration and regeneration of historic spaces inside and outside existing building, and of building remains, and the use of materials with local character (locally-produced materials, traditional materials of the region or district, other materials associated with the site). It is difficult to judge the range within which locally-produced materials can still be called local, but if efforts to use such materials are related to measures by local authorities to promote the use of locally-produced materials, follow the definition employed by the local authority. Other measures envisaged include use of exterior areas or designs which reflect aspects of local context, such as character, history and culture, or serve to promote local industries by, for example, using local personnel, skills and other resources for building construction and operation.
If there are such efforts, state their specific details in the "Other" column.

<Examples of efforts>
Case Studies of Use of Materials with Local Character
Setagaya Fukazawa Symbiotic Housing Project
With replacement houses, the tiles from the old house can be used in the exterior and old wells and trees preserved and reused.

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II. Local contribution by provision of spaces, facilities and functions
This item evaluates diverse forms of amenity through use of the building, with the aim of creating a rich local environment.

<Examples of efforts>
Case Studies of Local Contribution through Provision of Space
Public open space at Sumitomo Realty and Development's Shinjuku Oak Tower
This small square, which provides shade in summer, has benches where people can wait for each other or take a lunchtime break.

III. Formation of rich intermediate zones linking the building interior and exterior
Rather than isolating the interior of the building from the exterior, and the site from its surroundings, they can be joined attractively through intermediate and semi-outdoor spaces, with reference to the site's orientation and surrounding environment. Providing such buffer zones alleviates psychological stress for building users and thermal loads for the building, creating expansive and rich spaces.

<Examples of efforts>
Case Studies of Forming Rich Intermediate Spaces Linking Building Interior and Exterior
Setagaya Fukazawa Symbiotic Housing Project
Apartment balconies function as excellent intermediate zones that link the outside environment and the dwelling units. The image on the right shows greenery placed by an occupant which shades the balcony on a sunny summer day. Shading effects and watering of the plants help create a thermal buffer zone. Furthermore, open space created within the building's echelon structure offers a spatial buffer for common-use corridors and dwelling units. The same area also works as a thermal buffer in the summer as it creates a cool air pocket with continuous shade throughout the day.

Deep balconies provide space for ample vegetation

An open space provides both light and air for units on the north side of the building.

IV. Consideration for crime prevention
The goal of considering crime prevention performance is to evaluate the ability of the building to exert an influence to resist crime and disasters in public spaces, to create safe local environments where people will not feel at risk.

V. Ease of participation for building users etc.
Facility user satisfaction assessments accurately identify the needs of facility users and existing problems, and examines those needs before the design stage begins, to evaluate them for use in programming. POE (Pre/Post Occupancy Evaluation) is a kind of facility user satisfaction assessment that evaluates facilities before and after they are occupied. It uses methods such as group interviews and questionnaires to make a scientific investigation and assessment of how easy the facilities are to use.

VI. Appropriate maintenance and management of outdoor facilities, etc.
Inapplicable under CASBEE-BD/NC

VII. Other
Award one point for independent measures other than the above assessment items.
When evaluating "Other" efforts, state in the assessment software what kind of effort has been made, and attach documentation clearly comprehensible to a third party.

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3.2 Improvement of the Thermal Environment on Site

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	0 points in total from the table of the efforts to be evaluated.
Level 2	1-5 points in total from the table of the efforts to be evaluated.
Level 3	6-11 points in total from the table of the efforts to be evaluated.
Level 4	12-17 points in total from the table of the efforts to be evaluated.
Level 5	18 points or more in total from the table of the efforts to be evaluated.

Efforts to be evaluated

Assessment Item	Description	Point
I. Guide wind into the site to relieve the thermal environment	[1] The planned form and layout of buildings guides wind onto the plot.	2
	[2] Secure paths for air movement by providing green spaces of lawn, meadow and bushes etc., and suitable spaces and paths within the plot. Open space ratio is 40% or more, less than 60% (1 point) 60% or more, less than 80% (2 points) 80% or more (3 points)	1～3
II. Shaded space is created during the summer to alleviate thermal impact on pedestrian areas on the site	[1] Shaded areas are created with the use of medium/tall trees, piloti, eaves, pergolas, or other similar measures. Rate of horizontal projection area of medium and tall trees, piloti, etc. is 10% or more, less than 20% (1 point) 20% or more, less than 30% (2 points) 30% or more (3 points)	1～3
III. Green and water spaces are provided to alleviate thermal impact on pedestrian areas on the site	[1] Surface and near-surface temperatures are controlled by establishing green and water spaces. Total rate of green-covered areas, water-covered areas and horizontal projection areas of medium and tall trees is 10% or more, less than 20% (1 point) 20% or more, less than 30% (2 points) 30% or more (3 points)	1～3
	[2] Endeavor to reduce the area of paving on the plot. Percentage of paved area is 20% or more, less than 30% (1 point) 10% or more, less than 20% (2 points) Less than 10% (3 points)	1～3

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IV. Exterior finishes of the building promote alleviation of thermal impact on pedestrian areas on the site	[1] The green space plan includes accessible rooftop areas (including artificial base). The building has an accessible rooftop area that is partially covered with plants. (2 points) The building has an accessible rooftop area that is extensively covered with plants. (3 points)	2～3
	[2] Appropriate exterior wall materials for thermal control are used. Percentage of exterior walls with appropriate materials is Less than 10% (1 point) 10% or more, less than 20% (2 points) 20% or more (3 points)	1～3
V. Heat vents for service equipment are appropriately located to alleviate thermal impact on pedestrian areas on the site	[1] Heat vents for main service equipment (e.g. air conditioning system) are installed in high locations. At least half of cooling towers or outdoor units generating waste heat are installed 10 meters or higher above ground level. (1 point) Most cooling towers or outdoor units generating waste heat are installed 10 meters or higher above ground level OR no units are installed. (2 points)	1～2
	[2] High-temperature heat vents for main service equipment (e.g. combustion equipment) are installed in high locations. At least half of high-temperature heat venting units are installed 10 meters or higher above ground level. (1 point) Most high-temperature heat venting units are installed 10 meters or higher above ground level OR no units are installed. (2 points)	1～2

☐ **Commentary**

Evaluate measures to alleviate thermal impact on pedestrian areas on the site during the summer by creating a wind corridor, shaded space and green and water surfaces, as well as using appropriate exterior materials for thermal control and effective placement of heat vents. Verify measures which have been established and award an appropriate level according to the total number of points. Note that thermal measures to improve the off-site environment are evaluated under "LR3.2.2 Heat Island Effect."

I. Wind corridors which include pedestrian areas on the site are created to alleviate thermal impact

[1] This item evaluates the building's layout and shape with respect to wind corridors which include pedestrian areas on the site. Evaluate qualitatively and award 2 points when any measures are included.

<Examples of efforts>
- Wind corridors which also includes adjacent open spaces are considered in the layout design
- Both daytime and nighttime wind patterns are considered in the layout design

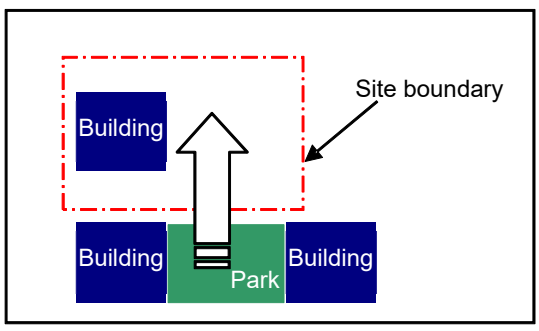

Figure 1: Layout of a wind corridor including the adjacent space

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[2] This item evaluates the building's layout plan with respect to wind corridors on the site created by green spaces such as lawns, meadows and shrubs, or open spaces including paths.
- Evaluate based on percentage of open space to the total site area.
- Award 1 point to open space of 40% or more, less than 60%, 2 points for 60% or more, less than 80%, and 3 points for 80% or more.
- Here, the vacant land ratio is calculated (defined) by the following formula:
  <Open space ratio> = 100 (%) - <Building coverage ratio> (%)
- Piloti and eaves more than 1 m deep are generally included in a building coverage ratio. In this assessment, however, they can be included as open space based on the following formula:
  <Open space ratio> =(<Site area> - <1F Floor area>) / <Site area> x 100 (%)
- When the building accommodates a specified structure prescribed in the Building Standard Law, the floor space thereof shall be included in the calculation of the building coverage ratio or 1F floor area.

Provide documentation for third-party verification that supports corresponding measures (e.g. wind pattern analysis of the site and surrounding areas, drawings that includes design measures such as building layout and shapes, green spaces, open spaces, and paths).

II. Shaded spaces are created during the summer to alleviate thermal impact on pedestrian areas on the site

In this category, evaluate measures to alleviate thermal impact on pedestrian areas of the site such as creating shaded spaces, specifically in areas that are under direct daylight (south and west sides of the building), by placing objects such as medium/tall trees, piloti, eaves or pergolas.
- Evaluate effectiveness based on percentage of Horizontal Projection Areas of medium/tall trees, piloti, eaves, or pergolas
- Award 1 point to a total percentage of horizontal projection areas of 10% or more, less than 20%, 2 points to 20% or more, less than 30%, and 3 points to 30% or more.
- Obtain the percentage of Horizontal Projection Area using the following formula:

$$\text{<Percentage of Horizontal Projection Area>} = \frac{\text{<Horizontal projection areas of medium/tall trees> + <Horizontal projection areas of piloti, eaves, pergolas, etc.>}}{\text{<Site area>}} \times 100\ [\%]$$

- Horizontal shaded area of medium/tall trees is based on the canopy of the trees. Refer to Appendix “2. Calculation of Tree Canopy Size and Green Area" to determine the canopy sizes.
- Horizontal shaded area of piloti, eaves, pergolas, etc. is determined based on the methods shown in Figure 3.

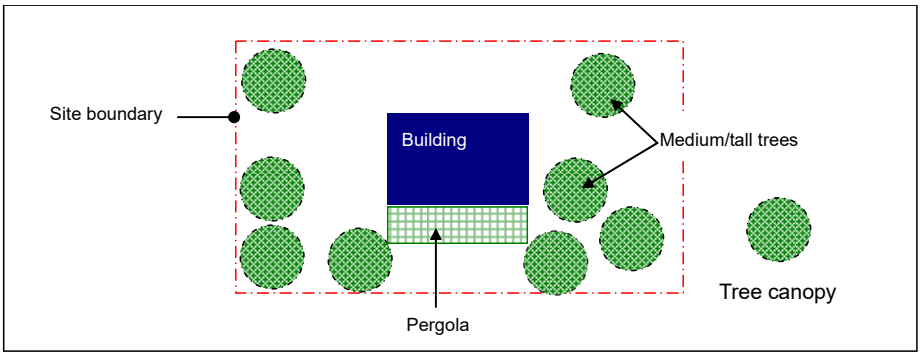

Figure 2: Horizontal projection areas of medium/tall trees and pergola

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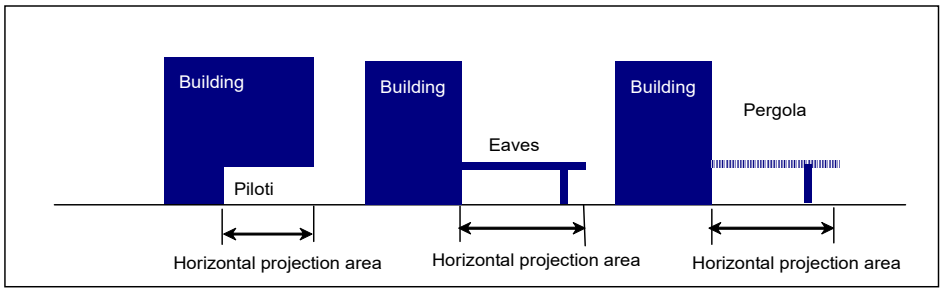

Figure 3: Horizontal projection areas of medium/tall trees, piloti, eaves, pergolas, etc.

III. Green and water spaces are provided to alleviate thermal impact on pedestrian areas on the site

[1] This item evaluates measures to control surface and near-surface temperatures by creating water and green spaces (e.g. lawn, meadows, shrubs, medium/tall trees) in order to alleviate thermal impact on pedestrian areas of the site.

- The assessment is carried out based on the sum of percentages of green-covered area utilizing lawn, meadows and shrubs, water-covered area, and horizontal projection area of medium/tall trees.
- Evaluate based on a total percentage of green-covered areas (e.g. lawn, meadows, shrubs), water-covered area and horizontal projection area of medium/tall trees. Award 1 point to a total of 10% or more, less than 20%, 2 points to 20% or more, less than 30%, and 3 points to 30% or more.
- Obtain the sum of the percentages of green-covered area, water-covered area, and horizontal projection area of medium/tall tree using the following formula:

  <Sum of the percentages of green-covered area, water-covered area, and horizontal projection area of medium/tall tree> = <Percentages of green-covered area> + 2.0 x <Percentage of water-covered area> + 1.5 x <Percentage of horizontal projection area of medium/tall tree>

  * Coefficient values that multiply the percentages of water-covered area and horizontal projection area of medium/tall trees
    Water surface has a higher water evaporation rate compared to green-covered space such as a lawn area, thus it is considered to provide a greater temperature control effect. As such, apply the coefficient value of 2. Similarly, leaves on medium/tall trees that spread three-dimensionally has a higher evaporation rate compared to the green space with the same projection area. Thus, apply the coefficient value of 1.5.

- Obtain each percentage using the following formula:
  <Percentage of green-covered area> = <Green area>/<Site area> x 100 (%)
  <Percentage of water-covered area> = <Water surface area>/<Site area> x 100 (%)
  <Percentage of horizontal projection area of medium/tall tree> = <Horizontal projection area of medium/tall tree>/<Site area> x 100 (%)
- Refer to Appendix 2 "Calculation of Tree Canopy Size and Green Area" to determine sizes of green area and horizontal projection area of medium/tall trees.
- In cases where an evaporation cooling system, such as water misting, is used as a temperature control measure, evaluate by converting the transpiration rate during misting to an equivalent size of green area. Obtain the equivalent green space (lawn) area value using the formula below. The transpiration rate for the lawn space is set as 0.01 L/(min-m^2) on a sunny summer daytime condition.

  <Equivalent green space for water misting>
  = (Mist volume per nozzle [L/min-unit)] x number of nozzles) / (transpiration rate of lawn space [L/min-m^2))

<Examples of efforts>
Case Studies of Thermal Control Using Water Mister
2005 Aichi Expo Site(photo)

Water mister example:
2005 Aichi Expo

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[2] This item evaluates measures to alleviate thermal impact on pedestrian areas of the site such as minimizing paved areas, or more specifically, not placing a large paved space (e.g. parking lots) under direct daylight (south and west sides of the building).

- Award 1 point for a percentage of paved area of 20% or more but less than 30%, 2 points to 10% or more but less than 20%, and 3 points to less than 10%.
- Obtain the percentage of paved area using the formula below:

<Percentage of paved area> = <Paved area> / <Site area> x 100 (%)

- Areas with water-retentive paving materials, which provide effective thermal control performance can be excluded.
- Paved areas that are clearly not under direct daylight and piloti areas can be excluded.

IV. Exterior finishes of the building promote alleviation of thermal impact on pedestrian areas on the site

[1] This item qualitatively evaluates use of green space in accessible rooftop areas in order to promote alleviation of thermal impact on pedestrian areas. When approximately 80% or more of the rooftop area is covered with greenery, it is considered as extensive.

[2] This item evaluates the use of greenery or water-retentive materials, especially on the south and west sides of the exterior walls, to promote alleviation of thermal impact on pedestrian areas on the site.

- Obtain percentage of the thermal-efficient exterior walls using the formula below. Refer to Appendix “2. Calculation of Tree Canopy Size and Green Area" to determine the size of green-covered areas on the exterior walls.
- The definition of retroreflective materials is in accordance with the CASBEE-HI manual.

$$\text{<Percentage of thermal-efficient exterior walls>} = \frac{\text{<Green-covered exterior wall area>} + \text{<Exterior wall area with water-retentive materials>} + \text{<Exterior wall area with retroreflective materials>}}{\text{<Total exterior wall area>}} \times 100\,(\%)$$

V. Heat vents for service equipment are appropriately installed in a way to alleviate thermal impact on pedestrian areas on the site

[1] This item evaluates heat vents for main service equipment (e.g. air conditioning system) installed in high locations to alleviate thermal impact on pedestrian areas on the site.

- Evaluate the locations of the cooling towers and external units
- A high location in this assessment refers to 10 meters or higher above ground (generally the height of the 3rd floor or higher).
- Award 2 points where a district heating and cooling system is used.
- Award 2 points for Apt.
- For building complex, establish appropriate points based on points from Apt (i.e. 2 points) and non-Apt buildings using the gross floor area ratio.

[2] This item evaluates the high-temperature heat vents for main service equipment (e.g. combustion equipment) that are installed in high locations to alleviate thermal impact on pedestrian areas on the site.

- Evaluate heat vents with chimneys (e.g. co-generation units, absorption refrigerators, boilers).
- High-temperature heat here refers to approximately 100°C or higher.
- A high location in this assessment refers to 10 meters or higher above ground (generally the height of the 3rd floor or higher).
- Award 2 points where a district heating and cooling system is used.
- Award 2 points for Apt.
- For building complex, establish an appropriate level based on points from Apt (i.e. 2 points) and non-Apt using the building's gross floor area ratio.

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LR: Environmental Load Reduction of Building

LR1 Energy

Note; To reduce energy consumption in buildings, it is important to devise ways to maximize the performance of the services to be provided with a smaller input. In the evaluation of LR1 Energy, we first evaluate whether the effects of architectural (passive) methods related to load reduction, which are directly linked to energy consumption, such as "1. Control of Heat Load on the Building Envelopes " and "2. Natural Energy Utilization (Direct Use)", are sufficiently effective. Next, we will evaluate the ingenuity of facilities (active) methods, such as building equipment and their operation methods, that are planned to be consistent with passive ingenuity, including the use of renewable energy (expansion of the use of non-fossil energy), in terms of "3. Efficiency in Building Service System" and "4. Initiatives for Efficient Operation."

This is in response to the revision of the Building Energy Efficiency Act in April 2024, which was implemented to strengthen the BEI and BEIm standards for large-scale non-residential use.
In addition to the promotion of energy conservation, the report also evaluates efforts to expand the use of non-fossil energy sources such as renewable energy, which will be increasingly necessary in the future toward the realization of a carbon-neutral society by 2050, and incorporates commissioning initiatives from the perspective of quality improvement and risk avoidance in increasingly sophisticated design and construction, such as ZEB.

Regarding the evaluation of "1 Control of Heat Load on the Building Envelopes" and "3 Efficiency in Building Service System," in accordance with the evaluation method[†] of the Building Energy Efficiency Act, and in light of trends in ZEB, ZEH-M and the energy performance labeling system for buildings, it shall be evaluated by BPI for the perimeter performance index, BEI for the primary energy consumption index for which the standards are gradually becoming stricter toward 2030, and BPIm and BEIm for buildings calculated by the model building method. "2 Natural Energy Utilization (Direct Use)" and "4 Initiatives for Efficient Operation" use CASBEE's unique evaluation methodology. In addition, depending on the use of the building, the evaluation content may differ (see below <For evaluation of special building use>), so it is necessary to be careful.

<For evaluation of special building use>
As a general rule, factories shall be evaluated in accordance with the concept of the Building Energy Efficiency Act. It should be noted that BPI and BEI for factory under the act may or may not be subject to calculation. Points to note are described below.
Under the Building Energy Efficiency Act, production areas are not included in the calculation of buildings that fall under the category of factory. In accordance with this policy, CASBEE excludes BPI and BEI in the production area of the plant from the evaluation.
Parts of the factory other than the production area, such as office and meeting rooms, are subject to evaluation in the same way as the Building Energy Efficiency Act, and are evaluated based on the values of BPI, BEI, etc. calculated for this part.
Lighting equipment is included in the calculation for warehouses, outdoor parking lots, and bicycle parking lots that are considered to be factory uses under the Building Energy Efficiency Act. In CASBEE, when these are subject to calculation by the act, they are subject to evaluation in the same way as the act, and evaluation is carried out based on the BEI and other values calculated for this part.
Under the Building Energy Efficiency Act, if there is no part of the building that is subject to BPI and BEI calculation, and both "1 Control of Heat Load on the Building Envelopes" and "3 Efficiency in Building Service System" are excluded from CASBEE assessment, it is considered that there is no part that requires energy-saving measures, and neither 2 Natural Energy Utilization (Direct Use)" and "4 Initiatives for Efficient Operation" are excluded. In other words, in such a case, LR1 Energy is not covered by all items.

[†] Refer to the website of the Building Research Institute for details of the "Energy Consumption Performance Calculation Program" (commonly known as the Web program and calculation program) among the calculation support programs that can be used for evaluation. (http://www.kenken.go.jp/becc/index.html)
For details on the "BEST Energy Efficiency Standards Compliance Tool" and how to use it, please refer to the website of the Institute for Built Environment and Carbon Neutral for SDGs.
(https://www.ibecs.or.jp/best/tool.html#sho-ene)

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1. Control of Heat Load on the Building Envelopes

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

- Note; For non-Apt, the BPI or BPIm shown at the following levels are used as indicators to evaluate. In addition, between each level, it is evaluated by linear interpolation to the first decimal place. For Apt, evaluation is based on the "5-1 Thermal Insulation Performance Grade" of the Japan Housing Performance Indication System under the Act on Promotion of Housing Quality Assurance.

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl	
	Zones 1-7	Zone 8
Level 1	[BPI] [BPIm] ≧ 1.03	[BPI] [BPIm] ≧ 1.03
Level 2	[BPI] [BPIm] ＝ 1.00	[BPI] [BPIm] ＝ 1.00
Level 3	[BPI] [BPIm] ＝ 0.97	[BPI] [BPIm] ＝ 0.97
Level 4	[BPI] [BPIm] ＝ 0.90	[BPI] [BPIm] ＝ 0.93
Level 5	[BPI] [BPIm] ≦ 0.80	[BPI] [BPIm] ≦ 0.85
Building type	Apt	
Level 1	Not adequate for Level 2.	
Level 2	Requirements for Grade 3 in 5-1 Thermal Insulation Performance Grade of the Japan Housing Performance Indication Standard are satisfied.	
Level 3	Requirements for Grade 4 in 5-1 Thermal Insulation Performance Grade of the Japan Housing Performance Indication Standard are satisfied.	
Level 4	Requirements for Grade 5 in 5-1 Thermal Insulation Performance Grade of the Japan Housing Performance Indication Standard are satisfied.	
Level 5	Requirements for Grade 6 or above in 5-1 Thermal Insulation Performance Grade of the Japan Housing Performance Indication Standard are satisfied.	

☐Commentary

Evaluate the efforts to improve thermal gains and the reduction of losses due to insolation and interior-exterior temperature gradients, and thermal load control as a means of reducing energy consumed by cooling and heating.

For non-Apt, the BPI or BPIm are used as indicators to evaluate. For Apt, evaluation is based on the "5-1 Thermal Insulation Performance Grade" of the Japan Housing Performance Indication System under the Act on Promotion of Housing Quality Assurance.

In general, the following are the measures to reduce the heat load of the building envelope.

- Measures in the building site plan, such as building form and core position, to reduce thermal loads.
- Extent of use of highly insulative construction methods and materials in walls, roof and elsewhere.
- Extent of use of louvers, eaves and other sun-shading methods on windows, which should take into account seasonal variations in sun height between winter and summer.
- Use of measures such as highly insulative multipaned glass windows, airflow windows and double skins.

(1) Evaluating nonresidential buildings (Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl)

Evaluate BPI or BPIm in the Building Energy Efficiency Act as an indicator. BPI, etc. shall be calculated and evaluated in this item by the aforementioned calculation support program, etc. in principle, although there are cases where it is not necessary to calculate BPI, etc., in the case of not certifying Performance Improvement Plans or Displaying Energy Efficiency Performance under the Building Energy Efficiency Act.

If BPI is not calculated, it is evaluated as level 1, considered that the certification standard of BPI = 1.00 has not been reached.

In the case of a factory, etc., if there is no part that should be calculated for BPI, etc., it will not be subject to evaluation.

Please note that BPI and BPIm according to the former energy saving standards (Heisei 25 standard) cannot be applied.

The evaluation results are determined according to the BPI or BPIm values and with linear interpolation to one decimal place (see the figure below).

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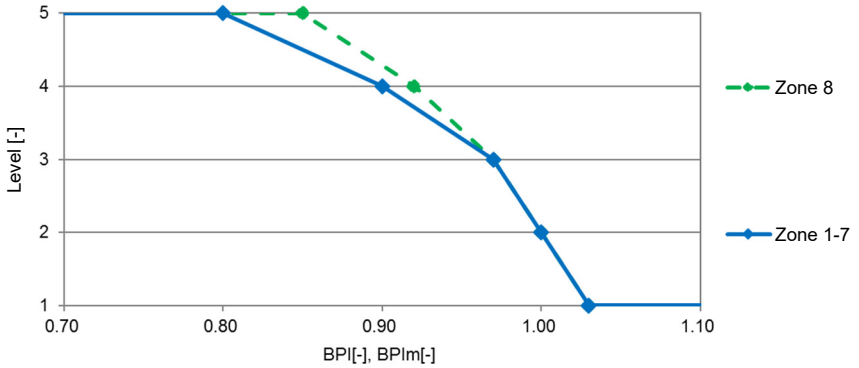

Figure: Level evaluation based on [BPI]&[BPIm]

(2) Evaluating residential buildings (Apt)
If multiple grades are mixed, award the lowest grade.
Level 1: If it does not meet the criteria of level 2, it will be rated as level 1.
Levels 2 to 5: The standards from Levels 2 to 5 shall be in accordance with the "5-1 Thermal Insulation Performance Grade" in the evaluation method standard of the Japan Housing Performance Indication Standard stipulated in the Act on Promotion of Housing Quality Assurance, and shall be evaluated according to the average perimeter heat transfer coefficient (U_A) standard and the average solar heat gain coefficient for cooling season (η AC) standard stipulated for each insulation regional classification (1~8 zone).
In addition, for Level 3 (Grade 4, equivalent to energy efficiency standards) and Level 4 (Grade 5, equivalent to certification standards), it is possible to judge based on specification standards.

■Reference 1: The standard values of Thermal Insulation Performance Grade for Apartments, etc.

Grades		Zones							
		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
		Yuubari, etc.	Sapporo, etc.	Morioka, etc.	Aizu Wakamatsu, etc.	Mito, etc.	Tokyo, etc.	Kumamoto, etc.	Okinawa, etc.
Grade 7	U_A	0.20	0.20	0.20	0.23	0.26	0.26	0.26	—
	η AC	—	—	—	—	3.0	2.8	2.7	—
Grade 6	U_A	0.28	0.28	0.28	0.34	0.46	0.46	0.46	—
	η AC	—	—	—	—	3.0	2.8	2.7	5.1
Grade 5	U_A	0.4	0.4	0.5	0.6	0.6	0.6	0.6	—
	η AC	—	—	—	—	3.0	2.8	2.7	6.7
Grade 4	U_A	0.46	0.46	0.56	0.75	0.87	0.87	0.87	—
	η AC	—	—	—	—	3.0	2.8	2.7	6.7
Grade 3	U_A	0.54	0.54	1.04	1.25	1.54	1.54	1.81	—
	η AC	—	—	—	—	4.0	3.8	4.0	—
Grade 2	U_A	0.72	0.72	1.21	1.47	1.67	1.67	2.35	—
	η AC	—	—	—	—	—	—	—	—

(3) Evaluating building complex
For mixed use of non-residential and residential uses, the level calculated for each use is weighted averaged by the floor area to obtain the level of the entire building (the evaluation software automatically calculates it, so the evaluator does not need to perform a weighted average calculation).

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2. Natural Energy Utilization (Direct Use)

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Note; The assessment is based on the direct use only in terms of natural energy utilization. The evaluation will be a qualitative evaluation based on the presence or absence of various methods introduced and the scale of implementation. (Since the policy of quantitative evaluation is indicated for the "Undetermined Technologies" in BEI of "3. Efficiency in Building Service System", duplicate evaluations are allowed here, and only qualitative evaluations are used.)

Building type	Off・Sch (Univ., etc.)・Rtl・Rst・Hal・Hsp・Htl・Fct	Sch (E.S./J.H.S./ H.S.)・Apt
Level 1	(No corresponding level)	(No corresponding level)
Level 2	(No corresponding level)	Natural lighting and ventilation do not meet level 3.
Level 3	No measures of the assessment criteria are implemented. Although some methods are used, their effectiveness, however, has not been examined. (Monuments, etc.)	Nearly all (at least 80%) of dwelling units or classrooms face exterior walls on two sides, ensuring effective natural lighting and ventilation.
Level 4	In some of the methods used as part of the efforts subject to the assessment, their effectiveness has been confirmed. And they influence a majority of major chambers (more than 50%) of the building.	In addition to level 3, building measures, such as ventilation voids, have been used to enhance efficacy. They influence a majority of dwelling units or classrooms (50% or more) of the building.
Level 5	The above building measures cover most of major chambers (more than 80%) of the building.	The above building measures cover most of dwelling units or classrooms (more than 80%) of the building.

Efforts to be evaluated

NO.	Description
1	Use of natural light: Planning for natural light systems that use daylight in place of lighting equipment. (E.g., light shelves, top lights, high side lights*, etc.)
2	Use of natural ventilation: Planning for the use of natural ventilation and ventilation systems that are effective in replacing the use of air conditioning equipment and reducing cooling loads. (E.g., automatic dampers, manually operated openings and windows (those with a plan for an operational management method), night purging, ventilation systems linked to atria, solar chimney ventilation towers, etc.)
3	Use of geothermal energy: Planning for the use of geothermal heat usage systems that are effective in replacing the use of heat sources and air conditioning equipment and reducing heating and cooling loads. (E.g., cool and heat tubes and pits, etc.)
4	Other: Planning for the effective use of nature in other systems.

* High side light; windows provided by design for the effective use of natural light, installed at high place near ceiling.

☐Commentary

There are two types of natural energy use: those that are used directly as energy, such as daylight, and those that are converted into electricity and heat. In this section, only initiatives that directly use renewable energy are evaluated. Converted natural energy (indirect use) is not subject to evaluation in this item because it is evaluated in "3. Efficiency in Building Service " as a measure to reduce energy consumption of each facility (see the following table).

For buildings except Apt and Sch (E.S./J.H.S./ H.S), evaluate measures for direct use of natural energy within the building appropriate to its scale, type and surrounding area. Localized energy use (such as for a monument) does not contribute to effective energy management, and thus is considered to be level 3. Level 4 or 5 is awarded to measures that are expected to achieve a substantial reduction

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in energy use.

In assessing direct use of natural energy in Apt and Sch (E.S./J.H.S./ H.S), evaluate measures implemented in private areas of dwelling units or classrooms. Many such buildings have natural lighting and ventilation as basic energy-saving measures. As such, the level 3 standard for these building types requires most of dwelling units or classrooms to have natural light and ventilation on at least two sides.
Furthermore, orientation and layout of the building also contribute to natural energy measures and are recognized as level 4 and 5.

Table: The policy in natural energy evaluation in CASBEE-BD

Form of use	Definition	Notes
Direct use of natural energy	Natural energy is used directly as energy, without the use of mechanical force, as in the use of daylight and natural air movement and ventilation.	Evaluated in 2. Natural Energy Utilization Evaluate some of "Undetermined Technologies" in 3. Efficiency in Building Service System."(Duplicate evaluations are allowed here)
Converted use of natural energy (Indirect Usage)	Photovoltaic generation, solar heat use and other semi-mechanical means are used to convert natural energy to electrical power, hot and cold water and other forms, before it is used as energy.	Evaluated in 3. Efficiency in Building Service System

■Reference: Specific evaluation examples for Levels 3, 4, and 5
(1) "Major chamber" refers to a room that is representative of the building use or occupies a large proportion of floor space (E.g., office in an office building, classroom in a university, bed room in a hospital, etc.). Evaluate the direct use of renewable energy that can be expected to be effective in these "major chambers".
(2) The percentage of the area of influence may be the sum of multiple methods.
(3) Cases rated as level 4 and 5
- When it is possible to secure an effective ventilation route (natural ventilation can be expected) at 50% of the total floor area of the office room for Off (Level 4)
  *When the effectiveness is ensured, such as a two-way opening or a ventilation route linked to the atrium.
- When it is possible to supply outside air from a cool tube at 50% of the floor area of the entire guest room for Htl (Level 4)
  *When geothermal heat from the cool tube can be effectively used via the outside air treatment unit in the guest room system.
- When natural lighting is possible from light shelves and atriums at 80% of the total floor area of office for Off (Level 5)
  *When natural light can be introduced into the room from near the windows, or when it is possible to light from the interior side, such as an atrium, etc.
- When effective natural ventilation is possible at 50% of the floor area of the entire classroom area, and outside air can be supplied from a cool trench at 30% of the floor area of the entire classroom area for Sch (Univ.) (Level 5)
  *Examples of multiple methods

(4) Cases where it is not Level 4 or 5 (if the energy saving effect is localized, the effectiveness is not expected, etc.)
- When natural ventilation and natural lighting are possible at the entrance for Htl (Level 3)
- When the windows can be opened and closed at 80% of the total floor area of the classroom for university use, but ventilation paths cannot be secured for Sch (Univ.) (Level 3)

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3. Efficiency in Building Service System

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

- Note; The BEI or BEIm shown at the following levels are used as indicators to evaluate. In addition, between each level, it is evaluated by linear interpolation to the first decimal place. (see *1 and *2) The following is a list of the various indicators used in the evaluation and their contents.
  - [BEI][BEIm] : Primary energy consumption performance, including on-site renewables
  - [BEI*][BEIm*] : Primary energy consumption performance without renewable energy
  - [BEI+]: Primary energy consumption performance, including on-site and off-site renewable energy. (Applied only for non-Apt buildings. Not applicable when Model Building Method is used)
  - Here, [BEI*][BEIm*] ≧ [BEI][BEIm] ≧ [BEI+]

{Non-residential Building types}

Type [1]	Off・Sch *note: see ( ) for small buildings	Remarks
Level 1	[BEI][BEIm] ≧ 0.9 (1.1)	
Level 2	[BEI][BEIm] = 0.8 (1.0)	Equivalent to Energy Efficiency Standards
Level 3	[BEI*][BEIm*] = 0.6	Equivalent to Certification Standards
Level 4	[BEI][BEIm] = 0.5, and [BEI*][BEIm*] ≦ 0.5	Equivalent to ZEB Ready
Level 5	[BEI][BEIm] ≦ 0.25, and [BEI*][BEIm*] ≦ 0.5	Equivalent to Nearly ZEB
	Or [BEI+] ≦ 0.25, and [BEI*] ≦ 0.5, and [BEI]＜[BEI*]	Applied only when the evaluation of off-site renewable energy is conducted (not applied when Model Building Method is used)
Type [2]	Rtl・Htl *note: see ( ) for small buildings	Remarks
Level 1	[BEI][BEIm] ≧ 0.9 (1.1)	
Level 2	[BEI][BEIm] = 0.8 (1.0)	Equivalent to Energy Efficiency Standards
Level 3	[BEI*][BEIm*] = 0.7	Equivalent to Certification Standards
Level 4	[BEI][BEIm] = 0.5, and [BEI*][BEIm*] ≦ 0.5	Equivalent to ZEB Ready
Level 5	[BEI][BEIm] ≦ 0.25, and [BEI*][BEIm*] ≦ 0.5	Equivalent to Nearly ZEB
	Or [BEI+] ≦ 0.25, and [BEI*] ≦ 0.5, and [BEI]＜[BEI*]	Applied only when the evaluation of off-site renewable energy is conducted (not applied when Model Building Method is used)
Type [3]	Rst・Hal・Hsp *note: see ( ) for small buildings	Remarks
Level 1	[BEI][BEIm] ≧ 0.9 (1.1)	
Level 2	[BEI][BEIm] = 0.85 (1.0)	Equivalent to Energy Efficiency Standards
Level 3	[BEI*][BEIm*] = 0.7	Equivalent to Certification Standards
Level 4	[BEI][BEIm] = 0.5, and [BEI*][BEIm*] ≦ 0.5	Equivalent to ZEB Ready
Level 5	[BEI][BEIm] ≦ 0.25, and [BEI*][BEIm*] ≦ 0.5	Equivalent to Nearly ZEB
	Or [BEI+] ≦ 0.25, and [BEI*] ≦ 0.5, and [BEI]＜[BEI*]	Applied only when the evaluation of off-site renewable energy is conducted (not applied when Model Building Method is used)

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Type [4]	Fct *note: see ( ) for small buildings	Remarks
Level 1	[BEI][BEIm] ≧ 0.9 (1.1)	
Level 2	[BEI][BEIm] = 0.75 (1.0)	Equivalent to Energy Efficiency Standards
Level 3	[BEI*][BEIm*] = 0.6	Equivalent to Certification Standards
Level 4	[BEI][BEIm] = 0.5, and [BEI*][BEIm*] ≦ 0.5	Equivalent to ZEB Ready
Level 5	[BEI][BEIm] ≦ 0.25, and [BEI*][BEIm*] ≦ 0.5	Equivalent to Nearly ZEB
	Or [BEI+] ≦ 0.25, and [BEI*] ≦ 0.5, and [BEI]＜[BEI*]	Applied only when the evaluation of off-site renewable energy is conducted (not applied when Model Building Method is used)

{Residential Building types}

Type [5]	Apt	Remarks (Labeling for Displaying Energy Efficiency Performance, etc.)
Level 1	Primary Energy Consumption Reduction Rate (renewable energy excluded) < -10%	No star of Labeling for Energy Efficiency Performance
Level 2	Primary Energy Consumption Reduction Rate (renewable energy excluded) = 0%	★ Labeling for Energy Efficiency Performance
Level 3	Primary Energy Consumption Reduction Rate (renewable energy excluded) =10%	★★ Labeling for Energy Efficiency Performance
Level 4	Primary Energy Consumption Reduction Rate (renewable energy excluded) ≧20%	★★★ Labeling for Energy Efficiency Performance Equivalent to ZEH (ZEH-M Oriented)*
Level 5	Primary Energy Consumption Reduction Rate (renewable energy excluded) =≧20%, and Primary Energy Consumption Reduction Rate (renewable energy included) ≧50%	Equivalent to ZEH-M Ready*
	Primary Energy Consumption Reduction Rate (renewable energy excluded) ≧30%	Applicable only for buildings of more than 6 floors or when effect of introducing renewable energy is low due to reasons such as shade. ★★★★ Labeling for Energy Efficiency Performance

* In the condition of ZEH-M, which is level 4 or higher, it is required to satisfy a reinforced standard for envelope performance, but in the LR1-3 evaluation, the evaluation is based only on the primary energy consumption reduction rate.

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*1: Regarding building types [1] to [4], the handling of various renewable energy and the indicators subject to linear interpolation are shown below.

Table: Indicators subject to linear interpolation and Handling of various renewable energy (Building types [1] to [4], other than apartments)

Ranges subject to linear interpolation	Indicators subject to linear interpolation	Remarks
Below Level 3 (Less than the certification standard)	[BEI]、[BEIm]	On-site renewable energy for self-consumption can only be included.
Level 3 or higher, below Level 4	[BEI*], [BEIm*]	
Level 4 or higher	[BEI]、[BEIm]	For evaluations that include on-site renewable energy* ∗Total amount (Soled electricity can also be included)
	[BEI+]	For evaluations that include on-site and off-site renewable energy

*2: Regarding building types [5], the handling of various renewable energy and the linear interpolation are shown below.

Table: Indicators subject to linear interpolation and Handling of various renewable energy (Building type [5], apartments)

Ranges subject to linear interpolation	Indicators subject to linear interpolation	Remarks
Below level 4	Primary Energy Consumption Reduction Rate (renewable energy excluded)	
Level 4 or higher	Primary Energy Consumption Reduction Rate (renewable energy included)	For evaluations that include on-site renewable energy* *Total amount (Soled electricity can also be included)
	Primary Energy Consumption Reduction Rate (renewable energy excluded)	For evaluations that include on-site and off-site renewable energy

☐Commentary

The reduction rate of energy consumed by the building during operation is evaluated, and is evaluated by the value of BEI or BEIm based on the definition of the Building Energy Efficiency Act and ZEB and ZEH-M, and the reduction rate of primary energy consumption used in the Labeling System for Energy Efficiency Performance of buildings. However, be careful as indicator for evaluation differs depending on the level, for example, it may include or do not include renewable energy, and may include off-site renewable energy etc., depending on the indicators used (BEI/BEIm, BEI*/BEIm*, BEI+).

(1) Evaluating nonresidential buildings (Off･Sch･Rtl･Rst･Hal･Fct･Hsp･Htl)

Evaluate BEI or BEIm under the Building Energy Efficiency Act. Please note that the scoring criteria are different for Off･Sch (Type [1]), Rtl･Htl (Type [2]), Rst･Hal･Hsp (Type [3]), Fct (Type [4]), and Apt (Type [5]). In addition, for medium-sized buildings (total floor area of 300 square meters or more and less than 2,000 square meters), the standards are scheduled to be strengthened in FY2026, so they are treated the same as large-scale buildings (total floor area of 2,000 square meters or more), but for small buildings (total floor area less than 300 square meters), the standards for levels 1 and 2 are set separately because the standards have not been strengthened at this stage. For evaluations beyond Level 4, CASBEE will evaluate the introduction of renewable energy in accordance with the ZEB definition[*3], but in particular, CASBEE will evaluate off-site renewable energy initiatives separately from the ZEB definition, with consideration for high-rise buildings and large-scale buildings where introduction of on-site renewable energy is limited. Between each level of the evaluation criteria,

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each building type is evaluated by linear interpolation to one decimal place according to values such as BEI or BEIm (see Fig. 1).

*3: FY30 "ZEB Roadmap Follow-up Committee Summary" Agency for Natural Resources and Energy of METI, March 2009

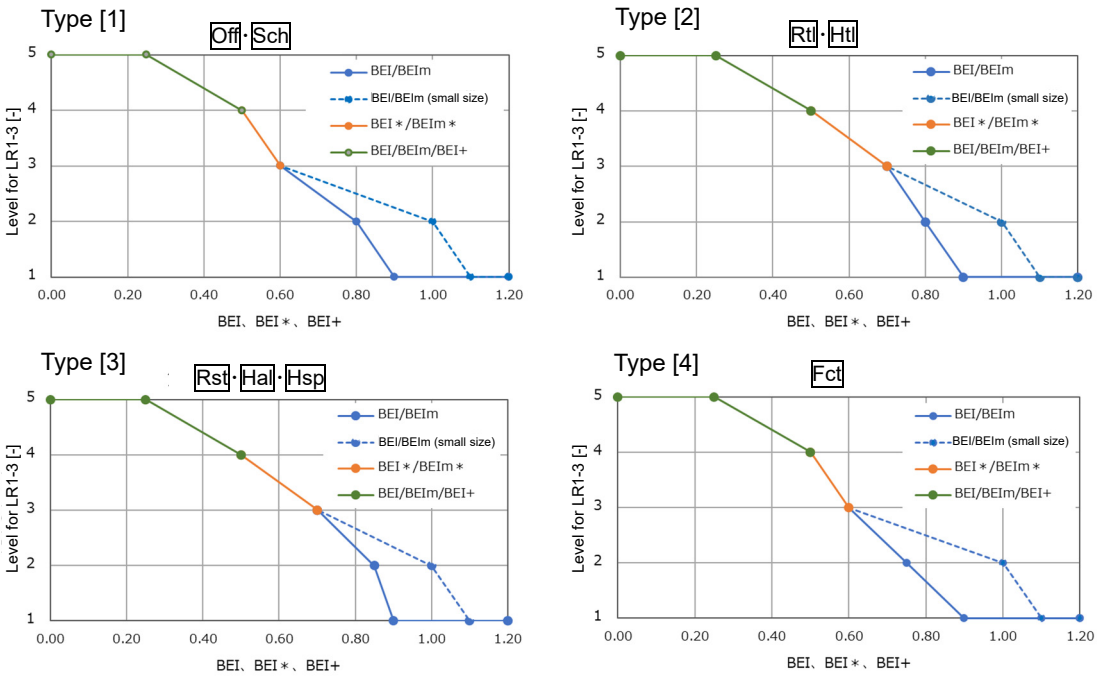

Figure1: Level evaluation based on [BEI]&[BEIm]

(2) Evaluation of off-site renewable energy (for non-Apt buildings)
It must be a power generation facility with additionality (procurement from a power source within 15 years from the date of operation start (commissioning date) or repowering date), and the power generation equipment must be limited to private line supply, self-wheeling, and off-site PPA that can identify the power generation equipment. (See Figure 2. Excludes the purchase of environmental value such as the procurement of green electricity).
In the evaluation, it is necessary to confirm the effectiveness of off-site renewable energy, and the following contents shall be indicated.
1) Presentation of an overview of the target "renewable energy power generation equipment/facilities" (location, scale, equipment specifications, etc.)
2) Presentation of materials for considering annual usage (materials for considering the balance between supply and demand)
3) On-site (within the site) where possible renewable energy facilities are planned (not applicable if there is no on-site renewable energy)
Regarding use of off-site renewable energy, CASBEE evaluates buildings at the design stage, so consult with the building owner to confirm the outline of the project and the details of operation after completion.

The definitions of "self-wheeling" and "off-site PPA" ((3) and (4) in Figure 2), which are subject to evaluation of off-site renewable energy, are currently under discussion by the Agency for Natural Resources and Energy and will follow those definitions (Figure 2 is the current definition).
The calculation of BEI+, including on-site and off-site renewable energy, is based on the following:

$$\text{BEI+} = \frac{\text{Molecules of BEI (energy consumption, including on-site renewable energy)} - \text{Annual Off-site Renewable Energy Usage}}{\text{Denominator of BEI (standard energy consumption)}}$$

* Annual Off-site Renewable Energy Usage is based on primary energy, just like energy efficiency calculations.
* off-site renewable energy cannot be evaluated by using BEIm that does not display the denominator

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or numerator values of BEI.

	Types of non-fossil electricity	Status under other laws
	1) **Self-generated and self-consumed non-fossil electricity** [Power plant owner] Own company [Power plant location] on-site/off-site (with private network) of the own company	A: ○
	2) **On-site PPT** [Power plant owner] Third party [Power plant location] on-site of the own company	A: ○
Via grid network	3) **Non-fossil electricity by self-wheeling** [Power plant owner] Own company / Third party (group company, etc.) [Power plant location] off-site of the own company	A: ○
Via grid network	4) **Off-site PPA** [Power plant owner] Third party [Power plant location] off-site of the own company	A: ○
Via grid network	5) **Non-fossil electricity based on electricity retail contracts** (e.g. Green product with 100% renewable electricity)	A: ○
Purchasing env. value	6) **Purchasing environmental value of renewable energy from retailers** (e.g. Renewable energy certificate)	A: ○ B: ○
Purchasing env. value	7) **Purchasing environmental value of renewable energy from cooperation other than retailers** (e.g. Renewable energy certificate, J-credits by renewables, Green electricity certificate)	A: ○ B: ○

In case of newly developed non-fossil power sources

A: Act on Promotion of Global Warming Countermeasures
B: Act on the Promotion of Environmentally Sound Use of Energy Sources and Effective Use of Fossil Energy Feedstocks by Energy Suppliers
Part of 1), 3), and 4) of the red frame are subject to evaluation.

Figure 2: Evaluation targets of off-site renewable energy in BEI+
Source: 1st meeting in FY2022 on Factory Judgment Standards WG Regarding the Specific Theory of the Revised Energy Conservation Law, Agency for Natural Resources and Energy, June 8, 2022

(3) Evaluating residential buildings (Apt)

The evaluation of the entire apartment building (in principle, the sum of all dwelling units + common area = entire residential building) is evaluated (the calculation of common areas can be omitted).The reduction rate of primary energy consumption will be evaluated based on the evaluation method of "multi-level evaluation of primary energy consumption performance (not considering renewable energy)" in the "Guidelines for Energy Efficiency Performance Labeling System for Buildings Sold and Rented". In addition, for Level 5, it is required to be equivalent to ZEH-M Ready using renewable energy ("self-consumption + surplus" and "does not include off-site renewable energy"), but if it is difficult to introduce renewable energy, ★★★★ Labeling for Energy Efficiency Performance (primary energy consumption reduction rate (excluding renewable energy)≧30%)) is the requirement for Level 5 (see Figure 3).

In addition, it is possible to judge based on specification standards for Level 2 (meeting "Standards for the prevention of heat loss through the exterior walls and windows of residential parts and standards for primary energy consumption" (MLIT Notification No. 266, revised in November 4, 2022). hereinafter referred to as the "Specification Standards")) and Level 4 (meeting "Certification Standards for the exterior walls and windows of residential parts and Certification Standards for Primary Energy Consumption" (MLIT Notification No. 1106, November 4, 2022. Hereinafter referred to as "Certification Specification Standards").

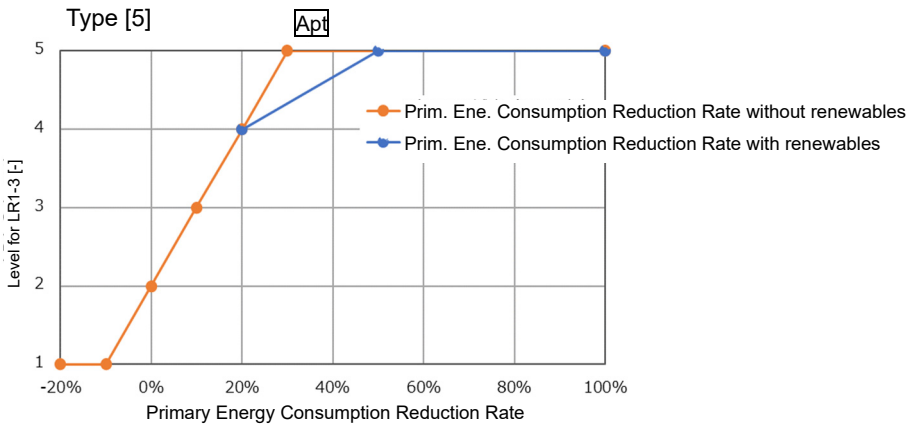

Figure3: Level evaluation based on Primary Energy Consumption Reduction Rate

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(4) Evaluating a building complex

In the case of building complex with mixed types [1]-[5], including apartment buildings, the evaluation indicators and values of BEI or BEIm, which are the scoring criteria for the level, differ depending on the conditions such as the presence or absence of renewable energy and the presence or absence of off-site renewable energy. Since these conditions are different between non-residential and residential (apartment buildings), the evaluation is first divided into non-residential mixed-use and apartment buildings, and the level is adjusted according to the floor area of these two uses, and the evaluation result is obtained. Firstly, the floor area of non-residential applications [1]-[4] is $A_{[1]}$-$A_{[4]}$, respectively, and the judgment criterion values of level 1 to 5 of each type are weighted average by the floor area of $A_{[1]}$-$A_{[4]}$. Then set the scoring standard value of the overall level 1~5 of the non-residential part (as type [6], see table below). After determining the levels of type [6] and [5] as the apartment complex, the final evaluation is made from the floor weighted average of those two levels. In addition, this series of weighted average calculations are automatically performed by the evaluation software, so there is no need for the evaluator to calculate them by one's self.

■Evaluation of non-residential building complex

Type [6]	Non-residential building complex of Types [1]-[4] *1:2	Remarks
Level 1	[BEI][BEIm] ≧ ($A_{[1]}$×0.9 + $A_{[2]}$×0.9 + $A_{[3]}$×0.9+ $A_{[4]}$×0.9) / Σ$A_{[6]}$	
Level 2	[BEI][BEIm] = ($A_{[1]}$×0.8 + $A_{[2]}$×0.8 + $A_{[3]}$×0.85+ $A_{[4]}$×0.75) / Σ$A_{[6]}$	
Level 3	[BEI*][BEIm*] = ($A_{[1]}$×0.6 + $A_{[2]}$×0.7 + $A_{[3]}$×0.7+ $A_{[4]}$×0.6) / Σ$A_{[6]}$	Renewables excluded
Level 4	[BEI][BEIm] = ($A_{[1]}$×0.5 + $A_{[2]}$×0.5 + $A_{[3]}$×0.5+ $A_{[4]}$×0.5) / Σ$A_{[6]}$、and [BEI*][BEIm*]≦0.5	
Level 5	[BEI][BEIm] ≦ ($A_{[1]}$×0.25 + $A_{[2]}$×0.25 + $A_{[3]}$×0.25+ $A_{[4]}$×0.25) / Σ$A_{[6]}$, and [BEI*][BEIm*] ≦ 0.5	Off-site renewables excluded
	[BEI+] ≦ ($A_{[1]}$×0.25 + $A_{[2]}$×0.25 + $A_{[3]}$×0.25+ $A_{[4]}$×0.25) / Σ$A_{[6]}$, and [BEI*][BEIm*] ≦0.5, and [BEI]＜[BEI*]	Off-site renewables included*3

*1: Symbols in the calculation of scoring criteria for non-residential building complex:
$A_{[1]}$ = Floor area of Type [1] (Off･Sch), $A_{[2]}$ = Floor area of Type [2] (Rtl･Htl),
$A_{[3]}$ = Floor area of Type [3] (Rst･Hal･Hsp), $A_{[4]}$ = Floor area of Type [4] (Fct), Σ
$A_{[6]}$ = Floor area for non-residential use of the entire building = $A_{[1]}$＋$A_{[2]}$＋$A_{[3]}$＋$A_{[4]}$

*2: In the case of small buildings, the standard value for judgment shall be read as 1.1 for level 1 (0.9) and 1.0 for level 2 (0.8~0.75).

*3: If there is off-site renewable energy in any of the types [1] to [4], it will be evaluated as BEI+.

$$\text{BEI+ for type [6]} = \frac{\text{Molecules of BEI for type [6] (energy consumption, including on-site renewable energy) - Annual Off-site Renewable Energy Usage}}{\text{Denominator of BEI for type [6] (standard energy consumption)}}$$

■Evaluation of the entire building, including apartment buildings:

Evaluation of the entire building complex is as follows:

$$\text{Level of the entire building} = \frac{(\text{Level of non-residential building} \times A_{[6]} + \text{Level of apartment building} \times A_{[5]})}{A}$$

$A_{[5]}$ = Floor area of Type [5] (Apt),
$A_{[6]}$ = Floor area of Type [1]-[4] (non-residential building complex),
A = $A_{[5]}$＋$A_{[6]}$ =Floor area of entire building complex

* Note that the evaluation method for building complex in CASBEE is different from that in the BELS certification system.

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4. Initiatives for Efficient Operation

4.1 Monitoring

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

- Note; In order to improve the efficiency of energy use in the operation stage after completion, we will evaluate the efforts at the design and construction stages, so to speak, in the preparatory stage. Specifically, it will evaluate the fineness of the measurement of various loads and energy consumption (monitoring), the establishment of a system for optimal management and operation after completion, the setting of target values, and the formulation and proposal of implementation plans related to performance verification. In addition, in light of recent movements to promote decarbonization, we have added commissioning initiatives as new evaluation items from the perspective of improving quality and avoiding risks in design and construction, such as efforts to promote the use of non-fossil energy at the operational stage and the recent ZEB transition.

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	(No corresponding level)
Level 2	It must be possible to identify the annual consumption of each kind of energy used in the building and use the base unit for energy consumption*1, or other means, for benchmark comparison.
Level 3	In addition to level 2, the breakdown of energy consumption by major application*2 does not meet the requirements of Level 4 (1/4~1/2 of the total breakdown) or the system efficiency*3 evaluation does not meet the requirements of Level 5 (2~3 types).
Level 4	In addition to level 3, the breakdown of energy consumption for each major building type must be identified, trends in consumption identified and analyzed, and their appropriateness confirmed.
Level 5	In addition to level 4, the system efficiency*2 of major equipment systems must be evaluated in order to evaluate the performance of the systems.
Building type	Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	No efforts to be evaluated.
Level 4	Equipment that indicates the amount of energy consumed, environmental-load-reducing devices and the like, are employed.
Level 5	A system for managing energy is established and efforts for reducing energy consumption are made therein.

*1 Annual primary energy consumption per floor area by building type based on statistical data, etc.

*2 Broadly, monitoring must be planned which will be able to identify the breakdown, by application, of a majority of the total energy consumption. The breakdown shall include items such as heat sources, air conditioning power, lighting and outlets, and hot water supply, which have a large breakdown ratio of annual primary energy consumption.

*3 Efficiency assessment must be performed on at least four of the types listed in the table (see commentary). If there are many systems, such as air conditioning, lighting and ventilation, it is permissible to estimate the whole from the assessment of representative systems. It must be possible to compare the energy-saving effects of introducing various methods, using the COP of heat source systems, system COP (of compound equipment), the WTF of pumped conveyance and the ATF of air movement. if district heating and cooling has been introduced, it is possible to evaluate according to a well-defined system COP, so evaluating efficiency is sufficient. Furthermore, data obtained by devices with control sensors can also be used in the efficiency assessment.

☐Commentary

For non-Apt, evaluate efforts to continuously track the energy consumption consumed during the operation phase of the building and build a measurement and metering system to lead to more efficient operation. The following are the evidence for the measurement and weighing system.

- Example of evidence material: Automatic control equipment diagram
  Power Equipment Diagram
  Gas Facility Diagram
  Plumbing Equipment Diagram (Cold and Hot Water)

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Table: Efficiency Assessment Examples

Equipment Item		Assessment Item	Assessment Summary
1	Heat source equipment	Heat source machine COP assessment	Amount of generated heat/energy consumed by the heat source (based on primary energy)
		COP assessment of heat source systems	Amount of generated heat/energy consumed by the heat source and related equipment (based on primary energy)
		Heating medium conveyance WTF	Amount of heat carried/energy consumed by pump (based on secondary energy)
2	Air conditioning equipment	Air conditioner conveyance ATF	Amount of heat carried/energy consumed by fan (based on secondary energy)
		Total enthalpy heat exchange effect	Amount of heat reduced, amount of energy
		Cooling effect by external air	Amount of heat reduced, amount of energy
		Multi-COP assessment for buildings	Efficiency in multi-split A/C system
3	Ventilation equipment	Assessment of variable air volume control	Reduced energy consumption through CO concentration control, temperature control, etc.
4	Lighting equipment	Assessment of various types of control	Amount of energy saved by the use of daylight, occupant sensors, etc.
5	Hot water supply equipment	Heat source machine COP assessment	Amount of generated heat/energy consumed by the heat source (based on primary energy)
		COP assessment of heat source systems	Amount of generated heat/energy consumed by the heat source and related equipment (based on primary energy)
		Heating medium transmission WTF	Amount of heat carried/energy consumed by pump (based on secondary energy)
6	Elevator	Individual control operation effect	Reduced energy
7	Other	Assessment of solar power generation facility	Power generation efficiency/Rating efficiency/Annual efficiency
		Heat storage tank	Efficiency of heat storage tank
		CGS assessment	Electricity generation efficiency, overall efficiency, energy saving rate
		Coordinated controls	Lighting/ventilation on/off control linked with security sensors
		Other	A/C CO_2 control effect, Ventilation CO_2 control effect, Task ambient A/C effect, Task ambient lighting effect, etc.

For Apt, level 4 is given when one of the following measures (a-c) is taken.

a. Equipment that indicates the amount of energy consumed is installed for one of the following services: electricity, gas or water. (The energy consumption may be expressed as the amount of energy consumed, energy costs, or any other related forms.)
b. Devices that indicate the amount of electricity or gas consumed are installed, which are connected to terminals such as electric plugs and gas valves rather than connected directly to the devices.
c. A distribution board having a function of breaking the branch circuit (a distribution board with a peak-cut function) depending on the use of power-consuming devices is installed.

Level 5 for Apt is given when, in terms of the information concerning the energy consumption of the dwelling, the amount of electricity for air conditioning, lighting and the like, used by the building owner or occupant, is individually measured, the related information may be accumulated and provided as necessary, and the Home Energy Management System (HEMS), which has a control function in order to adjust the power use, is installed. The requirements for the HEMS are in accordance with the low-carbon building certification manual issued by the Housing Performance Assessment and Indication Association, and the Japan Sustainable Building Consortium. (see Reference)

■Reference: HEMS (Home Energy Management System) requirements

All of the following (1) to (5) should be satisfied.

(1) Power consumption data is obtained, and its measurement and retrieval occur every 30 minutes or less, in terms of the entire residential block as well as one of the following: every branch circuit, room, equipment, power generation, power storage and discharge.
(2) Measured electric consumption data is available inside the dwelling unit.
(3) The period for storing data measured by HEMS devices is one of the following:
- More than 1 month when the predetermined time unit of power consumption indicated is less than 1 hour
- More than 13 months when the predetermined time unit of power consumption indicated is less than 1 day

(4) Power consumption adjusting functions of ECHONET Lite (control functions for adjusting power use through automatic control, remote control and the like) are available.
(5) HEMS must be installed in more than half of the total dwelling units.

■Bibliography: 74)

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4.2 Operation & Management System

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	No operation and management have been planned.
Level 2	Organizations, systems or management policies have been planned for operation and management.
Level 3	In addition to level 2, there must be an organized operation and management system, designated manager.
Level 4	In addition to level 3, target values for energy consumption in the whole buildings have been planned and presented to the building owner, based on calculation of annual energy consumption.
Level 5	In addition to level 4, there must be regular verification of equipment performance during building operation, with specific actions planned for repair of malfunctions etc. (commissioning system)
Building type	Apt
Level 1	No efforts to be evaluated.
Level 2	(No corresponding level)
Level 3	User manuals for individual facilities are provided to the occupants.
Level 4	In addition to satisfying the requirements for Level 3, general instructions regarding an energy-saving way of living are given to the occupants.
Level 5	In addition to satisfying the requirements for Level 3, appropriate instructions regarding the facilities and specifications installed in the subject dwelling unit, suitable for the respective building and life style, are given to the occupants.

☐Commentary

Evaluate whether there is an operation and management system related to energy during the operation of the building and its contents.

For non-Apt, this assessment should examine how far the designer went in preparing an operation and management system for cutting environment loads, and proposing it to the building owner.

The assessment should cover management systems and goal setting for planned and organized operation, maintenance and preservation of the building, the setting of target values for annual energy consumption, and the implementation of a target management plan to achieve the goals and targets.

Level 5 evaluates the planned use of platforms such as building OS necessary for efficient data-driven management, aiming to save energy by tuning and predicting and optimizing equipment system control according to how it is used during operation, and to achieve CO2 reduction through supply-demand linkage such as demand response. For information on the concept of platforms such as building OS, please refer to the "Comprehensive Guidelines for Smart Buildings" (May 2023, 1st edition) by the Information-technology Promotion Agency, Japan.

For Apt, even buildings and facilities with excellent energy-saving performance may not be effective depending on how the residents use them, so it is evaluated that residents are explained about the appropriate way to live and how to use them. For instance, the assessment is carried out as to whether user manuals for built-in facilities of the building including a water heater and air conditioning are provided to the occupants. User manuals would enable the occupants to conduct appropriate maintenance work, which would contribute to maintaining facilities' performance such as energy consumption efficiency.

■Reference: Sample effort required in Level 4 and 5

- Level 4; An explanation of an energy-saving way of living is provided in a manual for the subject apartment. Alternatively, an explanation of an energy-saving way of living based on leaflets that are publicly available, is provided.
- Level 5; Appropriate explanations of facilities installed are provided to the extent of how they actually work or their effective use, depending on the individual conditions. For instance, when an inventive approach to ventilation as part of a passive system is applied, the design concept of the subject dwelling unit is described and an explanation regarding when and which opening should be used in

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order to achieve effective ventilation is provided, depending on the geographical conditions.

4.3 Expanding adoption of non-fossil energy

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	No countermeasures
Level 4	Facilities, such as energy storage, are being introduced to expand the introduction of non-fossil energy such as the use of renewable energy (tangible) from any effort of *1
Level 5	In addition to Level 4, operational initiatives are being made to expand the introduction of non-fossil energy (intangible) from any effort of *2

☐Commentary
From the perspective of promoting decarbonization, evaluate efforts to expand the use of non-fossil energy on the demand side (building side), except Apt.

As a premise, if the building has installed renewable energy equipment (including off-site renewable energy) or procured renewable energy, it will be subject to evaluation, and specifically, the following are eligible.
1) On-site renewable energy facilities or off-site renewable energy that is subject to evaluation in LR1-3
2) Adoption of renewable energy power menus with additionality other than 1) above.
3) Other procurement of non-fossil energy [Note 1] for use in energy storage facilities on the building side.

On top of that, evaluate our efforts in the following cases.
*1: Level 4; Introduction of energy storage facilities to promote the use of renewable energy (tangible)
  1) Energy storage equipment: electric batteries, etc.
  2) Heat storage equipment: heat storage [heat, heat, hot water], etc.
  3) Others: Hydrogen storage derived from renewable energy electricity, etc., which are effective in the use of renewable energy (e.g., electrification of combustion equipment in factory production facilities)
*2: Level 5; Operational initiatives to promote the use of renewable energy (intangible).
  - Mainly by measures for operation [Note 2] using energy storage equipment.

- Note 1; "In the non-power sector, we will promote electrification with decarbonized electricity, and in sectors where electrification is difficult (high-temperature heat demand, etc.), we will decarbonize by using hydrogen, synthetic methane, synthetic fuels, etc. (Basic Energy Plan (October Reiwa 3))" (including carbon offset gases that can be confirmed to be additional.)
- Note 2; In the event of a surplus of renewable energy power in the power system, the operation of demand response (DR) to increase electricity use based on requests from electric power companies, etc. Specifically, it evaluates initiatives that contribute to the effective use of renewable energy electricity with additionality, such as heat storage and storage operation for electric air conditioning and hot water supply during DR raising, shifting the production time of electric production equipment in factories, changing the operation of air conditioners from combustion type to electric type, and stopping regular private power generation facilities (including CGS, etc.)

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4.4 Promoting Commissioning

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	No countermeasures
Level 4	Efforts from *1 are introduced.
Level 5	In addition to Level 4, more than 2 efforts from *2 are introduced.

☐Commentary

From the perspective of promoting decarbonization, evaluate efforts to expand the use of non-fossil energy on the demand side (building side), except.

It was newly established from the perspective of promoting carbon neutrality. Evaluate the Commissioning (Cx) efforts for the planning and design of equipment systems. Cx is a series of quality control processes to clarify the Client Requirements (OPR) related to equipment systems, manage rational design, construction, and operation, and achieve OPR. The Cx management team is hired by the client and acts as an agent for the client. At the same time, it is required to have an ethical view and independence to judge from a fair perspective. In the early days, Cx mainly referred to performance verification and tuning of equipment systems (narrow Cx), but the current Cx is regarded as a "process" (broad Cx) for the realization of OPR. The main actions that form the CX process are as shown in *1 and *2. In order to achieve carbon neutrality, it is necessary to ensure the quality of more advanced and advanced designs, and Cx's efforts are important from the perspective of risk avoidance through consensus building. Apt is excluded from the assessment.

*1: Level 4; Satisfy both 1) and 2) below,
1) Clarify the Client Requirements (OPR) and update them as needed.
2) Strive to form a consensus among the parties involved such as the client, designer, and constructor, and prepare a record document describing the history and results.

*2: Level 5; In addition to Level 4, satisfy more than 2 efforts below,
3) Review whether the design and construction documents are corresponding to the OPR.
4) Evaluate VE and CD in construction phase to determine whether they are suitable for realizing OPR.
5) Plan to conduct functional performance tests immediately after completion.

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LR2 Resources & Materials

1. Water Resources

1.1 Water Saving

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	No systems for saving water.
Level 2	(No corresponding level)
Level 3	Major faucets are equipped with water-saving valve.
Level 4	In addition to water-saving valve, other water-saving equipment (such as flush-mimicking sound systems, water-saving toilets) is used.
Level 5	(No corresponding level)

☐Commentary

Evaluate the water-saving methods installed on the building's water supply equipment.
In this context, "major faucets" refers to faucets in everyday use. For example, in a home the term would refer to those in the kitchen, bathroom, restrooms, etc. This also depends on the level of water-saving effect, but it is generally necessary to have water-saving measures attached to a majority of faucets.

Table: Examples of water-saving equipment

Faucets	(1) Save water by regulating water flow volume	Water- saving valve
		Fixed flow volume valves
		Foaming faucets etc.
	(2) Simplify operation of the equipment to save water by reducing wasteful flow.	Automatic faucets
		Fixed flow faucets (self-closing faucets)
Water-saving toilets	(1) Toilet bowls (Approx. 6 L/use)	Water-saving appliances (Improvements to water supply routes and bowl and trap shapes secure waste evacuation performance while saving water).
		Water-saving flush valves (Continuous flush prevention mechanism, with regulatable discharge volume).
	(2) Urinals (Approx. 4 L/use)	Flushing in response to usage, with user sensor.
		Fixed-time control system (Combination with lighting, fan switch linkage and 24-hour timers).
Other		Privacy noise generators, etc.

1.2 Rain Water & Grey Water

1.2.1 Rain Water Use System

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

- Note; The rain water usage rate is calculated by the formula below.

$$\text{Rain water usage rate} = \frac{\text{Rain water use [m}^3\text{]}}{\text{Potable water use [m}^3\text{]} + \text{Rain water use [m}^3\text{]} + \text{Waste water use [m}^3\text{]}}$$

In this case,
Waste water use [m^3] = grey water use [m^3] + sewage water use [m^3] + industrial water use [m^3]

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Building type	Off·Sch·Rtl·Rst·Hal·Fct·Hsp·Htl·Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	No systems for using rain water.
Level 4	Rain water is used.
Level 5	Rain water usage rate >= 20%.

☐Commentary
Evaluate the level of rain water use based on the system and usage rates.

The denominator of the rain water usage rate indicates the overall water demand. Apply annual values for calculation.
In areas where a recycled water/grey water infrastructure is provided, use of such system is considered as industrial water use.

Groundwater use is included in rain water use except in the cases below:
(1) Groundwater is used only as heat source water
Ground water used only in a water heat pump system is excluded from this assessment since it does not contribute to reduction of regular domestic water use. However, ground water can be included if it is recycled for domestic use after it is used as a heat source.
(2) Groundwater used for disaster response
Such groundwater use is limited to emergency situations and does not affect regular domestic water use and is thus excluded from this assessment.
(3) Groundwater is stored but not utilized.
(4) Use of groundwater may cause land subsidence, or the amount of water pumped may exceed the limit prescribed in the regulations.

1.2.2 Grey Water Reuse System

Off·Sch·Rtl·Rst·Hal·Fct·Hsp·Htl·Apt

! Application condition
Small buildings with a gross floor area of less than 2,000 m^2 are excluded from this assessment.

Building type	Off·Sch·Rtl·Rst·Hal·Fct·Hsp·Htl
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	No systems for reusing grey water.
Level 4	Grey water is reused.
Level 5	More than two types of waste water are used

☐Commentary
In CASBEE-BD/NC, evaluate utilization of grey water, sewage water and industrial water (collectively referred to as waste water) based on how many types of waste water are being used. Level 5 is awarded where more than two types of waste water are used.
In areas where recycled water/grey water infrastructure is provided, the use of such systems is considered as industrial water use.

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2. Reducing Use of Non-renewable Resources

2.1 Reducing Use of Materials

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

Buildings with wood as the main structural component are excluded from this assessment.

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	Major structural elements are made of non-wood materials (RC/SRC/S), and earned 0 points in total for the table of the efforts to be evaluated.
Level 3	Major structural elements are made of non-wood materials (RC/SRC/S), and earned 1-2 points in total for the table of the efforts to be evaluated.
Level 4	Major structural elements are made of non-wood materials (RC/SRC/S), and earned 3-4 points in total for the table of the efforts to be evaluated.
Level 5	Major structural elements are made of non-wood materials (RC/SRC/S), and earned 5 points or more in total for the table of the efforts to be evaluated.

Efforts to be evaluated

Assessment Item	Description	Point
1) Concrete strength F_C and main rebar strength F of main structure [unit: N/mm^2]	More than Fc = 36, and less than F = 390 (1 point)	1-4
	More than Fc = 60, and less than F = 490 (3 points)	
	More than Fc = 100, and less than F = 590 (4 points)	
2) Steel frame strength F in main structure frame [unit: N/mm^2]	F = 325 or more but less than 355 (1 point)	1-4
	F = 355 or more but less than 440 (3 points)	
	F = 440 or more (4 points)	
3) Other measures related to major structural elements	Use of pre-stressed concrete (which reduces material cross section, thereby reducing materials used).	1
	Equivalent measures.	1 point each

☐Commentary

High-strength materials contribute to a reduction in overall material use. As such, evaluate use of various components in RC, S and other structures. Apply the assessment criteria to all building types, as it may be difficult to determine the type of structure in some cases. In cases where multiple methods are combined, such as SRC, evaluate each structure and combine all points to determine the result for the entire building.

In cases where more than two types of materials are used, evaluate the material that is used most.

Exclude assessment of CFT structures as reduction in the use of steel material is not clearly demonstrated.

<Examples of other structural measures>

- Use of BCPs (cold-press-formed rectangular steel tubes)
- Reduction in steel reinforced using specific embedding methods, etc.

In cases of multiple measures, combine all points earned for each measure.

Exclude measures intended mainly to prevent building collapse caused by explosion or rupture in the event of a disaster or to reduce overall material use during the entire life cycle of the building.

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2.2 Continuing Use of Existing Structural Frame, etc

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition
Recycled use of existing building frames in temporary buildings is excluded from this assessment.

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	The existing building frame is not reused.
Level 4	(No corresponding level)
Level 5	Existing building frame is reused.

☐Commentary
Usually, the weight of the existing building skeleton of non-wooden structures consists of about 90% of the entire building, and about 70% in case that it is the energy consumption rate of the material production. Therefore, when construction is to be carried out on a site with an existing building, the resource productivity of the new building will differ greatly depending on whether the skeleton of the existing building is reused or entirely removed in favor of a completely new building. This item evaluates the level of reuse of existing building structural elements, such as reuse of existing piles and preservation of existing building perimeter walls, from the point of view of resource productivity.
Further, reuse, removal and reconstruction of parts of the frames used for a building located on-site or off-site are included in the assessment of the reuse of the existing building frames.

It is natural that existing buildings cannot be reused unconditionally, considering their earthquake resistance and state of deterioration, but if the existing building skeleton is not used for such reasons, the new building should be able to achieve a high level on the Q (Quality) item.

2.3 Use of Recycled Materials as Structural Material

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	No recycled materials are used in the main parts for structural strength.
Level 4	(No corresponding level)
Level 5	Recycled materials are used in the main parts for structural strength.

☐Commentary
Evaluate whether recycled materials are used in the building's main structure.
This category covers recycled materials used for building structure listed as the Eco Mark Products by the Japan Environment Association and the Designated Procurement Items under Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Act on Promoting Green Procurement,) enacted in May 2000. Wooden materials produced from sustainable forests, such as timbers from forest thinning, are evaluated in "2.5 Timber from Sustainable Forestry."
Unless the quantity is extremely limited, include all materials used.
Recycled materials used in the foundation of wooden structures are deemed used in the main parts for the building's structural strength in the assessment.

Since the list of the Designated Procurement Items under the Green Procurement Law and information regarding the Eco Mark Products are constantly updated, it is advisable to refer to the following websites prior to the assessment.

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- Act on Promoting Green Procurement .net (Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities, MOE)
  http://www.env.go.jp/policy/hozen/green/g-law/
- Eco Product Net (Green Purchasing Network)
  http://www.gpn.jp/econet/
- Eco Mark Products Search Site (the Japan Environment Association)
  http://www.ecomark.jp/search/search.php

<Examples of recycled materials>
(1) Green procurement items (for public works)

Blast furnace slag aggregate	Ferronickel slag aggregate
Copper slag aggregate	Electric furnace oxidized slag aggregate
Blast furnace cement	FA cement
Eco cement	Lumber

(2) Wood board with Eco Mark (Product Category No. 111)
(3) Products using thinned lumber, reused and unused wood materials, etc., with Eco Mark (Product Category No. 115)
(4) Specific items designated by local governments, etc.

2.4 Use of Recycled Materials as Non-structural Materials

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	No recycled materials are used.
Level 2	(No corresponding level)
Level 3	One type of recycled material is used.
Level 4	Two types of recycled material are used.
Level 5	Three or more types of recycled material are used.

☐Commentary
Evaluate the use of recycled materials in non-structural applications.
This category covers recycled materials used for non-structural materials listed as the Eco Mark Products
by the Japan Environment Association and the Designated Procurement Items under Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Act on Promoting Green Procurement,) enacted in May 2000, or specific items designated by local governments, etc.
Since the list of the Designated Procurement Items under the Green Procurement Law and information regarding the Eco Mark Products are constantly updated, it is advisable to refer to the following websites prior to the assessment.
- Act on Promoting Green Procurement .net (Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities, MOE)
  http://www.env.go.jp/policy/hozen/green/g-law/
- Eco Product Net (Green Purchasing Network) http://www.gpn.jp/econet/
- Eco Mark Products Search Site (the Japan Environment Association)
  http://www.ecomark.jp/search/search.php

<Assessment method>
- The assessment is based on the number of items used as recycled materials. When multiple materials belonging to the same category are used, count them all as one item. Further, though timbers from forest thinning are included in the Designated Procurement Items, they are evaluated in 2.5 Timber from Sustainable Forestry. Therefore, they are excluded from the assessment in this section.
- When a product is recognized as both an Eco Mark Product and a Designated Procurement Item, count it as one item.
- Unless it is a very small quantity, include all materials used.

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- Calculation example: Brick products A and B (Eco Mark Product category No. 109) and ceramic tile product C (a Green Procurement Item) are used.
→ Both brick products A and B are counted as one item, and combined with ceramic tile product C counted also as one item for a total of two items used. Award level 4.

Table: Examples of applicable recycled materials and are shown below as reference.

Applicable recycled materials	Material name
Designated Procurement Items under the Green Procurement Law	Recycled soil processed from construction sludge Hydrocrushed slag for earthworks Caisson filler using copper slag Caisson filler using ferronickel slag Steelmaking slag for ground improvement Recycled heated asphalt mixtures Asphalt mixtures with added ferrous slag Medium-temperature asphalt mixture Roadbed material with added ferrous slag Recycled aggregates, etc. Permeable concrete Steel slag blocks Sprayed concrete using FA Paving blocks (fired) using recycled materials Paving blocks (precast, non-reinforced concrete products) using recycled materials Ceramic tile Insulated sash doors Lumber Laminated wood Plywood Laminated veneer lumber Cross Laminated Timber (CLT) Flooring Particle board Fiberboard Wooden-type cement panels Recycled wood and plastic composite products Vinyl flooring
Tiles and blocks that have been awarded the Eco Mark (Product category No. 109)	Ceramic tile Block Brick
Boards using wood materials that have been awarded the Eco Mark (Product category No. 111)	Boards
Products using thinned lumber, reused and unused materials, etc. that have been awarded the Eco Mark (Product category No. 115)	Outdoor materials (Civil engineering and construction materials: Small logs) Exterior materials (Civil engineering and construction materials: Laminated wood) Exterior materials (Civil engineering and construction materials: Plywood) Exterior materials (Exterior) Interior materials (Floor materials) Interior materials (Wall materials) Interior materials (Sliding door frames) Interior materials (Doors) Activated carbon (for moisture regulation) Soil improvement materials
Construction products (for interior decorating finishes) that have been awarded the Eco Mark (Product category No. 123)	Wood flooring Paper screens and sliding partitions Paper to cover paper screens and sliding partitions Board Tatami matting Wallpaper Thermal insulation Acoustic absorption materials and anti-vibration mats Vinyl floor covers

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Applicable recycled materials	Material name
	Carpet tiles Staircase anti-slip treatment Braille nails Free access floor Accordion doors High-speed sheet shutter
Construction products (cladding and exterior parts and materials) that have been awarded the Eco Mark (Product category No. 137)	Roofing Roof materials Cladding materials Plastic decking materials Composite materials of recycled wood and plastic
Construction products (material-type parts and materials) that have been awarded the Eco Mark (Product category No. 138)	Construction stone Hard PVC pipes for drainage and ventilation Sumps for residential land Plastering

2.5 Timber from Sustainable Forestry

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition
Inapplicable if no timber is used.
- Note; Use the formula below to calculate the proportion of timber used.

$$\text{Proportion of timber used} = \frac{\text{Total quantity of timber used from sustainable forests (volume) [m}^3\text{]}}{\text{Total quantity of timber used in the building (volume) [m}^3\text{]}}$$

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	Timber from sustainably managed forests is not used.
Level 3	Timber from sustainably managed forests supplied less than 10% of timber usage, or no timber is used, even in the structural skeleton.
Level 4	Timber from sustainably managed forests supplies 10-50% of timber usage.
Level 5	Timber from sustainably managed forests supplies 50% or more of timber usage.

☐Commentary
Timber is a material that should be renewable, and this item expresses the level of timber use in a building. However, when timber comes from tropical rainforests or illegally logged forests, it cannot be described as renewable. Therefore, the level of use of timber from sustainably managed forests is evaluated here. The assessment procedure is as provided in (1) and (2) below.

(1) Method for determining timbers produced in sustainable forestry
Wooden materials and timbers from forest thinning accompanied by a certificate of origin that guarantees their places of origin as sustainable forests are treated as timbers from sustainable forestry. Further, coniferous woods are most likely from sustainable forests. Therefore, in principle, they are also treated as timbers from sustainable forestry. However, those which obviously seem otherwise are not treated as timbers from sustainable forestry.
Wooden materials including laminated wood and plywood made from wood that conforms to the above definition may also be treated as timbers from sustainable forestry. However, molding materials and frame members are excluded from the assessment.

■ Reference: Methods for verifying wooden materials with a certificate of a sustainable forest as their place of origin
The verification procedure is in accordance with the following: (1) Verification method utilizing the forest certification system and chain of custody certification system, (2) Verification by companies authorized by related associations or institutions in forestry and timber industry, and (3) Verification by individual companies utilizing their original measures, under the Guideline for Verification on Legality and Sustainability of Wood and Wood Products (Forestry Agency of Japan, April 2006). (Figures 1-3,

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Source: “Guideline for Verification on Legality and Sustainability of Wood and Wood Products,” ■Bibliography 75)

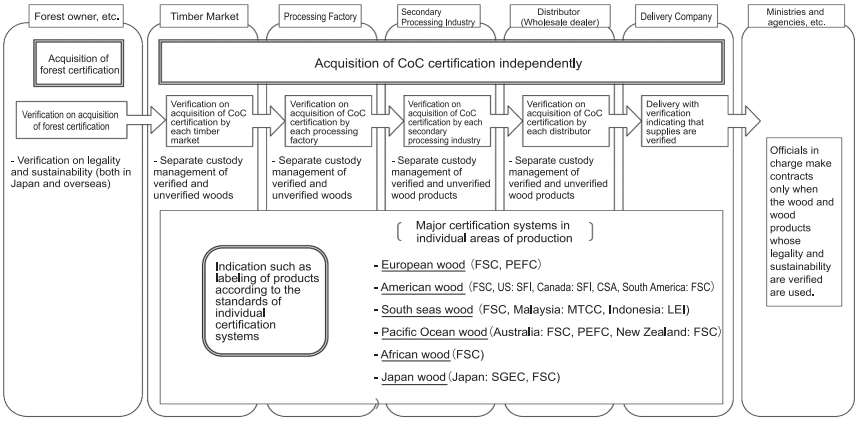

Figure 1: Schematic view of Verification Method based on the Forest Certification System and Chain of Custody Certification System

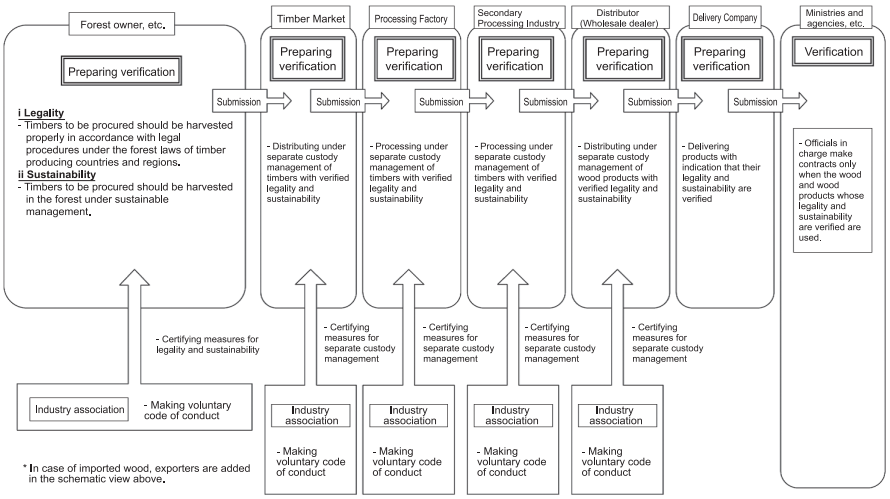

Figure 2: Schematic view of Verification by Companies Authorized by Related Associations or Institutions in Forestry and Timber Industry

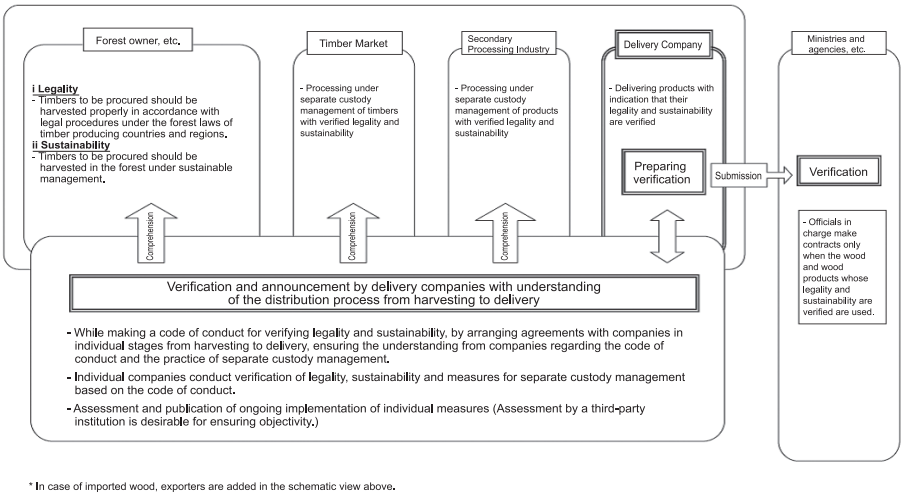

Figure 3: Schematic view of Verification by Individual Companies Utilizing Their Original Measures

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(2) Method for calculating the proportion of timbers used

1. Identify building condition
   - Collect and read each drawing
   - Collect and read each quotation
2. List the timber materials used, by position and tree type. (Not applicable for Temporary construction)
3. Identify the volumes of wood materials user, by position and type.
4. Determine whether the wood is produced from sustainable forests by tree type
5. Calculate the total volume of timber used.
   - Total amount of wood used (by volume)
   - Total use of timber from sustainable forests (by volume)
6. Use the formula below to calculate the proportion of timber used that is produced from sustainable forests.

$$\frac{\text{Total quantity of timber used from sustainable forests (volume)}\ [m^3]}{\text{Total quantity of timber used in the building (volume)}\ [m^3]}$$

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2.6 Reusability of Components and Materials

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	0 point in total from the table of the efforts to be evaluated, which are taken as efforts to promote material recycling on demolition.
Level 4	1 point in total from the table of the efforts to be evaluated, which are taken as efforts to promote material recycling on demolition.
Level 5	2 points or more in total from the table of the efforts to be evaluated, which are taken as efforts to promote material recycling on demolition.

Efforts to be evaluated

Description	Point
1) The structure of finishing materials can be separated easily.	1 point
2) Interior finishes and equipment are not entangled, and each can easily be removed separately for demolition, refurbishment and remodeling.	1 point
3) Reusable unit materials are used.	1 point
4) Structural materials or their units can easily be disassembled and reused.	1 point

☐Commentary

"2.3 Use of Recycled Materials as Structural Materials" and "2.4 Use of Recycled Materials as Non-structural Materials" expresses the degree of reused materials in the building at the time of its new construction or refurbishment, as the starting point of its life cycle. This item evaluates measures such as easier recycling which can promote recycling at the demolition and disposal stage, which is the end of the building lifecycle. In this category, evaluate measures to facilitate recycling at the end of the building lifecycle (i.e. demolition and disposal stage) such as material segregation.

"The structure and finishing materials can be separated easily" for this assessment means that structural materials and internal finishes, including underlay materials, can be separated easily. Therefore, S structures with cement panels, or RC structures with curtain walls, are not evaluated under this item.

The following are specific examples. In these examples, measures indicated as "easy separation," "relatively easy separation" and their equivalent may be included in the scope of assessment.

<Examples of easy separation>

(1) Structural frames with painted finishes

(2) Structural frames + light steel + finishing materials (FP panels used for insulation)

<Examples of relatively easy separation>

(3) GL construction method (Sprayed insulation (urethane etc.) used)

<Examples of difficult separation>

(4) Plastered walls

(5) Mortar and tile

"Interior finishes and equipment are not entangled" means cases designed for changing interior décor, such as SI (skeleton/infill) methods, and cases in which pipes and wires are no embedded in structural frames and finishing materials, as with the GL method (direct pasting method using an adhesive for direct plastering of gypsum board) and others. Conversely, do not evaluate in cases with mortar and tile or plastered walls on the structure.

"Reusable unit materials" include OA floors and movable partitions.

In "Reusable structural materials or their units," the assessment is carried out regarding design efforts in which structural materials and their units can be easily detached from each other and reused, the examples of which include a case where beam-column joints of a steel construction are all replaced with bolted connections.

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3. Avoiding the Use of Materials with Pollutant Content

3.1 Use of Materials without Harmful Substances

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	There are no building materials to be evaluated without substances specified in the Pollutant Release and Transfer Register Law. Or the inspection has not been carried out.
Level 4	There are 1-3 building materials to be evaluated without substances specified in the Pollutant Release and Transfer Register Law.
Level 5	There are 4 or more building materials to be evaluated without substances specified in the Pollutant Release and Transfer Register Law.

Building materials to be evaluated

Category	Description	Category	Description
Adhesives	For vinyl tile floors and seating	Paints	For fittings (wooden and metal)
	For tile		For wooden parts (frames for floor and ceiling)
	For wallpaper		For structural materials
	For floor board		For walls
Sealants	For sash	Anti-corrosion treatment	For frames
	For glass		For materials other than frames
	For tile joint	Undercoats	For materials for coated floors
	For wall joint	Floor coverings	For finishing wax
Waterproofing materials	Primer for waterproofing	Preservatives	For wooden parts
	For paint (surface coating)		

☐Commentary

In this assessment, evaluate the reduction of chemicals which may affect interior air quality and also the overall environment.

Various materials are used in buildings and these contain various chemical substances. These chemicals may have a harmful impact on human health and cause problems such as sick house syndrome and endocrine disruption due to environmental hormones. Materials with a low risk of causing health problems (except for sick house syndrome caused by VOCs) are considered as materials with no harmful substances in this assessment.

Targeted substances include Class I and II chemicals referred to in the law governing improved reporting and management of specific chemicals released into the environment. Class I designated chemical substances are defined as follows:

(1) The chemical substance concerned threatens to harm human health, or to impair the lives or growth of animals.
(2) Condition (1) is applicable to chemical substances which can easily be generated from the substance concerned through the action of nature.
(3) The chemical substance concerned depletes the ozone layer, harming human health through the increased penetration of ultraviolet radiation to the surface.

In addition to any one of the above, the following condition must apply to designated substances.

(4) The physical or chemical state of the chemical substance and the conditions of its manufacture, import, use and generation are recognized to result in its continuing presence in the environment

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over a wide area.

Table: Examples of class I designated chemical substances and class II designated chemical substances

Volatile organic compounds	Benzene, toluene, xylene etc.
Organochlorines	Dioxins, trichloroethylene etc.
Agrochemicals	Methyl bromide, fenitrothion, chlorpyrifos etc.
Metallic compounds	Lead and its compounds, organic tin compounds
Ozone-depleting substances	CFCs, HCFCs etc.

In evaluating the level of usage of materials which do not contain harmful substances, it is logical to indicate the total volumes of each substance type covered by the PRTR Law that are used in the evaluated building. However, that is not practically possible, for the following reasons.

(1) As of August 2011, (Japanese) government ordinances have designated 462 types under "Type one designated chemical substances" alone.
(2) The Safety Data Sheets (SDS) have not been written for the chemical substances used in buildings that must be managed.
(3) It would be a huge task to calculate the volumes of materials used in the building.
Instead, it is more practical to consider applications where there is a certain probability of these substances appearing, and count the number of such categories of building materials that are free of substances designated under the PRTR Law.

The categories of materials which have at least a certain probability of containing materials with health risks are adhesives, resilient sealants, parting agents, waterproofing agents, anti-corrosion treatments, paints and undercoats. For this assessment of the use of materials which do not contain harmful substances, the number of those categories (materials to be evaluated) which are free of chemical substances designated under the PRTR Law should be counted. The adhesive includes floor finishing materials such as tiles, carpets, etc.

In principle, SDS should be used for this assessment, but in some cases, it could be difficult to judge what is covered by the assessment in practice. In such cases, check with the manufacturer and judge accordingly.

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3.2 Avoidance of CFCs and Halons

- Note; Atmospheric emissions of CFCs and halons pose a global threat to the ozone layer. In the construction field, such substances have been used frequently as flame retardants, foaming agents (insulation materials, etc.) and refrigerants. In Japan, current regulations allow only the use of low ozone-depleting potential (ODP) CFCs and halons; however, careful handling is still required due to high global warming potential (GWP).
  In this assessment, evaluate use of low-ODP and GWP CFCs and halons in flame retardants, foaming agents (insulation materials, etc.) and refrigerants.
  ODP, or ozone depletion potential, is a relative scale which compares the global loss of ozone caused by 1 kg of a given substance with the global loss of ozone due to 1 kg of CFC-11, which is fixed at an ODP of 1.0. A substance with absolutely no potential for ozone depletion has an ODP of zero.
  GWP (Global Warming Potential), or global warming potential, is a relative scale which compares the gas in a given substance with that of the same mass of carbon dioxide, which is fixed at a GWP of 1.

3.2.1 Fire Retardant

Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt

! Application condition

Buildings that have no fire-extinguishing equipment or have sprinklers only, and those having no gas fire extinguishing facilities are excluded from the assessment. A foam extinguisher is also excluded from the assessment.

Building type	Off · Sch · Rtl · Rst · Hal · Hsp · Htl · Fct · Apt
Level 1	Halon flame retardants with high ODP/GWP are used (incl. critical uses).
Level 2	Halogenated flame retardants are used.
Level 3	(No corresponding level)
Level 4	Inert gas flame retardants are used. Or, flame retardants with 0 ODP and less than 50 GWP are used.
Level 5	(No corresponding level)

☐Commentary

Evaluate flame retardants based on ODP/GWP impacts. In this assessment, chemicals in flame retardants are evaluated. Thus, buildings with absolutely no fire-extinguishing system or which contain only a fire sprinkler system are excluded.

Assessment levels are defined as follows:
Level 1: high ODP/GWP
Level 2: very low ODP/high GWP
Level 4: zero-ODP/very high GWP

Halon flame retardants have been banned in principle since 1994. However, exception has been made for applications deemed essential to public safety, termed as critical use. Critical use of halon in designated/non-designated flame retardant materials is permitted as stated in notices issued by the Fire and Disaster Management Agency (Fire Prevention Notice 87 and Hazard Notice No.84, issued on April 28, 2005). In this assessment, however, critical and non-critical uses of halon are both evaluated as level 1 from the standpoint of their impact on the global environment.

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Table: Examples of Critical-uses for which halon fire retardants may be used.

Types of facility		Examples of facility
Communications equipment etc.	Communications equipment rooms etc.	Communications equipment rooms, wireless equipment rooms, telephone exchange rooms, magnetic disk rooms, computer rooms, telex rooms, telephone exchange switching rooms, communications equipment control rooms, data print rooms
	Broadcasting studios etc.	TV relay rooms, remote centers, studios, lighting control rooms, musical equipment rooms, adjustment rooms, monitor rooms, broadcasting equipment rooms
	Control rooms etc.	Electrical power control rooms, operation rooms, control rooms, management rooms, disaster prevention centers, dynamometer rooms
	Film storages etc.	Film storage rooms, lighting control rooms, relay desks, VTR rooms, tape rooms, projector rooms, tape storerooms
	Measurement equipment rooms in hazardous material handling facilities	Measurement equipment rooms in hazardous material handling facilities
Historical assets	Exhibition rooms etc.	Important cultural assets, artwork repositories, exhibition rooms, showrooms
Other	Workshops etc.	Print rooms containing rotary presses
Car parks	Car parks, etc.	Automated parkade, mechanical parkade (where drivers enter fire-protected areas))

Source: Fire Prevention Notice No. 87, Hazard Notice No. 84 (issued on April 28, 2005)

3.2.2 Foaming Agents (Insulation Materials, etc.)

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct・Apt
Level 1	Not adequate for Level 3.
Level 2	(No corresponding level)
Level 3	Insulation foaming materials with zero-ODP are used.
Level 4	Insulation foaming materials with zero-ODP and low GWP (less than 10 in 100-year value) are used.
Level 5	Insulation foaming materials with zero-ODP and low GWP (less than 1 in 100-year value) are used; or, no insulation foaming material used.

☐Commentary

Evaluate foaming agents (insulation materials, etc.) based on ODP/GWP impacts.

Insulation materials are classified into mineral fiber materials (e.g. glass wool, rock wool and asbestos), expanded plastic materials (e.g. polyurethane, polystyrene and polyethylene) and natural materials (e.g. carbonized cork, cellulose fiber and wool). Of these, CFCs and HCFCs have been used in the expanded plastic materials listed below in Reference 1.

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■ Reference 1: Foaming agents used in expanded plastic insulating materials

Types of expanded insulation materials	Period of use	Foaming agent name	ODP	GWP (100-year value)
Urethane foam	Before 1995	CFC-11	1	4,750
	Start of 2000s	HCFC-141b	0.11	725
Urethane modified isocyanurate foam	Next generation	HFC-134a	0	1430
		HFC-245fa	0	560
		Cyclopentane C_5H_{10}	0	3
Styrene olefin foam	Before 1995	CFC-12	1	10,900
	Start of 2000s	HCFC-142b	0.065	2,310
	Next generation	HFC-134a	0	1,430
Phenol foam	Before 1995	CFC-113	0.8	6,130
	Since 2000	Dichloromethane CH_2Cl_2	0	

Only expanded insulation materials of extremely low ODP are commercially available in Japan, thus ODP = 0-0.01 is considered standard and defined as level 3. However, GWPs of currently-used foaming agents are not necessarily low. Therefore, materials with ODP = 0 and a very low GWP are considered level 5. ODPs and GWPs of various foaming agents are shown below in Reference 2.

■Reference 2: ODP and GWP values of foaming gases

Substance	Persistence in atmosphere	ODP (CFC standard)	GWP (CO_2 standard) in 100-year value
CFC-11	50	1.0	4,750
CFC-12	120	1.0	10,900
CFC-113	85	0.8	6,130
CFC-114	300	1.0	10,000
CFC-115	1700	0.6	7,370
HCFC-22	13.3	0.055	1,810
HCFC-123	1.4	0.02～0.06	77
HCFC-124	5.9	0.022	609
HCFC-141b	9.4	0.11	725
HCFC-142b	19.5	0.065	2,310
HCFC-225ca	2.5	0.25	122
HCFC-225cb	2.6	0.033	595
HFC-23	264	0	14,800
HFC-32	5.6		675
HFC-125	32.6		3,500
HFC-134a	14.6		1,430
HFC-143a	48.3		4,470
HFC-152a	1.5		124
HFC-227ea	36.5		3,220
HFC-236fa	209		9,810
HFC-245ca	6.6		560
FC-14	50000	0	6500
FC-116	10000		9200
FC-218	2600		7000
FC-C318	3200		8700

In addition to the data above, ODPs and GWPs can be verified using the following documents.
- MOE 2008 “Annual Report on Ozone Layer Monitoring,” volume 4 appendix, P. 139-147, issued August 2009 (http://www.env.go.jp/earth/report/h21-02/full.pdf)

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3.2.3 Refrigerants

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition
Exclude from assessment if no refrigerant gases are used.

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	HCFC is used as the refrigerant.
Level 3	Refrigerant of ODP = 0 is used as the refrigerant.
Level 4	Natural refrigerants and new chilling systems (ODP = 0) with GWP less than 50 are used.
Level 5	(No corresponding level)

☐Commentary
Exclude all specified CFC refrigerants, and evaluate the use of CFC substitutes.
Due to the widespread use of CFC substitutes as refrigerants, zero-ODP is considered as level 3.

Natural refrigerants and new chilling systems in level 4 include the following items:
(1) Natural refrigerants are CO_2 and hydrocarbons such as ammonia, propane and butane.
(2) New chilling systems (MH chilling systems) are those using hydrogen-occluded alloy (MH alloy). MH alloy is able to store up to 1,000 times its own volume of hydrogen. When it absorbs hydrogen, it emits heat, and absorbs heat when it emits hydrogen, and these properties are used for refrigeration.

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LR3 Off-site Environment

- Note; In the assessment under Section LR3, evaluate each criterion based on the point scoring system. Use the total points in a five-level assessment. Most items included in Section LR3 are assessed qualitatively. As such, provide detailed descriptions and additional comments on actual measurements actually in effect in the "Summary for Design for Environment (DfE)" column included in the scoring software.

<Scoring method>

- If the planned content actually applies to the content of each of the efforts to be evaluated, add the corresponding points. And the total points determine the level of the assessed building according to the points shown for each level.
- Some points can be selected as "Not Applicable," according to factors such as the building types and site conditions. The cases which are to be excluded are stated in the commentary for each point. Select "Not Applicable" on the scoring software, and the item concerned will be automatically excluded from the scoring subjects.
- In the "Other" column, points can be added in case of the efforts that do not appear in the Efforts to be evaluated table. When scoring the "Other" column, describe the efforts in the "Summary for Design for Environment (DfE)" column of the software.

1. Consideration of Global Warming

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1-5	The level for this item is expressed by the value of the Whole Life Carbon (WLC) emission rate converted to a 1-5 score (rounded to 1 decimal point). Levels 1, 3 and 5 are defined by the following emission rates. Level 1: WLC emission rate is 125% or more of the reference value. Level 3: WLC emission rate is 100% of the reference value. Level 5: WLC emission rate is 50% or less of the reference value.

☐Commentary

Use WLC as the index for evaluating the level of effort for consideration of global warming. Currently, global warming is regarded as the most important global environmental problem, and in order to measure its impact, it is common to compare it with the total amount of greenhouse gases (GHG) emitted. The sum of these GHG emissions over the lifetime of a building is called "whole-life carbon (WLC)" for buildings.

Calculation of WLC for a building is normally a very large task, but CASBEE uses an approximate calculation method (i.e. Standard Calculation) in order to simplify the process. For details of the calculation procedure and conditions, refer to Part IV 2.3 Assessment Method. Specifically, a reference WLC emission for each building application is set based on the WLC emission of a standard building that satisfies "Level 3" for all evaluation items except LR1 Energy, and either BEI=1 or a primary energy consumption reduction rate of 0% in the Building Energy Efficiency Act. Using the reference values, calculation is performed more-or-less automatically based on the GHG-related assessment results (scores) at each stage of a building lifecycle (i.e. construction, operation, maintenance/renewal/demolition).

1) Construction stage

LR2 Resources & Materials evaluates "Continuing Use of Existing Structural Frame, etc." and "Use of Recycled Materials." The GHG related to the manufacture of construction materials (embodied carbon), which is considered in relation to these measures, is approximately calculated from the usage rate of existing structural skeletons and the blast furnace cement usage rate.

2) Operation stage

Use “BEI”, the primary energy consumption ratio, or the “primary energy consumption reduction rate”, which is evaluated under LR1 Energy, to make a simple estimate of the GHG emission at the operation stage.

3) Maintenance/Renewal/Demolition

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Extension of service life by improving longevity is evaluated under "Q2 Quality of Service." However, it is difficult to estimate the actual extension of service life with sufficient precision to use it as a calculation condition for WLC. Therefore, take service life as a constant for all non-residential buildings for WLC estimation.

- Offices, hospitals, hotels, schools and halls: Fixed 60 years
- Retailers, restaurants and factories: Fixed 30 years
- Apartments: 30, 60 or 90 years, according to the deterioration countermeasure grades in the Japan Housing Performance System.

There are many other measures that affect GHG emissions, but here we have focused on those with relatively large impacts, which are also relatively easy to set assessment conditions for. Therefore, narrow the assessment subjects to a certain range of efforts and do not evaluate others. Also, the precision of the process may not be high, because the assessment results for other scoring items are only calculated simply. However, for the promotion of global warming countermeasures, it is important to widely publicize GHG emissions, their values and reduction effects, so we have decided to present approximate figures.
If the assessor personally makes more detailed calculations (individual calculation), they are not to be reflected in the scores for this item.

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2. Consideration of Local Environment

2.1 Air Pollution

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

Evaluate as level 5 if absolutely no atmospheric pollution is generated on the site.

- Note; For the criterion, use concentration level of the Air Pollution Control Law, the “Guidelines for Small Capacity Low NOx Combustors” (MOE) or the local ordinance, whichever is more stringent.

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct・Apt
Level 1	Gas and dust concentrations at sources of NOx, SOx and dust exceeds the emission standards set by the Air Pollution Control Law, the Guidelines for Small Capacity Low NOx Combustors (MOE) or local ordinances.
Level 2	(No corresponding level)
Level 3	Gas and dust concentrations at sources of NOx, SOx and dust are reduced to below the emission standards*1 set by the Air Pollution Control Law, the Guidelines for Small Capacity Low NOx Combustors (MOE) or local ordinances.
Level 4	Gas and dust concentrations at sources of NOx, SOx and dust are considerably reduced to below the emission standards*2 set by the Air Pollution Control Law, the Guidelines for Small Capacity Low NOx Combustors (MOE) or local ordinances.
Level 5	No incineration equipment is used, and absolutely no atmospheric pollutants leave the virtual enclosed space boundary of the building to the outside.

*1 For level 3, the concentration level should be limited to below the standard value and over 90% of the standard value.

*2 For level 4, the emission concentration should be limited to below 90% of the standard value.

☐Commentary

Evaluate NOx, SOx and soot reductions using performance values of the equipment, relative to the corresponding emission standards stipulated in the Air Pollution Control Law, the Guidelines for Small Capacity Low NOx Combustors (MOE) or local ordinances. Refer to Reference 2 for facilities regulated under the Air Pollution Control Law and Reference 3 for others (e.g. small boilers). In cases where specification/performance values are not yet established, evaluate based on the equipment intended for use or on target performance values of equipment in operation.

If absolutely no atmospheric pollutants are generated on site, level 5 should be awarded (evaluated as no load is emitted from the virtual enclosed space boundary to space outside). Accordingly, level 5 may be given when no combustion equipment is used on-site. If combustion equipment is used, evaluate at level 3 or 4, according to the reduction rate. In the above scoring criteria, level 4 is for 90% or less of the standard value, but that figure will be revised as appropriate in future, to take into account future trends in technical development and cost. Emergency generation equipment and other devices which are not normally in operation are not evaluated under this item.

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■Reference 1: Calculation method for multiple devices

If there are multiple types of relevant devices, emitting differing concentrations of atmospheric pollutants, take a weighted average of the standard outputs of each installed device.

Calculation method for multiple devices (with sample values)

(1) Specifications	(2) Combustion capacity of equipment (kW)	(3) Coefficient	(4) = (1) x (3)
Concentration level 80%	300	300/450＝0.67	0.536
Concentration level 85%	100	100/450＝0.22	0.187
Concentration level 100%	50	50/450＝0.11	0.11
	450	Total	0.833（83%）

■Reference 2: Assessment of facilities regulated under the Air Pollution Control Law

1. Facilities regulated under the Air Pollution Control Law

Table: Facilities regulated under the Air Pollution Control Law.

	Building name	Size conditions
1	Boilers	- Combustion capacity at least 50 l/hr.
2	Boilers	Any of the following: - Raw material processing capacity 20 t/day - Combustion capacity at least 50 l/hr.
3	Garbage furnace, sintering furnace	- Raw material processing capacity at least 1 t/day
4	(For refining metals) Blast furnace, converter, open-hearth furnace	
5	(For refining and casting metals) Blast furnace	Any of the following: - Grate area at least 1 m^2 - Tuyere area at least 0.5 m^2 - Combustion capacity at least 50 l/hr. - Transformer rated capacity at least 200 kVA
6	(For metal casting, rolling and heat treatment) Heating furnace	
7	(For the manufacture of petroleum products, petrochemical products, coal tar products) Heating furnace	
8	(For oil refining) Catalyst regeneration tower of a fluid catalytic cracking unit	- Capacity for combustion of carbon with adhering catalyst, at least 200 kg/hr.
8-2	Combustion furnace of a sulfur recovery unit for an oil gas cleaner	- Combustion capacity at least 6 l/hour
9	(For manufacture of ceramics) Sintering furnace, blast furnace	Any of the following: - Grate area at least 1 m - Transformer rated capacity at least 200 kVA - Combustion capacity at least 50 l/hour
10	(For manufacture of inorganic chemical industrial products or foodstuffs) Reacting furnace (including fuel combustion equipment for manufacturing carbon black) Direct heating furnace	
11	Dry kiln	
12	(For the manufacture of iron, steel, ferrous alloys, carbide products) Electric furnace	- Transformer rated capacity at least 1,000 kVA
13	Waste incinerator	Any of the following: - Grate area at least 2 m^2 - Incineration capacity at least 200 kg/hr.
14	(For refining copper, lead, zinc) Roasting furnace, sintering furnace (Including pellet sintering furnaces) Blast furnace, converter, melting furnace, dry kiln	Any of the following: - Raw material processing capacity 0.5 t/hr. or more - Grate area at least 0.5 m^2 - Tuyere area at least 0.2 m^2 - Combustion capacity at least 20 l/hr.
15	(For manufacturing cadmium-based pigments or cadmium carbonate products), drying kiln	- Volume at least 0.1 m^3
16	(For manufacturing ethylene chloride) Rapid chlorine freezing equipment	- Chlorine processing capacity at least 50 kg/hr.
17	(For manufacturing ferric chloride) Dissolution bath	
18	(For manufacturing activated carbon (using zinc chloride)) Reacting furnace	- Combustion capacity at least 3 l/hour
19	(For manufacturing chemical products) Chlorine reaction facilities, chlorine – hydrogen reaction facilities, chlorine hydrogen absorption facilities	- Chlorine processing capacity at least 50 kg/hr.
20	(For aluminum refining) Electrolytic furnace	- Current capacity at least 30 kA
21	(For manufacturing phosphorus, phosphoric acid, phosphate fertilizers, and compound fertilizers (using phosphate rock)) Reaction facilities, concentration facilities, sintering furnaces, blast furnace	Any of the following: - Phosphate ore processing capacity at least 80 kg/hr. - Combustion capacity at least 50 l/hr.

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		- Transformer rated capacity at least 200 kVA
22	(For manufacturing hydrofluoric acid) Concentration facilities, absorption facilities, distillation facilities	Any of the following: - Heat transfer area at least 10 m^2 - Pump power at least 1KW
23	(For manufacturing sodium tripolyphosphate (using phosphate ore as raw material)) Reaction, drying and sintering facilities	Any of the following: - Raw material processing capacity at least 80 kg/hr. - Grate area at least 1 m^2 - Combustion capacity at least 50 l/h
24	(Secondary refining of lead (including manufacture of lead alloys, lead pipe, sheet and wire)) Blast furnace	Any of the following: - Combustion capacity at least 10 l/h - Transformer rated capacity at least 40 kVA
25	(For manufacturing lead accumulator batteries) Blast furnace	Any of the following: - Combustion capacity at least 4 l/h - Transformer rated capacity at least 20 kVA
26	(Manufacturing lead-based pigments) Blast furnace, air furnace, reaction furnace, drying facilities	Any of the following: - Volume at least 0.1 m^2 - Combustion capacity at least 4 l/h - Transformer rated capacity at least 20 kVA
27	(Manufacturing nitric acid) Absorption facilities, bleaching facilities, concentration facilities	- Nitric acid synthesis, bleaching, concentration capacity at least 100 kg/hr.
28	Coke oven	- Raw material processing capacity at least 20 t/hr.
29	Gas turbine	- Combustion capacity at least 50 l/hour
30	Diesel engines	
31	Gas engine	- Combustion capacity at least 35 l/hour
32	Gasoline engine	

2. Standards and outlines of atmospheric pollutants from factories and other business operation sites (excerpt)

The Air Pollution Control Law sets specific emission standards for NOx, SOx and soot particles from soot/smoke-generating facilities (e.g. boilers) based on type and capacity of the facility (selected excerpts for the assessment reference).

Table 2: Regulatory Methods for Air Pollutants Discharged from Factories and Workplaces and Outline (Excerpt)

Category		Substance	Main source	Standard/outline
Soot and smoke		Sulfur oxides (SOx)	Fuels and mineral ores used in combustion process of boiler/waste incinerator	1. Standard value (volume) set based on height of emission outlet (He) and regional constant value K Allowable emission (Nm^3/h) = K x 10^{-3} x He^2 General emission standard: K = 3.0 - 17.5 Special emission standard: K = 1.17 - 2.34 2. Fuel use standard based on the season Standard of sulfur in fuels set regionally Sulfur content: 0.5-1.2% or less 3. Overall emission standard Regional/facility-specific standard set based on overall emission reduction plan
		Soot	Same as above and use of electric furnace	Emission standard (concentration) per facility/capacity General emission standard: 0.04-0.5 g/Nm^3 Special emission standard: 0.03-0.2 g/Nm^3
	Harmful substances	Nitrogen oxide (NOx)	Combustion, synthesis, or decomposition process of boiler/waste incinerator	1. Emission standard per facility/capacity 60-950 ppm 2. Overall emission standard Regional/facility-specific standard set based on overall emission reduction plan

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■Reference 3: Assessment of NOx/SOx/soot-generating combustion facilities (e.g. small boilers) not subject to regulation under the Air Pollution Control Law

A combustion facility that is not subject to regulation under the Air Pollution Control Law but generates NOx, SOx and soot is evaluated in this assessment. This applies to small boilers and individual water heaters in apartments. In such case, award level 3 to emission concentrations equivalent to the standard value as referred to in the Guidelines for Small Capacity Low NOx Combustion equipment issued by MOE; award level 4 to concentrations of 90% or less than the guideline standard. Evaluation is based on performance assessment of individual equipment. Determine the appropriate level where the majority of the equipment satisfies criteria at the given level.

Table 3: Guidelines for Small Capacity Low NOx Combustors (MOE, 2009 edition)

Combustion Equipment type		Guideline standard value (ppm, conversion: O_2 = 0%)	
Device	Capacity*1	Type of Fuel*2	Guideline standard (ppm)*3
Boiler	Fuel consumption capacity of less than 50 l/hr. (heavy oil equivalent) and heat transfer area of less than 10 m^2	Gas	50
		Kerosene	80
		Type A heavy oil	100
Absorption chiller	Fuel consumption capacity of less than 50 l/hr. (heavy oil equivalent) and heat transfer area of less than 10 m^2	Gas	60
		Kerosene	80
		Type A heavy oil	100
Consumer gas water heater specified below: - Gas-fueled on-demand water heater (end stop type) - Gas-fueled hot water supply/space heater (water supply section only) - Gas-fueled bath tub system with hot water supply (water supply section only)		Gas	60
Gas engine (excluding GHP)	Fuel consumption of less than 35 l/hr. (heavy oil equivalent)	Gas	300*4
Gas heat pump (GHP)	Fuel consumption of less than 10 l/hr. (heavy oil equivalent)	Gas	100*5

*1 Conversion of heavy oil and gas is obtained based on conversion coefficients set by the municipal governments.
*2 Gas includes 12 A/13 A town gas and LPG. Other types of town gas and biogas are not included in the guideline.
*3 NOx concentration is based on 0% oxygen concentration equivalent.
*4 Guideline standard for gas engines (excluding GHP) is based on NOx concentration at the factory setting level.
*5 Guideline standard for GHP is the 12-mode value obtained in accordance with the method specified in JIS B 8627-1 Appendix I.

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2.2 Heat Island Effect

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	0 points in total from the table of the efforts to be evaluated.
Level 2	1-5 points in total from the table of the efforts to be evaluated.
Level 3	6-12 points in total from the table of the efforts to be evaluated.
Level 4	13-19 points in total from the table of the efforts to be evaluated.
Level 5	20 points or more in total from the table of the efforts to be evaluated.

Efforts to be evaluated

Assessment Item		Description	Point
I. Preliminary investigation of heat environment	1) Preliminary investigation of the local heat environment	[1] Existing data such as data from nearby meteorological stations and regional meteorological observation data (AMEDAS data) was used to identify the wind environment, including directions, speeds and prevailing direction. (1 point)	1 - 2
		[2] In addition to [1] above, on-site measurements were taken, or a supplementary detailed investigation was performed using a wide-area environmental forecasting system based on wide-area meteorological data and topographical data. (2 points)	
		[3] Inapplicable under CASBEE-BD/NC	-
II. Thermal impact reduction in surrounding area	2) Thermal impact reduction in surrounding area by facilitating the flow of air toward downwind areas	[1] Position and shape of the building are arranged in the planning to promote the flow of air downwind. The building has no practical impact on the flow of air downwind: 1 point The building does not obstruct the flow of air downwind: 2 points	1 - 2
		[2] Exposed area of the building facing the prevailing summer winds is reduced. Exposed area facing the prevailing wind direction is: 60% or more but less than 80%: 1 point 40% or more but less than 60%: 2 points Less than 40%: 3 points	1 - 3
		[3] Height, shape and spacing of building are arranged to recover the flow of air. Building spacing index Rw is: 0.3 or more but less than 0.4: 1 point 0.4 or more but less than 0.5: 2 points 0.5 or more: 3 points	1 - 3
	3) Consider ground surface coverage to reduce thermal impact beyond the site	[1] Ground covering materials are used to reduce thermal impact. Percentage of ground covered with appropriate materials is: 15% or more but less than 30%: 1 point 30% or more but less than 45%: 2 points 45% or more: 3 points	1 - 3

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	4) Consider the building cladding materials to reduce thermal impact beyond the site	[1] Rooftop greenery system or high reflective roof material is used to reduce thermal impact. Percentage of roof covered with appropriate system/material is: Less than 20%: 1 point 20% or more but less than 40%: 2 points 40% or more: 3 points	1～3
		[2] Appropriate exterior wall materials are used to reduce thermal impact. Percentage of exterior walls covered with appropriate material is: Less than 10%: 1 point 10% or more but less than 20%: 2 points 20% or more: 3 points	1～3
	5) Reduce atmospheric emission of heat from building equipment	[1] Appropriate measures to prevent heat loss via exterior walls/windows and to improve energy efficiency for A/C systems have been implemented. Score (results) in the "LR1 Energy" assessment is: 3.0 or more but less than 4.0: 1 point 4.0 or more but less than 4.5: 2 points 4.5 or more: 3 points	1～3
		[2] Air temperature increase is reduced by measures such as cooling of waste heat emitted from building service systems. Measures established to control air temperature increase are: at standard level: 1 point at intermediate level: 2 points at advanced level: 3 points	1～3
III. Confirmation of effects	6) Use simulations or other means to confirm effects in mitigating deterioration of the heat environment	[1] Building form and positioning, relative to wind direction, were considered at the desk plan stage (desktop prediction). (1 point)	1～2
		[2] Numerical simulation of fluid flow, or other methods, was used for the current situation and the planned building, considering topography of the site area, the building and surrounding green space, to predict impact. (2 points)	

☐Commentary

Evaluate measures that contribute to reduction in off-site thermal load such as due to heat island. Verify measures are implemented and award the appropriate level according to the point total. Note that the corresponding on-site measures are evaluated in the assessment under "Q3.3.2 Improvement of the Thermal Environment on Site."

I. Preliminary investigation of heat environment

1) Preliminary investigation of the local heat environment

Appropriate implementation of a preliminary survey is a necessary beginning to devising measures to reduce thermal impact beyond the site. Evaluate according to the level of the preliminary survey.

[1] For this item, award 1 point in cases where a preliminary analysis of wind characteristics (directions, velocity and prevalence) is conducted using existing data from nearby meteorological stations or regional meteorological observation data (AMEDAS).

[2] For this item, award 2 points in cases where, in addition to the preliminary analysis, wind characteristics are identified more thoroughly based on field measurements or are supplemented with a wide-area atmospheric environment forecasting system based on wide-area metrological/topographical data.

Provide documentation or drawings to support the analysis for third party verification.

II. Thermal impact reduction in surrounding areas

2) Thermal impact reduction in surrounding areas by promoting the flow of air to downwind areas

To ensure effective airflow to downwind/surrounding areas, a structure's wind resistance requires

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review from a broader perspective. For Item [1], evaluate whether the building obstructs the flow of air to surrounding areas. For Items [2] and [3], evaluate the building's wind resistance from a broader perspective.

[1] For this item, perform a qualitative evaluation on how the positioning of the building affects the airflow to surrounding areas (e.g. residential areas, parks, schools, greenbelt, etc.). Award two points for effective positioning, such as the example shown in Figure 12, which does not obstruct flow. Award zero points where the building seems to obstruct flow and one point where the building has no practical impact on airflow.
In analyzing wind conditions of the building's surroundings, collect and review all available data such as local wind characteristics (e.g. Figures 12 and 13). Refer to CASBEE for Heat Island for details regarding the wind characteristics database.

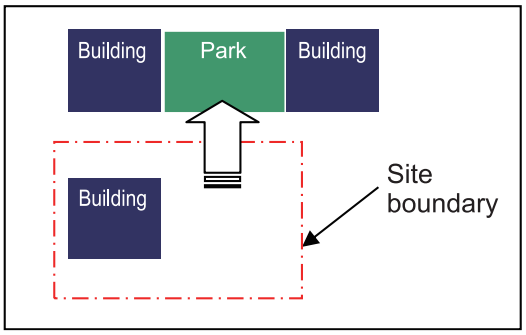

Figure 1: Example of building position for unobstructed air flow

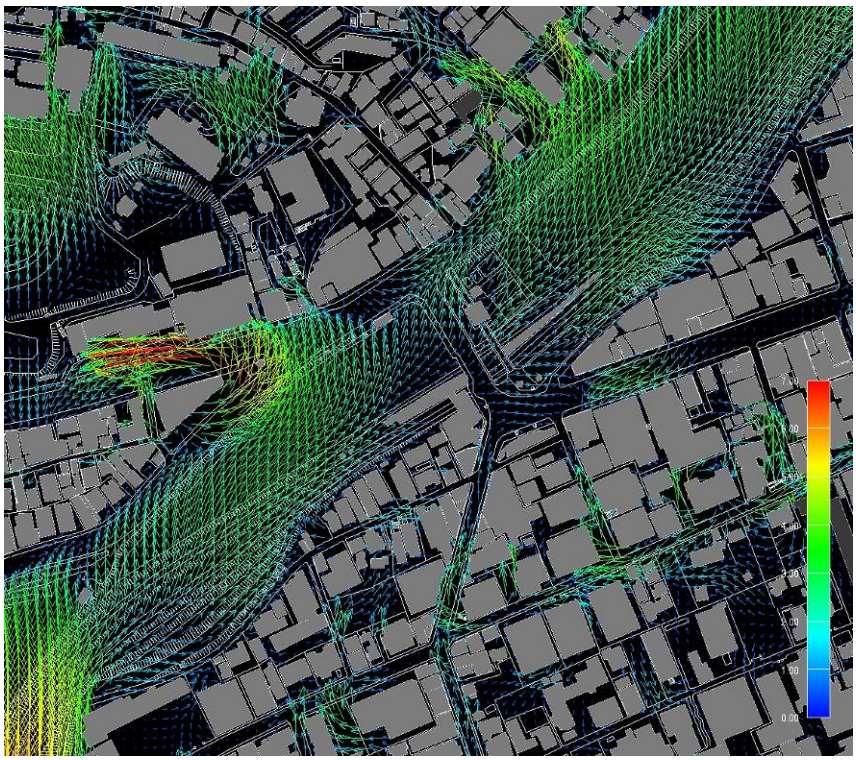

Figure 2: Wind characteristics database for Tokyo: pedestrian-level wind velocity distribution

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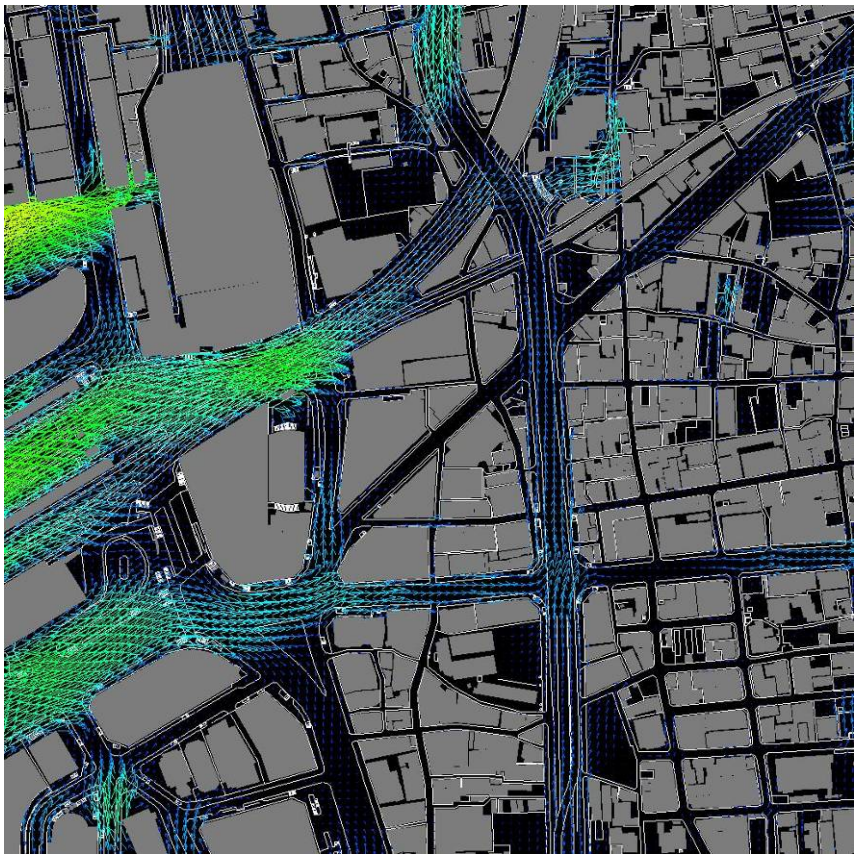

Figure 3: Wind characteristics database for Osaka: pedestrian-level wind velocity distribution

For Items [2] and [3], evaluate the building's effectiveness in promoting airflow to downwind areas from a broader perspective.

- A decrease in wind velocity occurs in downwind areas due to building wind resistance. Impact can thus be greatly reduced by ensuring that the smallest possible exposed area faces the prevailing wind. For Item [2], evaluate exposed area of the building facing the prevailing wind.
- At the same time, decreased wind velocity due to a building is expected to regain somewhat on the site if the space between buildings is wider (i.e. building units are positioned sparingly in the direction of the prevailing wind). Thus, for Item [3], evaluate recovery wind velocity based on building spacing.
- In cases where the maximum floor space ratio of the subject site is not specified according to any of the following: urban planning, the width of the frontal road, or ordinances, 1 point is given to [2] and [3].
- For the calculation method of the percentage of exposed area and the building spacing index Rw, refer to the Appendix “5. Calculation method of the percentage of exposed area and the building spacing index Rw.”

[2] For this item, evaluate based on percentage of exposed area of the building facing the prevailing wind in summer months. This type of assessment normally requires review impacts from adjacent buildings: in this particular assessment, however, base the evaluation on the assumption that the adjacent area is vacant.

<Percentage of exposed area> = Sb / (Ws x Hb) x 100 [%]

Sb: Exposed area perpendicular to the prevailing wind direction
Hb: Standard height = [(Standard floor space ratio/standard building coverage ratio) x (Average floor height above the ground)]
Ws: Maximum width of the site perpendicular to the prevailing wind direction

[3] For this item, in order to promote wind recovery in the area downwind from the building, the assessment is based on the building spacing index (Rw), which is the ratio of the setback distance from the site boundary in the direction of the prevailing wind in summer relative to the building height (H) and the distance from the adjacent building.

- When the height of the building is more than 50% of the standard height Hb, points are given

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depending on the building spacing index Rw. Buildings whose height is less than 50% of the standard height Hb are given 3 points.
- Standard height Hb: [(Standard floor space ratio) / (Standard building coverage ratio)] x (Average floor height above the ground) (same as Item [2])
- The site boundary that provides the maximum site width (Wd) against the direction of the prevailing wind is determined in order to evaluate the setback distance in the direction of the prevailing wind (W_1 and W_2).
- Obtain the building spacing index Rw using the formula below:

$$Rw=(W_1+W_2)/H=\underbrace{W_1/H}_{\text{Value of upwind side}}+\underbrace{W_2/H}_{\text{Value of downwind side}}$$

H : Height of the building
W1,W2 : Setback distance in the direction of prevailing wind

3) Consider ground surface coverage to reduce thermal impact beyond site
Evaluate thermal impact reduction measures, namely the use of ground covering materials with a high evaporative cooling capacity or solar reflectance. Both types of ground covering measures are included in this assessment.
- Base evaluation on the percentage of ground covered with appropriate materials. Obtain the percentage using the formula below:

<Percentage of ground covered with appropriate materials>
= <Percentage of ground covered with evaporative materials> +
<Percentage of ground covered with highly reflective material>

- Each percentage is obtained using the corresponding formula below:

A. Percentage of ground covered with evaporative materials
Evaluate effectiveness of thermal impact reduction based on ground area with a high evaporative cooling capacity. The assessment is based on the total value of evaporative cooling effects for applicable areas (i.e. covered with lawn, grass or shrubs, water area, area with mid/high trees and water retention area) in lawn area equivalent.

<Percentage of ground covered with evaporative materials>
= <percentage of green-covered area> + 2.0 x <percentage of water-covered area>
+ 3.0 x <percentage of horizontal projected area of medium and tall trees>
+ <percentage of water retention area>

- Obtain each of the above percentages using the following formulas:
<Percentage of green-covered area> = <Green area>/<Site area> x 100 [%]
<Percentage of water-covered area> = <Water surface area>/<Site area> x 100 [%]
<Percentage of horizontal projection area of mid-height/tall tree> = <Horizontal projection area of mid-height/tall tree>/<Site area> x 100 [%]
<Water retention area> = <Area with water-retentive materials>/<Site area> x 100 [%]

- Refer to Appendix “2. Calculation of Tree Canopy Size and Green Area" to determine sizes of green area and horizontal projection area of mid-height/tall trees.
- Materials with a high water retention capability are those referred to in Appendix “3. High Water Retention Materials" or equivalent materials.
- Areas covered with water-permeable materials are considered as without evaporative cooling effects and are thus excluded from the total water-retentive area.

B. Percentage of ground covered with solar reflective materials
Evaluate effectiveness of solar energy reflected outward based on the percentage of ground covered with materials with high solar reflectance capability.

<Percentage of ground covered with high solar reflectance materials>
= <Area covered with high solar reflectance materials>/<Site area> x 100 [%]

- Evaluate effectiveness of thermal impact reduction based on the use of ground covering materials with high solar reflectance.

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- Materials with high solar reflectance are coating materials (JPMS27), water-proofing sheets (KRKS-001), or equivalent materials, as listed in Appendix “4. High Solar Reflectance Materials."
- Ground covering materials with high solar reflectance used in areas accessible by people and cars (sidewalk, roadway, parkade, parks, rooftop, etc.) have lower reflectance values than those used in inaccessible areas of rooftop (approximately 25-35% lower) in order to minimize solar reflection impacts on people (heat and light).

4) Consider the building cladding materials to reduce thermal impact beyond site
Evaluate thermal impact reduction measures, namely use of effective exterior materials, in individual areas (i.e. roof and walls).

[1] For this item, evaluate roof area covered with evaporative cooling materials (e.g. rooftop greenery) or with materials with a high solar reflectance.
- Obtain the percentage area of such materials with respect to the total roof area, using the formula below:

<Percentage of roof area with applicable materials>
= <Percentage of roof area covered with evaporative materials> +
<Percentage of roof area covered with materials with high solar reflectance>

- Each percentage is obtained using the corresponding formula below:

A. Percentage of roof area covered with evaporative materials
- Evaluate effectiveness of thermal impact reduction based on the use of rooftop greenery.
- Obtain the percentage roof area with evaporative materials using the formula below.
- Refer to Appendix 2 "Calculation of Tree Canopy Size and Green Area" to determine sizes of green area on the roof and horizontal projection area of mid-height/tall trees.

<Percentage of roof covered with evaporative materials>
= <percentage of green-covered area> + 2.0 x <percentage of water-covered area> + 3.0 x <percentage of horizontal projected area of medium and tall trees> + <percentage of water retention area>

- Obtain percentages of green-covered area, water-covered area, horizontal projected area of medium-height and tall trees and water retention area on the rooftop, using the formulae below.
<Percentage of green-covered area> =<Green area>/<Total roof area> x 100 [%]
<Percentage of water-covered area> =<Water surface area>/<Total roof area> x 100 [%]
<Percentage of horizontal projected area of medium-height/tall trees> = <Horizontal projected area of medium-height/tall trees>/<Total roof area> x 100 [%]
<Percentage of water retention area> = <Water retention area>/<Total roof area> x 100 [%]

B. Roof area with high solar reflectance materials
- Evaluate effectiveness of thermal impact reduction based on the use of roof covering materials with high solar reflectance.

<Percentage of roof area covered with high solar reflectance materials>
= <Roof area covered with high solar reflectance materials>/<Total roof area> x 100 [%]

- Materials with a high solar reflectance are coating materials (JPMS27), water-proofing sheets (KRKS-001), or equivalent materials, as listed in Appendix 4 "High Solar Reflectance Materials."
- A high rate of long-wave radiation promotes radiative cooling during the night, thus contributing to A/C load reduction in the evening.

[2] For this item, evaluate effectiveness of thermal impact reduction based on the use of green or water-retentive materials for exterior walls.
- Obtain the thermal-efficient exterior walls for the total exterior wall area (including window areas).
- Percentage of the thermal-efficient exterior walls is calculated using the formula below, as described in IV-2. Appropriate Exterior Wall Materials under "Q3.3.2 Improvement of the Thermal Environment on Site." Refer to Appendix “2. Calculation of Tree Canopy Size and Green Area" to determine the size of green-covered areas on the exterior walls.
- The definition of retroreflective materials is in accordance with the CASBEE-HI manual.

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$$\text{<Percentage of Horizontal Projection Area>} = \frac{\text{<Horizontal projection areas of medium/tall trees> + <Horizontal projection areas of piloti, eaves, pergolas, etc.>}}{\text{<Site area>}} \times 100\ [\%]$$

5) Reduce atmospheric emission of heat from building equipment

[1] For this item, evaluate reduction of atmospheric thermal emissions from building service systems based on effective energy use. Effective measures include the following:

- Building thermal load control
  Sun shielding structures (e.g. mid/tall trees, eaves, louvers); control of waste heat from A/C system via insulation reinforcement
- Improved efficiency in the building service system
  Use of an energy-efficient system (e.g. A/C, lighting, ventilation, elevators)
- Natural energy utilization (optimal use of natural energy potential of the surrounding areas)
  Use of natural airflow and daylight
- Untapped energy utilization (optimal use of urban waste heat from surrounding areas)
  Use of waste heat from garbage incineration facility
  Use of seawater, river water, groundwater, etc.
- Introduction of high-efficiency infrastructure
  Regional heating/cooling systems

For overall evaluation of the measures above, apply the score results obtained in the "LR1 Energy" assessment. Award 1 point for a score of 3.0 or higher but lower than 4.0, 2 points for a score of 4.0 or higher but lower than 4.5, and 3 points for a score of 4.5 or higher.

[2] For this item, evaluate reduction of atmospheric thermal emissions from A/C external units (i.e. sensible heat emissions) that directly affect air temperature.

- Standard-level measures refer to methods such as maintaining waste heat temperature as low as possible (e.g. effective positioning of A/C exterior units away from intake vents to avoid recirculation of diffused air).
- Advanced-level measures refer to methods that control/reduce sensible heat emission by approximately 80% or more[*1], such as latent heat conversion (e.g. water misting, evaporative cooling[*2], use of river water and sewage water as a heat sink, and waste heat recovery.
- Award 3 points for Apt.
- For building complex, establish an appropriate level based on points from Apt (i.e. 3 points) and non-Apt buildings using the building's gross floor area ratio.

*1 Examples: absorption chillers, centrifugal chillers, etc.
*2 Include waste heat from both A/C system and power generation system when calculating the rate.

III. Confirmation of effects

6) Use simulations or other means to confirm effects in mitigating deterioration of the heat environment

Evaluate if simulations or similar means are used to confirm the effects of various measures. Evaluate according to the level of the confirmation method used.

(1) Award 1 point if a desktop study (desktop forecast) has been made on the form and layout of the building relative to the wind direction, and the study found that thermal impact beyond the site is being thoroughly reduced.

(2) Award 2 points if numerical simulation of fluid flow, or other methods, were used on the current situation and the planned building, considering topography of the site area, the building and surrounding green space, to predict impact, and the study found that thermal impact beyond the site is being thoroughly reduced.

Present documents and diagrams so that the above effects can be confirmed by a third party.

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2.3 Load on Local Infrastructure

2.3.1 Reduction of Rain water Discharge Loads

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt	
	If there are administrative guidelines	If there are no administrative guidelines
Level 1	(No corresponding level)	
Level 2	(No corresponding level)	
Level 3	Measures to control rainwater runoff are being implemented on the scale instructed.	No measures to control rainwater runoff have been implemented.
Level 4	Level 3 is satisfied, and measures are being implemented to control rainwater runoff, but Level 5 is not satisfied.	Measures are being implemented to control rainwater runoff, but Level 5 is not satisfied.
Level 5	Level 3 is satisfied, and the site has secured the basic rain stock capacity necessary for 100 mm / hour rainfall indicated in the "Technology Standard for Rainwater Harvesting" of the Architectural Institute of Japan.	

☐Commentary

Under this item, evaluate measures to control rainwater runoff on the site (groundwater permeation measures and temporary storage measures) etc., in order to evaluate performance in limiting rain water runoff flow.

- Level 3: The assessment of rain flow control measures follows the scale of measures specified in administrative instructions concerning the methods and sizes of countermeasures, which have been set by local authorities with reference to the state of urbanization in the area, and conditions in rivers and sewers. Areas which do not have administrative instructions and where no measures to control rainwater runoff have been implemented, are also awarded as level 3.
- Level 4: The specified scale of measures in administrative instructions has been met, and further measures have also been implemented (Greater rain stock capacity is ensured, or rain water percolation and similar measures were implemented voluntarily, etc.).
- Level 5: The specified scale of measures in administrative instructions has been met, and the site has secured the basic rain stock capacity necessary for 100 mm / hour rainfall indicated in the "Technology Standard for Rainwater Harvesting" of the Architectural Institute of Japan. Areas which do not have administrative instructions and where the site has secured the basic rain stock capacity necessary for 100 mm / hour rainfall, are also awarded as level 5.
- The rain stock capacity on the site shall be calculated as follows (refer Reference 1).

The rain stock capacity on the site [mm]
= (1) Amount of rain stock by land use type of site [m^3] + (2) Amount of rain stock by infiltration facility [m^3] + (3) Effective storage capacity of storage facilities [m^3] / the site area [m^2]

Here,
(1) Amount of rain stock by land use type of site [m^3]
= the basic rain stock capacity (100 [mm]) × rain stock index*/ 1000

* Rain stock index; value obtained by subtracting the runoff coefficient according to the type of land use from 1.

If it is difficult to calculate based on the type of land use, it is obtained by the following formula
(1) Amount of rain stock by land use type of site [m^3]
= (Non-soaking area: 2 [mm], Soaking area: 5 [mm], paddy field: 50 [mm]) × the area of each [m^2]

(2) Amount of rain stock by percolation facility [m^3]
= (Amount of penetration per facility*[m^3/h] × 1 [h] + Amount of void storage per facility [m^3]) × number of facility

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* Amount of penetration per facility[m^3/h]= Impact Factor × the specific penetration of infiltration facilities [m]× Saturated hydraulic conductivity of the soil [m]
* Use 0.81 for Impact Factor normally, and 0.14 [m/h] for Saturated hydraulic conductivity of the soil.
* When it is indicated by the municipality, use the value for the amount of penetration and f void storage per facility.
* Obtain the amount of void storage per facility by porosity of single-grain crushed stone as 35%, with consideration for the amount of storage in basin and pipes, also.
* For permeable pavement, it is also possible to calculate the capacity of rain stock as an infiltration facility without using the rain stock index.

(3) Effective storage capacity of storage facilities [m^3]
* Effective storage capacity is the storage capacity excluding mud sump and overflow space in the storage tank capacity.

Table 1: Land use type and Rain stock index
（Rain stock index is obtained by subtracting the runoff coefficient according to the type of land use from 1.00）

Land use type		Rain stock index	Range for runoff coefficient
Roof	Normal	0.05～0.15	0.85～0.95
	Green roofs with slopes	0.20	Refer to Sports grounds / With drainage facilities
	Flat green rooftops	0.50	Refer to Sports grounds / With drainage facilities
Pavement	Asphalt pavement	0.10～0.20	0.80～0.90
	Gravel road	0.30～0.70	0.30～0.70
	Permeable pavement	0.30～0.60	0.40～0.70
Bare Ground (middle space) planted space	Compacted	0.50	0.50
	Not compacted	0.70～0.90	0.10～0.30
Sports grounds, etc. (unpaved)	No drainage facilities	0.50	Refer to Bare Ground (middle space) / Compacted
	With drainage facilities	0.20	0.80
Golf course (with drainage facilities to remove rainwater)		0.50	0.50
Slopes (covered with artificially created vegetation)		0.60	0.40
Forests, fields, and wilderness		0.70～0.90	0.10～0.30
paddy field		0.20～0.30	0.70～0.80
Water surface		0.00	1.00
Parks with a lot of grass and trees		0.75～0.95	0.05～0.25
Mountain	With gentle slope	0.60～0.80	0.20～0.40
	With steep slope	0.40～0.80	0.40～0.60

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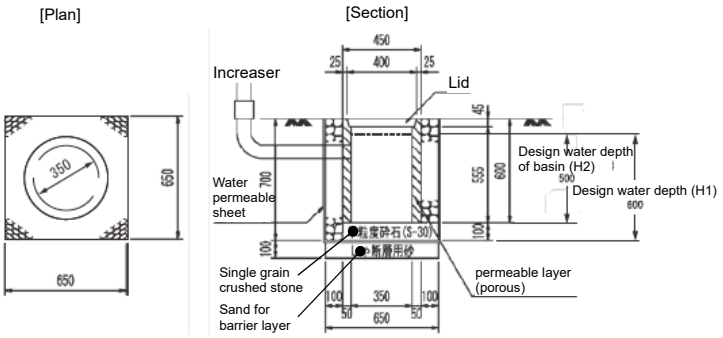

Figure 1: Example of infiltration basin

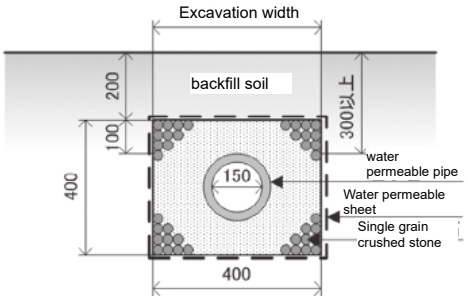

Figure 2: Example of infiltration trench

■Reference 1: "Basic Rain Stock Capacity" and the "Technology Standard for Rainwater Harvesting" of the Architectural Institute of Japan

"Basic Rain Stock Capacity" is an index indicated in the "Technology Standard for Rainwater Harvesting (AIJES-W0003-2016)" of the Architectural Institute of Japan Environmental Standards. Based on the "Basic Act on Water Cycle" enacted in 2018 and the "Act on Promotion of Rainwater Utilization" included under it, this technical standard was newly established in response to the fact that due to the frequent occurrence of torrential rains in recent years, rivers and public sewerage systems have become unable to cope with rainwater, and it is necessary to manage rainwater in an all-area manner throughout the river basin. In this technical standard, the concept of "rain stock" is presented to store and utilize rain, and it is required to respond to 100 mm/h of rainfall (basic rain stock capacity of 100 mm/h) at all sites.

<Excerpt of basic rain stock capacity in "Technology Standard for Rainwater Harvesting (AIJES-W0002-2023)">

Chapter 3 Rain Stock Technology 3.1 Rain Stock Performance

All sites shall have secured the basic rain stock capacity necessary for 100 mm / hour rainfall, and an effective rain storage performance for flood control, water utilization, disaster prevention, and the environment.

[Commentary]

The basis of the rain storage performance is to temporarily keep 100 mm/h of rainwater on the site, regardless of par unit time or total rainfall, and this is the basic rain stock capacity. Since the concept of the rain stock capacity is different from the runoff control amount set by local governments, etc., if the runoff control amount is stipulated by laws and regulations, etc., the basic rain stock capacity shall be ensured after complying with it.

Rainfall storage for flood control reduces the risk of flooding due to the concentration of heavy rain in a short period of time. The purpose is to have a mitigating function at each site. Therefore, flood control rain stock is essential for all sites.

(omitted)

Rainfall storage for water usage is used on a daily basis for a variety of available applications, such as sprinkling rainwater, flushing toilets, and cleaning. (omitted) It shall be actively addressed from the viewpoint of effective use of water resources at the building site.

Rainfall storage for disaster prevention is to secure the minimum necessary amount of emergency living water as one of the disaster prevention and mitigation measures, and this is also an essential rain storage as flood control rain stock.

Rainfall storage for environment retains, infiltrates, and evaporates rainwater through gardens and plantings, thereby suppressing runoff from the site, and also functions as a countermeasure against urban heat islands. In addition, expanding green spaces and low-lying wetlands with rain-storing performance will contribute to the conservation of biodiversity. (omitted)

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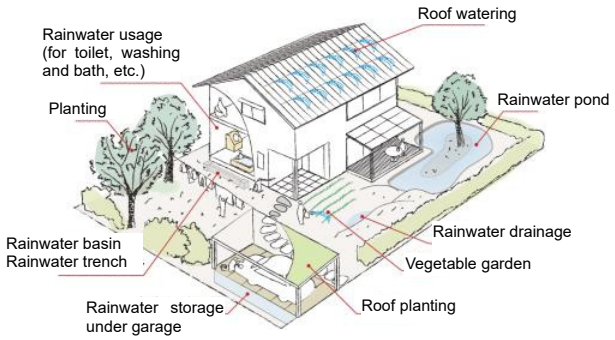

Figure 3: Examples of elemental technologies for rain storage in detached houses
Source: "Technology Standard for Rainwater Harvesting (AIJES-W0002-2023)" February 2024, Architectural Institute of Japan
■Bibliography 78)

■Reference 2: Precautions for rainwater infiltration facilities
In order to efficiently demonstrate the runoff control effect, it is desirable to install rainwater infiltration facilities as much as possible, but it is necessary to avoid installing them in areas where infiltration is unsuitable, such as steep slope collapse risk areas. The following table shows examples of guidelines for determining suitable and unsuitable sites for penetration. In addition, if an infiltration capacity map has been prepared by a local government or a specific river basin for comprehensive flood control, this map will be used to make a decision.

Table 2: Guidelines for determining suitable and unsuitable sites for penetration

Judgment conditions	Contents
Topography and Geography	Suitable areas: terraces, sections, fan-shaped land, natural embankments, hilly land, etc. Unsuitable areas: Alluvial lowlands, artificial altered areas such as embankments, cut soil surfaces, landslide prevention areas, steep slope collapse risk areas, sediment disaster warning areas, etc.
Soil quality	Avoid soil types that are not permeable. - When the saturated hydraulic conductivity of the soil is less than 10-7 m/sec - When the porosity is 10% or less - When the clay content is 40% or more in the particle size distribution
Groundwater table	Areas with high groundwater levels are not suitable because their infiltration capacity is reduced. The distance between the groundwater level and the bottom of the infiltration facility must be at least 0.5 m.
Impact on the surrounding environment	Diffusion of pollutants by infiltration in soil contaminated areas, areas where contamination is expected are to be excluded.

Source: “Draft Guide for Promoting the Development of Underground Rainwater Infiltration Facilities” April 2010, MITI
■Bibliography 79)

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2.3.2 Sewage Load Suppression

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

- Note; Emission standards used for this assessment on facilities subject to the Water Pollution Control Law, should be the most stringent, between the values stipulated by the Water Pollution Control Law and by local authority discharge standards. For facilities subject to the Sewerage Law, apply the most stringent, between the values stipulated by the Sewerage Law and by local authority discharge standards.

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	The Water Pollution Control Law, the Sewerage Law or the discharge standards set by local authorities etc., whichever is the most stringent, is satisfied.
Level 4	Discharge standards are satisfied, and further special measures have been used for better control of sewage loads.
Level 5	(No corresponding level)

☐Commentary

Award level 3 if the discharge standards of the Water Pollution Control Law, the Sewerage Law or standards specified by local authorities are satisfied. Award level 4 if the discharge standards are satisfied, and special measures or targets have been adopted for more advanced efforts.

■Reference 1: Standards for discharge to public sewers under the Sewerage Law

1. Ordinance standards for the building of exempted facilities

The standards are stipulated for sewerage water within the following water quality ranges.

Item	Range of standard values stipulated in ordinances
Temperature	Discharges at 45°C or above
Hydrogen ion concentration	5 and below, or 9 and above
n-hexane extracts	
Mineral oils	Discharges exceeding 5 mg/l
Vegetables oils and fats	Discharges exceeding 30 mg/l
Iodine consumption	Discharges at or exceeding 220 mg/l

2. Water quality standards for restriction of sewerage discharge from specific places of business

Item	Standard value
Cadmium and its compounds	0.3 mg/liter or less
cyanide	1 mg/liter or less
Organophosphorus compounds	1 mg/liter or less
Lead and its compounds	0.1 mg/liter or less
Hexavalent chromium compounds	0.5 mg/liter or less
Hi and its compounds	0.1 mg/liter or less
Mercury and alkyl mercury and other mercury compounds	0.005 mg/liter or less
Alkyl mercury compounds	Must not be detected
Polychlorinated biphenyls	0.003 mg/liter or less
Trichloroethylene	0.1 mg/liter or less
Tetrachloroethylene	0.1 mg/liter or less
Dichloromethane	0.2 mg/liter or less
carbon tetrachloride	0.02 mg/liter or less
1,2-Dichloroethane	0.04 mg/liter or less
1,1-Dichloroethylene	1 mg/liter or less
cis-1,2-dichloroethylene	0.4 mg/liter or less
1,1,1-Trichloroethane	3 mg/liter or less
1,1,2-Trichloroethane	0.06 mg/liter or less
1,3-Dichloropropene	0.02 mg/liter or less
Thiuram	0.06 mg/liter or less
Simazine	0.03 mg/liter or less
Thiobencarb	0.2 mg/liter or less

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benzene	0.1 mg/liter or less
Selenium and its compounds	0.1 mg/liter or less
Boron and its compounds (outside the ocean)	10 mg/liter or less
(Sea area)	230 mg/liter or less
Fluorine and its compounds (outside marine areas)	8 mg/liter or less
(Sea area)	15 mg/liter or less
1,4-Dioxane	0.5 mg/liter or less
Chromium and its compounds	2 mg/liter or less
Copper and its compounds	3 mg/liter or less
Zinc and its compounds	2 mg/liter or less
Phenolic iron and its compounds (solubility)	5 mg/liter or less
Iron and its compounds (solubility)	10 mg/liter or less
Manganese and its compounds (soluble)	10 mg/liter or less
Dioxins	10 pg-TEQ/liter or less

3. Ordinance standards which stipulate water quality standards for restriction of sewerage discharge from specific places of business

Standards are set by ordinances for the following items. The standards are more lax than the figures below.

Substance	Range of standard values stipulated in ordinances	Remarks
Hydrogen ion concentration Biochemical oxygen demand Suspended solids n-hexane extracts Mineral oils Vegetables oils and fats	Exceeding 5, less than 9 Less than 600 mg/l Less than 600 mg/l Not exceeding 5 mg/l Not exceeding 30 mg/l	
Ammoniac nitrogen Nitrite nitrogen and nitrate nitrogen	Less than 380 mg/l	If discharge standards are set under ordinances, in accordance with the Water Pollution Control Law, applicable to the water discharged from the sewer concerned, take 3.8 times the discharged water standard value.
Nitrogen Phosphorous	Less than 240 mg/l Less than 32 mg/l	If discharge standards are set under ordinances, in accordance with the Water Pollution Control Law, applicable to the water discharged from the sewer concerned, take 2 times the discharged water standard value.

Source: Administrative ordinances for the Sewerage Law
(Ordinance No.147, 22nd April 1959, final revision ordinance No. 2, 1st April 2024)

2.3.3 Traffic Load Control

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	0 points in total from the table of the efforts to be evaluated.
Level 2	1 point in total from the table of the efforts to be evaluated.
Level 3	2 points in total from the table of the efforts to be evaluated.
Level 4	3 points in total from the table of the efforts to be evaluated.
Level 5	4 points or more in total from the table of the efforts to be evaluated.

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Efforts to be evaluated

Assessment Item	Description	Point
I. Efforts related to use of bicycles (use of alternative means of transport)	(1) Provision of an appropriate number of cycle parking spaces (including motorcycle spaces) for building users, and consideration for the convenience of cycle park users (ease of entry and egress, placement in a convenient location, etc.).	1
	(2) Other (state content)	1
II. Efforts to provide car parking space	(1) Provision of an appropriate number of car parking spaces (as a measure to avoid parking on roads, and congestion of nearby roads).	1
	(2) Provision of parking facilities for unloading goods vehicles (residential buildings are not applicable).	1
	(3) Consideration of the position, form and number of parking lot approach roads (entry and exit) (to contribute to relieving congestion of local roads).	1
	(4) Other (state content)	1

☐ **Commentary**

Evaluate the content of efforts made to control traffic loads (congestion etc.) caused by automobile traffic generated by the building's operation.

I. Efforts related to use of bicycles (use of alternative means of transport)

(1) For this item, evaluate measures to encourage use of bicycles, as a means of restricting the use of cars by building users.

(2) For this item, evaluate efforts other than those for bicycles, such as creation of new circulating bus routes.

<Examples of efforts>
- Bicycle station in an office district
The facility offers amenities to bicycle commuters (e.g. parking space, showers, lockers)

(Image provided by Fun Ride Station/Run Station)

II. Efforts to provide car parking space.

(1) For this item, evaluate the provision of appropriate numbers of parking spaces, to avoid building users parking on roads outside the site.

(2) For this item, evaluate the provision of appropriate numbers of car parking spaces for service vehicles involved in the operation of the building (maintenance and service vehicles, delivery and pickup vehicles, package delivery vehicles, garbage collection vehicles, etc.) to avoid parking outside the site for service visits.

(3) For this item, evaluate efforts to facilitate smooth vehicle movement in and out of the building parking lots, avoiding vehicle congestion around the entrances and exits.

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2.3.4 Reduction of Waste Treatment Loads

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	0-1 point in total from the table of the efforts to be evaluated.
Level 2	2 points in total from the table of the efforts to be evaluated.
Level 3	3 points in total from the table of the efforts to be evaluated.
Level 4	4 points in total from the table of the efforts to be evaluated.
Level 5	5 points or more in total from the table of the efforts to be evaluated.

Efforts to be evaluated

Assessment Item	Description	Point
I. Estimation of types and quantities of waste	(1) The types and quantities of waste generated on the site (interior and exterior) on a day-to-day basis have been estimated to assist in planning measures to reduce the waste processing load.	1
II. Provision of space and equipment to encourage separate collection	(2) Interior and exterior stock space has been planned that will allow sorted collection of many varieties of waste.	1
	(3) Interior and exterior waste sorting and collection containers and boxes have been planned.	1
	(4) Planned collection of valuable materials has been planned (group collections, etc.).	1
	(5) Inapplicable under CASBEE-BD/NC	-
III. Installation of equipment for waste reduction, compaction or composting	(6) Measures are planned to reduce, compact and compost organic garbage (home processing and composting etc. of organic waste).	1
	(7) Reduction and compaction of bottles, cans etc. are planned.	1

☐Commentary

Evaluate efforts to reduce the generation of waste when the building is in operation, and to sort, reduce and compact that waste.

I. Estimation of types and quantities of waste

(1) It is important to predict the actual garbage output situation and estimate it in order to reduce the amount of waste output from inside the building. Evaluate whether the types and quantities of waste produced on a day-to-day basis have been estimated or planned to be estimated.

II. Provision of space and equipment to encourage separate collection

Various types and quantities of waste are generated inside the building. Evaluate provision of adequate space for proper sorting and stocking under (2), provision of containers, boxes, racks etc. for sorting and stocking under (3), and planning for regular planned collections for valuable materials under (4).

III. Installation of equipment for waste reduction, compaction or composting

(6) For organic waste generated in the course of building operation, evaluate planning for reduction, compaction and composting by disposers composters and similar equipment.

(7) For bottles, cans and other non-organic wastes, evaluate planning for equipment to reduce and compact waste.

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3. Consideration of Surrounding Environment

3.1 Noise, Vibration & Odor

3.1.1 Noise

Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt

! Application condition

The assessment is carried out regarding buildings that have designated facilities regulated within the designated area under the Noise Regulation Law, buildings subject to the regulation under the Large-Scale Retail Stores Location Law, and buildings subject to regulations such as local ordinances. All other buildings are considered as level 3.

Building type	Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt
Level 1	Noise level exceeds the current regulation standard*1 specified under the Noise Regulation Law or the Large-Scale Retail Stores Location Law or regulations such as local ordinances.
Level 2	(No corresponding level)
Level 3	Noise level is at or below the current regulation standard*1 specified under the Noise Regulation Law or the Large-Scale Retail Stores Location Law or regulations such as local ordinances.
Level 4	(No corresponding level)
Level 5	Noise level is significantly below*2 the current regulation standard*1 specified under the Noise Regulation Law or the Large-Scale Retail Stores Location Law or regulations such as local ordinances.

*1 Take the current values of the regulation standard, and evaluate facilities accordingly, even if they were installed before the current values came into effect (evaluate for day, morning, evening and night).

*2 Level 5 applies to noise level at or below [current standard value -10 dB] throughout the day.

☐Commentary

The assessment item in this section covers buildings that have designated facilities subject to the regulation within the designated area under the Noise Regulation Law (■see Reference 2) and buildings subject to the regulation under the Large-Scale Retail Stores Location Law or regulations such as local ordinances. All other buildings shall be uniformly rated as Level 3. If, however, more active measures have been used in buildings other than the above, they may be evaluated according to their level. When using CASBEE for Construction (New Construction), it is sufficient to evaluate according to the design specification. However, a condition of assessment is that the standards must be satisfied for all the measurement times stipulated in the Noise Regulation Law and the Large-Scale Retail Stores Location Law, namely day (8am - 7pm), morning and evening (6am - 8am, 7pm - 10pm) and night (10pm - 6am).

When rating as Level 5, evidence indicating that the level of noise is substantially below the current regulation standard (less than 10 dB) must be provided for the third-party inspection.

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■Reference 1: Standard noise levels specified under the Noise Regulation Law
Zone categories and standards are applied according to those stipulated by corresponding Prefectural governors. Level 3 in the following examples is set at the noise regulation level for factories and designated workshops under the Tokyo metropolitan government environmental quality standards.

(1) Type 1 zones (Dedicated type 1 low-rise residential zone, Dedicated type 2 low-rise residential zone, AA zone, etc.)
Zones in which it is particularly important to preserve tranquility, for the sake of maintaining a good residential environment.

	Day	Morning and evening	Night
Level 1	Not adequate for level 3.	Not adequate for level 3.	Not adequate for level 3.
Level 2			
Level 3	Not exceeding 45 dB	Not exceeding 40 dB	Not exceeding 40 dB
Level 4			
Level 5	Not exceeding 35 dB	Not exceeding 30 dB	Not exceeding 30 dB

(2) Type 2 zones (Dedicated type 1 medium-and-high-rise residential zone, Dedicated type 2 medium-and-high-rise residential zone, Type 1 residential zone, Type 2 residential zone, quasi-residential zone, etc.)
Zones in which tranquility must be preserved because the land was provided for residential use.

	Day	Morning and evening	Night
Level 1	Not adequate for level 3.	Not adequate for level 3.	Not adequate for level 3.
Level 2			
Level 3	Not exceeding 50 dB	Not exceeding 45 dB	Not exceeding 45 dB
Level 4			
Level 5	Not exceeding 40 dB	Not exceeding 35 dB	Not exceeding 35 dB

(3) Type 3 zones (adjacent commercial zones, commercial zones, quasi-industrial zones, etc.)
Zones provided for commercial, industrial and other use, as well as for residential use, in which it is important to prevent noise, to secure the living environment for local residents.

	Day	Morning and evening	Night
Level 1	Not adequate for level 3.	Not adequate for level 3.	Not adequate for level 3.
Level 2			
Level 3	Not exceeding 60 dB	Not exceeding 55 dB	Not exceeding 50 dB
Level 4			
Level 5	Not exceeding 50 dB	Not exceeding 45 dB	Not exceeding 40 dB

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[4] Type 4 zones (industrial zones, etc.)
Zones in which extreme noise must be prevented, to avoid degrading the living environment for local residents.

	Day	Morning and evening	Night
Level 1	Not adequate for level 3.	Not adequate for level 3.	Not adequate for level 3.
Level 2			
Level 3	Not exceeding 70 dB	Not exceeding 60 dB	Not exceeding 55 dB
Level 4			
Level 5	Not exceeding 60 dB	Not exceeding 50 dB	Not exceeding 45 dB

■ Reference 2: Facilities subject to regulation under the Noise Regulation Law
The designated facilities under the Noise Regulation Law, which are subject to quantitative assessment under this item, are stated below.

1. Metal machining machinery a. Rolling equipment (limited to that with power plant rated output of 22.5 kW or more). b. Pipe-making machinery c. Bending machines (limited to roller-type machines with rated motor output of 3.75 kW or more). d. Hydraulic presses (excluding correction presses). e. Mechanical presses (limited to those with nominal press capacity of at least 294 kN). f. Shear cutters (limited those with rated motor output of 3.75 kW or more). g. Forging machines h. Wire forming machines i. Blasting equipment (other than {ton?} blasting equipment, and excluding sealed types). j. Tumblers k. Cutters (only those using grind wheels).
2. Pneumatic compressors and blowers (limited those with rated motor output of 7.5 kW or more).
3. Stone or ore crushers, grinders, sieving and grading equipment (limited those with rated motor output of 7.5 kW or more).
4. Looms (only those with motors)
5. Construction material manufacturing machinery a. Concrete plant (excluding aerated concrete plants, and limited to those with mixer mixing capacity of at least 0.45 m^3). b. Asphalt plants (limited to those with mixer mixing weight of at least 200 kg)
6. Grain milling machines (limited to roller-type machines with motor rated output of 7.5 kW or more).
7. Timber cutting machinery a. Drum barkers b. Chippers (limited those with motor rated output of 2.25 kW or more). c. Wood grinders d. Belt saws (used for cutting lumber, with rated motor output of at least 15 kW, or for carpentry, with rated motor output of at least 2.25 kW). e. Circular saws (used for cutting lumber, with rated motor output of at least 15 kW, or for carpentry, with rated motor output of at least 2.25 kW). f. Planers (limited those with rated motor output of 2.25 kW or more).
8. Paper machines
9. Printing presses (only those with motors).
10. Plastic injection molding machinery
11. Casting foundry equipment (only jolt-type equipment).

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■ Reference 3: Examples of noise prevention measures

Content						Acoustical insulation effect
Physical methods	Technical measures against sound sources	The source of the sound must be removed	Prevention of direct pressure variation	Prevention of vortices, flow disturbances, explosions etc.		Estimate on the basis of experience and experiments etc.
			Reduction of object vibration	Reduction of agitative force	Eliminate impact, collision, friction and imbalance. Put in balance.	〃
				Vibration isolation	Place anti-vibration devices between the vibrating body and the stationary body to put the vibration transfer rate below 1.	〃
				Damping processes	Paint or affix damping materials to raise the loss coefficient to 5% or more. Use anti-vibration steel plates.	Estimate on the basis of experiments normally at around 10 dB.
	Transmission reduction	Reduction of the transmission of sound that has been generated	Reduction of sound transmission	Sound absorption treatment	Apply sound absorbent material to locations struck by sound to give the necessary absorption rate.	Determined by design
				Acoustic isolation: Sealed type	Surround the sound source with materials having the necessary transmission losses (covers, hoods, structures).	〃
				Acoustic isolation: Partial	Erect barriers (walls, building) sound reduction index of at least 10 dB from the source volume.	〃 25 dB is the limit.
				Acoustic isolation: Open type	Attach mufflers along the sound route with the necessary sound reduction index.	Determined by design
			Use of phenomena which reduce sound transmission	Distance attenuation	Move the sound source as far as possible away from the problem point.	0-6 dB double distance
				Attenuation by directionality	Do not orient directions of strong sound radiation towards the problem point.	Normally around 10 dB
				Attenuation by absorption in air	Effective with long distances and high-frequency sources.	0.6 dB/100 m (at 1 kHz) Around 5 dB/100 m (at 8 kHz)
				Attenuation by air temperature and wind	Place the sound source downwind.	Differs with wind speed and air temperature distribution
				Attenuation by absorption in ground surfaces	Make the ground surface sound absorbent.	0.7 dB/10 m for grass 30 cm high (at 1 kHz)
				Attenuation by trees	A row of trees will have no effect.	Around 10 dB/50 m for trees with high leaf density
Sensory methods	Masking			Generate a noise to mask the offending noise. Effective against low noise levels.		
Psychological methods	Greetings, compensation etc.			Consider psychology in dealing with the situations of the offended and offending parties.		

■Bibliography 80)

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3.1.2 Vibration

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

The assessment is carried out regarding buildings that have designated facilities regulated within the designated area under the Vibration Regulation Law and buildings subject to regulations such as local ordinances. All other buildings are excluded from this assessment.

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	Vibration level exceeds the current regulation standard*1 specified under the Vibration Regulation Law or regulations such as local ordinances.
Level 2	(No corresponding level)
Level 3	Vibration level is at or below the current regulation standard*1 specified under the Vibration Regulation Law or regulations such as local ordinances.
Level 4	(No corresponding level)
Level 5	Vibration level is significantly below*2 the current regulation standard*1 specified under the Vibration Regulation Law or regulations such as local ordinances.

*1 Take the current values of the regulation standard, and evaluate facilities accordingly, even if they were installed before the current values came into effect (evaluate for both day and night).

*2 For level 5, vibration should be limited to below [current standard value -5 dB] (for both day and night).

☐Commentary

For this item, evaluate the impact of vibration generated within the site on adjacent sites and the surrounding area.

The assessment item in this section covers buildings that have designated facilities subject to the regulation within the designated area under the Vibration Regulation Law (see Reference 2) or regulations such as local ordinances. All other buildings are excluded from the assessment.

When using CASBEE for Building (New Construction), it is sufficient to evaluate according to the design specification. However, a condition of assessment is that the standards must be satisfied for all the measurement times stipulated in the Vibration Regulation Law, namely day (8am - 7pm), morning and evening (6am - 8am, 7pm - 10pm) and night (10pm - 6am).

When rating as Level 5, evidence indicating that the level of vibration is substantially below the current regulation standard (less than 5 dB) must be provided for the third-party inspection.

■Reference 1: Standard Values from the Vibration Regulation Law

The following are standard values for each zone type under the Vibration Regulation Law. Follow zone categories and standards stipulated by the Prefectural governor. The following examples take the vibration regulation standard for factories and designated workshops under Tokyo municipal environmental standards ordinances as level 3.

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(1) Type 1 zones (type 1 low-rise residential exclusive zone, type 2 low-rise residential exclusive zone, AA zone, type 1 medium-to-high-rise residential exclusive zone, type 2 medium-to-high-rise residential exclusive zone, type 1 residential zone, type 2 residential zone, sub-residential zone and unspecified zone)
- Zones in which it is particularly important to preserve tranquility, for the sake of maintaining a good residential environment

	Day	Night
Level 1	Not adequate for level 3.	Not adequate for level 3.
Level 2		
Level 3	Not exceeding 60 dB	Not exceeding 55 dB
Level 4		
Level 5	Not exceeding 55 dB	Not exceeding 50 dB

(2) Type 2 zones (adjacent commercial zones, commercial zones, quasi-industrial zones, industrial zones, etc.).
- Zones provided for residential, commercial, industrial and other use.
- Zones which are mainly provided for industrial and similar use, in which the residents' living environment is conserved.

	Day	Night
Level 1	Not adequate for level 3.	Not adequate for level 3.
Level 2		
Level 3	Not exceeding 65 dB	Not exceeding 60 dB
Level 4		
Level 5	Not exceeding 60 dB	Not exceeding 55 dB

■ Reference 2: Designated facilities under the Vibration Regulation Law

1. Metal machining machinery a. Hydraulic presses (excluding correction presses). b. Mechanical presses c. Shear cutters (limited to those with rated motor output of 1 kW or more). d. Forging machines e. Wire forming machines (limited those with motor rated output of 37.5 kW or more).
2. Compressors (limited to those with motor rated output of 7.5 kW or more)
3. Stone or ore crushers, grinders, sieving and grading equipment (limited to those with power plant rated output of 7.5 kW or more).
4. Looms (only those with motors).
5. Concrete block machines (limited to those with power plant rated output of 2.95 kW or more), concrete pipe manufacturing machinery, and concrete column manufacturing machinery (limited to those with power plant rated output of 10 kW or more).
6. Timber cutting machinery a. Drum barkers b. Chippers (limited those with motor rated output of 2.2 kW or more).
7. Printing presses (limited those with motor rated output of 2.2 kW or more).
8. Rollers for rubber mixing and plastic mixing (limited to those other than calendar rollers having motor rated output of 30 kW or more).
9. Plastic injection molding machinery
10. Casting foundry equipment (only jolt-type equipment).

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3.1.3 Odor

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition

Evaluate buildings within the regulated areas as specified under the Offensive Odor Control Law, regulations such as local ordinances, and buildings in which designated malodorous substances are handled. Buildings in which such substances are not handled are excluded from this assessment.

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	Odor level is below the allowable limit for odor index, and for the concentrations of currently designated malodorous substances under the Offensive Odor Control Law or regulations such as local ordinances.
Level 2	(No corresponding level)
Level 3	Odor level satisfies the allowable limit for odor index, and for the concentrations of currently designated malodorous substances under the Offensive Odor Control Law or regulations such as local ordinances.
Level 4	(No corresponding level)
Level 5	(No corresponding level)

☐Commentary

For this item, evaluate whether the allowable limit values under the Offensive Odor Control Law or regulations such as local ordinances are satisfied.

For CASBEE-BD/NC, evaluate whether the design specification has the performance necessary to adequately clear standard values under the Offensive Odor Control Law. As it is difficult to set threshold values for odor below the regulation value, the scoring criterion for the time being is to evaluate at Level 1 or 3.

■Reference: Regulation standards under the Offensive Odor Control Law

Under the Offensive Odor Control Law, the prefectural governor (or mayor in the case of an area within the city area) and the mayor are to designate the regulated area and determine the method of regulation and the regulatory standard. There are two types of regulatory methods, "Specified Offensive Odor Substance Regulations" and "Odor Index Regulations," and three types of regulatory standards (No. 1, No. 2, and No. 3) are set based on each.

The Specified Offensive Odor Substance Regulations is a method of identifying 22 types of substances that cause unpleasant odors and regulating them based on the concentration of these substances, including ammonia, hydrogen sulfide, trimethylamine, etc. The concentration standard for each substance is determined in the range corresponding to the odor intensity 2.5 to 3.5.

Odor index regulation is a method by quantifying the degree of bad odor based on the human sense of smell and regulating it based on that value, specifically, diluting the odor with odorless air and diluting it until the odor is no longer felt. It can also be used when multiple odor components are mixed or for odors other than Specific Offensive Odor Substance.

Standards No. 1, No. 2, and No. 3 define the places and targets to be regulated, with No. 1 being the property line, No. 2 being the gas outlet such as a chimney, and No. 3 being the standard regulating drainage water.

Table: Example of regulatory standards under the Offensive Odor Control Law

	Site boundary line	Chimney or other gas outlet					Discharged water
		Outlet height less than 15 m			Outlet height 15 m or more		
		Outlet diameter less than 0.6 m	Outlet diameter 0.6 m or more, but less than 0.9 m	Outlet diameter 0.9 m or more	Outlet height is less than 2.5 times the height of the tallest nearby building	Outlet height is at least 2.5 times the height of the tallest nearby building	
Type 1 Zone	Odor index 10	Odor index 31	Odor index 25	Odor index 22	$qt=275 \times H_0^2$	qt= 357/Fmax	Odor index 26

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Type 2 zone	Odor index 12	Odor index 33	Odor index 27	Odor index 24	qt=436 x H_0^2	qt = 566/Fmax	Odor index 28
Type 3 zone	Odor index 13	Odor index 35	Odor index 30	Odor index 27	qt=549 x H_0^2	qt= 712/Fmax	Odor index 29

Enforced from July 1, 2002

3.2 Wind/Sand Damage & Sunlight Obstruction

3.2.1 Restriction of Wind Damage

Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt

! Application condition

In the absence of a mandate based on law, regulation of administrative instruction, or of demands from the local area, building which apply no particular measures should be awarded Level 3.

Building type	Off · Sch · Rtl · Rst · Hal · Fct · Hsp · Htl · Apt
Level 1	No preliminary study or was performed about the creation of strong wind spots*1 and no countermeasures*2 were taken against wind hazard.
Level 2	A preliminary study has been performed and measures taken to avoid or reduce wind hazard, but there has been no assessment. Alternatively, wind strength grade has been evaluated on the basis of a desktop forecast*3, and wind strength has been worsened in some areas, or there are measurement points at which the wind environment rank for the sight has been lowered.
Level 3	A preliminary study has been performed and measures taken to avoid or reduce wind hazard*4. Then, the wind strength grade has been evaluated on the basis of a desktop forecast*3, and the results show that wind strength has not worsened. Alternatively, rank assessment has been performed on the basis of wind environment assessment indices*5, and the results indicate that a wind environment with suitable rank for the location has been achieved.
Level 4	A preliminary study or prevention planning has been performed and measures taken to avoid or reduce wind hazard, followed by a rank assessment*5 has been performed on the basis of wind environment assessment indices. Results indicate that the wind environment in some parts is better than usual for the location.
Level 5	A preliminary study or prevention planning has been performed and measures taken to avoid or reduce wind hazard, followed by a rank assessment*5 has been performed on the basis of wind environment assessment indices. Results indicate that the wind environment is better than usual for the location.

*1 Preliminary study: See Reference 1
*2 Wind hazard reduction measures: See Reference 1
*3 Desktop forecast: See Reference 2
*4 Prevention plan and reduction and avoidance countermeasures: See Reference 1
*5 Rank assessment on the basis of wind environment assessment indices: See Reference 3

☐Commentary

Under this item, evaluate measures against wind hazard. When evaluating, append the following documents, to allow a third party to confirm the content of the measures.

<Supporting documents>
- Wind environment data, such as wind directions, speeds, and prevailing winds, based on the preliminary study.
- Assessment documents using wind strength grades, based on the desktop forecast.
- Rank assessment documents, based on the wind environment assessment indices.

As Reference 1 shows, the wind hazard control process generally works through a preliminary study,

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wind hazard control countermeasures and wind hazard assessment, but for this item, evaluate whether there was a preliminary study, whether there was a preventive plan addressing building layout and form, whether reduction and avoidance measures such as tree planting and windbreak fences were used, whether there was an assessment, and its accuracy, and results for the level of impact from strong wind (ranking by wind strength grade or wind environment assessment indices).

■Reference 1: Wind Hazard Control Process

Item	Content
I. Preliminary study	Identify aspects of the wind environment, such as wind speed, wind direction and prevailing winds to predict wind hazard. Existing data, such local meteorological data and regional meteorological observation data (AMEDAS data) are generally used. To improve accuracy, take on-site measurements and use a wide-area atmospheric environment forecasting system based on wide-area meteorological data and topographic data.
II. Wind hazard control countermeasures	(1) Prevention plan using building layout and form The prevention plan using building layout and form is a plan for making a broad assessment at the initial design stage, as a planned way of preemptively preventing the generation of wind hazards. It follows a process of examining wind directions and speeds on the site and studying various alternative proposals for the building layout and form. It is very important, because it can prevent potential wind hazards, and is the starting point for countermeasures. (2) Reduction and avoidance countermeasures using tree planting, windbreak fences, etc. These are countermeasures to reduce or avoid wind hazards generated by the building through the use of tree planting, windbreak fences, eaves, arcades and similar elements. Predictions and assessments for studying (1) and (2) use predictive methods such as desktop forecasting, numerical fluid flow simulation and wind tunnel tests, and assessment methods such as using wind strength grades and wind environment assessment indices.
III. Assessment of wind hazard	(1) Assessment using wind strength grade Assessment using wind strength grade evaluates the impact of wind strength from the usual main wind directions on the site. It is less accurate than assessment using wind environment assessment indices. Wind strength grades use the Meteorological Agency Beaufort Scale. (2) Rank assessment using the wind environment assessment indices Assessment using the wind environment assessment indices predicts the impact of strong wind from 16 directions, analyzing the incidence of strong winds. It is more accurate than assessment using wind strength grade. There are the following wind environment assessment indices. - The assessment yardstick based on wind environment assessment index produced by Murakami et al. - The assessment yardstick produced by the Wind Engineering Institute. Assessment using wind environment assessment indices requires topography of the area around the site, the current state of buildings and green space, and numerical fluid simulations and wind tunnel tests for the planned building, to produce a forecast assessment.

■Reference 2: Desktop forecast method

1. Ascertain the meteorological situation.
   [1] Calculate the incidence for each wind direction and wind strength grade
   Find the annual number of occurrences for each wind direction, and identify characteristics of the region, such as prevailing wind.
   [2] Calculate annual average wind speed for each wind direction
   Find the average wind speed for each wind direction in the area, and identify what strength of wind blows.
2. Selection of the forecast wind direction
   [1] Deciding the forecast wind direction
   Identify the wind direction that causes the highest incidence (select the wind direction for which

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building wind impact occurs most often)

3. Forecast
   [1] Select applicable data from standard model experiment results which correspond to the shape of the targeted building
   [2] Create a zone chart indicating wind increases for each forecasted wind direction
4. Assessment
   (Note that assessment using desktop forecasting judges the amount of change caused by changes of wind speed at a given location, it does not produce absolute assessments).
   (1) Forecast results are collated in the table below

Forecast wind direction	Before construction		After construction		
	Convert to wind speed at 10 m above ground (a)	Beaufort wind strength grade	Rate of increase (b)	Wind speed (a) x (b)	Beaufort wind strength grade
North (example)	1.2		1.3 (example)		
NNW (example)					
South (example)					

   (2) Evaluate by comparing wind strength grades before and after construction

If the rate of wind speed increase between before and after construction is around 1.1-1.2, the range of change is likely to fall within the same Beaufort scale grade, so evaluate increase rates of 1.3 or more. Also, according to Penwarden, a wind strength grade of 5 represents "the allowable limit on land," so it is necessary to make sure wind strength does not exceed that grade.

■Reference 3: Rank assessment using wind environment assessment index

Rank assessment using wind environment assessment index judges whether a building plan will cause wind impact. It starts with a preliminary study to investigate wind directions, speeds and incidence rates, and then uses either "The assessment yardstick based on wind environment assessment index by Murakami et al." or "The assessment yardstick by the Wind Engineering Institute" for the assessment. Either one defines relationships between wind speeds and incidences, tailored to the site. The former categorizes subjects as rank 1 - unranked and the latter uses Range A to Range D.

Once the category (rank or range) corresponding to the location of the assessment subject has been confirmed, the next step is to check which category (rank or range) the wind speed and incidence belongs to, and evaluate according to the result. If the result is lower than the category (rank or range) corresponding to the location, which means the wind speed has got substantially worse, award level 2. Award level 3 it is the same as the category for the location, and level 4 or level 5 if it is better (meaning the environment is good, with a reduced wind speed).

1. The assessment yardstick based on wind environment assessment index produced by Murakami et al.

The subject is categorized into ranks 1-3 according to the purpose the space is used for, in order of increasing vulnerability to wind impact, and peak daily gust speeds of 10 m/sec, 15 m/sec and 20 m/sec are used as the evaluated levels of strong winds, to give the probability of the allowable wind speed being exceeded by each combination. (See the table below).

For example, in a residential district, which is a rank 2 application, it is permissible for the daily gusts to exceed 10 m/sec on 22% of days (approximately 80 days per year). Even if the incidence of peak daily gust speed exceeding 10 m/sec is below 22%, the situation is still unacceptable if 15 m/sec is exceeded for 3.6% or more of days (approximately 13 days per year) Thus, each rank has three allowable incidence rates, and if even one of those is not satisfied, the situation is unsuitable for the rank.

The incidence of wind speeds (probability of a speed being exceeded) can be calculated using a Weibull distribution formula. In this case, the Weibull coefficient is based on not the average wind speed but the peak daily gust speed. if the peak daily gust speed is not obtained, the gust factor can be used to convert to the peak daily gust speed as a yardstick for the assessment, but in that case the Weibull coefficient based on the peak daily gust speed is used to calculate the excess wind probability. The gust factor value used is in the range 1.5 to 3.0, based on the surroundings of the site, specifically whether it is a built-up area and near to high-rise buildings. The common range for a built-up area is between 2.0 and 2.5. In the table below,

- Peak daily gust speed:
  Assessment time 2-3s. Peak daily average speed: Average wind speed over ten minutes. The wind

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speeds defined here are at 1.5 m above ground level.
- 10 m/s: Garbage flies in the wind. Laundry is blown down.
- 15 m/s: Freestanding Street signs and bicycles, etc. blow over. Difficult to walk
- 20 m/s: Phenomena such as people close to being blown away are certain to occur.

- G.F.: Gust factor (1.5 m above ground, assessment duration 2-3s).
  - Dense urban districts: 2.5-3.0 (Wind disturbance is strong, but average speed is not high)
  - Normal urban district: 2.0-2.5
  - Places of particularly high wind speed: 1.5-2.0 (areas of increased wind near high-rise buildings, etc.)

For details, refer to "New Knowledge of Building Winds," edited by the Wind Engineering Institute and published by Kajima Institute Publishing.

Table: Wind environment assessment index for each rank

Degree of strong wind impact		Examples of corresponding uses of space	Permissible strong wind level and permissible incidence of gusts surpassing that level		
			Peak daily gust speed (m/s)		
			10	15	20
			Peak daily average speed (m/s)		
			10/G.F.	15/G.F.	20/G.F.
Rank 1	Places with applications most easily affected by wind	-Shopping street in residential area -Outdoor restaurant	10% (37 days)	0.9% (3 days)	0.08% (0.3 days)
Rank 2	Places with applications easily affected by wind	-Parks -Residential areas	22% (80 days)	3.6% (13 days)	0.6% (2 days)
Rank 3	Places with applications less likely to be affected by wind	-Office district	35% (128 days)	7% (26 days)	1.5% (5 days)
Unranked	Wind environment in excess of rank 3		-		

- How to use this table; E.g. In a rank 1 application, the wind environment is permissible if the incidence of daily peak gusts above 10 m/s does not exceed 10% (approximately 37 days per year).

■Bibliography 81)

2. The assessment yardstick produced by the Wind Engineering Institute

Rather than calculating cumulative incidence for all wind speeds, find the wind speed corresponding to cumulative incidence values of 55% and 95%.

Use the table below to determine the index wind speed for each area. The wind speed with a cumulative incidence of 55% is the average wind speed in each wind environment, and the wind speed with a cumulative incidence of 95% is largely equivalent to the annual average value of daily peak wind speed (a relatively high wind speed that blows around once a week). If this assessment method is used, the subject is reduced to the next range if either of the assessment index wind speeds is not satisfied. That means that if the 55% cumulative incidence wind speed is 1.7 m/sec, and the 95% cumulative incidence wind speed is 4.5 m/sec, the wind environment of that place would be evaluated as range C.

Cumulative incidence means the incidence of a given wind speed, added to the incidences of all lower wind speeds.

Assessment height: 5 m above ground

Range*		Wind speed with 55% cumulative incidence	Wind speed with 95% cumulative incidence
Range A	Equivalent to residential district	≦1.2m/s	≦2.9m/s
Range B	Equivalent to low and medium-rise built-up area	≦1.8m/s	≦4.3m/s
Range C	Equivalent to medium and high-rise built-up area	≦2.3m/s	≦5.6m/s
Range D	Equivalent to area of strong wind	> 2.3m/s	> 5.6m/s

* Range A: Wind environment seen in residential districts
Range B: Wind environment seen in districts in between ranges A and C
Range C: Wind environment seen in office districts
Range D: Undesirable wind environment

■Bibliography 81)

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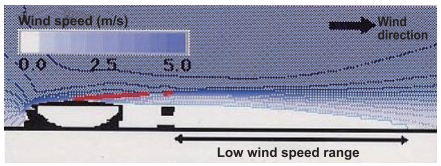
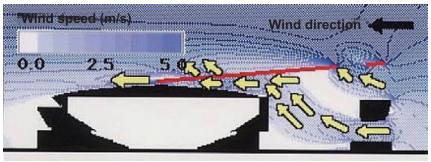
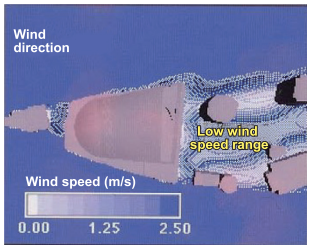
■Reference 4: Conduct a preliminary survey of wind speed and direction and related factors in the area
<Example: Saitama Super Arena>
The building roof configuration and its plan form were determined on the basis of the results of a wide-area atmospheric simulation, as countermeasures against the north wind, which is the prevailing wind in winter. The wind from the sea in summer is deliberately drawn in through the front opening of the arena, to vent through the opening on the north side, making efficient use of natural airflow and securing pleasant airflow through the streets of the area.



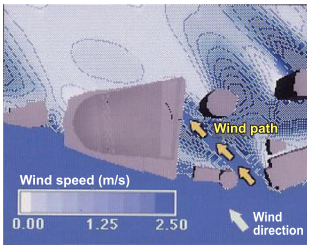
Results of analysis of wind conditions due to prevailing winter wind (cross section)



Results of analysis of wind conditions due to prevailing summer winds (cross section)



Results of analysis of wind conditions due to prevailing winter wind (plan)



Results of analysis of wind conditions due to prevailing summer winds (plan)

Saitama Super Arena
Design: MAS2000 Design Team (Leader: Nikken Sekkei)
In association with: Ellerbe Becket, Flack+Kurtz Consulting Engineers
Technical cooperation: Taisei Corporation (Documentation provided by Taisei Corporation)

■Bibliography 81), 82)

3.2.2 Restriction of Sand and Dust

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

! Application condition
Evaluate schools (elementary/junior high/high schools) with a schoolyard. In cases where no other buildings (residential or otherwise) are in the school's surrounding area, award level 3 as dust pollution is not expected to affect living conditions.

Building type	Sch (Elementary/Junior High/High Schools)
Level 1	0 points in total from the table of the efforts to be evaluated.
Level 2	Insufficient level of measures for schoolyard dust control is established. (1 point in total)
Level 3	Standard level of measures for schoolyard dust control is established. (2 points in total)
Level 4	More than sufficient level of measures for schoolyard dust control are established. (3 points in total)
Level 5	A high level of measures for schoolyard dust control are established. (4 points or more in total)

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Efforts to be evaluated

Assessment Item	Description	Point
I. Measures to control airborne dispersion of dust from schoolyard	(1) Dust shield trees or nets surrounding the school perimeter.	1
	(2) Structures surrounding the school perimeter.	2
II. Dust-proofing measures for schoolyard surface	(1) Sprinkler system	1
	(2) Dust-proof paving	2
	(3) Dust-proof paving/lawn covering	4

☐Commentary
Evaluate elementary/junior high/high schools with a schoolyard in terms of dust control measures (anti-dust generation/dispersion) at the newly-constructed stage or when dust control measures are planned and established after completion of construction.

3.2.3 Restriction of Sunlight Obstruction

Off･Sch･Rtl･Rst･Hal･Fct･Hsp･Htl･Apt

! Application condition
Evaluate level 3 if there are no shade regulations in the region.

Building type	Off･Sch･Rtl･Rst･Hal･Fct･Hsp･Htl･Apt
Level 1	Not adequate for Level 3.
Level 2	(No corresponding level)
Level 3	Shade regulations are satisfied, or there are no shade regulations applicable to the site.
Level 4	A standard one rank* above the shade regulations is satisfied.
Level 5	(No corresponding level) the one stricter

* For example, at a neighboring commercial area, standard for semi-residential area which have one rank stricter standard than that for commercial area, is met.

☐Commentary
Under this item, evaluate measures against daylight obstruction.
"One rank above" for sunlight obstruction means that, for example, in an area where the shade regulation limits shade on adjacent commercial areas to 5 hours/3 hours (at 5 m, 10 m), the next higher standard is for residential areas, set at 4/2.5 hours.
If the strictest level or regulation is already applied, one rank above should be taken to mean one hour/0.5 hours (5 m, 10 m) higher than the regulation standard.

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3.3 Light Pollution

3.3.1 Outdoor Illumination and Light that Spills from Interiors

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt
Level 1	0 points in total from the table of the efforts to be evaluated.
Level 2	1 point in total from the table of the efforts to be evaluated.
Level 3	2 points in total from the table of the efforts to be evaluated.
Level 4	3 points in total from the table of the efforts to be evaluated.
Level 5	4 points in total from the table of the efforts to be evaluated.

Efforts to be evaluated

Content	Point
(1) Outdoor illumination and light that spills from interiors Only some of the checklist points of the "Light Pollution Countermeasure Guidelines" are satisfied. (1 point) A majority of the checklist points of the "Light Pollution Countermeasure Guidelines" are satisfied. (2 points)	1～2
(2) Countermeasures against light pollution from billboard lighting Billboard lighting satisfies some of the considerations in "Considerations for Billboard Illumination." (1 point) A majority of the considerations in "Considerations for Billboard Illumination" are satisfied, or there is no billboard lighting. (2 points)	1～2

☐Commentary

Evaluate light pollution caused by buildings includes exterior lighting at night, light spill from the interior, lighting for advertising displays, and glare reflecting from the building. MOE published its Light Pollution Countermeasure Guidelines; and local governments are adopting their own Local Illumination Environment Plan in accordance with the guidelines. For this item, the basic approach should be to use the level of compliance with the Light Pollution Countermeasure Guidelines or Local Illumination Environment Plan as the judgment criterion.

* If a Local Illumination Environment Plan has been adopted by a local authority, the level of compliance with that plan may also be used as the judgment standard.

(1) Outdoor illumination and light that spills from interiors

Evaluate according to the level of compliance with the "Checklist (check sheet) on exterior illumination and similar fixtures" in the Light Pollution Countermeasure Guidelines or Local Illumination Environment Plans (of one has been adopted for the region concerned,

- 0 points: Almost no points satisfy the checklist.
- 1 point: Only some of the checklist points are satisfied.
- 2 points: A majority of the checklist point are satisfied.

■Reference 1: "Checklist for a good lighting environment" in the Light Pollution Countermeasure Guidelines

Check item	Approach and examples of measures
0. Was the examination system appropriate? ☐ Did any lighting specialist participate in the examination system?	→Add a person with specialist knowledge of light and illumination to the examination system. →If it is difficult to put such a person into the examination system, get the expert's advice as an advisor.
1. Is energy used effectively? ☐ Are illumination levels set appropriately for purposes? Is the brightness too high or too low, relative to the JIS brightness standard or other	→Set brightness to match the purpose of the lighting, with reference to the JIS brightness standard or other lighting-related standards.

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lighting-related standards?	If brightness is too high, change to a lower-wattage light source.
☐ Is the illuminated range appropriate? Is it wider than necessary?	→Reconsider the illuminated range.
☐ Does the chosen light source have high overall efficiency?	→Reference 2) Choose overall efficiency higher than that in the Guide to outdoor lighting equipment.
☐ Was the installation of lighting equipment with high coefficient of utilization, or of equipment for increasing coefficient of utilization, considered?	→Reconsider the lighting patterns and installation positions of the lighting equipment.
2. Have measures been devised to diminish the impact on human activities?	
☐ Has lighting equipment been chosen that leaks little light upwards or towards the surroundings? Also, have measures been considered to reduce light leakage? Is reference 2), upward light output ratio in the "Guide to outdoor lighting equipment" satisfied.	→Select lighting equipment which satisfies upward light output ratio in the "Guide to outdoor lighting equipment" Reference 2). Alternatively, consider installation of the following.
☐ Have glare and extreme contrast been restricted? Have target values been considered for restriction of luminosity and luminance from lighting equipment in directions that cause problems?	→Reconsider the selection of lighting equipment and the direction of light projection. If necessary, use louvers and hoods, etc. for shading.
☐ Could lighting that is excessive in brightness, brilliance, hue or other changes over time causes discomfort or impede daily activities? Have target values been considered for luminance of illuminated surfaces or the brightness of windows due to leaked light been considered?	→Reconsider the settings for brightness (luminance) and operation methods. Lower the set brightness (luminance) if necessary. Alternatively, use louvers and hoods, etc. to shade lighting equipment.
3. Have measures been devised to diminish the impact on flora and fauna (ecosystems)?	
☐ Was harmony with the surroundings considered? Does the lighting plan involve lighting that is far brighter than the surrounding environment?	→Reconsider the set brightness. If brightness is too high, change to a lower-wattage light source.
☐ Has a survey been conducted of flora and fauna that should be protected in the environment surrounding the lighting equipment? Have measures been considered to avoid impact on flora and fauna that should be protected?	→Reinvestigate impact on the surrounding environment, and reconsider whether lighting equipment should be installed, and the appropriateness of the set brightness, the lighting equipment used, the operating methods and other aspects.
4. Have operation and management methods been considered?	
☐ Is there an operating plan with specifications for each time bracket, tailored to the surrounding environment?	→Consider adjustable brightness, or turning off some or all lights, at night.
☐ Have periodic cleaning and lamp replacement been considered?	→Consider performing periodic inspection, cleaning and lamp replacement.
5. Has care been taken over application to district development?	
☐ Was there overall coordination?	→Have a district development coordinator check impact on cooling loads, scenic appearance, and other aspects.
☐ Was lighting design considered that incorporated public, semi-public and private spaces?	→Lighting design should address lighting of plots on both sides of roads, and spaces that face the street.
☐ Were the targets of measures selected appropriately?	→Consideration of parking lots, used car lots and outdoor golf driving ranges, which can be expected to have a strong impact.
☐ Were safety and peace of mind considered?	→Consideration of lighting that is suitable for crime prevention, etc.

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■Reference 2: "Guide to outdoor lighting equipment" in the Light Pollution Countermeasure Guidelines

Regulations	Assessment	Content
Overall efficiency	Evaluate for overall efficiency. Lamp output/(lamp power + power losses in the lighting circuit)	If lamp input power is 200W or more, we recommend at least 60 [lm/W], and at least 50 lm/W for lamps below 200W.
Overall efficiency	Coefficient of utilization = effective used output/total lamp output = (lit area x average brightness)/total lamp output	Coefficient of utilization is the proportion of the light generated by the lamp which reaches areas or objects which require illumination.
Upward light output ratio	Evaluate according to ULOR (upward light output/lamp output).	Lighting environment I*: 0%
		Lighting environment II*: 0-5%
		Lighting environment III*: 0-15%
		Lighting environment IV*: 0-20%
Glare and impact on human activities	"Standard for Exterior Public Illumination for Pedestrians" by the Illumination Engineering Institute of Japan.	
	Following the points under "Glare restriction" in the Basically, follow existing JIS and technical guidance.	
Impact on flora and fauna	Improve the light distribution characteristics and mounting of lighting equipment, or place light screens, etc. in the environment to limit, as far as possible, the artificial light shining into the natural environment.	

* Reference 3 shows the classifications of lighting environments I-IV.

■Reference 3: "4 types of lighting environment" in the Light Pollution Countermeasure Guidelines

(1) Lighting environment I	These are natural parks or rural communities, in which the density of installation of outdoor lighting equipment is relatively low. Such areas are basically dark.
(2) Lighting environment II	These are residential areas in villages or suburbs, with the main lighting behind street lamps and anti-crime lamps, etc., with low brightness in surrounding areas.
(3) Lighting environment III	These are urban residential areas, with road and street lighting and some distribution of objects such as billboards, with moderate brightness in surrounding areas.
(4) Lighting environment IV	These are busy urban districts and the centers of major cities, with a high density of outdoor illumination and billboards, and with high brightness in surrounding areas.

(2) Light pollution from billboard lighting

Evaluate lighting used on all outdoor advertising (spotlights, neon lights and other lighting of advertising surfaces) and outdoor advertising activities (moving signs, vending machines, searchlights, etc.).

Evaluate according to the proportion of the considerations that have been implemented among those listed in Reference 4 "Matters to consider in billboard illumination" in the Light Pollution Countermeasure Guidelines.

- 0 points: Almost none of the considerations in "Matters to consider in billboard illumination" are satisfied.
- 1 point: Some of the considerations in "Matters to consider in billboard illumination" are satisfied.
- 2 points: A majority of the considerations in "Matters to consider in billboard illumination" are satisfied.

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■Reference 4: "Matters to consider in billboard illumination" in the Light Pollution Countermeasure Guidelines

Main matters to consider	Content
(1) Consideration of light leakage ☐ Set the range receiving brightness and luminance to a suitable extent.	→In particular, do not use searchlights, lasers or other equipment which leak light over a wide area and have a strong impact.
☐ Select the shining directions appropriately.	→Take care when placing internally-illuminated signs and exposed fluorescent tubes.
☐ Apply detailed measures to reduce the total usage of artificial lighting.	→Apply design measures for contrast, in order to reduce the total usage of artificial light.
(2) Considerations related to the quality of light ☐ Light must not flash.	→ Do not allow flashing at light sources and in the range illuminated.
☐ Light must not move.	→Do not move the range illuminated by the light source.
☐ Projected light must not be colored.	→Do not pass the light of floodlights through filters, or otherwise tint it. (Excluding the use of filters out of consideration for the environment).
(3) Considerations related to energy conservation ☐ Encourage the use of light sources of high efficiency. ☐ Manage lighting times appropriately.	

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3.3.2 Measures for Reflected Solar Glare from Building Walls

Off・Sch・Rtl・Rst・Hal・Fct・Hsp・Htl・Apt

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct・Apt
Level 1	(No corresponding level)
Level 2	(No corresponding level)
Level 3	Not adequate for Level 4.
Level 4	Measures for reducing reflected glare from building walls (including glass surfaces) are taken.
Level 5	In addition to efforts required for Level 4, further advanced measures such as confirming a significant reduction effect due to simulation practice are taken.

☐Commentary

For this item, as the countermeasures for light pollution caused by buildings, evaluate measures to mitigate the glare cast on the surround area by reflection of daylight from walls. Glare caused by reflection of daylight from buildings can cause unanticipated impact, particularly in office buildings with large areas of glass. Therefore, this is a matter that must be considered with great care.

- Major measures against reflected glare evaluated as Level 4 are as follows:

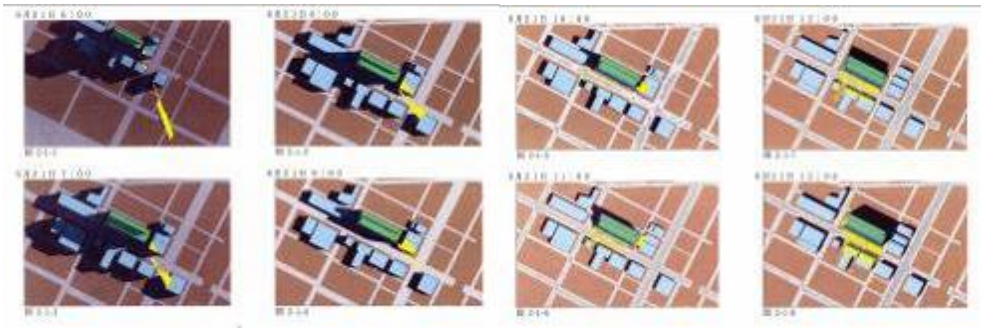
Measure	Method	Content
Counter measures on building walls	Reduced reflectance	Application of anti-reflection film on the inner side of the reflecting surface, or a coating applied to the glass, can cut reflectance*.
	Diffuse reflection	Measures such as surface treatments and template glass can make the reflection more diffuse.
	Adjusted reflection angle	The angle at which the glass is mounted can be adjusted to reduce the impact of reflections.

* Glass may become prone to thermal cracking due to higher solar absorbance rate. Glass with surface treatment is limited by wind pressure strength consideration.

- Measures evaluated as Level 5 include, in addition to implementing those rated as Level 4, performing a simulation in order to ensure a significant reduction of glare or elimination of almost all glare due to the measures.

■Reference: Countermeasures against light pollution by reflected glare from buildings

It is particularly important to consider light reflecting on the surrounding area if the building has a glass facade. If the facade is curved or inclined, it can extend light pollution effects in a surprisingly wide range, so light pollution must be thoroughly considered in advance. Recently, computers have been able to run simulations as shown below, so it is easy to identify the impact of reflected light.



(Documentation provided by Nihon Sekkei)

■Bibliography 83)

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2. Bibliography

Q1 Indoor Environment

1) Indoor Environment Forum, Post-Occupancy Evaluation Method for Office (POEM-O popular edition), 2000
2) Indoor Environment Forum, Post-Occupancy Evaluation Method for Office, 1994
3) Architectural Institute of Japan, Standards and Design Guidelines for Sound Insulation Performance in Buildings (2nd edition), 1997
4) Architectural Institute of Japan, Handbook of Building Environmental Design - Environment, 2007
5) The Society of Heating, Air-conditioning and Sanitary Engineers of Japan, Handbook of Air-conditioning and Sanitary Engineering, Volume 3 Air-conditioning Equipment Design, 2010
6) Architectural Institute of Japan, Sound Insulation Design in Buildings, 1988
7) Architectural Institute of Japan, Floor Impact Sound Insulation Design in Buildings, 2009
8) Morimasa Itamoto, (Air Conditioning Noise Research Group), Sound Reduction Design for Air-Conditioning Equipment, Rikogakusha Publishing, 1976
9) Sanitation Management Standards for Building under the Law for Maintenance of Sanitation in Buildings
10) The Healthcare Engineering Association of Japan, Guidelines for Design and Control of Air Conditioning Systems in Hospitals (HEAS-02-2004)
11) MEXT, School Sanitation Standards under the School Health Law, 2009
12) Tokyo Metropolitan Government, Sanitation Standards for Metropolitan Schools
13) MLIT, Standards and Procedures for Building Service Systems
14) ANSI/ASHRAE - 55 - 1992 ASHRAE Standard
15) Japan Housing Performance Standard under Housing Quality Assurance Act
16) Architectural Institute of Japan, Daylight Illuminance Calculation Method
17) Yukiko Yamada, Architectural Environmental Engineering, Baifukan Co., Ltd., 1997
18) Kazuaki Yamagata, Practical Teaching Materials for Architectural Environmental Engineering, Shokokusha Publishing
19) Japan Industrial Standards: JIS C 8106 Fluorescent light fittings, 2008
20) Japan Industrial Standards: JIS Z9125 Lighting Standard for Indoor Workplaces, 2007
21) Japan Industrial Standards: JIS Z9110 General Rules of Lighting Standard, 2011
22) The Illuminating Engineering Institute of Japan, Task and Ambient Lighting (TAL) Promotion Committee Report, 2012
23) The Illumination Engineering Institute of Japan, Technical Design Guidelines for Housing Illumination, 2007
24) The Illuminating Engineering Institute of Japan, Technical Guide for Practical Lighting Design, 2011
25) Ministry of Land, Infrastructure, Transport and Tourism, Technical Standard Concerning Sick House Syndrome (ordinances & notifications)
http://www.mlit.go.jp/jutakukentiku/build/sickhouse.files/setumeishiryou.pdf
26) Shinichi Tanabe, Indoor Chemical Pollution: Overview and Provisions for Sick Houses, 1998
27) Building Management Education Center, Environmental Health Management in Buildings
28) Kouchi Ikeda, Mechanisms of Indoor Atmospheric Pollution, Kajima Institute Publishing
29) Midori Yoshikawa, et. al., Indoor Pollution and Allergies, Inoueshoin Co., Ltd.
30) Architecture Knowledge Magazine, Complete Guide of Sick House Countermeasures: Special Edition, March 2001
31) Society of Heating, Air-conditioning and Sanitary Engineering of Japan, SHASE-S102-2011: Ventilation Standard and the Commentary
32) Raymond J. Cole, Nils Larsson, GBC '98: Building Assessment Manual, 1998
33) Toshiyuki Nomura and Kengo Nomura, Checkpoints in Architectural Regulations for Building Design, Shokokusha Publishing
34) R. J. Cole, D. Rousseau, and I. T. Theaker, Building Environment Performance Assessment Criteria: Version 1-Office Buildings, The BEPAC Foundation, Vancouver, December 1993
35) US Green Building Council, LEED (Buildings: Leadership in Energy and Environmental Design), Rating System Version 2.0, June 2001
36) - 42) Omitted

Q2 Quality of Service

43) New Office Promotion Association, New Office Minimums, 1994
44) Nobuki Sano, Kunihiro Inoue and Nobuaki Yamada, Architectural Planning: Building Design Basics and Applications, Shokokusha Publishing
45) The Optical Fiber Promotion Council (NPO), Installation of High-Speed Data Communications

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Equipment, May 2005
46) Optical Fiber Promotion Council (NPO), Guide for Piping and Wiring Systems in Broadband Age: Condominiums and Office Buildings, July 2006
47) Nobuko Ogawa, Midori Nomura, Shoko Abe and Yoshihiko Kawauchi, New Trends in Barrier–free Environment, Chuohoki Publishing
48) Ministry of Land, Infrastructure, Transport and Tourism website, Barrier-free Design in Buildings https://www.mlit.go.jp/jutakukentiku/jutakukentiku_house_fr_000049.html
49) Hisao Kajimoto (Editor), The Approach to Universal Design: Architecture, Urban Development and Product Design, Maruzen Publishing
50) Architectural Institute of Japan, Need for Comfortable Office Environment: Assessment Method for Occupancy Environment, Shokokusha Publishing
51) Japan Industrial Standards: JIS T 9251 Shape, Size and Arrangement of Protruding Objects Including Blocks for Guiding the Visually Impaired, 2001
52) Building and Equipment Long-Life Cycle Association, 10 Rules in Design and Construction for Improved Maintenance, 2007
53) Research Institute of Environmental Management, Administration and Maintenance of JAPAN, Survey on Guidelines for Leading Municipalities Regarding Storage Area for Waste and Recycled Materials, Environmental Management No. 59, 2006/05
54) MHLW Website, Hygiene Control Manual for Mass Food Preparation Facilities (Ministry of Health, Labour and Welfare, March 24, 1997, Health and Food Safety Bureau Notice No. 85, Appendix, Last Revised: June 16, 2017, Life Sanitation and Food Safety Department Notice No. 0616-1) http://www.mhlw.go.jp/topics/syokuchu/01.html
55) Building and Equipment Long-Life Cycle Association, Survey Report on Service Lives of Building Structure, Components and Service Equipment, 1998
56) Building Maintenance & Management Center, Technology for improving the durability of building equipment, 1986
57) Building Center of Japan, Seismic Design and Construction Guidelines for Buildings Service Systems
58) The Society of Heating, Air-conditioning and sanitary Engineers, Seismic Design and Construction Methods for Buildings Service Systems
59) -72) Omitted

Q3 Outdoor Environment on Site
73) Ministry of Land, Infrastructure, Transport and Tourism website, Landscape Portal Site, https://www.mlit.go.jp/toshi/townscape/toshi_townscape_tk_000016.html

LR1 Energy
74) Association for Evaluating and Labeling Housing Performance, Japan Sustainable Building Consortium, Low Carbon Building Certification Manua

LR2 Resources & Materials
75) Forestry Agency, Guidelines for Certifying Legality and Sustainability of Wood and Wooden Products, April 2006
76) PRTR Working Group (Japan Federation of Construction Contractors, Inc., Japan Civil Engineering Contractors' Association, Inc., Building Contractors Society), Chemical Substance Management in the Construction Industry - Activity Report - June 2002
77) Ministry of the Environment, Annual Report on Monitoring Results for the Ozone Layer, etc. on FY2008, Part 4, Appendix, pp. 139-141, August 2009 http://www.env.go.jp/earth/report/h21-02/full.pdf

LR3 Off-site Environment
78) AIJES-W0003-2023 Technology Standard for Rainwater Harvesting, February 2024
79) Ministry of Land, Infrastructure, Transport and Tourism, Guidelines for Promoting the Development of Rainwater Underground Infiltration Facilities (Draft), April 2010
80) Japan Environmental Management Association for Industry, Pollution Control Technologies and Regulations - Noise Volume -
81) The Wind Engineering Institute, Wind Characteristics in Urban Building Areas (New Edition), Kajima Institute Publishing
82) Shuzo Murakami, Yoshiteru Iwasa, et al., (Architectural Institute of Japan), Wind Environment Survey and Research on Evaluation Criteria Based on Resident Log Data, 1983
83) Ministry of the Environment, Light Pollution Guidelines

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3. Appendix

1. Table of durability (years) of building elements (Use values in table below for the assessment).

Classification		By construction type	Service life	Specifications, etc.	Source	Notes
Structural skeleton		Steel reinforced concrete	65	Slump 18	Gov.Bld.Dept.	Planned years to renewal
Building Exterior	Roof	Asphalt Waterproofing	30	Counterweight concrete (thickness 80)	Gov.Bld.Dept.	
		Tile	30		Gov.Bld.Dept.	Service life is 10 years -10% repair for the waterproof course, mortar bed and tiles.
		Aluminum coping	40		Gov.Bld.Dept.	
	Outer walls	Stones	65	Granite	Gov.Bld.Dept.	Inada type or equivalent Polished finish
		Tiling	40	Embedded porcelain tile	Gov.Bld.Dept.	
		Synthetic resin spraying	15	Mortar setting bed	Gov.Bld.Dept.	Emulsion finish
	Curtain wall	PC sheet	65	Embedded mosaic tiles	Gov.Bld.Dept.	
	Exterior ceilings (Eaves)	Aluminum Molding	30		Gov.Bld.Dept.	
		Stainless steel Molding	40		Gov.Bld.Dept.	
		Boarding	20	Flexible board	Gov.Bld.Dept.	EP Finish
	Exterior fittings	Steel fittings	30		Gov.Bld.Dept.	OP coating
		Aluminum fixtures	40		Gov.Bld.Dept.	
		Stainless steel entry/ exit doors	40	4,400 x 2,500	Gov.Bld.Dept.	Automatic stainless steel double-opening doors
		Synthetic resin on steel (Painting)	5		Gov.Bld.Dept.	
	Exterior Misc	Roof railings (Steel)	30		Gov.Bld.Dept.	Painted every 5 years
		Roof railings (Stainless steel)	65	H = 1,100	Gov.Bld.Dept.	
		Roof railings(Aluminum)	40	H = 1,100	Gov.Bld.Dept.	
Building Interior	Floors	Granite	65	Inada type or equivalent	Gov.Bld.Dept.	
		Marble	65		Gov.Bld.Dept.	
		Terrazzo block	65		Gov.Bld.Dept.	
		Tiling	65	Ceramic tile	Gov.Bld.Dept.	
		Mortar finish	30	Mortarboard	Gov.Bld.Dept.	
		PVC tiling	20	Mortar setting bed	Gov.Bld.Dept.	Semi-hardened
		Vinyl flooring sheet	20	Mortarboard	Gov.Bld.Dept.	Polyvinyl chloride sheet (LONLEUM) or equivalent
		Carpet	20	Mortar setting bed	Gov.Bld.Dept.	Tile carpet
	Inner walls	Granite	65	Inada type or equivalent	Gov.Bld.Dept.	
		Marble	65		Gov.Bld.Dept.	
		Terrazzo block	65		Gov.Bld.Dept.	
		Tiling	65	Porcelain tile	Gov.Bld.Dept.	
		Mortar finish	65	EP coating	Gov.Bld.Dept.	Repainted every 10 years
		Multi-layer painted finish	20	Mortar setting bed	Gov.Bld.Dept.	Service life, including undercoat (repainted every 10 years (60%))
		Vinyl wallpaper	20	Plywood underlay	Gov.Bld.Dept.	Service life of underlays (replaced every 10 years)
			20	GL construction method, PB T = 12	Gov.Bld.Dept.	Service life of underlays (replaced every 10 years)
		Walnut veneering	20	T = 9, with furring strips	Gov.Bld.Dept.	
		Melamine-faced board	30	T = 9, with furring strips	Gov.Bld.Dept.	
	Ceilings	Aluminum Molding	30	Light steel underlay	Gov.Bld.Dept.	
		Boards	30	Faced plasterboard	Gov.Bld.Dept.	
		Vinyl wallpaper	30	PB underlay, T = 9	Gov.Bld.Dept.	Service life of underlays (replaced every 10 years)
		Synthetic resin spraying	20	Concrete underlay	Gov.Bld.Dept.	
	Interior fixtures	Aluminum fixtures	40		Gov.Bld.Dept.	
		Steel fixtures	30	OP Coating	Gov.Bld.Dept.	
		Wooden fixtures	30		Gov.Bld.Dept.	Flush door
	Misc. other	Toilet screens	65	Terrazzo block panel	Gov.Bld.Dept.	
		Toilet screens	30	Faced sheet steel panel	Gov.Bld.Dept.	
		Suspended shelves				

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Classification		By construction type	Service life	Specifications, etc.	Source	Notes
		Sinks	(30)		Gov.Bld.Dept.	From documents calculating refurbishment costs for government buildings.
		FRP bathtubs	15		Gov.Bld.Dept.	
		Stainless steel bathtubs	25		Gov.Bld.Dept.	
Electrical Equipment	High -pressure devices	High-voltage power input equipment Distribution board	25	Interior cubicles	Gov.Bld.Dept.	
			25	Exterior cubicles	Gov.Bld.Dept.	
		Transformer	25		Gov.Bld.Dept.	
		Condenser	30		Gov.Bld.Dept.	
		High-voltage power input equipment				
	Home electrical appliances equipment	Private generators (Diesel-engines)	30		Gov.Bld.Dept.	25 years for the engine
	DC power supply devices	Storage batteries(Lead)	7	Sealed lead (HS)	Gov.Bld.Dept.	
		Storage batteries(Alkaline)	25	Sealed, AHH	Gov.Bld.Dept.	
	Boards	Power control board	25		Gov.Bld.Dept.	
		Lighting distribution board	25		Gov.Bld.Dept.	
		Terminal board	30		Gov.Bld.Dept.	
	Lighting fixtures	Fluorescent light fixtures	20		Gov.Bld.Dept.	
		Incandescent light fixtures	20		Gov.Bld.Dept.	
		Guide lamps	20		Gov.Bld.Dept.	
	Light electrical appliances	Telephone switchboard	15	Electronic pushbutton telephone	Gov.Bld.Dept.	
		Amplifier	20	Rack type	Gov.Bld.Dept.	
		Speakers	20	Embedded in ceiling	Gov.Bld.Dept.	
		Intercom	20	Base and satellite system	Gov.Bld.Dept.	
		Electric clocks	20	Base and satellite system	Gov.Bld.Dept.	
		TV antennae	10		Gov.Bld.Dept.	20 years for masts
		TV amplifiers	20		Gov.Bld.Dept.	
		Mergers and splitters	20		Gov.Bld.Dept.	
	Automatic fire detection	Sensors	20	Differential type	Gov.Bld.Dept.	
		Receivers	20	50L	Gov.Bld.Dept.	
	Wiring Appliances	Switches	(30)	Tumbler switch	Gov.Bld.Dept.	From documents calculating refurbishment costs for government buildings.
		Sockets	(30)		Gov.Bld.Dept.	From documents calculating refurbishment costs for government buildings.
	Wiring and plumbing	Electrical wiring	30		Gov.Bld.Dept.	
		Pipes	65	Thin steel cable duct	Gov.Bld.Dept.	
		Cable racks	65	Steel	Gov.Bld.Dept.	
Mechanical Equipment	Heating and cooling sources Equipment	Steel plate boilers	15		Gov.Bld.Dept.	
		Cast iron boilers	30	Steam	Gov.Bld.Dept.	
		Smoke tube boilers	20		Gov.Bld.Dept.	
		Turbo chillers	20		Gov.Bld.Dept.	
		Reciprocating chillers	15		Gov.Bld.Dept.	
		Absorption chillers	20		Gov.Bld.Dept.	
		Hot air heating pump chillers	15		Gov.Bld.Dept.	
		Cooling tower	13	FRP counterflow	Gov.Bld.Dept.	
	Air conditioning equipment	Compressed air handling unit	20		Gov.Bld.Dept.	
		Packaged air conditioning system (Water-cooled type)	20		Gov.Bld.Dept.	
		Packaged air conditioning system (Hot air heat pump)	15		Gov.Bld.Dept.	
	Heating and cooling	Fan coil unit	20		Gov.Bld.Dept.	
		Fan convector	20		Gov.Bld.Dept.	
	Total enthalpy heat exchanger	Total enthalpy heat exchanger	20	Rotating	Gov.Bld.Dept.	
		Heat exchanger unit	20	Embedded in ceiling	Gov.Bld.Dept.	
	Air supply and venting equipment	Blower	20	Centrifugal	Gov.Bld.Dept.	
		Smoke extractor	25		Gov.Bld.Dept.	
	Pumps	Lifting pump	20		Gov.Bld.Dept.	
		Hot and cold water pump	20		Gov.Bld.Dept.	

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Classification		By construction type	Service life	Specifications, etc.	Source	Notes
		Hot water supply and recirculating pump	20		Gov.Bld.Dept.	20 years for the motor
		Cooling water pump	20		Gov.Bld.Dept.	
		Misc. waste water pump	15		Gov.Bld.Dept.	
		Fire extinguishing pump	20	Unit-type	Gov.Bld.Dept.	
	Water tanks	Water intake tanks, elevated water tanks (Steel plate)	20	Panel-type	Gov.Bld.Dept.	
		Water intake tanks, elevated water tanks (FRP)	25	Panel-type	Gov.Bld.Dept.	
		Water intake tanks, elevated water tanks (Stainless steel)	30	Panel-type	Gov.Bld.Dept.	
	Tanks	Oil tanks (Underground)	30		Gov.Bld.Dept.	
		Hot water tank (Steel plate)	20		Gov.Bld.Dept.	
		Hot water tank (Stainless steel)	25		Gov.Bld.Dept.	
	Pipes	Carbon steel pipes (White) (Water supply)			Gov.Bld.Dept.	
		Carbon steel pipes (White) (Water drainage and ventilation)	30		Gov.Bld.Dept.	
		Carbon steel pipes (White) (Firefighting)	30		Gov.Bld.Dept.	
		Carbon steel pipes (White) (Hot and cold water)	20		Gov.Bld.Dept.	
		Carbon steel pipes (Black) (Steam)	20		Gov.Bld.Dept.	
		PVC-lined steel pipes (Water supply)	25		Gov.Bld.Dept.	
		Copper pipes (Hot water)	30	M	Gov.Bld.Dept.	
		Copper pipes (Coolant)	30	L	Gov.Bld.Dept.	
		Stainless steel pipes (Cold and hot water supply)	30		Gov.Bld.Dept.	
		Vinyl pipes (Water supply)	20	HIVP	Gov.Bld.Dept.	
		Vinyl pipes (Water drainage)	30	VP	Gov.Bld.Dept.	
		Cast iron pipes (Water drainage)	40		Gov.Bld.Dept.	
		Fume pipes (Water drainage)	28		Gov.Bld.Dept.	
			40		Gov.Bld.Dept.	
	Air ducts	Air conditioning ducts	30		Gov.Bld.Dept.	
		Pan-type air vent	30		Gov.Bld.Dept.	
		Universal-type air vents	30		Gov.Bld.Dept.	
	Water boilers	Gas water heaters	10		Gov.Bld.Dept.	
		Electric water heaters	10		Gov.Bld.Dept.	
	Fire extinguishers	Indoor fire hydrants	30		Gov.Bld.Dept.	
		Siamese connection	30		Gov.Bld.Dept.	
		Halogen fire extinguisher spray head	20		Gov.Bld.Dept.	
		Halogen fire extinguisher trigger system	20		Gov.Bld.Dept.	
	Hygienic equipment	Toilet bowl	30	Japanese-style	Gov.Bld.Dept.	
		Urinal	30		Gov.Bld.Dept.	
		Wash basins	30		Gov.Bld.Dept.	
		Vanity wash basin				
		Faucets	15		Gov.Bld.Dept.	
	Automatic control equipment	Sensors	15	Electronic, temperature	Gov.Bld.Dept.	
		Regulators	15	Electronic, temperature	Gov.Bld.Dept.	
		Controllers	12	Electronic	Gov.Bld.Dept.	
		Control panels	10		Gov.Bld.Dept.	
		Central monitoring board	10		Gov.Bld.Dept.	
Elevators	Elevators	Elevators	30	General	Gov.Bld.Dept.	

Source for the table: Values of Government Building Department contained in the service life table of "Building's LC Assessment database, 4th Revised Edition (the first edition published March 1st 2008)," Building and Equipment Life Cycle Association.

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<Reference table> Use the value from this table only if there is no applicable value in the previous table.

Classification		By construction type	Service life	Specifications, etc.	Source	Notes
Structural skeleton		Steel reinforced concrete	At least 75 years		Yoda	From a 1969 survey of the Yokohama Mitsui & Co. Building (construction completed in 1969)
			117 years		Iizuka	Estimated from a survey of wear reduction in telephone exchange buildings (building maintenance).
			At least 50 years		Shinozaki	Survey of reinforced concrete structures aged approximately 50 years (AIJ anthology of convention speeches '74)
			At least 60 years		Kasino	Durability can be secured in ordinary concrete design when the progress of neutralization is used as an indicator (Basic Observations on Long-Life Construction)
Building Exterior	Roof	Asphalt Waterproofing	20	Counterweight concrete	AIJ	
			25	Counterweight cinders	NTT	
			25	With protective layer	Kobayashi	
			30	Counterweight concrete	BELCA	
		Waterproof sheet	20		Kobayashi	Polymer waterproof sheet
			20	Exposed	NTT	Synthetic polymer waterproof roofing sheet
			15	Exposed silver coating	BELCA	Ronloop or equivalent, T = 20
		Painted waterproofing	15		Kobayashi	Polymer coating waterproofing
			20		NTT	Urethane-type x 1
		Mortar finish	15	Double coating	AIJ	Mortar service life
			15	Double coating	NTT	Mortar service life
			15		Kobayashi	Mortar service life
		Tile	10		AIJ	Tile service life
			10		NTT	Tile service life
			10		Kobayashi	Tile service life
			30		BELCA	Service life is 10 years -10% repair for the waterproof course, mortar bed and tiles.
		Aluminum coping	40		BELCA	
	Outer walls	Stones	25	Granite	AIJ	
			25	Granite	NTT	
			25	Granite	Kobayashi	
			60	Granite	BELCA	Inada type or equivalent Polished finish
		Tiling	50	Dry, rectangular, biscuit fired	AIJ	Including partial terracotta finish
			60	4.7 cm square tiles	NTT	
			50	Porcelain	Kobayashi	
			60	Embedded porcelain tile	BELCA	40 years for floating method construction
		Synthetic resin spraying	25		AIJ	Lysin finish
			25	Mortar setting bed	NTT	Lysin finish
			25		Kobayashi	Lysin finish
			30	Mortar setting bed	BELCA	Acrylic lysin
		Epoxy-type sprayed tile	15	Concrete setting bed	BELCA	
		Sealant	10		JASS8	Values for reference service life
	Curtain wall	Aluminum	40		Kobayashi	
			40		BELCA	Panel mounting
		PC sheet	60	Small embedded tiles	BELCA	
	Exterior ceiling (Eaves)	Aluminum Molding	40		BELCA	
		Stainless steel Molding	40		BELCA	
		Boarding	25	Plasterboard	AIJ	
			25	Flexible board	BELCA	EP Finish
	Exterior fittings	Steel fittings	35		AIJ	
			50		NTT	
			30		Kobayashi	
			35		BELCA	Ready-mixed synthetic resin paint
		Aluminum fixtures	40		Kobayashi	
			40		BELCA	
		Stainless steel entry/exit doors	60	4,334 x 2,800	BELCA	Stainless steel entrance unit

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Classification		By construction type	Service life	Specifications, etc.	Source	Notes
		Synthetic resin on steel Painting	5		NTT	
			6		Kobayashi	
			3		BELCA	
	Exterior Misc	Roof railings (Steel)	25	Wire mesh	AIJ	Steel columns
			25	Wire mesh	Kobayashi	
		Roof railings (Steel)	25		BELCA	Painted every 3 years
		Roof railings (Stainless steel)	60	H = 1,100	BELCA	
		Roof railings (Aluminum)	40	H = 1,100	BELCA	
		Steel fire escape staircase	30	Aluminum	Kobayashi	
Building Interior	Floors	Granite	60	Inada type or equivalent	BELCA	
		Marble	60		BELCA	
		Terrazzo block	30		AIJ	
			30		NTT	
			30		Kobayashi	
			50		BELCA	
		Tiling	30	Hard	AIJ	
			30		NTT	
			30		Kobayashi	
			50	Ceramic tile	BELCA	
		Mortar finish	20	Mortarboard	AIJ	
			25	Mortarboard	NTT	
			20	Mortarboard	Kobayashi	
			30	Mortarboard	BELCA	
		PVC tiling	20	Mortar setting bed	NTT	Semi-hardened
			20	Mortar setting bed	Kobayashi	
			30	Mortar setting bed	BELCA	Semi-hardened
		Vinyl flooring sheet	18	Mortarboard	AIJ	
			20	Mortarboard	NTT	
			30	Mortarboard	BELCA	Polyvinyl chloride sheet (LONLEUM) or equivalent
		Carpet	15	Mortar setting bed	Kobayashi	Needle-punched carpet
			30	Mortar setting bed	BELCA	Contract carpet
	Inner walls	Granite	60	Inada type or equivalent	BELCA	
		Marble	60		BELCA	
		Terrazzo block	40		AIJ	
			50		BELCA	
		Tiling	30	White narrow tile	AIJ	
			10		NTT	
			50		Kobayashi	
			50	Ceramic tile	BELCA	
		Mortar finish	20		AIJ	
			36		NTT	
			30	EP coating	BELCA	Repainted every 5 years
		Multi-layer painted finish	10		NTT	Service life for paint only
			30	Mortar setting bed	BELCA	Service life, including undercoat (repainted every 10 years (90%))
		Vinyl wallpaper	10		NTT	Service life for wallpaper only
			30	Plywood underlay	BELCA	Service life of underlays (replaced every 10 years)
			20	GL construction method, PB T = 12	BELCA	Service life of underlays (replaced every 10 years)
		Walnut veneering	20	T = 9, with furring strips	BELCA	
		Melamine-faced board	30	T = 9, with furring strips	BELCA	
	Ceilings	Aluminum fixtures	60	Light steel underlay	BELCA	
		Boards	25	Plasterboard	AIJ	
			25		NTT	
			25		Kobayashi	
			30	Faced plasterboard	BELCA	
		Vinyl wallpaper	30	PB underlay, T = 10	BELCA	Service life of underlays (replaced every 10 years)
		Synthetic resin spraying	60	Concrete underlay	BELCA	

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Classification		By construction type	Service life	Specifications, etc.	Source	Notes
	Interior fixtures	Aluminum fixtures	50		Kobayashi	
			50		BELCA	
		Steel fixtures	45		AIJ	
			40	OP Coating	BELCA	
		Wooden fixtures	28		AIJ	Flush door
			30		NTT	
			28		Kobayashi	
			30		BELCA	Flush door
	Misc. other	Toilet screens	40	Terrazzo block panel	AIJ	
			30	Terrazzo block panel	BELCA	However, related finishes have a large influence
			40	Faced sheet steel panel	BELCA	
		Bath units	20		Kobayashi	From refurbishment costs for apartments (equipment and management No.8804)
		Suspended shelves	20	Faced sheet steel panel	BELCA	
		Sinks	20		BELCA	
Electrical Equipment	High-pressure devices	High-voltage power input equipment	25		AIJ	
			25		Kobayashi	
			30	Interior cubicles	BELCA	
			20	Exterior cubicles	BELCA	
		Distribution board	25		AIJ	
			25		Kobayashi	
			30		BELCA	
		Transformer	25		AIJ	
			25		Kobayashi	
			30		Kuboi	
			30		BELCA	Interior
		Condenser	20		AIJ	
			20		Kobayashi	
			25		Kuboi	
			25		BELCA	
		Breaker	20		Kuboi	
			25		BCS	
	Home electrical appliances equipment	Private generators (Diesel-engines)	30	For emergency use	AIJ	25 years for the engine
			30	For emergency use	Kobayashi	
			20	For emergency use	Kuboi	
			30	For emergency use	BELCA	
	DC power supply devices	Storage batteries (Lead)	10		AIJ	
			10		Kobayashi	
			7		Kuboi	
			13	Sealed lead (HS)	BCS	
			7	Sealed lead (HS)	BELCA	
		Storage batteries (Alkaline)	15		Kuboi	
			15	Pocket alkaline	BCS	
			15	Pocket alkaline	BELCA	
	Boards	Power control board	25		AIJ	
			25		Kobayashi	
			20		Kuboi	
			30		BELCA	
		Lighting distribution board	30		BELCA	
		Terminal board	60		BELCA	
	Lighting fixtures	Fluorescent light fixtures	10		AIJ	
			10		Kobayashi	
			30		BELCA	
		Incandescent light fixtures	15		AIJ	
			15		Kobayashi	
			30		BELCA	
		Guide lamps	30		BELCA	
	Light electrical appliances	Telephone switchboard	30		BELCA	
		Amplifier	17		AIJ	
			25	Rack type	BELCA	Broadcasting amplifier
		Speakers	18		AIJ	

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Classification		By construction type	Service life	Specifications, etc.	Source	Notes
			25	Embedded in ceiling	BELCA	
		Intercom	20	Base unit	AIJ	
			20	Base unit	Kobayashi	
			20	Base and satellite system	BELCA	
		Electric clocks	20	Base unit	AIJ	
			20	Base and satellite system	Kobayashi	
			15	Base and satellite system	Kuboi	
			25	Base and satellite system	BELCA	
		TV antennae	15	With mas	BELCA	
		TV amplifiers	15		BELCA	
		Mergers and splitters	20		BELCA	
	Automatic fire detection	Sensors	20	Distributed	AIJ	
			20	Differential type	Kobayashi	
			20	Differential type	BELCA	
		Receivers	20	Distributed	AIJ	
			20		Kobayashi	
			20	P-1 grade, 50 L	BELCA	
	Wiring Appliances	Switches	5		AIJ	
			6		Kobayashi	
			17		BCS	
			20	With P	BELCA	
		Sockets	6		AIJ	
			6		Kobayashi	
			16		BCS	
			20	With P	BELCA	
	Wiring and plumbing	Electrical wiring	20		AIJ	
			20		Kobayashi	
			40	With P	BELCA	
		Pipes	20		AIJ	
			20		Kobayashi	
			60	Thin steel cable duct	BELCA	
		Cable racks	60	Steel	BELCA	
Mechanical Equipment	Heating and cooling sources Equipment	Steel plate boilers	25		AIJ	
			15		BCS	
			15		BELCA	
		Cast iron boilers	10	Sectional boiler	Kobayashi	
			20		Kuboi	
			21.1	Sectional boiler	BCS	
			25	Steam	BELCA	
		Smoke tube boilers	15		Kuboi	
			18.9		BCS	
		Turbo chillers	25		Kobayashi	
			20		Kuboi	
			21.1		BCS	
			20		BELCA	
		Reciprocating chillers	15		Kuboi	
			15		BCS	
			15		BELCA	
		Absorption chillers	15		Kuboi	
			17.5		BCS	
			20		BELCA	
		Hot air heating pump chillers	15		BELCA	
		Cooling tower	20		Kobayashi	
			13	FRP	Kuboi	
			14.4		BCS	
			15	FRP	BELCA	
	Air conditioning equipment	Compressed air handling unit	15		Kobayashi	
			18		Kuboi	
			17.5		BCS	
			15		BELCA	
		Packaged air-conditioning system (Water-cooled type)	15	Semi-sealed	Kuboi	
			13.4		BCS	
			15		BELCA	

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Classification		By construction type	Service life	Specifications, etc.	Source	Notes
		Packaged air-conditioning system (Hot air heat pump)	15		BELCA	
	Heating and cooling	Fan coil unit	20		Kobayashi	
			18		Kuboi	
			15.8		BCS	
			15	Exposed, floor mounted	BELCA	
		Fan convector	13.6		BCS	
			15	Exposed, floor mounted	BELCA	
		Cast-iron radiator	30		AIJ	
			20.8		BCS	
	Total enthalpy heat exchanger	Total enthalpy heat exchanger	15	Rotating	BELCA	
		Heat exchanger unit	15	Embedded in ceiling	BELCA	
	Air supply and venting equipment	Blower	20		AIJ	
			20		Kobayashi	
			18		Kuboi	
			18.6	Sirocco fan	BCS	
			20	Forward curved fan	BELCA	
		Smoke extractor	25	Forward curved fan	BELCA	
	Pumps	Lifting pump	15	Turbine pump	AIJ	20 years for the motor
			15	Turbine pump	Kobayashi	20 years for the motor
			15		Kuboi	
			17	Sirocco fan	BCS	
			15	Multi-level	BELCA	
		Hot and cold water pump	17		BCS	
			15		BELCA	
		Hot water supply and recirculating pump	15		AIJ	20 years for the motor
			15		Kobayashi	20 years for the motor
			15	Line pump	BELCA	
		Cooling water pump	15	Volute	BELCA	
		Misc. waste water pump	15		AIJ	20 years for the motor
			15		Kobayashi	20 years for the motor
			15	Submerged	Kuboi	
			12.9	Submerged	BCS	
			10	Submerged	BELCA	
		Fire extinguishing pump	27	Turbine	AIJ	20 years for the motor, 25 for the engine
			27		Kobayashi	20 years for the motor, 25 for the engine
			27	Unit-type	BELCA	
	Water tanks	Water intake tanks, elevated water tanks (Steel plate)	20		AIJ	
		Water intake tanks, elevated water tanks (FRP)	20		Kobayashi	
			20	Panel-type	BELCA	
		Water intake tanks, elevated water tanks (Stainless steel)	20	Panel-type	BELCA	
	Tanks	Oil tanks (Underground)	25		BELCA	
		Hot water tank (Steel plate)	15		AIJ	
			15		Kobayashi	
			17.1		BCS	
			15		BELCA	
		Hot water tank (Stainless steel)	18.7		BCS	
			15		BELCA	
	Pipes	Carbon steel pipes (White) (Water supply)	20		AIJ	
			20		Kobayashi	
			18.1		BCS	
		Carbon steel pipes (White) (Water supply)	18		AIJ	
			18		Kobayashi	
			14.9		BCS	
			12		BELCA	
		Carbon steel pipes (White) (Water drainage and ventilation)	18		AIJ	
			18		Kobayashi	
			18.4		BCS	
			20		BELCA	
		Carbon steel pipes	20		AIJ	

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Classification		By construction type	Service life	Specifications, etc.	Source	Notes
		(White) (Firefighting)	25		Kobayashi	
			25		BELCA	
		Carbon steel pipes (White) (Hot and cold water)	18		BCS	
			20		BELCA	
		Carbon steel pipes (Back) (Steam)	15		AIJ	
			17.8		BCS	
			20		BELCA	
		PVC-lined steel pipes (Water supply)	30		BELCA	
		Copper pipes (Hot water)	18.3		BCS	
			15	M	BELCA	
		Copper pipes (Coolant)	30	L	BELCA	
		Stainless steel pipes (Cold and hot water supply)	30		BELCA	
		Vinyl pipes (Water supply)	30	HIVP	BELCA	
		Vinyl pipes (Water drainage)	25	VP	BELCA	
		Cast iron pipes (Water drainage)	28		AIJ	
			28		Kobayashi	
			30		BELCA	
		Fume pipes (Water drainage)	28		AIJ	
			30		BELCA	
	Air ducts	Air conditioning ducts	20		AIJ	
			20		Kobayashi	
			30		BELCA	
		Pan-type air vent	20		BELCA	
		Universal-type air vents	20	VHS	BELCA	
	Water boilers	Gas water heaters	8.2		BCS	
			10		BELCA	
		Electric water heaters	10		BELCA	
	Fire extinguishers	Indoor fire hydrants	20		BELCA	
		Siamese connection	20		BELCA	
		Halogen fire extinguisher spray head	25		BELCA	
		Halogen fire extinguisher trigger system	25		BELCA	
	Hygienic equipment	Toilet bowl	25	Japanese-style	AIJ	
			25	Japanese-style	Kobayashi	
			25	Japanese-style	BELCA	
		Urinal	30		AIJ	
			30		Kobayashi	
			30		BELCA	
		Wash basins	25		AIJ	
			25		Kobayashi	
			25		BELCA	
		Faucets	20		BELCA	
	Auto control equipment	Sensors	10	Electronic, temperature	BELCA	
		Regulators	10	Electronic, temperature	BELCA	
		Controllers	10	Electronic	BELCA	
Elevators	Elevators	Elevators	20		AIJ	
			20		Kobayashi	
			25		Kuboi	
			25	Standard type	BELCA	

The Table was created with reference to values of the Architectural Institute of Japan, NTT, Kobayashi, Kuboi, BCS and BELCA, provided in the service life table of "Building's LC Assessment Database, 4th Revised Edition" (The 1st edition was published on March 1, 2008.) published by the Building and Equipment Long-life Cycle Association (BELCA), and values for sealing materials provided in "Technical Guidelines and Commentaries on Watertight Design and Construction of Outer Wall Joints (JASS8)" (The 2nd edition was published on February 25, 2008.) published by the Architectural Institute of Japan.

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2. Calculation of Tree Canopy Size and Green Area

In principle, calculation of medium/tall tree canopy sizes and green spaces covered with plants such as lawns is based on the method referred to in the Urban Green Space Conservation Law. The law stipulates the following two methods to obtain tree canopy sizes and horizontal projected areas of ground-covering plants:

A. Method based on the Green Facility Planning Accreditation System (Article 60 of the Urban Green Space Conservation Law, Regulation 23)
- Horizontal projected area planned/expected at the time of plant maturity

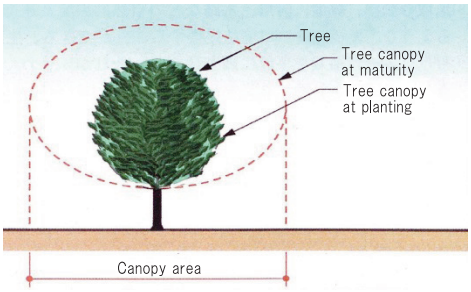
B. Method based on the Green Zoning System (Article 34 of the Urban Green Space Conservation Law, Regulation 9)
- Actual horizontal projected area at the time of planting

In the CASBEE assessment, tree canopy sizes and green spaces are evaluated focusing on healthy, long-term growth of plants as aimed for by the planners and facility administrators. Thus, calculation in this assessment is largely based on Method A above, with some elements of Method B and other considerations.

In the CASBEE assessment, trees are categorized as follows:
- Medium/tall trees: trees with a height of 1.0 m or taller at the time of planting (apply Item (1) method below).
- Low trees: trees with a height of 1.0 m or lower at the time of planting (apply Item (2) method below).

(1) Horizontal projected area of medium/tall trees (canopy area)

- Apply the horizontal projected area of medium/tall tree canopies at the time of plant maturity. The method is not based on the area at the time of planting and requires calculation of the anticipated canopy areas at maturity (Regulation 23).
  This method is recommended in cases where areas have many mature trees.



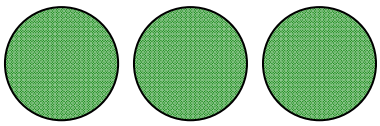
- The table below shows anticipated radii of tree canopies and corresponding canopy sizes based on tree heights at time of planting. The anticipated values can be applied in calculation of the horizontal projected area (Regulation 9).

Table II.3.1 Anticipated radius of tree crown

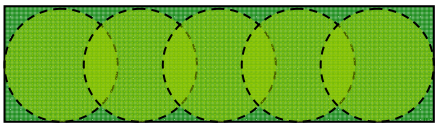
Tree height at time of planting	Anticipated radius of tree canopy	Anticipated area of tree canopy
4.0 m or taller	2.1m	13.8 ㎡
2.5 m or taller but lower than 4.0 m	1.6m	8.0 ㎡
1.0 m or taller but lower than 2.5 m	1.1m	3.8 ㎡

*This method can only be applied to trees with a height of 1 m or taller.

- Add all tree canopy areas except overlapping areas (Regulation 23).
  In cases where canopies of multiple closely-placed trees overlap, obtain the total canopy area can be obtained as shown below (method based on the Planting Handbook published by Hiratsuka City; partially modified for CASBEE).



Canopies do not overlap:
Total area of all tree canopies



Canopies overlap: Area of within the canopy perimeter (bounded by straight lines)

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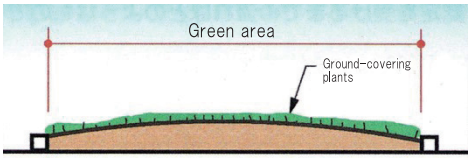
(2) Calculation of green area with ground-covering plants or low trees

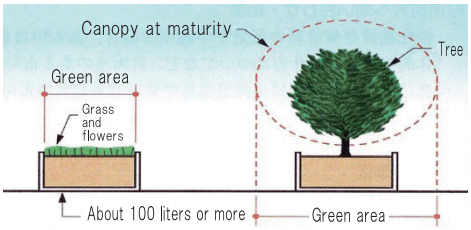
1) Green area with ground-covering plants (e.g. lawn) or low trees

- Apply the horizontal projected area that ground-covering plants (e.g. lawn and other plants) or low trees are expected to cover at the time of maturity (method based on Regulation 23; partially modified for CASBEE).



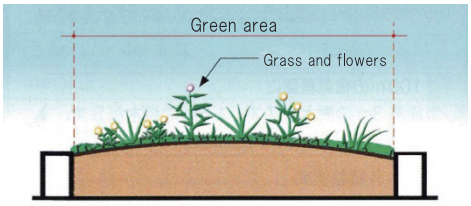
2) Green area with planters/containers

- In cases where planters or containers with a volume of 100 liters or more are used, calculate the area using the method described in (1) or (2)-1).
- In cases where a planter or container is used for a wall, apply the calculation method described in 5) (Regulation 23).



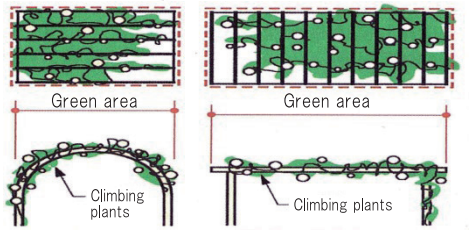
3) Green area of flower beds, etc.

- Apply the horizontal projected area of soil designated for flowers and other plants or of a green facility that is covered with other type of materials (Regulation 9).



4) Green area of plant trellises

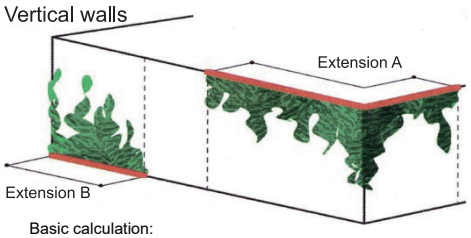
- In cases where trellises are placed on the ground or on the rooftop, apply the horizontal projected area the plants are expected to cover at the time of maturity (Regulation 23).



5) Green area of walls

i. Vertical walls

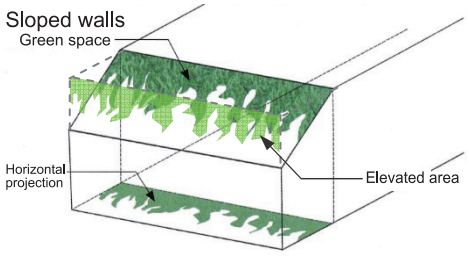
- In cases where plants grow upward from the ground or downward from the rooftop along the walls, calculate green area with the horizontal length of planned green area multiplied by 1.0 m (Regulation 23).
- However, when the said depth is clearly more than 1.0 m (such as with use of metal fences that support climbing plants) and can be verified, the actual values can be calculated (CASBEE's unique method).
- In cases where planting materials (e.g. plant bases) are placed on the wall, calculate the area covered by such materials (CASBEE's unique method).



Basic calculation:
Green area = (A + B) x 1.0 m
When extensions of more than 1.0 m can be verified, calculate using the actual values

ii. Sloped walls

- Apply the larger value of the two: horizontal projected area or elevated area of the expected green-covered wall (method based on Regulation 23; partially modified for CASBEE).



Reference: Building Greener Towns - System Guide to Urban Green Space Conservation Law - issued by Parks & Green Space Dept., MLIT, July 2006

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3. Highly water-retentive materials

While a growing number of water-retentive materials are available on the market, the effectiveness of evaporative cooling varies depending on water content level in the materials. Assessment methods for the materials' capability in relation to heat island mitigation are not yet established and still under review at several research institutes. Therefore, determining standard performance levels still needs further study in many aspects.
Currently available water-retentive materials are categorized in Table II.2. The list includes some readily available materials; however, a variety of other materials (e.g. non-asphalt products with water-retentive components) have also been developed. Difference in the effectiveness of evaporative cooling is caused by water supply mechanisms (i.e. precipitation versus artificial supply), while solar reflectance levels account for surface temperature difference. Appropriateness of characteristics must be considered for each application. For example, the required strength of water-retentive building materials used for roofs, balconies and verandas require differs from that required for paving sidewalks, roadways, parkades and parks.
Table II.3 shows examples of standard values for water-retentive paving published by the Japan Interlocking Block Pavement Engineering Association. These values are currently used for assessment reference. Furthermore, the Society for Water-Retentive Paving Technology Studies has developed an indoor light exposure test method for water-retentive paving. The test analyzes surface temperature difference between regular paving and water-retentive paving under certain light exposure conditions.

Table II.3.2 Examples of Water-Retentive Materials Table II.2 Examples of Water-Retentive Materials

	Main materials	Main applications	Water retention capacity	Water content by volume when wet	Density
Tiles	Ceramic	Roof/verandah /balcony	5-15 L/m^2 (with 35 mm thickness)	15～40%	0.6～ 1.8g/cm^3
Blocks	Ceramic	Park/parkade/ sidewalk/road way	9-18 L/m^2 (with 60 mm thickness)	15～30%	1.6～1.9 g/cm^3
	Cement	Park/parkade/ sidewalk/road way	9-18 L/m^2 (with 60 mm thickness)	15～30%	—
Water-retentiv e agent	Asphalt+water -retentive agents	Parkade/sidew alk/roadway	3-6.5 L/m^2 (with 100 mm thickness)	6～13%	—
Soil	Soil	Park/sidewalk	-	—	—

Note: Items with [-] indicate that standard values are not available

Table II.3.3 Examples of Standard Values for Water-Retentive Paving1)

Assessed by	Water retention capacity	Water absorption	Slip-resistance*	Bend strength*	Size allowance*
Japan Interlocking Block Pavement Engineering Association	0.15 g/cm^3 or more	70% or more	Sidewalk: BPN 40 or more Roadway: BPN 60 or more	Sidewalk: 3.0 N/mm^2 or more Roadway: 5.0 N/mm^2 or more	Sidewalk: ±2.5 mm (width), +4 mm & -1.0 mm (thickness) Roadway: ±2.5 mm (width), ±2.5 mm (thickness)

* Performance standard not required in water-retentive building materials for roofs, verandas and balconies.

<Bibliography>
1) Japan Interlocking Block Pavement Engineering Association, Quality Standard for Interlocking Blocks in Water-Retentive Paving, 2005
2) Jun Tanimoto, Toshiya Ogishima, et al., The Development of Highly Water-Retentive Passive Cooling Bricks, Architectural Institute of Japan Technical Reports, No.11, 2000
3) Yasunobu Ashie, et al., Planning Method Development for Urban Thermal Environment with Use of Water-Retentive Materials, Technical Papers Presented to The Society of Heating, Air-Conditioning and Sanitary Engineers of Japan, 1996

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4. Materials with higher solar reflectance

Due to a growing interest in heat island mitigation, coating materials and waterproof sheets with high solar reflectance are now generally available. Local authorities such as the Tokyo municipal government have also supported and tested the use of various products in order to combat urban thermal issues. Under these circumstances, a calculation method for coating film, JIS K 5602, was established in 2008. As data based on standardized methods become available, further improvements in solar reflectance technology are expected.
The standard solar reflectance and long-wave radiation rates are established particularly with respect to urban heat island mitigation. The Tokyo prefectural government and other institutions have also taken a similar approach. This is thought to be in consideration of future comparisons with other technologies (e.g. green space materials, water-retentive materials). Some industry organizations have set their own standards. The table below shows the PMS27 standard by Japan Paint Manufacturers Association and the KRK S-001 standard for waterproof sheets with high solar reflectance established by the Synthetic Polymer Roofing Manufacturers Association. In addition to waterproof sheets and coating materials, a variety of other materials with the similar capacity are also being developed and applied in construction (e.g. roofing tiles, slates, metal/film materials, glass). As objective performance assessment methods are not yet established for these materials, use of the existing standard for coating materials and waterproof sheets is assumed.
Due care is required in building exterior walls or sidewalks with high solar reflectance to avoid negative impact on pedestrians. In particular, use of such materials for the exterior walls of an urban high-rise building is not recommended as it increases ground-level solar radiation heat of the surrounding areas. Furthermore, as solar reflectance rates of the materials have been indicated to decrease over time, shifts in performance levels must also be taken into account. It is recommended that the materials maintain solar reflectance of 80% or more of the initial rate after a two-year outdoor exposure test.

Table II.3.4 Standard performance values of solar reflectance and long-wavelength emittance

Assessed by	Solar reflectance	Long-wavelength emittance	Project/standard, etc.
Japan Paint Manufacturers Association	Solar reflectance in near-infrared region of 40.0% or higher at a luminosity L of 40.0 or less; or, a higher reflectance rate than L at a luminosity L higher than 40.0	-	JPMS27: Weather-Resistant Coating Materials for Roof (2009)
Synthetic Polymer Roofing Manufacturers Association	Near-infrared region solar reflectance of 50.0% or higher (wavelength: 780-2500 nm)	-	KRK S-001: Standard for Waterproof Sheets with High Solar Reflectance (2008)
Tokyo Prefecture	Solar reflectance of 50% or higher (gray) by third-party assessment	-	Cool Roof Promotional Project (2006)

Note: Long-wavelength emittance rates of all coating materials and waterproof sheets are approximately 0.9 and no standard value has been established. Note, however, the rates tend to decrease with metal roofs.

<Bibliography>
4) Yukio Ishikawa, Evaporative Cooling Study of Cool Roof Systems with Heat-Sensitive Hydrogel – Thermal Property Measurement, Joint Research Draft published by Solar Energy Society and Japan Wind Energy Association, 2004
5) Kazuhiro Mitsumoto, Heat Island Mitigation Effects of Highly Reflective Paints and Water-Retentive Building Materials, Tokyo Metropolitan Government Heat Island Symposium, July 2004
6) ASHRAE Guide, 1969
7) Pacific Gas and Electric Company, High Albedo Roofs (Codes and Standards Enhancement Study), 2000

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5. Calculation of <Percentage of exposed area> and <building spacing index Rw>

(1) Percentage of exposed area

Evaluate the extent of consideration for ventilation to downwindward areas, based on percentage of exposed area of the building facing the prevailing wind in summer months. This type of assessment normally requires review impacts from adjacent buildings: in this particular assessment, however, base the evaluation on the assumption that the adjacent area is vacant.

- Percentage of exposed area of the building facing the prevailing wind direction is calculated by using the following formula.

<Percentage of exposed area> = Sb / (Ws x Hb) x 100(%)

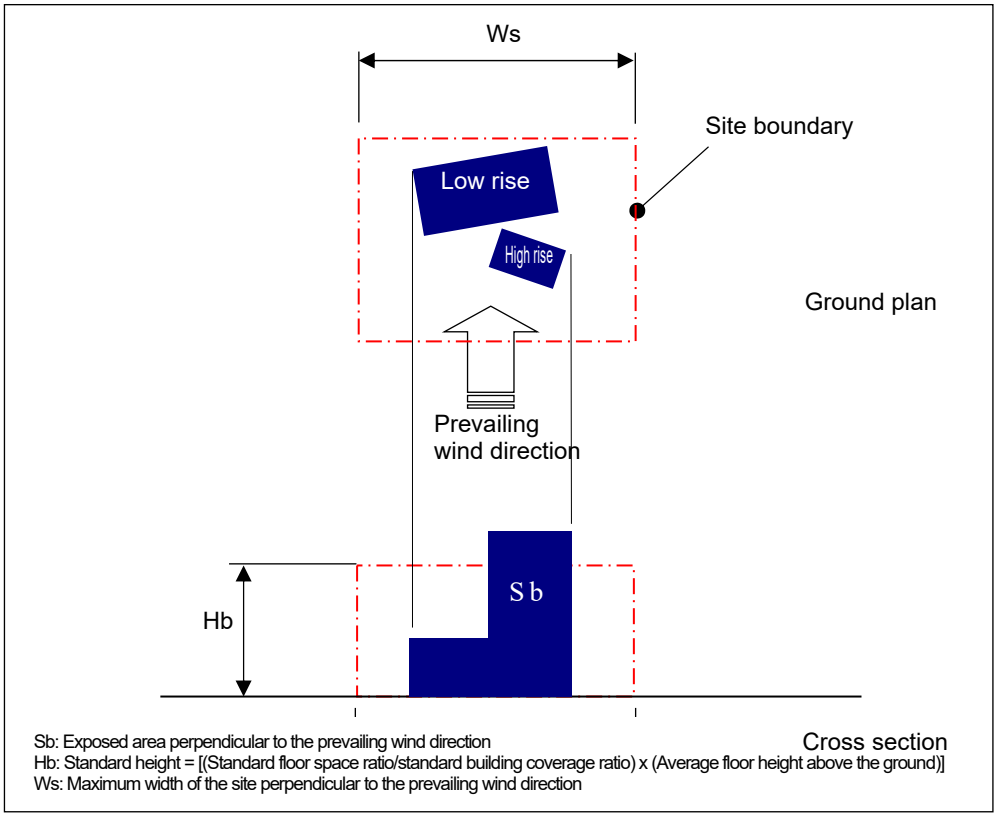

Figure II.3.1 Percentage of exposed area of the building that faces the prevailing wind

- Exposed area Sb of the building facing the prevailing wind is the upper front area above the ground level of the building front (Article 2, Paragraph 1, Item 6 of the Ordinance, and Article 2, Paragraph 2 of the Ordinance).
- When the building has the designated structures specified in the Building Standard Law, their exposed areas should be included in the calculation. However, retaining walls for adjusting the height difference on-site may be excluded from the calculation of exposed areas.
- Standard height Hb is expressed as [(Standard floor space ratio) / (Standard building coverage ratio)] x (Average floor height above the ground).
- The standard floor space ratio is the lowest value of the maximum floor space ratios of the subject site based on one of the following: urban planning due to the designation of zoning, the width of the frontal road, or ordinances. However, when eased values for individual floor space ratios apply, the eased maximum floor space ratios shall be used in the assessment.
- The standard building coverage ratio is the lowest value of the maximum building coverage ratios of the subject site based on either of the following: urban planning due to the designation of zoning or ordinances. However, when eased values for the building coverage ratios apply to buildings on a corner location, the eased maximum building coverage ratios shall be used in the assessment.
- "Floor above the ground" shall be the floor excluding the basement floor of the number of floors of the building.
- When the prevailing wind direction is not perpendicular to the property line, base the evaluation on the orthogonal-oriented wind closest to the prevailing wind.
- In cases where the site consists of several buildings, evaluate based on the overall exposed area of all buildings.

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- In cases where the site is irregularly shaped, determine the maximum site width according to the method shown in Figure II.3.2.

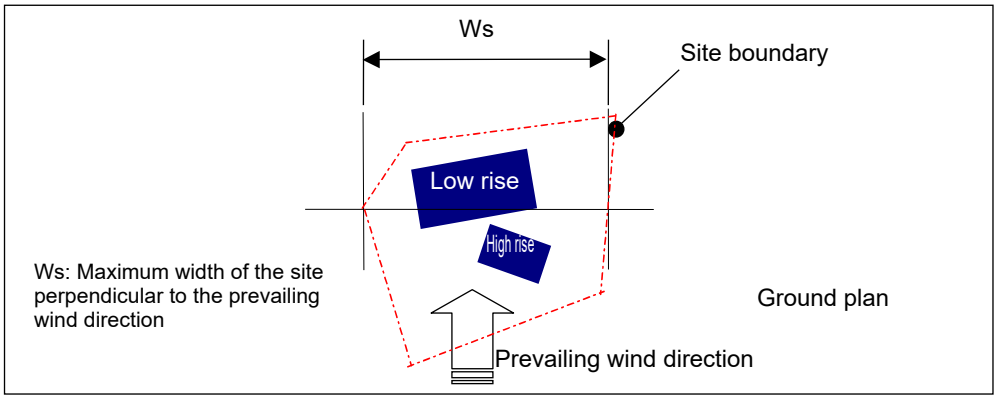

Figure II.3.2 “Ws” of an irregularly-shaped site

- When the subject building is located on a slope, the exposed area Sb above the average ground level (Article 2, Paragraph 2 of the Ordinance, the horizontal surface at the average height of positions that make contact with the surrounding ground) is calculated (Figure II.3.3).
- When multiple buildings are located on a slope, the exposed area Sb is calculated in the following procedure (Figure II.3.4).
  1) The height of individual buildings is the height from the average ground level of such buildings.
  2) The exposed area Sb is calculated assuming that the site is a horizontal ground level (The average ground levels of the individual buildings are all at the same height.) on which buildings having the height defined in Item [1] are located.

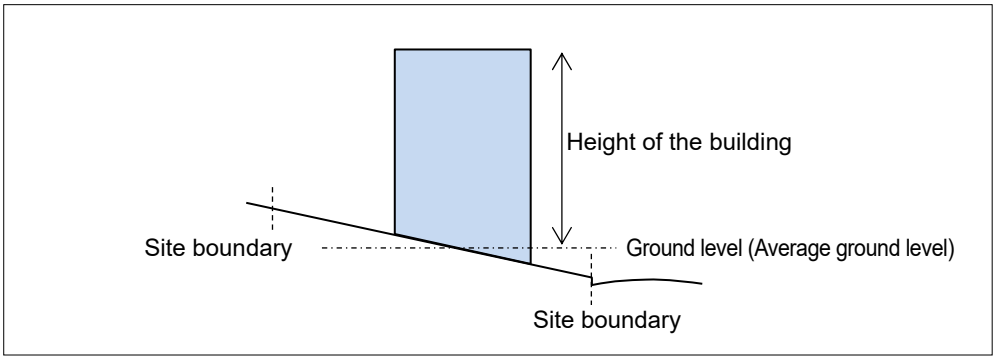

Figure II.3.3: Calculation of the height of a building located on a slope

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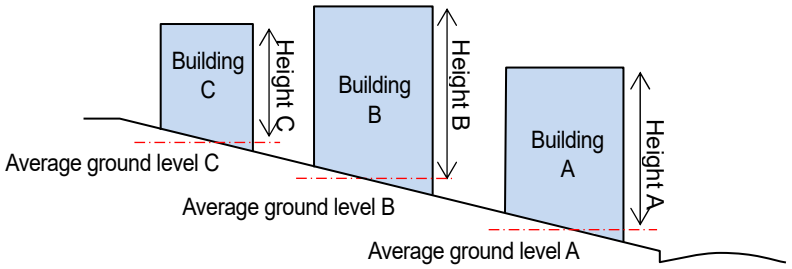
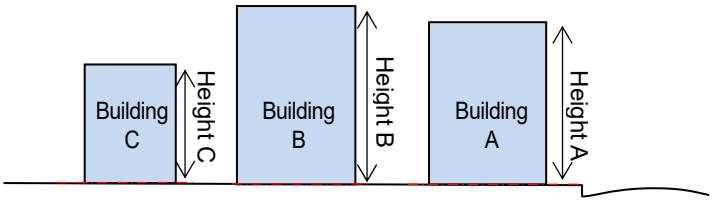


1) The height from the average ground level of each building is calculated.



2) Sb is calculated assuming that a building having the height obtained in Item [1] is located on horizontal ground.

Figure II.3.4: Calculation of the exposed area in cases when multiple buildings are located on a slope

(2) building spacing index (Rw),
in order to promote wind recovery in the area downwind from the building, the assessment is based on the building spacing index (Rw), which is the ratio of the setback distance from the site boundary in the direction of the prevailing wind in summer relative to the building height (H) and the distance from the adjacent building.

- Evaluate the setback distance in the direction of the prevailing wind (W1 and W2) with the site boundary that is determined to maximize the site width (Wd) against the direction of the prevailing wind.
- Obtain the building spacing index Rw using the formula below:

$$Rw = (W_1 + W_2) / H = \underbrace{W_1 / H}_{\text{Value of upwind side}} + \underbrace{W_2 / H}_{\text{Value of downwind side}}$$

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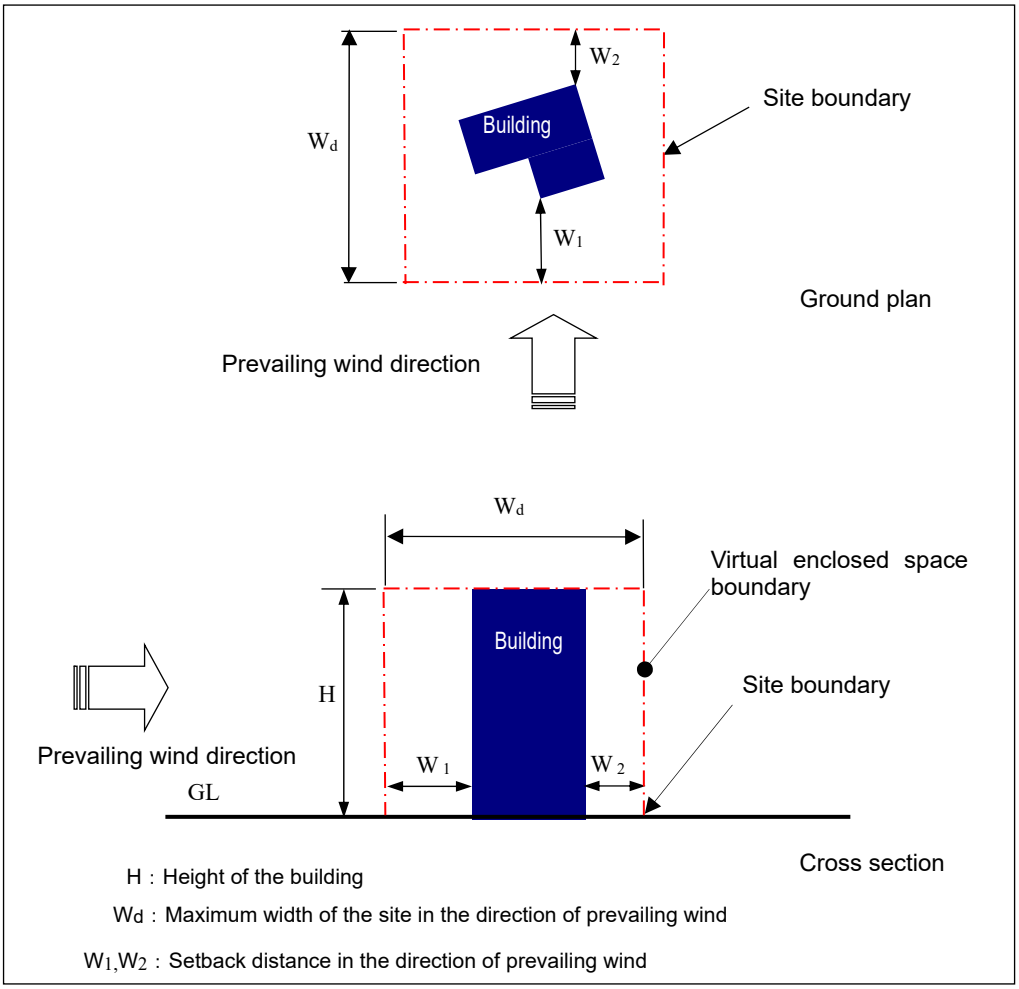

Figure II.3.5 Setback distance from site boundary W_1/W_2 and building height H

- When the prevailing wind in summer is not perpendicular to the property line, base the evaluation on the orthogonal-oriented wind closest to the prevailing wind instead.
- In cases where the site is irregularly shaped, determine the maximum site width W_d according to the method shown in Figure II.3.6.
- In cases where the higher portion of the building has a setback, calculate the setback distance according to the method shown in Figures II.3.7 and 3.8.
- In cases where the site consists of several units, calculate according to the method shown in Figure II.3.9. Apply the method in Figure II.3.10 where two units with a significant height difference are closely positioned.
- In cases where the site is irregularly shaped and also consists of several units, determine the maximum site width W_d according to the method shown in Figure II.3.11.

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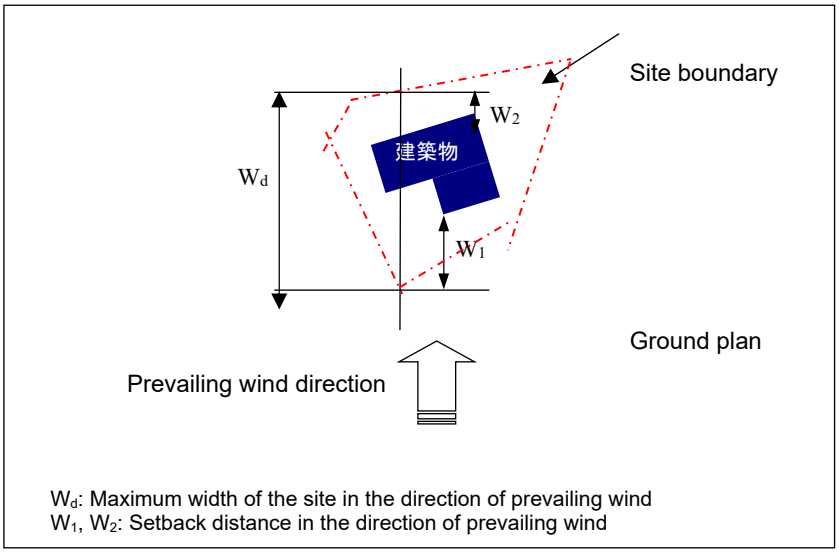
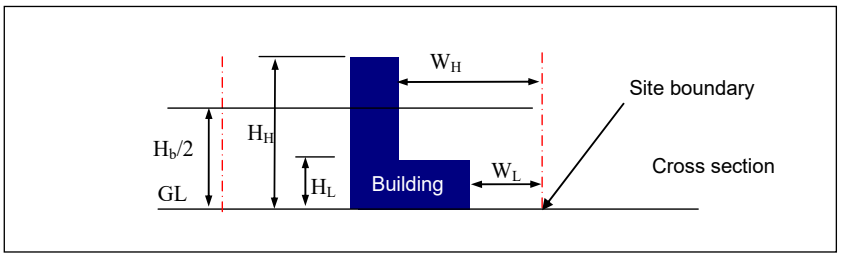


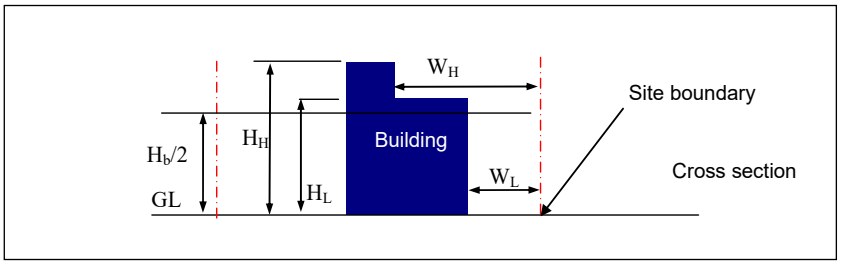
W_d: Maximum width of the site in the direction of prevailing wind
W_1, W_2: Setback distance in the direction of prevailing wind

Figure II.3.6 Maximum site width W_d and setback distance W_1 and W_2 on an irregularly-shaped site



If the setback of the higher portion of the building is located below $H_b/2$, apply the setback distance of the portion W_H/H_H regardless of whether it is downwind or upwind.

Figure II.3.7 W/H calculation method in cases where the higher portion of the building has a setback: 1



If a setback is located at $H_b/2$ or higher, regardless of whether it is downwind or upwind, the value of the side of the building that has the setback is calculated in $(W_H+W_L)/2H_H$.

Figure II.3.8 W/H calculation method in cases where the higher portion of the building has a setback: 2

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<where multiple groups of building units on the site>

- In cases where multiple groups of building units on the site are in the direction of prevailing wind, evaluate each group individually.
- Apply the setback distance and the spacing (W) of the narrowest portion.
- Apply the height of the unit located on the upwind side as height (H) which corresponds to the spacing between two units with different heights.
- When two units with a significant height difference are closely positioned, evaluate according to the method shown in Figure II.3.10.
- In cases where the higher portion of the building has a setback, evaluate according to the methods shown in Figures II.3.7 and 3.8.
- Obtain the building spacing index Rw of a group of building units using the formula below (example: subject building units shown in Figure II.3.9):

$$Rw = (W_1 / H_1 + W_2 / H_1 + W_3 / H_2 + \cdots + W_{N+1} / H_N) / N$$

(N=number of building units)

- In cases where multiple groups of building units are on the site, obtain individual Rw for each group and average the value.

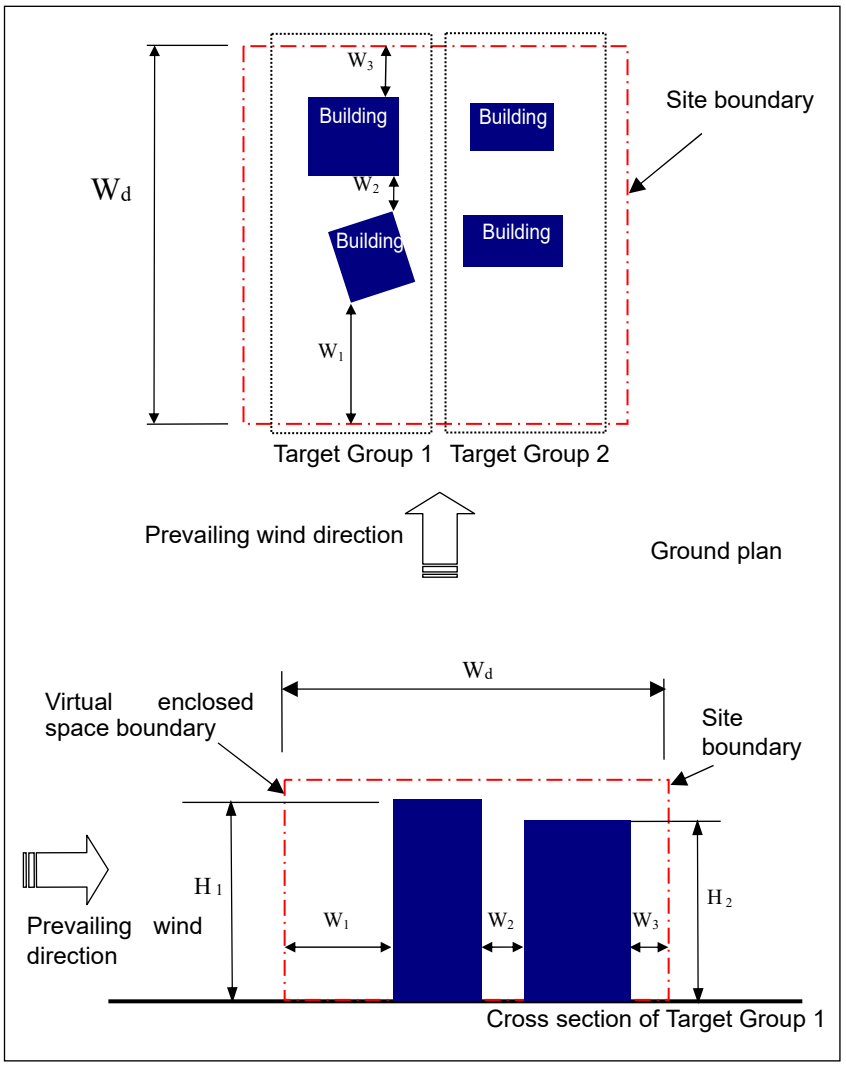

Figure II.3.9 Assessment method for sites with multiple building units

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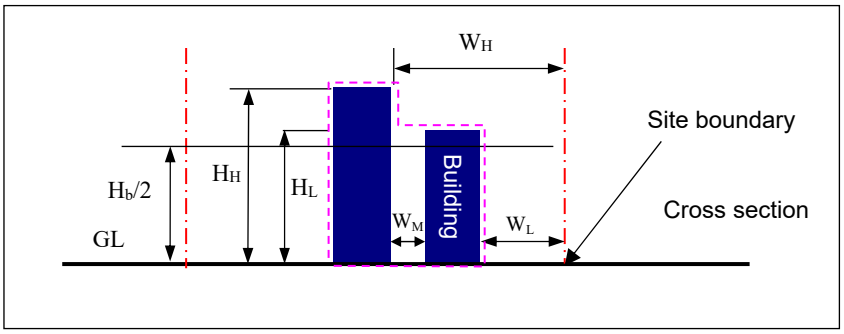

When two units, with a significant height difference at Hb/2 or higher, are closely positioned, the two units are considered as one building with a setback (refer to Figure II.3.8).
In this case, the building must satisfy the following condition: $(H_H - H_L) > W_M$
Apply $(W_H + W_L)/2/H_H$ as the value of the side of the building which has the setback.

Figure II.3.10 W/H calculation method in cases where two units with a significant height difference is closely positioned

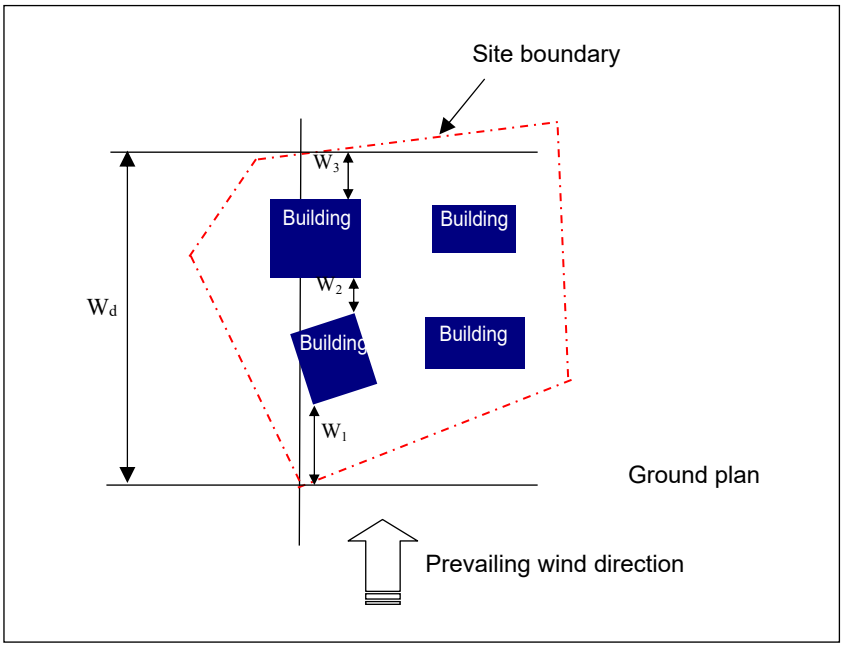

Figure II.3.11 Determining maximum site width W_d and setback distance for multiple units on irregularly-shaped lot

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PART III. Overview of the Built Environment SDGs

1. What are the Built Environment SDGs?

1.1 Overview of the SDGs and their relationship to the building sector

The 2030 Agenda for Sustainable Development (abbreviated as the 2030 Agenda) was unanimously adopted by UN member states at the UN Summit on Sustainable Development in September 2015. The original text of the Agenda, "Transforming our world: the 2030 Agenda for Sustainable Development," is an important international agreement to "transform" the world into a sustainable one. At the core of the 2030 Agenda are the Sustainable Development Goals (SDGs).
The SDGs are a set of development goals that summarize the items to be implemented and achieved by 2030 in 17 goals (aspirational goals) and 169 targets (action goals). The SDGs emphasize the importance of the participation of a wide range of stakeholders, including the private sector, local governments, NGOs/NPOs, and the general public. Among them, the built environment sector has a significant impact on the economy, society, and environment of our country and bears a great responsibility toward building a sustainable society and has an obligation to contribute toward achieving the SDGs.

Many of the 17 goals and 169 targets of the SDGs are closely related to the building sector. For example, efforts to correct excessive scrap-and-build practices and to supply buildings that can become quality stock are related to Goal 11 "Sustainable Cities and Communities" and Goal 12 "Responsible Consumption and Production". The building sector's efforts are also related to many of the SDGs. As described above, it is necessary to understand the relationship between the SDGs and the building sector and to deepen our efforts.

Figure III.0 .1 The 17 Goals of the SDGs

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1.2 Positioning of the Built Environment SDGs Checklist

CASBEE was developed to provide a comprehensive assessment of the environmental performance of planned/completed buildings. The SDGs, on the other hand, are an action plan for broad social change aimed at improving the sustainability of both people and the planet from a long-term perspective. In other words, CASBEE assess the performance of buildings, while the SDGs aim to realize ingenuity and consideration in building construction and use from the perspective of action planning. As shown in the figure below, for example, when buildings (1), (2), and (3) are assessed, if the Q and L of the three are the same, the three environmental performance ratings will be the same. However, if the SDG perspective of an action plan for social transformation is introduced, there could be a difference in the assessment of the three. The new axis to be added as an assessment of action plans for social change is called "Built Environment SDGs".

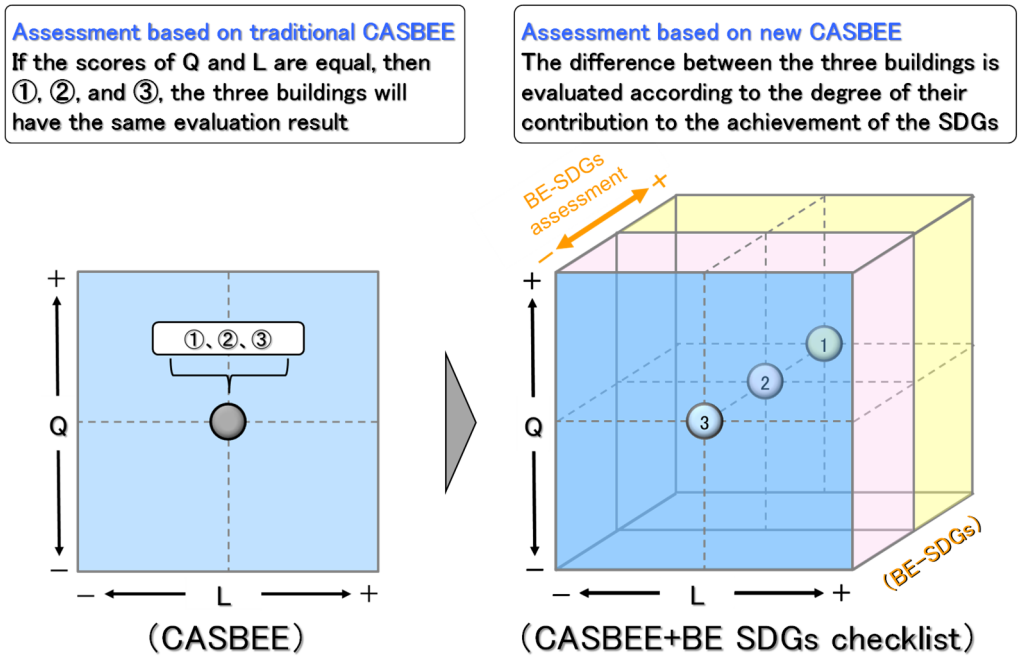

Figure III.0 .2 New perspectives on built environment assessment brought about by the introduction of the SDGs

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The Venn diagram below shows the assessment items related to the SDGs and CASBEE. 17 goals and 169 targets of the SDGs include items that are closely related to built environment assessment. Those set of items is the set of assessment items for the Built Environment SDGs.
In the recent revision of CASBEE for Building Design (New Construction), a "Built Environment SDGs Checklist" was developed for self-assessment of efforts to achieve the SDGs in light of the set of assessment items of the Built Environment SDGs. Since there are some overlapping items between the set of assessment items for the Built Environment SDGs and the set of assessment items for CASBEE, the results of the CASBEE assessment are used to reduce the burden of the assessment.

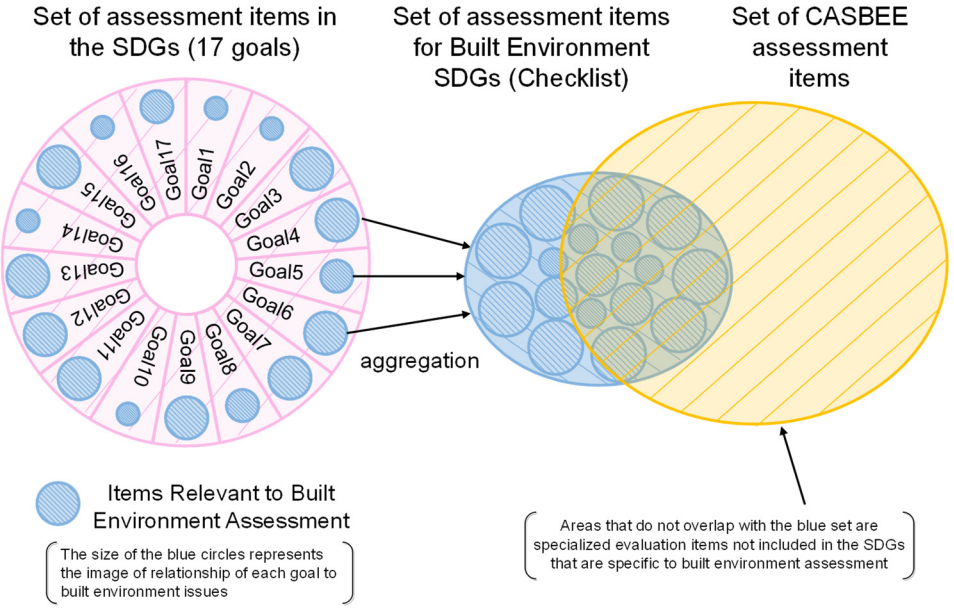

Figure III.0 .3 Organization of assessment items related to SDGs and CASBEE

The following diagram illustrates the process of considering assessment items for the Built Environment SDGs. First, A) from the 17 goals and 169 targets of the SDGs, which are action plans that contribute to improving the sustainability of people and the planet, B) items related to the planning, production, operation, and disposal of buildings were extracted. Then, C) items and examples of efforts to be assessed that are closely related to environmental performance assessment of buildings were extracted. In addition, D) goal aggregation was examined in order to identify and clarify the materiality of built environment planning/assessment. The following pages show the results of the study on the introduction of the Built Environment SDGs.

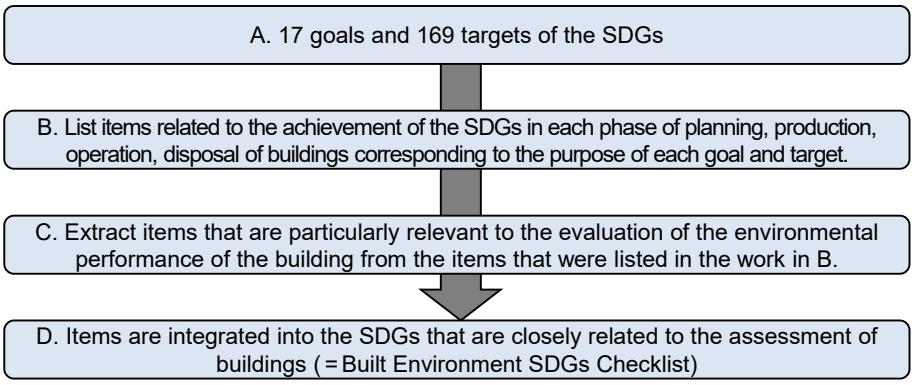

Figure III.0 .4 Framework for considering the introduction of the Built Environment SDGs

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Table III.1.1 Positioning of assessment items in the Built Environment SDGs (Goals 1-3)

A) The SDGs 17 Goals	B) Items related to achieving the SDGs in the planning, production, operation, and disposal of buildings	C) Particularly relevant assessment items (examples of initiatives) for environmental performance assessment of buildings	D) Consideration of goal aggregation
Goal 1. No Poverty	Planning and supply of affordable housing, low income housing, etc.	Low cost through rational design and construction while ensuring environmental performance	Aggregation to Goal 12 etc.
	Planning and supplying housing and buildings with low life cycle costs (LCC)	Ensure high environmental performance leading to reduced utility and medical costs	
	Planning and supply of resilient housing and buildings that can withstand disasters (prevention of poverty triggered by the disaster)	Ensure performance to withstand earthquake, fire, wind and flood damage, etc.	
	Improvement of building resilience performance	Resilient Design (LCP, BCP)	
	Adoption of fair trade building materials and equipment that contribute to the prevention of poverty among producers and distributors	Use of building materials with sustainable production systems (e.g., certified forest timber)	
Goal 2. Zero Hunger	Securing food in times of disaster	Ensure food stockpiling space that will not be compromised in the event of an emergency that disrupts food supply	Aggregation to Goal 12 etc.
	Planning and supplying facilities that enable stable food production regardless of weather conditions, etc.	Planning and supplying facilities for stable food production	
	Improvement of soil quality at the time of disposal of houses and buildings with a view to future conversion to agricultural land, etc.	Brownfield restoration, soil improvement	
Goal 3. Good Health and Well-Being	Supply of buildings that contribute to the maintenance and promotion of the health of building users (wellness houses, wellness offices)	Thermal environment (insulation and airtightness)	No aggregation
		Air quality (no use of building materials containing harmful substances, consideration for non-smoking and separate smoking areas, adequate humidity to prevent infectious diseases), sanitation (improvement of air quality, water quality, and soil quality)	
		Lighting and illumination (ensuring shading performance)	
		Sound environment (ensuring sound insulation performance)	
		near the building)	
		Creation of a secure environment (crime prevention and privacy)	
	Reduce the risk of health hazards to hospital users and medical personnel	Environmental maintenance to prevent nosocomial infections (airborne, droplet, and contact infections).	
	Health hazard prevention for producers and distributors	Improve the working environment for construction workers by avoiding the use of building materials containing harmful substances, etc.	
	Prevention of health hazards to nearby residents	Consideration for the surrounding environment	

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Table III.1.2 Positioning of assessment items in the Built Environment SDGs (Goals 4-7)

A) The SDGs 17 Goals	B) Items related to achieving the SDGs in the planning, production, operation, and disposal of buildings	C) Particularly relevant assessment items (examples of initiatives) for environmental performance assessment of buildings	D) Consideration of goal aggregation
Goal 4. Quality Education	Planning and supplying a building environment suitable for home study	Design features that enable changes in floor plans, etc. to meet the needs of residents (e.g., growth of children) (movable walls, skeleton infill, etc.)	No aggregation
	Planning and supplying a building environment suitable for general education	Develop a thermal, air, light, and sound environment conducive to learning	
	Planning and supplying a building environment suitable for professional education (technical, vocational, etc.)		
	Planning and supplying school buildings that can provide quality education	Improvement of learning environment (open, ICT, barrier-free, woody, eco-school, etc.)	
	Consideration of gender and vulnerable groups in education	Universal design	
	Creating a good working environment for faculty and staff	Smart Wellness Design	
Goal 5. Gender Equality	Planning and supplying a user-friendly built environment regardless of gender, generation, religion, etc.	Spatial margin (simple flow lines, floor plan)	No aggregation
		Design innovations to reduce the burden of housework,childcare,nursing care, etc.	
		Design innovations to accommodate gender differences in the assessment of hot and cold sensations	
		Design innovations to accommodate LGBT and other groups	
	Creating a work environment that facilitates the involvement of all people in the built production process	Creation of a working environment that facilitates the involvement of all people in the production of construction	
Goal 6. Clean Water and Sanitation	Effective use of water resources	Water saving (adoption of water-saving devices, etc.)	No aggregation
		Rainwater & grey water use (installation of tanks, etc.)	
	Consideration for the water cycle	Rain water infiltration (use of rain water infiltration basins, etc.)	
		Soil contamination countermeasures	
	Proper treatment of sewage	Sewage purification (installation of septic tanks)	
	Sanitation around sink and basin areas	Design features to maintain a hygienic water environment (prevention of spread of bacteria and viruses)	
	Maintenance of water and sewage facilities, water supply and drainage systems	Ensure reliability of water supply and drainage systems	
Goal 7. Affordable and Clean Energy	Energy as a daily necessity	Efforts to eradicate energy poverty (supply of cheap and safe energy)	No aggregation
	Energy conservation measures and passive design	Design innovations that contribute to energy conservation	
	Energy creation measures	Design innovations that contribute to energy creation	
	Energy storage measures	Design innovations that contribute to energy storage (e.g., use of storage batteries)	
	Energy mix	Linkage with distributed energy systems	
	Energy management	Introduction of energy management systems (HEMS, BEMS, etc.)	
	Securing energy resources during emergencies	LCP, BCP, emergency energy (emergency power supply, etc.)	
	Zero-energy design	Efforts toward ZEH and ZEB	
	Life cycle design	Ongoing efforts toward LCCM, energy consumption, and GHG reduction	

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Table III.1.3 Positioning of assessment items in the Built Environment SDGs (Goals 8-10)

A) The SDGs 17 Goals	B) Items related to achieving the SDGs in the planning, production, operation, and disposal of buildings	C) Particularly relevant assessment items (examples of initiatives) for environmental performance assessment of buildings	D) Consideration of goal aggregation
Goal 8. Decent Work and Economic Growth	Creation of spaces that enhance the intellectual productivity of building users	Devices to create an environment that enhances intellectual productivity (ensuring communication space, relaxation space, space for refreshment, etc.)	No aggregation
	Creation of spaces that maintain job satisfaction for building users	Consideration for the health, comfort, and safety of building users (smart wellness)	
	Resource conservation through recycling and waste reduction	Measures to reduce the amount of waste generated at each stage of the production and disposal of housing and building	
	Promotion of superior stock and enhancement of asset value	Innovations for extending the service life of homes and buildings	
	Reforms in the way construction workers and laborers work	Diversity initiatives (promotion of activities by women, persons with disabilities, non-Japanese, elderly, etc.), reform of work styles (safety management, working environment, improvement of employment conditions)	
	Utilization of local resources (local distinctive human resources, building materials, etc.)	Active use of local timber	
Goal 9. Industry, Innovation and Infra-structure	Promote innovation in the building industry	Foster momentum for new technology development through active use of state-of-the-art technology and building materials in the field	No aggregation
	Creation of a built environment that encourages innovation among building users	Ensure communication, relaxation, refreshment space, etc.	
		Access to information and communication technology	
	Improvement of building resilience performance	Resilient design (BCP, LCP)	
		Confirmation of site hazards	
		Ensure performance to withstand earthquake, fire, wind and flood damage, etc.	
Goal 10. Reduced Inequalities	Consideration for the environmentally vulnerable (children, elderly, disabled, etc.)	Kids design	Aggregation to Goal 5 etc.
		Age friendly design	
		Barrier-free design	
	Planning and supplying a user-friendly built environment regardless of gender, generation, religion, etc.	Universal design	

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Table III.1.4 Positioning of assessment items in the Built Environment SDGs (Goals 11 and 12)

A) The SDGs 17 Goals	B) Items related to achieving the SDGs in the planning, production, operation, and disposal of buildings	C) Particularly relevant assessment items (examples of initiatives) for environmental performance assessment of buildings	D) Consideration of goal aggregation
Goal 11. Sustainable Cities and Communities	Planning and supply of affordable housing, low income housing, etc.	Low cost (including low running cost, etc.) through rational design and construction while ensuring environmental performance	No aggregation
	Architectural design in conjunction with transportation planning	Prevention of traffic accidents, coordination with public transportation	
	Collaboration with residents	Public involvement	
	Consideration for air, water, and soil conservation	Reduction of environmental load on the surrounding environment (sewage purification, soil improvement, etc.)	
	Disaster prevention, mitigation, and crime prevention considerations	Resilient design (LCP, BCP)	
		Confirmation of site hazards	
		Site security measures	
	Consideration for townscape and landscape	Townscape and landscape-friendly architectural planning	
	Consideration for local ecosystems, etc.	Consideration for biodiversity, planning of exterior structures with consideration for ecosystem preservation	
	Designing homes and buildings that contribute to fostering social capital	Consideration for the surrounding environment	
		Secure communication space	
	Contribute to making cities and communities smarter	Building plans linked to smart urbanization (smart cities, construction of distributed energy systems, etc.)	
	Promote local procurement	Active use of local timber	
	Planning and supply of built environment buildings	Environmental performance assessment and certification of homes and built environments	
	Rehabilitation, preservation, and operation of historic buildings	Inheritance of local characteristics	
Goal 12. Responsible Consumption and Production	Extending the service life of homes and buildings	Initiatives that contribute to the longevity of housing and buildings	No aggregation
	Sustainable production and consumption of building materials	Utilization of sustainable resources	
	Proper operation plan and management of building facilities	Periodic inspections (including after-sales service)	
	Effective use of various resources during construction	Reduction of waste during production and dismantling (3R)	
	Effective use of various resources during operation	Operational GHG emissions reduction, water use reduction, monitoring, energy management	
	Control and proper management of the use of harmful substances	Reduce use and prevent proliferation of harmful substances	
	Reduction of GHG emissions during construction, operation, and disposal	Reduction of GHG emissions during construction, operation, and disposal	
	Understanding the supply chain in construction activities	Supply chain conscious procurement	

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Table III.1.5 Positioning of assessment items in the Built Environment SDGs (Goals 13-17)

A) The SDGs 17 Goals	B) Items related to achieving the SDGs in the planning, production, operation, and disposal of buildings	C) Particularly relevant assessment items (examples of initiatives) for environmental performance assessment of buildings	D) Consideration of goal aggregation
Goal 13. Climate Action	Designing homes and buildings that contribute to climate change mitigation	Reduction of building WLC	No aggregation
	Designing homes and buildings to contribute to climate change adaptation	Reduce heat gain in urban spaces	
		Responding to building damage caused by extreme weather	
		Reducing the impact of climate change on building users	
	Early warning of climate change-related disasters, prevention of damage spread, and early recovery	Resilient design (LCP, BCP)	
Goal 14. Life Below Water	Preservation of aquatic ecosystems and prevention of marine pollution due to sewage discharge	Sewage purification (installation of septic tanks), rain water infiltration (reduction of combined sewer load)	Aggregation to Goal 12 etc.
	Considerations for turbid water runoff	Discharge of turbid water well below effluent standards	
	Production and disposal of building materials that contribute to the prevention of marine pollution	Reduce use, substitution, and reuse of plastic products	
Goal 15. Life on Land	Conservation of terrestrial ecosystems	Consideration for biodiversity conservation, including greening of exterior, rooftop and wall surfaces	No aggregation
		Soil contamination countermeasures	
	Consideration for forest conservation	Utilization of sustainable resources	
	Effective use of wood resources	Reuse of wood (used lumber) generated during building disposal	
Goal 16. Peace, Justice and Strong Institutions	Ensure privacy	Privacy-conscious design to block external views	Aggregation to Goal 12 etc.
	Crime prevention	Crime prevention through environmental design (CPTED)	
	Operation plan and management of security equipment	Periodic inspection of security equipment	
	Compliance with laws and regulations related to construction	Compliance measures	
	Implementation of fair trade in procurement	Fair trade measures	
	Supply chain management	Consideration for the environment when procuring materials	
Goal 17. Partnerships for the Goals	Use of traceable building materials and equipment	Consideration for suppliers when procuring materials	No aggregation
	Architectural planning with consideration for local residents	Building plans that facilitate communication (consideration for townscape and landscape, revitalization of communities such as local neighborhood associations, prevention of isolation of residents, etc.)	
	Promote partnerships with stakeholders	Supply chain management, creating shared value	
		Introduction of after-sales service system	
		Develop an ICT environment that facilitates communication	

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2. Assessment Methodology using Built Environment SDGs Checklist

2.1 Assessment target

CASBEE-BD/NC can be used to assess various efforts to contribute to the achievement of the SDGs in buildings.

2.2 Assessment criteria

The Built Environment SDGs Checklist features separate scoring of items related to SDG Goals 1-17, and the results are used to indicate the overall level of commitment to the SDGs.

The scoring criteria were considered to be appropriate for each use of the subject building, and the assessment criteria are considered as much as possible in order to create a simple system. The assessment criteria for each scoring item were established based on the following concepts

(i) This checklist is intended to provide perspective on global economic, social, and environmental issues.
(ii) Unlike the performance assessment in CASBEE, the Built Environment SDGs Checklist may include some subjective assessment by the evaluator, and it is difficult to score the level of efforts to SDGs in a detailed and quantitative manner. Therefore, this checklist is scored in three levels: "not engaging," "engaging," and "actively engaging".
(iii) If there are any other efforts related to the content of the scoring items that are appealing, they can be described as matters of special note. If the efforts are objectively worthy of points in light of the domestic and international situation, points can be added at the evaluator's own discretion. In addition, the results of the comprehensive assessment are subdivided into five levels so that the amount of efforts to be assessed can be easily visualized.

2.3 Overview of assessment system

(1) Item-by-item scoring

There are two main types of scoring items included in the Built Environment SDGs Checklist: the first is unique to the Built Environment SDGs, and the second is automatically scored using the CASBEE assessment results.

Scoring items unique to the Built Environment SDGs are scored according to the assessment criteria set for each item. For items that are based on CASBEE, Level 1 is "not engaging" (1 point), Levels 2 and 3 are "engaging" (2 points), and Levels 4 and 5 are "actively engaging" (3 points), out of the five CASBEE Levels 1 to 5.

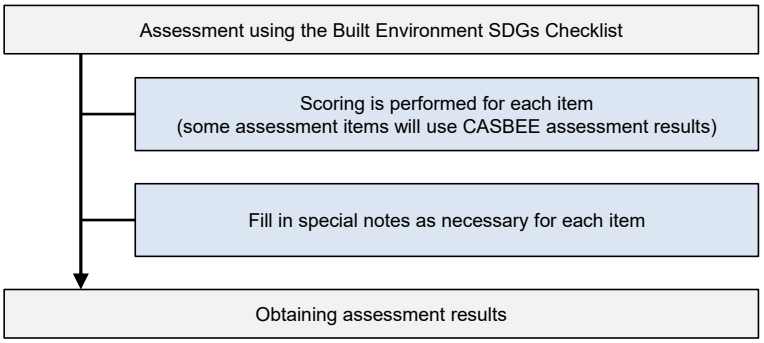

Figure III.0 .1 Assessment system in the Built Environment SDGs

(2) Assessment results

The scoring results will be consolidated in the "CASBEE for Building Design + Built Environment SDGs Assessment Results Sheet".

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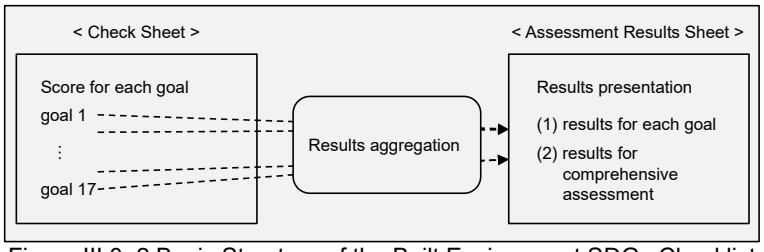

Figure III.0 .2 Basic Structure of the Built Environment SDGs Checklist

The "CASBEE for Building Design + Built Environment SDGs Assessment Result Sheet" displays the assessment results for each of the SDG as a bar graph and numerical values. Furthermore, the comprehensive assessment results are displayed in terms of the number of SDGs circles. These allow for a multifaceted and comprehensive understanding of the characteristics of the subject building with respect to the SDGs.

The rating for each of the SDG is expressed as a score out of 3 points and is obtained by the following formula

$$\text{Score for each SDG} = \frac{\text{Sum of the scores of the assessment items (major items) in each goal}}{\text{Number of assessment items (major items) in each goal}} \quad \text{... (1)}$$

The comprehensive assessment is based on the score of each goal and is determined by the following formula

$$\text{Comprehensive assessment} = (\text{Average score of all goals} - 1) \times 2 + 1 \quad \text{... (2)}$$

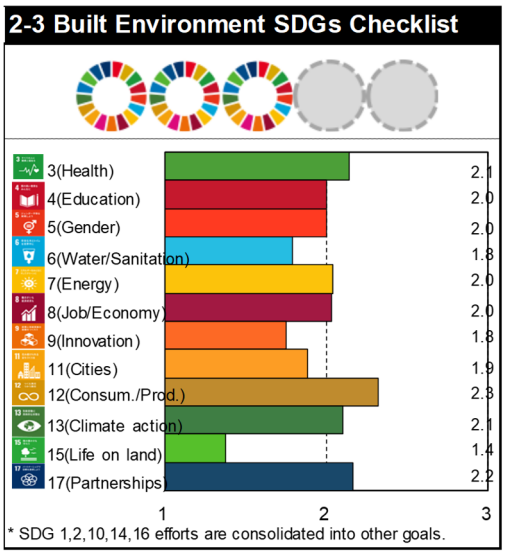

Figure III.0 .3 Display of Built Environment SDGs Checklist Assessment Results

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Table III.0 .1 Correspondence between score and rank

Assessment results	Score	Rank
Making significant contribution to the achievement of the SDGs	4.5 or more	
Making great efforts to contribute to the achievement of the SDGs	3.5 or more and less than 4.5	
Making good efforts to contribute to the achievement of the SDGs	2.5 or more and less than 3.5	
Committed to a certain level of effort required as building professionals	1.5 or more and less than 2.5	
Minimum efforts are being made as building professionals	Less than 1.5	

2.4 Assessment of mixed-use buildings

In CASBEE, the assessment of a building with two or more building types is calculated by weighting and averaging the assessment results for each building type to be assessed according to the ratio of the floor area of each building type. However, the Built Environment SDGs Checklist has the characteristic of comprehensively assessing the plans and efforts to be assessed for the whole building in terms of the SDGs, so it does not carry out an assessment for each building type, but assesses the whole building at once, even if it is a mixed-use building.

2.5 Assessment procedure for the Built Environment SDGs

2.5.1 Structure of the assessment sheet

The Built Environment SDGs Checklist has been developed so that the assessment results can be easily entered on general-purpose spreadsheet software for a variety of uses. Scoring can be performed using the same file as CASBEE-BD/NC.

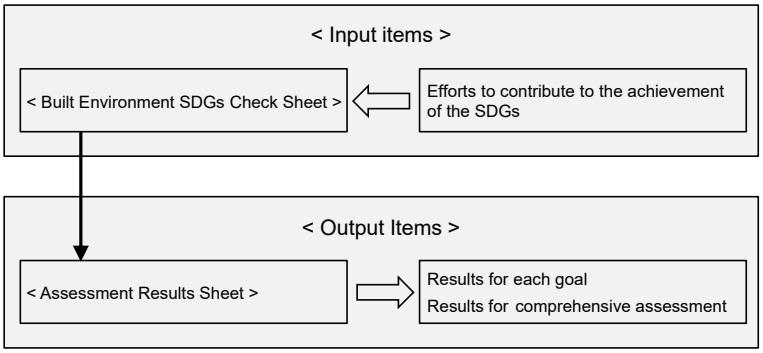

Figure III. 2.4 Overall structure of the assessment sheet

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2.5.2 Built Environment SDGs Checklist

The scoring sheet indicates the assessment criteria for each building type. For each scoring item, three levels of assessment criteria are clearly indicated, from Level 1 to Level 3. Evaluators score according to the table.

Table III. 2.2 Major components in the scoring sheet

Items	Explanation
Efforts to be assessed column	Examples of efforts in the building sector that contribute to the achievement of the SDGs are listed and the assessment criteria for each item are indicated
Scoring column	If the column is painted white: Select one of three buttons for the scoring result according to the efforts to be evaluated: "Not engaging", "Engaging" or "Actively engaging"
	If the column is painted gray: Assessment items are automatically scored as the efforts to be evaluated overlap with efforts to be evaluated in other goals or are determined by the CASBEE assessment results
Special notes column	Any unique efforts that are not listed as efforts to be evaluated on the Built Environment SDGs Checklist can be described here
Bonus point column	Boxes should be checked if the efforts described in the special notes are worthy of bonus point
Scores column	The final score of the efforts in each item after taking into account the bonus point, etc. is displayed

The following shows how to enter the scoring sheet.

(1) Assessment criteria

As shown in the figure below, the scoring sheet has buttons for selecting the level of efforts to be assessed for each scoring item on a 3-point scale, and the evaluator scores himself/herself according to the table. The areas where the scoring buttons are grayed out are items for which the CASBEE scoring results are used, and no new scoring is required. Scoring buttons in white are unique to the Built Environment SDGs Checklist, and are scored by selecting the appropriate button. Assessment criteria are set at three levels for each item: not engaging, engaging, and actively engaging.

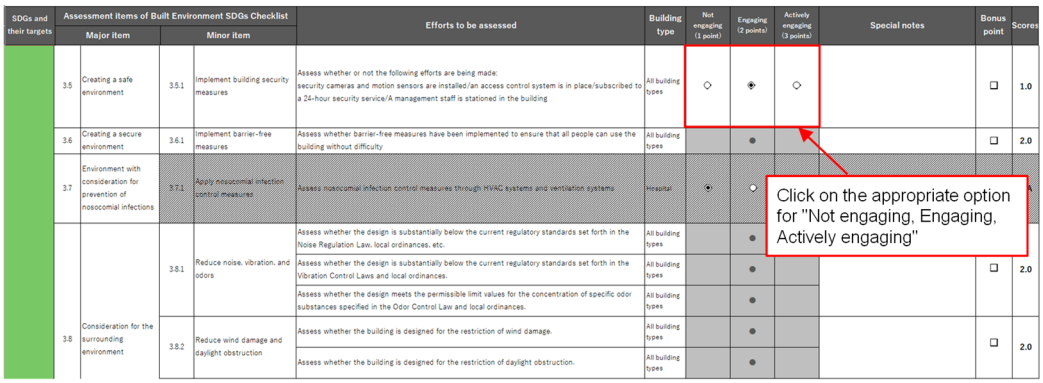

Figure III. 2.5 Scoring Sheet Screen

(2) Special note

As shown in the figure below, if there are pioneering or ambitious efforts related to the contents of the "Checklist Items" that are not exemplified in the efforts to be assessed, they can be additionally entered as special notes.

In addition, if the evaluator judges that the contents of the special notes are worthy of points, it is possible to check the boxes to have bonus point. However, the maximum bonus score awarded is one point and the number of points awarded for any one assessment item must not exceed three in total.

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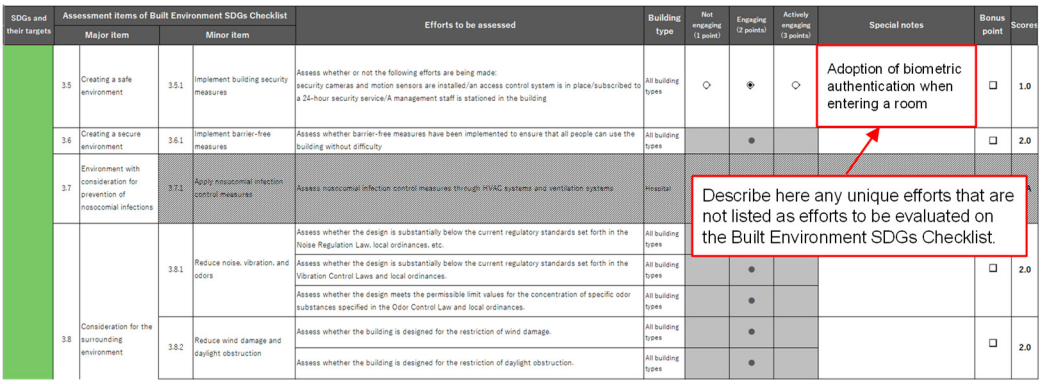

Figure III. 2.6 How to fill in special notes

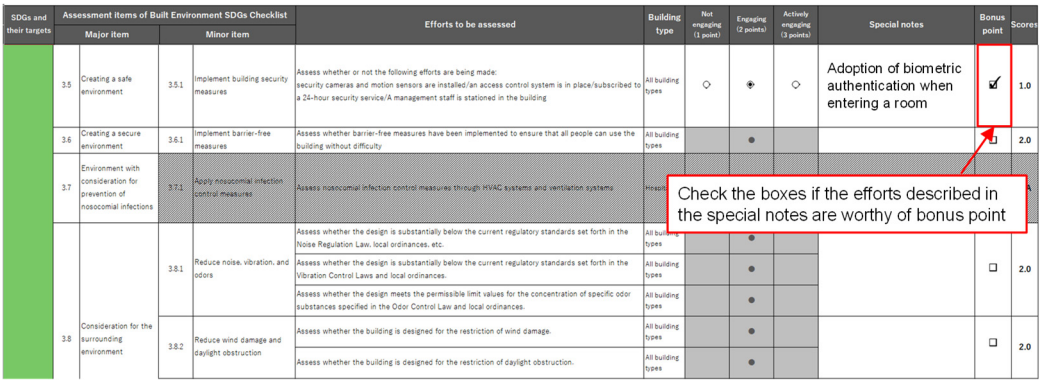

Figure III. 2.7 How to check the boxes for bonus point

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2.6 Assessment items of the Built Environment SDGs Checklist

The scoring will be done according to the following table.

Table III.2.3 Assessment items of the Built Environment SDGs Checklist (Goals 1-3)

SDGs	Assessment items of the Built Environment SDGs Checklist	
	Major item	Minor item
Goal 1. No Poverty	Assessment based on Goal 12: Responsible Consumption and Production, etc.	
Goal 2. Zero Hunger	Assessment based on Goal 12: Responsible Consumption and Production, etc.	
Goal 3. Good Health and Well-Being	3.1 Thermal environment	3.1.1 Ensure a comfortable room temperature
		3.1.2 Improving thermal insulation
		3.1.3 Creating a homogeneous thermal environment
	3.2 Air and sanitation	3.2.1 Use appropriate ventilation measures
		3.2.2 Ensure adequate humidity control
		3.2.3 Take measures to address indoor air quality
		3.2.4 Prevent passive smoking
		3.2.5 Keep sink and basin areas sanitary
	3.3 Lighting and illumination	3.3.1 Use daylight to ensure adequate brightness
		3.3.2 Reduce glare on window surfaces
		3.3.3 Provide adequate lighting
	3.4 Sound environment	3.4.1 Ensure sound insulation and sound absorption performance
	3.5 Creating a safe environment	3.5.1 Implement building security measures
	3.6 Creating a secure environment	3.6.1 Implement barrier-free measures
	3.7 Environment with consideration for prevention of nosocomial infections	3.7.1 Apply nosocomial infection control measures
	3.8 Consideration for the surrounding environment	3.8.1 Reduce noise, vibration, and odors
		3.8.2 Reduce wind damage and sunlight obstruction
		3.8.3 Reducing light pollution
		3.8.4 Reduce thermal effects on surroundings
		3.8.5 Reduce chemical dispersal to surrounding areas

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Table III.2.4 Assessment items of the Built Environment SDGs Checklist (Goals 4-7)

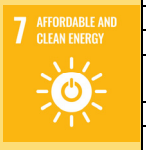
SDGs	Assessment items of the Built Environment SDGs Checklist	
	Major item	Minor item
Goal 4. Quality Education	4.1 Design that allow floor plans, etc. to be changed to meet the needs of residents	4.1.1 Prepare a study space in the home
	4.2 Creating a thermal, air, light, and sound environment suitable for learning	4.2.1 Ensure a comfortable room temperature
		4.2.2 Improving thermal insulation
		4.2.3 Use daylight to ensure adequate brightness
		4.2.4 Use appropriate ventilation measures
		4.2.5 Take measures to address indoor air quality
		4.2.6 Ensure sound insulation and sound absorption performance
	4.3 Creating a learning environment	4.3.1 Arrange learning spaces in schools
		4.3.2 Prepare the necessary facilities for learning
	4.4 Universal design	4.4.1 Create an environment of education for all
Goal 5. Gender Equality	5.1 Spatial margin	5.1.1 Create spatial margins
	5.2 Design that reduce the burden of housework, child-rearing, nursing care, etc.	5.2.1 Reduce the burden of housework, child care, nursing care, etc.
		5.2.2 Implement barrier-free measures
	5.3 Design that accommodate different temperature/cooling sensation evaluations by gender	5.3.1 Control air conditioning according to the individual
	5.4 Designing for LGBT and other groups	5.4.1 Designing with LGBT considerations
Goal 6. Clean Water and Sanitation	6.1 Water saving	6.1.1 Adopt water saving devices
	6.2 Use of rain water and grey water	6.2.1 Use rain water and grey water
	6.3 Rain water infiltration	6.3.1 Work to infiltrate rain water
		6.3.2 Consider for groundwater systems
	6.4 Soil contamination countermeasures	6.4.1 Preventing soil contamination
	6.5 Sewage purification	6.5.1 Properly dispose of sewage
	6.6 Design that keep sink and basin areas sanitary	6.6.1 Keep sink and basin areas sanitary
	6.7 Ensure reliability of water supply and drainage systems	6.7.1 Conduct periodic inspections of water supply and drainage systems
Goal 7. Affordable and Clean Energy 	7.1 Design that contribute to energy conservation	7.1.1 Work to reduce heat load
		7.1.2 Engage in direct natural energy utilization
		7.1.3 Adopt equipment and systems with high energy-saving performance
	7.2 Design that contribute to energy creation	7.2.1 Engage in energy creation
	7.3 Design that contribute to energy storage	7.3.1 Engage in energy storage
	7.4 Linkage with distributed energy systems	7.4.1 Work with distributed energy systems in the community
	7.5 Installation of energy management systems	7.5.1 Managing energy
	7.6 LCP, BCP, and emergency energy	7.6.1 Securing energy in an emergency
	7.7 Efforts toward ZEH and ZEB	7.7.1 Work on ZEH and ZEB conversion
	7.8 Efforts toward LCCM (Life Cycle Carbon Minus), energy consumption and continuous efforts towards GHG emission reduction	7.8.1 Working toward carbon neutrality

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Table III.2.5 Assessment items of the Built Environment SDGs Checklist (Goals 8 and 9)

SDGs	Assessment items of the Built Environment SDGs Checklist	
	Major item	Minor item
Goal 8. Decent Work and Economic Growth	8.1 Design to create an environment that enhances intellectual productivity	8.1.1 Create a place for intellectual productivity
	8.2 Consideration for the health, comfort, and safety of building users	8.2.1 Ensure a comfortable room temperature
		8.2.2 Improving thermal insulation
		8.2.3 Use daylight to ensure adequate brightness
		8.2.4 Use appropriate ventilation measures
		8.2.5 Take measures to address indoor air quality
		8.2.6 Ensure sound insulation and sound absorption performance
	8.3 Measures to reduce the amount of waste generated at each stage of the production and disposal of housing and building	8.3.1 Reduce material usage
		8.3.2 Continued use of building frame, etc.
		8.3.3 Use recycled materials in building frame materials
		8.3.4 Use recycled materials other than building frame materials
		8.3.5 Use timber from sustainable forestry
		8.3.6 Work to enhance the reusability of components and materials
	8.4 Innovations for extending the service life of houses and buildings	8.4.1 Longer use of frame materials
		8.4.2 Use exterior finish materials longer
		8.4.3 Use interior finish materials longer
		8.4.4 Use air conditioning and ventilation ducts longer
		8.4.5 Use air conditioning and plumbing piping longer
		8.4.6 Use major equipment longer
		8.4.7 Design to withstand natural disasters
		8.4.8 Improve fire protection performance
	8.5 Active use of local timber	8.5.1 Engage in the use of local resources
Goal 9. Industry, Innovation and Infra-structure	9.1 Foster momentum for new technology development through active use of state-of-the-art technology and building materials on site	9.1.1 Adopt the latest technology
		9.1.2 Work to make buildings smarter
	9.2 Creating communication, relaxation, refreshment space, etc.	9.2.1 Create space for refreshment
		9.2.2 Create space for communication
	9.3 Access to information and communication technology	9.3.1 Adopt advanced communication technologies
	9.4 Introduction to resilient design	9.4.1 Protecting internal equipment
		9.4.2 Ensure resilience of HVAC system
		9.4.3 Ensure resilience of water supply & drainage and sanitation systems
		9.4.4 Ensure resilience of electrical equipment
		9.4.5 Ensure resilience of support method of machines & ducts
		9.4.6 Ensure resilience of communication wiring
	9.5 Identification of site hazards	9.5.1 Identify site hazards and share information
	9.6 Ensure performance to withstand earthquake, fire, wind, flood, etc.	9.6.1 Adopt the latest technology for disaster prevention

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Table III.2.6 Assessment items of the Built Environment SDGs Checklist (Goals 10 and 11)

SDGs	Assessment items of the Built Environment SDGs Checklist	
	Major item	Minor item
Goal 10. Reduced Inequalities	Assessment based on Goal 5: Gender Equality, etc.	
Goal 11. Sustainable Cities and Communities	11.1 Low cost through rational design and construction while ensuring environmental performance	11.1.1 Ensure basic environmental performance of the building
		11.1.2 Reduce running costs while ensuring basic environmental performance
	11.2 Prevention of traffic accidents, coordination with public transportation	11.2.1 Reduce traffic and accidents due to automobile use
	11.3 Public Involvement	11.3.1 Encourage community participation
	11.4 Reduction of environmental load on the surrounding environment	11.4.1 Contribute to the prevention of air pollution
		11.4.2 Properly dispose of sewage
		11.4.3 Control rain water runoff
		11.4.4 Preventing soil contamination
	11.5 Introduction to resilient design	11.5.1 Protecting internal equipment
		11.5.2 Ensure resilience of HVAC system
		11.5.3 Ensure resilience of water supply & drainage and sanitation systems
		11.5.4 Ensure resilience of electrical equipment
		11.5.5 Ensure resilience of support method of machines & ducts
		11.5.6 Ensure resilience of communication wiring
	11.6 Identification of site hazards	11.6.1 Identify site hazards and share information
	11.7 Site security measures	11.7.1 Provide security measures for the site and outbuildings
	11.8 Townscape and landscape-friendly architectural planning	11.8.1 Create a favorable townscape and landscape
	11.9 Consideration for biodiversity, planning of exterior structures with consideration for ecosystem preservation	11.9.1 Protecting the biological environment
	11.10 Consideration for the surrounding environment	11.10.1 Reduce noise, vibration, and odors
		11.10.2 Reduce wind damage and sunlight obstruction
		11.10.3 Reducing light pollution
		11.10.4 Reduce thermal effects on surroundings
		11.10.5 Reduce chemical dispersal to surrounding areas
	11.11 Creating communication space	11.11.1 Provide space and facility functions
	11.12 Architectural planning linked to smart urbanization	11.12.1 Work to make buildings smarter
	11.13 Active use of local timber	11.13.1 Engage in the use of local resources
	11.14 Assessment and certification of environmental performance of houses and buildings	11.14.1 Utilize labeling and certification of built environment
	11.15 Inheritance of local characteristics	11.15.1 Inheriting history

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Table III.2.7 Assessment items of the Built Environment SDGs Checklist (Goal 12)

SDGs	Assessment items of the Built Environment SDGs Checklist	
	Major item	Minor item
Goal 12. Responsible Consumption and Production	12.1 Performance and initiatives that contribute to the longevity of housing and buildings	12.1.1 Longer use of frame materials
		12.1.2 Use exterior finish materials longer
		12.1.3 Use interior finish materials longer
		12.1.4 Use air conditioning and ventilation ducts longer
		12.1.5 Use air conditioning and plumbing piping longer
		12.1.6 Use major equipment longer
		12.1.7 Design to withstand natural disasters
		12.1.8 Improve fire protection performance
	12.2 Sustainable use of resources	12.2.1 Procuring timber from sustainable forestry
		12.2.2 Engage in the use of local resources
	12.3 Periodic Inspection	12.3.1 Maintain HVAC piping
		12.3.2 Maintain water supply and drainage pipes
		12.3.3 Maintain electrical wiring
		12.3.4 Maintain communication wiring
		12.3.5 Maintain equipment and facilities
		12.3.6 Allocate backup space
	12.4 Reduction of waste during production and disposal	12.4.1 Properly control materials
		12.4.2 Reduce material usage
		12.4.3 Continued use of building frame, etc.
		12.4.4 Use recycled materials in building frame materials
		12.4.5 Use recycled materials other than building frame materials
		12.4.6 Work to enhance the reusability of components and materials
	12.5 Operational GHG emissions reduction, water use reduction, monitoring, energy management	12.5.1 Adopt water saving devices
		12.5.2 Control air quality
		12.5.3 Reduce waste generation
		12.5.4 Managing energy
	12.6 Reduce use of materials with harmful substances	12.6.1 Properly dispose of sewage
		12.6.2 Contribute to the prevention of air pollution
		12.6.3 Preventing soil contamination
		12.6.4 Reduce chemical dispersal to surrounding areas
	12.7 Reduce GHG emissions during construction, operation, and disposal	12.7.1 Working toward carbon neutrality
	12.8 Supply chain conscious procurement	12.8.1 Procuring construction materials that take into account economic, social, and environmental considerations in the production and distribution process

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Table III.2.8 Assessment items of the Built Environment SDGs Checklist (Goals 13-15)

SDGs	Assessment items of the Built Environment SDGs Checklist	
	Major item	Minor item
Goal 13. Climate Action	13.1 Reduction of building WLC	13.1.1 Working toward carbon neutrality
	13.2 Reducing heat gain in urban spaces	13.2.1 Reduce thermal effects on surroundings
	13.3 Reducing the impact of extreme weather on building	13.3.1 Take measures against typhoons and flying debris, floods, and landslides
		13.3.2 Identify site hazards and share information
	13.4 Reducing the Impact of climate change on building users	13.4.1 Ensure a comfortable room temperature
		13.4.2 Improving thermal insulation
		13.4.3 Creating a homogeneous thermal environment
	13.5 Introduction to resilient design	13.5.1 Protecting internal equipment
		13.5.2 Ensure resilience of HVAC system
		13.5.3 Ensure resilience of water supply & drainage and sanitation systems
		13.5.4 Ensure resilience of electrical equipment
		13.5.5 Ensure resilience of support method of machines & ducts
		13.5.6 Ensure resilience of communication wiring
Goal 14. Life Below Water	Assessment based on Goal 12: Responsible Consumption and Production, etc.	
Goal 15. Life on Land	15.1 Consideration for greening of exterior, rooftop, and wall surfaces, and biodiversity conservation	15.1.1 Conservation of the biological environment
	15.2 Soil contamination countermeasures	15.2.1 Preventing soil contamination
	15.3 Sustainable use of resources	15.3.1 Procuring timber from sustainable forestry
		15.3.2 Engage in the use of local resources
	15.4 Reuse of wood generated during disposal	15.4.1 Reusing old materials

Table III.2.9 Assessment items of the Built Environment SDGs Checklist (Goals 16 and 17)

SDGs	Assessment items of the Built Environment SDGs Checklist	
	Major item	Minor item
Goal 16. Peace, Justice and Strong Institutions	Assessment based on Goal 12: Responsible Consumption and Production, etc.	
Goal 17. Partnerships for the Goals	17.1 Consideration for suppliers when procuring materials	17.1.1 Procuring timber from sustainable forestry
		17.1.2 Engage in the use of local resources
	17.2 Building plans that facilitate communication	17.2.1 Create a favorable townscape and landscape
		17.2.2 Encourage community participation
	17.3 Supply chain management, creating shared value	17.3.1 Work with stakeholders to improve economic, social, and environmental conditions in production and distribution processes
	17.4 Introduction of after-sales service system	17.4.1 Provide after-sales service
	17.5 ICT environment that facilitates communication	17.5.1 Provide ICT environment

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3. Assessment Criteria of Built Environment SDGs Checklist

- Note; There are two main types of scoring items included in the Built Environment SDGs Checklist. The first is unique to the Built Environment SDGs, scored according to the assessment criteria set for each item. The second is automatically scored using the CASBEE assessment results.
- In any case, if efforts are being carried out that is closely related to the content of the relevant item, it can be added as a special note only if it is not exemplified in the efforts to be assessed shown in the scoring criteria in each assessment item.
- However, the maximum number of points that can be added is one point, and the number of points for an assessment item cannot exceed three points in total.

Legend

Type of assessment item	
Built Environment SDGs items	SDGs original
CASBEE Assessment items	CASBEE incorporated

Example 1)

3.5.1 Implement building security measures SDGs original

This is an assessment item unique to the Built Environment SDGs in the above case and indicates that all building types are subject to assessment.

Example 2)

3.7.1 Apply nosocomial infection control measures SDGs original

! Application condition Evaluate Hsp only

This is an assessment item unique to the Built Environment SDGs in the above case and indicates that the building type to be assessed is a hospital.

Example 3)

3.1.1 Ensure a comfortable room temperature CASBEE incorporated

This is an assessment item supported by the CASBEE assessment, and indicates that the building type to be assessed follows the CASBEE criteria quoted in the each “assessment criteria” as the reference. The score is determined by the result of the quoted CASBEE assessment item.

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Goal 1: No Poverty

Efforts to achieve Goal 1 will be collectively assessed under Goal 12 Responsible Consumption and Production, etc.

Goal 2: Zero Hunger

Efforts to achieve Goal 2 will be collectively assessed under Goal 12 Responsible Consumption and Production, etc.

Goal 3: Good Health and Well-Being

3.1 Thermal environment

3.1.1 Ensure a comfortable room temperature — CASBEE incorporated

Evaluate efforts to ensure a comfortable room temperature are assessed.

Efforts to be assessed
- The air conditioning system is designed to provide a comfortable room temperature even during peak load periods.

Assessment criteria
- The result of Q1.2.1.1 "Room temperature" of CASBEE-BD/NC is referred for scoring.

3.1.2 Improving thermal insulation — CASBEE incorporated

Evaluate efforts to control heat outflow from the indoor environment in winter and heat inflow into the indoor environment in summer in order to improve the indoor thermal environment.

Efforts to be assessed
- Efforts are being made to reduce heat gain or loss from the outside of the building.

Assessment criteria
- The result of Q1.2.1.2 "Perimeter performance" of CASBEE-BD/NC is referred for scoring.

3.1.3 Creating a homogeneous thermal environment — CASBEE incorporated

Evaluate efforts to create a homogeneous indoor thermal environment.

Efforts to be assessed
(i) Detailed zoning air conditioning is used to eliminate uneven temperatures in the indoor environment and create a comfortable environment.
(ii) A type of air conditioning system is used to reduce the vertical temperature difference and airflow velocity (residual air velocity) in the occupied area.

Assessment criteria
- Scores will be calculated by averaging the scores from (i) and (ii) of the efforts to be assessed.
- The results of Q1.2.1.3 "Zoned control" and Q1.2.3 "Type of air conditioning system" of CASBEE-BD/NC for (i) and (ii), respectively, are referred for scoring.

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3.2 Air and sanitation

3.2.1 Use appropriate ventilation measures — CASBEE incorporated

Evaluate efforts regarding ventilation plans that contribute to improved air quality.

Efforts to be assessed
- Efforts are being made to exceed ventilation levels required by the building code, the built environment sanitation code, and school environmental sanitation standards to improve air quality.

Assessment criteria
- The result of Q1.4.2 "Ventilation" of CASBEE-BD/NC is referred for scoring.

3.2.2 Ensure adequate humidity control — CASBEE incorporated

Evaluate efforts regarding dehumidification for comfort in summer and humidification for health in winter.

Efforts to be assessed
- The system is designed to allow humidification and dehumidification for comfort and health reasons.

Assessment criteria
- The result of Q1.2.2 "Humidity control" of CASBEE-BD/NC is referred for scoring.

3.2.3 Take measures to address indoor air quality — CASBEE incorporated

Evaluate efforts to avoid air quality pollution by chemical pollutants by taking indoor air quality and hygiene into consideration.

Efforts to be assessed
- Adequate measures are taken to avoid air quality pollution by chemical pollutants.

Assessment criteria
- The result of Q1.4.1.1 "Chemical pollutant " of CASBEE-BD/NC is referred for scoring.

3.2.4 Prevent passive smoking — CASBEE incorporated

Assess architectural innovations that take non-smokers into consideration.

Efforts to be assessed
- Measures are taken to prevent non-smokers from being exposed to smoke, such as non-smoking or installation of smoking booths.

Assessment criteria
- The result of Q1.4.3.2 "Control of smoking" of CASBEE-BD/NC is referred for scoring.

3.2.5 Keep sink and basin areas sanitary — CASBEE incorporated

Evaluate efforts for maintaining sanitation of the water supply.

Efforts to be assessed
- The rooms are easy to clean, including the water areas, and are made of stain-resistant materials, etc. Maintenance is taken into consideration.

Assessment criteria
- The result of Q2.1.3.2 "Securing maintenance functions" of CASBEE-BD/NC is referred for scoring.

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3.3 Lighting and illumination

3.3.1 Use daylight to ensure adequate brightness — CASBEE incorporated

Evaluate efforts to ensure indoor brightness by utilizing daylight instead of relying on lighting fixtures.

Efforts to be assessed
- The building is equipped with daylight devices as well as windows on the exterior walls of the building.

Assessment criteria
- The result of Q1.3.1.3 "Daylight devices" of CASBEE-BD/NC is referred for scoring.

3.3.2 Reduce glare on window surfaces — CASBEE incorporated

Evaluate efforts to reduce glare on window surfaces exposed to direct daylight.

Efforts to be assessed
- Efforts are being made for anti-glare measures on window surfaces (e.g., blinds, curtains, eaves, etc.).

Assessment criteria
- The result of Q1.3.2.1 "Daylight control" of CASBEE-BD/NC is referred for scoring.

3.3.3 Provide adequate lighting — CASBEE incorporated

Evaluate efforts to appropriate control of room brightness, color temperature, and lighting location.

Efforts to be assessed
- Lighting control in the subject space is assessed, such as detailed lighting control and automatic control.

Assessment criteria
- The result of Q1.3.4 "Lighting control" of CASBEE-BD/NC is referred for scoring.

3.4 Sound environment

3.4.1 Ensure sound insulation and sound absorption performance — CASBEE incorporated

Evaluate efforts to ensure quietness in the room.

Efforts to be assessed
- Efforts are being made to use building materials with high sound insulation and sound absorption performance for window sashes, walls, and floors as a means of ensuring quietness within the space.

Assessment criteria
- The result of Q1.1 "Sound environment" of CASBEE-BD/NC is referred for scoring.

3.5 Creating a safe environment

3.5.1 Implement building security measures — SDGs original

Assess security measures to improve building safety.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

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Efforts to be assessed
1) Security cameras and motion sensors are installed.
2) An access control system is in place.
3) Subscribed to a 24-hour security service.
4) A security staff is stationed in the building.

Explanation
- Measures to improve the security performance of the site/exterior are assessed in Section 11.7.1, "Provide security measures for the site/exterior.

3.6 Creating a secure environment

3.6.1 Implement barrier-free measures — CASBEE incorporated

Assess whether barrier-free measures have been implemented to ensure that all people can use the building without difficulty.

Efforts to be assessed
- The building is designed to allow all people to use the building without any inconvenience, while meeting the standards for facilitating the movement of people in the building.

Assessment criteria
- The result of Q2.1.1.3 "Barrier-free planning" of CASBEE-BD/NC is referred for scoring

3.7 Environment with consideration for prevention of nosocomial infections

3.7.1 Apply nosocomial infection control measures — SDGs original

! Application condition Evaluate Hsp only

Assess nosocomial infection control measures through HVAC systems and ventilation systems.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	Applicable items among the efforts to be assessed	three points

Efforts to be assessed
Each room is planned to meet the ventilation requirements (room pressure, ventilation frequency, and final filter efficiency) corresponding to the cleanliness class of the "Guideline for Design and Management of Hospital HVAC systems HEAS-02-2013" of the Japan Association of Healthcare Equipment and Services.

Explanation
- Hospitals are subject to assessment.
- If each room is planned to meet the ventilation conditions (room pressure, ventilation frequency, and final filter efficiency) corresponding to the cleanliness class of the "Guidelines for the Design and Management of Hospital HVAC Systems HEAS-02-2013" of the Japan Healthcare Equipment Association, the room is considered "actively engaged".

3.8 Consideration for the surrounding environment

3.8.1 Reduce noise, vibration, and odors — CASBEE incorporated

Efforts to reduce the impact of noise, vibration, and odor on the neighborhood will be assessed.

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Efforts to be assessed
(i) The device is significantly lower than the current regulatory standards stipulated in the Noise Regulation Law or the Large-Scale Retail Stores Location Law, local ordinances, etc.
(ii) The device is significantly lower than the current regulatory standards set forth in the Vibration Regulation Law and local ordinances.
(iii) Devices that meet the permissible limit values for the concentration of specific odor substances specified in the Odor Control Law, local ordinances, etc.
Assessment criteria
- Scores will be calculated by averaging the scores from (i) through (iii) for the efforts to be assessed.
- The results of LR3.3.1.1 "Noise" of CASBEE-BD/NC for (i), for (ii), LR3.3.1.2 "Vibration" of CASBEE-BD/NC, and for (iii), LR3.3.1.3 "Odor" of CASBEE-BD/NC are referred for scoring.

3.8.2 Reduce wind damage and sunlight obstruction CASBEE incorporated

Efforts to reduce the impact of wind damage and sunlight obstruction on the neighborhood will be assessed.

Efforts to be assessed
(i) Restrictions of wind damage.
(ii) Restriction of sunlight obstruction.
Assessment criteria
- Scores will be calculated by averaging the scores from (i) and (ii) of the efforts to be assessed.
- The results of LR3.3.2.1 "Restriction of wind damage" of CASBEE-BD/NC for (i) and LR3.3.2.3 "Restriction of sunlight obstruction" for (ii) are referred for scoring.

3.8.3 Reduce light pollution CASBEE incorporated

Evaluate efforts to reduce the impact of nighttime lighting and glare from buildings in order to maintain a positive local environment.

Efforts to be assessed
- Efforts are being made on anti-glare measures against outdoor lighting and indoor lighting that leaks light outside.

Assessment criteria
- The result of LR3.3.3 "Light Pollution” of CASBEE-BD/NC is referred for scoring.

3.8.4 Reduce thermal effects on surroundings CASBEE incorporated

Efforts to reduce the deterioration of the local thermal environment, such as the heat island effect, will be assessed.

Efforts to be assessed
- Efforts are being made to contribute to the reduction of off-site heat load, such as measures to reduce the heat island effect.

Assessment criteria
- The result of LR3.2.2 "Heat Island Effect" of CASBEE-BD/NC is referred for scoring.

3.8.5 Reduce chemical dispersal to surrounding areas CASBEE incorporated

Evaluate efforts to reduce the use of chemical pollutants that may adversely affect the surrounding environment.

Efforts to be assessed
- Efforts are being made to reduce the use of chemical substances that may have an impact on the environment.

Assessment criteria
- The result of LR2.3.1 "Use of materials without harmful substances” of CASBEE-BD/NC is referred for scoring.

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Goal 4: Quality Education

4.1 Design that allow floor plans, etc. to be changed to meet the needs of residents

4.1.1 Prepare a study space in the home SDGs original

! Application condition Evaluate Apt only

Assess the ingenuity of study spaces in the units and in common areas.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

Efforts to be assessed
1) In apartments, there is a separate study space.
2) In apartments, study spaces/study corners are located in common spaces.
3) In apartments, there is an ingenious study space that can be used in accordance with the changing stages of the family.
4) There is a study space/study corner in the common area of the apartments.

Explanation
- Apartments are subject to assessment.
- The assessment will be based on whether there is a room that can be used as a study space when necessary, or whether a part of the room can be easily changed to create a study space. The requirements for a study space are that it has a desk (worktop), lighting, power supply, and communication environment.

4.2 Creating a thermal, air, light, and sound environment suitable for learning

4.2.1 Ensure a comfortable room temperature CASBEE incorporated

Efforts to ensure a comfortable room temperature are assessed.

Efforts to be assessed
- The air conditioning system is designed to provide a comfortable room temperature even during peak load periods.

Assessment criteria
- The result of Q1.2.1.1 "Room temperature" of CASBEE-BD/NC is referred for scoring.

4.2.2 Improving thermal insulation CASBEE incorporated

Evaluate efforts to control heat outflow from the indoor environment in winter and heat inflow into the indoor environment in winter in order to improve the indoor thermal environment.

Efforts to be assessed
- Efforts are being made to reduce heat gain or loss from the outside of the building.

Assessment criteria
- The result of Q1.2.1.2 "Perimeter performance" of CASBEE-BD/NC is referred for scoring.

4.2.3 Use daylight to ensure adequate brightness CASBEE incorporated

Evaluate efforts to ensure indoor brightness by utilizing daylight instead of relying on lighting fixtures.

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Efforts to be assessed
- The building is equipped with daylight devices as well as windows on the exterior walls of the building.

Assessment criteria
- The result of Q1.3.1.3 "Daylight devices" of CASBEE-BD/NC is referred for scoring.

4.2.4 Use appropriate ventilation measures CASBEE incorporated

Evaluate efforts regarding ventilation plans to improve air quality.

Efforts to be assessed
- Efforts are being made to exceed ventilation levels required by the building code, the built environment sanitation code, and school environmental sanitation standards to improve air quality.

Assessment criteria
- The result of Q1.4.2 "Ventilation" of CASBEE-BD/NC is referred for scoring.

4.2.5 Take measures to address indoor air quality CASBEE incorporated

Evaluate efforts to avoid air quality pollution by chemical pollutants by taking indoor air quality and hygiene into consideration.

Efforts to be assessed
- Adequate measures are taken to avoid air quality pollution by chemical pollutants.

Assessment criteria
- The result of Q1.4.1.1 "Chemical pollutant contents" of CASBEE-BD/NC is referred for scoring.

4.2.6 Ensure sound insulation and sound absorption performance CASBEE incorporated

Evaluate efforts to ensure quietness in the room.

Efforts to be assessed
- Efforts are being made to use building materials with high sound insulation and sound absorption performance for window sashes, walls, and floors as a means of ensuring quietness within the space.

Assessment criteria
- The result of Q1.1 "Sound environment" of CASBEE-BD/NC is referred for scoring

4.3 Creating a learning environment

4.3.1 Arrange learning spaces in schools SDGs original

! Application condition Evaluate Sch only

Assess the ingenuity of learning spaces in schools.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Establishment of study rooms
2) Secure space for active learning

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Explanation
- The establishment of study rooms that students can freely use and spaces for active learning that take active learning into consideration are highly assessed.

4.3.2 Prepare the necessary facilities for learning SDGs original

! Application condition Evaluate Sch only

Evaluate efforts regarding the development of the learning environment.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable.	two points
Actively engaging	Two or more of the efforts to be assessed are applicable.	three points

Efforts to be assessed
1) Meet the standards (minimum level) for facilitating mobility in buildings under the new Barrier-Free Japan Act. (Q2.1.1.3 Level 4 or higher)
2) An environment in which students can use ICT one by one according to class development has been established through the provision of movable computers, etc. and wireless LAN. (Reference 4.1)
3) Built environment and facilities that contribute to environmental education (new energy, energy conservation, natural energy utilization, wood utilization, resource recycling, etc.) are in place. (Reference 4.2)
4) Other than 3), buildings and facilities conducive to SDG education are in place.

Explanation
- Evaluate efforts for buildings and facilities that can provide quality education in schools.

(Bibliography 4.1) Japan Association of Educational Technology (JAET): Checklist for informatization of schools
(Bibliography 4.2) Ministry of Education, Culture, Sports, Sports, Science and Technology (MEXT), Ministry of Agriculture, Forestry and Technology (MAF), Ministry of Land, Infrastructure, Transport and Tourism, and Ministry of the Environment (MLIT): Eco-schools Promoting environmentally friendly school facilities

4.4 Universal design

4.4.1 Create an environment of education for all SDGs original

! Application condition Evaluate Sch only

Assess whether consideration is being given to ensure access to education for all.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Compliance with the minimum level of the New Barrier-Free Building Act (Level 4 or higher in Q2.1.1.3 of CASBEE-BD/NC)
2) Installation of LGBT-friendly restrooms

Explanation
- Schools will be assessed for its various facilities to ensure that all students can receive an equal education.

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Goal 5: Gender Equality

5.1 Spatial margin

5.1.1 Create spatial margins — CASBEE incorporated

Assess whether spatial margins are planned to allow all people to use the building without inconvenience.

Efforts to be assessed
- The building has a degree of freedom in terms of floor height and space shape, taking into consideration the possibility of future changes in use.

Assessment criteria
- The result of Q2.3.1 "Spatial margin" of CASBEE-BD/NC is referred for scoring.

5.2 Design that reduce the burden of housework, child-rearing, nursing care, etc.

5.2.1 Reduce the burden of housework, child care, nursing care, etc. — SDGs original

! Application condition Evaluate Apt only

Design innovations that reduce the burden of housework, childcare, nursing care, etc. will be assessed.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

Efforts to be assessed
1) The design is designed to reduce the burden of housework.
2) The design is designed to reduce the burden of childcare.
3) The design is designed to reduce the burden of care.

Explanation
- Designs that reduce the burden of housework include spaces in kitchens, etc. that facilitate housework by more than one person, as well as devices related to flow lines.
- Design that reduces the burden of child-rearing refers to the use of fixtures and fittings that take into consideration accidents and injuries of infants and toddlers, as well as spaces where infants can easily be seen.
- Design that reduces the burden of caregiving refers to the reduction of the burden associated with moving around during caregiving and the provision of space for caregivers to assist.

5.2.2 Implement barrier-free measures — CASBEE incorporated

Assess whether barrier-free measures have been taken to ensure that all people can use the building without difficulty.

Efforts to be assessed
- The building is designed to allow all people to use the building without any inconvenience, in compliance with the standards for facilitating building movement.

Assessment criteria
- The result of Q2.1.1.3 "Barrier-free planning" of CASBEE-BD/NC is referred for scoring

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5.3 Design that accommodate different temperature/cooling sensation evaluations by gender

5.3.1 Control air conditioning according to the individual SDGs original

! Application condition Evaluate Off only

Assess the installation of air conditioning equipment, etc. to accommodate gender and individual differences in temperature and cooling sensation.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	Applicable items among the efforts to be assessed	three points

Efforts to be assessed
Installation of personal air conditioning or other equipment that enables individual adjustment of temperature and cooling

Explanation

- Assess whether or not air conditioning equipment is installed to accommodate gender and individual differences in temperature/cooling sensation.

5.4 Designing for LGBT and other groups

5.4.1 Designing with LGBT considerations SDGs original

Assess design innovations that are LGBT-friendly.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	Applicable items among the efforts to be assessed	three points

Efforts to be assessed
1) Installation of LGBT-friendly restrooms
2) Other LGBT-friendly design innovations

Explanation

- The design of the building will be assessed in consideration of LGBT and other groups.

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Goal 6: Clean Water and Sanitation

6.1 Water saving

6.1.1 Adopt water saving devices — CASBEE incorporated

Assess water saving measures that reduce water consumption in order to protect water resources.

Efforts to be assessed
- Water saving systems are being introduced.

Assessment criteria
- The result of LR2.1.1 "Water Saving" of CASBEE-BD/NC is referred for scoring.

6.2 Use of rain water and grey water

6.2.1 Use of rain water and grey water — CASBEE incorporated

In order to conserve water resources, evaluate efforts for rain water and grey water use that contribute to reducing water consumption.

Efforts to be assessed
- Efforts are being made to use rain water and grey water.

Assessment criteria
- The result of LR2.1.2 "Rainwater & grey water use" of CASBEE-BD/NC is referred for scoring.

6.3 Rain water infiltration

6.3.1 Work to infiltrate rain water — CASBEE incorporated

Efforts to infiltrate rain water into the site in order to preserve the local water cycle will be assessed.

Efforts to be assessed
- Measures are implemented to prevent rain water from infiltrating into the ground.

Assessment criteria
- The result of LR3.2.3.1 "Reduction of rain water discharge loads" of CASBEE-BD/NC is referred for scoring.

6.3.2 Consider for groundwater systems — SDGs original

Efforts to reduce impacts to groundwater systems in order to preserve the local water cycle and protect water resources will be assessed.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Devices to reduce obstruction to groundwater flow
2) Active on-site greening

Explanation
- Efforts to reduce the impact of building construction on groundwater systems will be assessed.

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6.4 Soil contamination countermeasures

6.4.1 Preventing soil contamination — SDGs original

Efforts to control soil contamination are assessed.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Conduct soil contamination survey
2) Excavation and removal of contaminated soil

Explanation
- Efforts for investigation and excavation removal to control soil contamination will be assessed.

6.5 Sewage purification

6.5.1 Properly dispose of sewage — CASBEE incorporated

Evaluate efforts in order to reduce the local environmental load of sewage treatment and to prevent pollution of the surrounding environment due to unintended discharges, such as during heavy rains, will be assessed.

Efforts to be assessed
- Efforts are being made to devise a method that is significantly lower than the emission standards set by the Water Pollution Control Law, the Sewerage Law, and regional public organizations.

Assessment criteria
- The result of LR3.2.3.2 "Sewage load suppression” of CASBEE-BD/NC is referred for scoring.

6.6 Design that keep sink and basin areas sanitary

6.6.1 Keep sink and basin areas sanitary — CASBEE incorporated

Evaluate efforts for maintaining sanitation of the water supply.

Efforts to be assessed
- The rooms are easy to clean, including the water areas, and are made of stain-resistant materials, etc. Maintenance is taken into consideration.

Assessment criteria
- The result of Q2.1.3.2 "Securing maintenance functions” of CASBEE-BD/NC is referred for scoring.

6.7 Ensure reliability of water supply and drainage systems

6.7.1 Conduct periodic inspections of water supply and drainage systems — CASBEE incorporated

Efforts to improve the reliability of water supply & drainage and sanitation facilities from the perspective of effective use of water supply in times of disaster will be assessed.

Efforts to be assessed
- Efforts are being made to improve the reliability of water supply & drainage and sanitation facilities.

Assessment criteria
- The result of Q2.2.4.2 "Water supply & drainage of CASBEE-BD/NC is referred for scoring.

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Goal 7: Affordable and Clean Energy

7.1 Design that contribute to energy conservation

7.1.1 Work to reduce heat load — CASBEE incorporated

Efforts to control of heat load on the outer surface of buildings, such as insulation and improved solar shielding performance, will be assessed.

Efforts to be assessed
- The company is taking measures to reduce heat load, which contributes to the reduction of energy used for heating and cooling.

Assessment criteria
- The result of LR1.1 "Control of heat load on the building envelopes" of CASBEE-BD/NC is referred for scoring.

7.1.2 Engage in direct natural energy utilization — CASBEE incorporated

Evaluate efforts for direct natural energy utilization such as daylight utilization, natural ventilation, natural ventilation, etc., without using mechanical power.

Efforts to be assessed
- Efforts are being made to install equipment and systems that enable direct natural energy utilization and other design innovations.

Assessment criteria
- The result of LR1.2 "Natural Energy Utilization (Direct Use)" of CASBEE-BD/NC is referred for scoring

7.1.3 Adopt equipment and systems with high energy-saving performance — CASBEE incorporated

Evaluate efforts for efficiency in building service system and equipment, such as high-efficiency air conditioners and lighting fixtures, utilization of unused energy, etc.

Efforts to be assessed
- Efforts are being made to install equipment and systems that can significantly reduce energy consumption.

Assessment criteria
- The result of LR1.3 "Efficiency in building service system" of CASBEE-BD/NC is referred for scoring.

7.2 Design that contribute to energy creation

7.2.1 Engage in energy creation — SDGs original

Assess various approaches to energy creation (including unused heat utilization).

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

Efforts to be assessed
1) Solar heat utilization (hot water utilization), etc.
2) Solar power use (electricity use), etc.
3) Unused heat utilization (geothermal heat utilization/well water utilization/river water utilization heat

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pumps), etc.
4) Others (biomass, other renewable energy on-site)
5) Off-site renewable energy (award only renewables evaluated in LR1.3 "Efficiency in building service system")

Explanation
- Evaluate efforts for "energy creation," which is indispensable for the realization of ZEB. If multiple mechanisms to create energy without emitting carbon dioxide (including the use of unused heat) that are integrated with buildings are introduced, they will be highly assessed.

7.3 Design that contribute to energy storage

7.3.1 Engage in energy storage — CASBEE incorporated

Evaluate efforts for energy storage and thermal storage systems that are useful for effective utilization of energy generated by PV, etc. and for demand response on the demand side through peak shift and peak shaving. Assess various approaches to livestock energy.

Efforts to be assessed
- Equipment and systems related to energy storage that promote the use of renewable energy have been introduced.

Assessment criteria
- The result of LR1.4.3 "Expanding adoption of non-fossil energy" of CASBEE-BD/NC is referred for scoring.

7.4 Linkage with distributed energy systems

7.4.1 Work with distributed energy systems in the community — SDGs original

Assess the degree of energy efficiency and decarbonization and BCP/BCD compliance at the building group or area scale in conjunction with distributed energy systems.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

Efforts to be assessed
1) Existence or non-existence of initiatives for area use (building groups/supply-demand linkage)
2) Provision of emergency power supply to the community (BCP compliance is also subject to assessment)
3) Introduction of CEMS
4) Active use of renewable energy/unused heat

Explanation
- Evaluate efforts for energy conservation and decarbonization at the building or area scale through the introduction of distributed energy systems. In addition, efforts to be assessed will include BCP/BCD measures through area-scale energy supply in case of emergency, use of ICT technology, use of unused heat, and linkage with renewable energy.

7.5 Installation of energy management systems

7.5.1 Managing energy — CASBEE incorporated

Evaluate efforts regarding the establishment and utilization of continuous measurement and metering systems that contribute to efficient energy use during the operational phase of the building.

Efforts to be assessed
- Monitoring is implemented and HEMS or BEMS for efficient operation of energy is installed.

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Assessment criteria
- The result of LR1.4.1 “Monitoring” and LR1.4.2 ”Operation & Management System" of CASBEE-BD/NC is referred for scoring.

7.6 LCP, BCP, and emergency energy

7.6.1 Securing energy in an emergency — CASBEE incorporated

Evaluate efforts to maintain the functionality of electrical equipment during disasters, etc.

Efforts to be assessed
- Efforts are being made to secure power supply in case of emergency, such as power failure. (e.g., Facility equipped with emergency power generation equipment and uninterruptible power supply equipment, or facility avoiding installation in underground spaces)

Assessment criteria
- The result of Q2.2.4.3 "Electrical equipment” of CASBEE-BD/NC is referred for scoring.

7.7 Efforts toward ZEH and ZEB

7.7.1 Work on ZEH and ZEB conversion — SDGs original

Efforts to convert to ZEH and ZEB for the purpose of preventing global warming will be assessed.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
ZEH Ready, ZEB Ready or higher

Explanation
- Evaluate efforts for ZEH and ZEB.

7.8 Efforts toward LCCM (Life Cycle Carbon Minus), energy consumption and continuous efforts towards GHG emission reduction

7.8.1 Working toward carbon neutrality — CASBEE incorporated

Efforts to reduce the WLC of buildings to prevent global warming are assessed.

Efforts to be assessed
- Efforts are being made to reduce the WLC of buildings.

Assessment criteria
- The result of LR3.1 "Consideration of global warming" of CASBEE-BD/NC is referred for scoring.

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Goal 8: Decent Work and Economic Growth

8.1 Design to create an environment that enhances intellectual productivity

8.1.1 Create a place for intellectual productivity — SDGs original

! Application condition Evaluate Off only

Evaluate efforts to enhance intellectual productivity in the office.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

Efforts to be assessed
1) Availability of spaces that are easy to concentrate, planned and maintained with a view to enhancing intellectual productivity
2) Availability of informal communication spaces that are planned and maintained with a view to enhancing intellectual productivity.
3) Availability of spaces for refreshment and relaxation planned and maintained with a view to enhancing intellectual productivity.

Explanation
- Offices shall be assessed.
- Evaluate efforts including those in common areas of the building.
- The above plans and improvements are assessed from the viewpoint of increasing intellectual productivity.

8.2 Consideration for the health, comfort, and safety of building users

8.2.1 Ensure a comfortable room temperature — CASBEE incorporated

Efforts to ensure a comfortable room temperature are assessed.

Efforts to be assessed
- The air conditioning system is designed to provide a comfortable room temperature even during peak load periods.

Assessment criteria
- The result of Q1.2.1.1 "Room temperature" of CASBEE-BD/NC is referred for scoring.

8.2.2 Improving thermal insulation — CASBEE incorporated

Evaluate efforts to control heat outflow from the indoor environment in winter and heat inflow into the indoor environment in winter in order to improve the indoor thermal environment.

Efforts to be assessed
- Efforts are being made to reduce heat gain or loss from the outside of the building.

Assessment criteria
- The result of Q1.2.1.2 "Perimeter performance" of CASBEE-BD/NC is referred for scoring

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8.2.3 Use daylight to ensure adequate brightness CASBEE incorporated

Evaluate efforts to ensure indoor brightness by utilizing daylight instead of relying on lighting fixtures.

Efforts to be assessed
- The building is equipped with daylight devices as well as windows on the exterior walls of the building.

Assessment criteria
- The result of Q1.3.1.3 "Daylight devices" of CASBEE-BD/NC is referred for scoring.

8.2.4 Use appropriate ventilation measures CASBEE incorporated

Evaluate efforts regarding ventilation plans that contribute to improved air quality.

Efforts to be assessed
- Efforts are being made to exceed ventilation levels required by the building code, the built environment sanitation code, and school environmental sanitation standards to improve air quality.

Assessment criteria
- The result of Q1.4.2 "Ventilation" of CASBEE-BD/NC is referred for scoring.

8.2.5 Take measures to address indoor air quality CASBEE incorporated

Evaluate efforts to avoid air quality pollution by chemical pollutants by taking indoor air quality and hygiene into consideration.

Efforts to be assessed
- Adequate measures are taken to avoid air quality pollution by chemical pollutants.

Assessment criteria
- The result of Q1.4.1.1 "Chemical pollutant contents" of CASBEE-BD/NC is referred for scoring.

8.2.6 Ensure sound insulation and sound absorption performance CASBEE incorporated

Evaluate efforts to ensure quietness in the room.

Efforts to be assessed
- Efforts are being made to use building materials with high sound insulation and sound absorption performance for window sashes, walls, and floors as a means of ensuring quietness within the space.

Assessment criteria
- The result of Q1.1 "Sound environment" of CASBEE-BD/NC is referred for scoring

8.3 Measures to reduce the amount of waste generated at each stage of the production and disposal of housing and building

8.3.1 Reduce material usage CASBEE incorporated

Efforts to reduce material usage (e.g., use of high-strength materials) will be assessed.

Efforts to be assessed
- Efforts are being made to use high-strength materials and measures to reduce the amount of material used.

Assessment criteria
- The result of LR2.2.1 "Reducing use of materials" of CASBEE-BD/NC is referred for scoring.

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8.3.2 Continued use of building frame, etc. CASBEE incorporated

Evaluate efforts for the reuse of existing structural frames from the perspective of resource productivity.

Efforts to be assessed
- The existing structural frame is reused.

Assessment criteria
- The result of LR2.2.2 "Continuing use of existing structural frame, etc." of CASBEE-BD/NC is referred for scoring

8.3.3 Use recycled materials in building frame materials CASBEE incorporated

Evaluate efforts regarding the use of recycled materials in building frame materials.

Efforts to be assessed
- Recycled materials are used in major structural components.

Assessment criteria
- The result of LR2.2.3 "Use of recycled materials as structural materials" of CASBEE-BD/NC is referred for scoring

8.3.4 Use recycled materials other than building frame materials CASBEE incorporated

Evaluate efforts for the use of recycled materials other than building frame materials.

Efforts to be assessed
- Recycled materials are used in areas other than the building frame.

Assessment criteria
- The result of LR2.2.4 "Use of recycled materials as non-structural materials" of CASBEE-BD/NC is referred for scoring

8.3.5 Use timber from sustainable forestry CASBEE incorporated

Evaluate efforts on the use of timber from sustainable forestry.

Efforts to be assessed
- Timber from sustainable forestry is used.

Assessment criteria
- The result of LR2.2.5 "Timber from sustainable forestry" of CASBEE-BD/NC is referred for scoring

8.3.6 Work to enhance the reusability of components and materials CASBEE incorporated

Evaluate efforts to enhance the reusability of components and materials as a measure to promote recycling at the time of demolition and disposal, which is the end point of a building's life cycle.

Efforts to be assessed
- Measures to promote recycling at the time of dismantling and disposal, such as ease of sorting, are taken.

Assessment criteria
- The result of LR2.2.6 "Reusability of components and materials" of CASBEE-BD/NC is referred for scoring

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8.4 Innovations for extending the service life of houses and buildings

8.4.1 Longer use of frame materials — CASBEE incorporated

Evaluate efforts to extend the period of time before major renovation work is required.

Efforts to be assessed
- Necessary measures are taken to extend the period of time before major renovation work is required.

Assessment criteria
- The result of Q2.2.2.1 "Service life of structural materials" of CASBEE-BD/NC is referred for scoring.

8.4.2 Use exterior finish materials longer — CASBEE incorporated

Evaluate efforts to extend the time before the exterior wall finish materials require repair.

Efforts to be assessed
- Efforts are being made to lengthen the required intervals for repair of exterior wall finish materials.

Assessment criteria
- The result of Q2.2.2.2 "Necessary Refurbishment interval for exterior finishes" of CASBEE-BD/NC is referred for scoring

8.4.3 Use interior finish materials longer — CASBEE incorporated

Evaluate efforts to extend the time before major interior finish materials need to be replaced.

Efforts to be assessed
- The necessary renewal interval for main interior finishes is being extended.

Assessment criteria
- The result of Q2.2.2.3 "Necessary renewal interval for main interior finishes" of CASBEE-BD/NC is referred for scoring

8.4.4 Use air conditioning and ventilation ducts longer — CASBEE incorporated

Evaluate efforts to extend the period of time before air conditioning and air conditioning ventilation ducts need to be replaced.

Efforts to be assessed
- Necessary replacement intervals for air conditioning and ventilation ducts are being extended.

Assessment criteria
- The result of Q2.2.2.4 "Necessary renewal interval for air conditioning and ventilation ducts" of CASBEE-BD/NC is referred for scoring.

8.4.5 Use air conditioning and plumbing piping longer — CASBEE incorporated

Evaluate efforts to extend the time before the HVAC and plumbing system needs to be replaced.

Efforts to be assessed
- Necessary renewal intervals for water supply and drainage pipes, and that for HVAC are being extended.

Assessment criteria
- The result of Q2.2.2.5 "Necessary renewal interval for HVAC and water supply and drainage pipes" of CASBEE-BD/NC is referred for scoring.

8.4.6 Use major equipment longer — CASBEE incorporated

Evaluate efforts to extend the period of time before major facilities and equipment need to be renewed or replaced.

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Efforts to be assessed
- Necessary renewal intervals for major equipment and services are being extended.

Assessment criteria
- The result of Q2.2.2.6 "Necessary replacement interval for major equipment and services" of CASBEE-BD/NC is referred for scoring.

8.4.7 Design to withstand natural disasters SDGs original

Evaluate efforts to confirm information on the possibility of natural disasters occurring in the local characteristics and possible damage, and to share such information among stakeholders.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Confirm the hazard of the site using hazard maps, etc.
2) Other initiatives to improve resilience to natural disasters

Explanation
- Evaluate efforts at the planning stage of the building will be aimed at extending the service life of the building.

8.4.8 Improve fire protection performance SDGs original

Evaluate efforts for advanced efforts to withstand fire.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
Advanced efforts to withstand fire

Explanation
- Evaluate advanced efforts in building planning, such as efforts to prevent fires from occurring or to prevent the spread of fire in the event of a fire.

8.5 Active use of local timber

8.5.1 Engage in the use of local resources CASBEE incorporated

Evaluate efforts, such as the active use of locally produced lumber, which contribute to the revitalization of local industry and economy.

Efforts to be assessed
- The use of materials with local characteristics (for structural materials, interior materials, exterior materials, exterior construction, etc.) is being considered.

Assessment criteria
- The results of Q3.3.1 "Attention to local characteristics & improvement of comfort - I 2) Use of materials with local characteristics" and Q3.2 "Attention to townscape and landscape 4) Formation of a good landscape with materials with local characteristics" of CASBEE-BD/NC are referred for scoring.

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Goal 9: Industry, Innovation and Infrastructure

9.1 Foster momentum for new technology development through active use of state-of-the-art technology and building materials on site

9.1.1 Adopt the latest technology SDGs original

Assess whether or not building materials, equipment, systems, etc. that utilize the latest technology are used.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Adoption of building materials using the latest technology (retroreflective solar reflective film, etc.)
2) Adoption of equipment using the latest technology (e.g., IoT for equipment)
3) Adoption of systems using the latest technology (e.g., life cycle management system using BIM)
4) Others (utilization of AI, etc.)

Explanation

- The assessment will be based on whether or not building materials, equipment, systems, etc. that utilize the latest technology are used.

9.1.2 Work to make buildings smarter SDGs original

Evaluate efforts for smartening that will have a positive ripple effect on the surrounding area.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

Efforts to be assessed
1) Introduction of high-speed, high-capacity, low-latency information systems, including 5G support
2) Optimal operation of facilities based on analysis of HEMS / BEMS data using AI
3) Cooperation with CEMS

Explanation

- Evaluate efforts for building smartness.

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9.2 Creating communication, relaxation, refreshment space, etc.

9.2.1 Create space for refreshment — CASBEE incorporated

Efforts to secure space for refreshment, etc. necessary for comfortable office life will be assessed.

Efforts to be assessed
- Spaces for refreshment and other amenities necessary for a comfortable office life are devised.

Assessment criteria
- The result of Q2.1.2.2 "Space for refreshment" of CASBEE-BD/NC is referred for scoring.

9.2.2 Create space for communication — SDGs original

! Application condition Evaluate Off only

Evaluate efforts regarding the planning and development of communication spaces in offices.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Availability of formal communication spaces that are planned and maintained with a view to enhancing intellectual productivity.
2) Availability of informal communication spaces that are planned and maintained with a view to enhancing intellectual productivity.

Explanation
- Offices shall be assessed.
- Efforts are being made including those in common areas of the building.
- The assessment will focus on the planning and development of communication spaces that take into account the perspective of enhancing intellectual productivity.

9.3 Access to information and communication technology

9.3.1 Adopt advanced communication technologies — CASBEE incorporated

Evaluate efforts to create a comfortable communication environment that contributes to the realization of a functional space.

Efforts to be assessed
- Comfortable communication environment facilities are installed.

Assessment criteria
- The result of Q2.1.1.2 "use of advanced information & IT equipment" of CASBEE-BD/NC is referred for scoring

9.4 Introduction to resilient design

9.4.1 Protecting internal equipment — CASBEE incorporated

Evaluate efforts with respect to improving the continuity of use of the building and protecting internal facilities that contribute to ensuring resilience.

Efforts to be assessed
- Measures to protect its internal facilities are taken.

Assessment criteria
- The results of Q2.2.1.1 "Earthquake-resistance (resistance to building breakage)" and Q2.2.1.2 "Seismic isolation, seismic & vibration control (internal equipment protection)" of CASBEE-BD/NC are referred for scoring

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9.4.2 Ensure resilience of HVAC system CASBEE incorporated

Evaluate efforts to maintain the functionality of HVAC systems in the event of a disaster, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of the HVAC system.

Assessment criteria
- The result of Q2.2.4.1 "HVAC system" of CASBEE-BD/NC is referred for scoring.

9.4.3 Ensure resilience of water supply & drainage and sanitation systems CASBEE incorporated

Evaluate efforts to maintain the functionality of water supply & drainage and sanitation facilities in the event of a disaster, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of water supply & drainage and sanitation facilities.

Assessment criteria
- The result of Q2.2.4.2 "Water supply & drainage, sanitation" of CASBEE-BD/NC is referred for scoring

9.4.4 Ensure resilience of electrical equipment CASBEE incorporated

Evaluate efforts to maintain the functionality of electrical equipment during disasters, etc.

Efforts to be assessed
- Efforts are being made to secure power supply in case of emergency, such as power failure. (e.g., The facility equipped with emergency power generation equipment and uninterruptible power supply equipment, or the facility avoiding installation in underground spaces)

Assessment criteria
- The result of Q2.2.4.3 "Electrical equipment" of CASBEE-BD/NC is referred for scoring

9.4.5 Ensure resilience of support method of machines & ducts CASBEE incorporated

Evaluate efforts to maintain the functionality of mechanical and plumbing supports in the event of a disaster, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of mechanical and piping supports.

Assessment criteria
- The result of Q2.2.4.4 "Support method of machines & ducts" of CASBEE-BD/NC is referred for scoring

9.4.6 Ensure resilience of communication wiring CASBEE incorporated

Evaluate efforts to maintain the functionality of telecommunications and information facilities during disasters, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of communications & IT equipment.

Assessment criteria
- The result of Q2.2.4.5 "Communications & IT equipment" of CASBEE-BD/NC is referred for scoring

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9.5 Identification of site hazards

9.5.1 Identify site hazards and share information SDGs original

Efforts to confirm and share information on the possibility of natural disasters occurring in the local characteristics and possible damage will be assessed.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Confirm the hazard of the site using hazard maps, etc.
2) Share and disseminate information on disasters using digital signage, etc.

Explanation

- The above two items are used to assess whether the company confirms and shares information on the possibility of natural disasters occurring in the local characteristics and the expected damage.

9.6 Ensure performance to withstand earthquake, fire, wind, flood, etc.

9.6.1 Adopt the latest technology for disaster prevention SDGs original

Assess whether or not the latest technology related to disaster prevention is employed.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

Efforts to be assessed
1) Devices against earthquakes (latest seismic isolation, vibration control (damping), etc.)
2) Devices against fire (e.g., use of the latest noncombustible materials)
3) Innovations against wind and flood damage (use of designs that minimize wind and flood damage using CFD technology)
4) Other innovations related to disasters

Explanation

- Evaluate efforts as the latest technology for disaster prevention.

Goal 10: Reduced Inequalities

Efforts to achieve Goal 10 will be collectively assessed under Goal 5 Gender Equality, etc.

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Goal 11: Sustainable Cities and Communities

11.1 Low cost through rational design and construction while ensuring environmental performance

11.1.1 Ensure basic environmental performance of the building

CASBEE incorporated

Efforts to ensure the basic environmental performance of the building (sound environment, thermal environment, light environment, air environment, etc.) will be assessed.
Scoring is based on the average of the scores of the following six items.

Efforts to be assessed (i) to (vi)
(i) Building materials with high sound insulation performance are used for window sashes, walls, and floors as a measure to prevent sound in the space from leaking to the outside.
(ii) The air conditioning system is designed to provide a comfortable room temperature even during peak load periods.
(iii) Measures are taken to prevent heat from entering or escaping from outside the room.
(iv) The building is equipped with daylight devices as well as windows on the exterior walls of the building to actively utilize daylight.
(v) Adequate measures are taken to avoid air quality pollution by chemical pollutants.
(vi) Efforts are made to exceed the ventilation levels of the building code, the building sanitation code, and the school environmental sanitation standards to improve air quality.

Assessment criteria (i) to (vi)
- The results of Q1.1 for (i), Q1.2.1.1 for (ii), Q1.2.1.2 for (iii), Q1.3.1.3 for (iv). Q1.4.1.1 and Q1.4.2 of CASBEE-BD/NC are used for (v) and (6), respectively, are referred for scoring.

11.1.2 Reduce running costs while ensuring basic environmental performance

SDGs original

Evaluate efforts to reduce the life cycle cost of the building.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

Efforts to be assessed
1) Efforts to reduce costs during construction
2) Efforts to reduce costs during operation
3) Efforts to reduce costs at the time of repair and renewal

Explanation
- Evaluate efforts to reduce the life cycle cost of buildings.

11.2 Prevention of traffic accidents, coordination with public transportation

11.2.1 Reduce traffic and accidents due to automobile use

CASBEE incorporated

Efforts to control the increase in traffic due to automobile use by building users and to prevent accidents near parking lot entrances and exits will be assessed.

Efforts to be assessed
- Efforts are being made to encourage building users to use means of transportation other than automobiles, to secure appropriate parking spaces, and to ensure the safety of parking lot entrances and exits.

Assessment criteria
- The result of LR3.2.3.3 "Traffic load control" of CASBEE-BD/NC is referred for scoring

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11.3 Public Involvement

11.3.1 Encourage community participation — CASBEE incorporated

Evaluate efforts to encourage the participation of building users and local residents in the operation and management of the building.

Efforts to be assessed
- Efforts are being made to encourage the participation of local residents in the operation and management of the building.

Assessment criteria
- The result of Q3.3.1 "Attention to local characteristics & improvement of comfort – V. Involvement of building users, etc." of CASBEE-BD/NC is referred for scoring

11.4 Reduction of environmental load on the surrounding environment

11.4.1 Contribute to the prevention of air pollution — CASBEE incorporated

Efforts to prevent air pollution are assessed in order to maintain good local air quality.

Efforts to be assessed
- Efforts are being made to significantly lower its contaminants from the emission than the standards set by Air Pollution Control Law, recommended guidelines for low NOx small-scale combustion equipment, or by local ordinances, etc.

Assessment criteria
- The result of LR3.2.1 "Prevention of air pollution" of CASBEE-BD/NC is referred for scoring

11.4.2 Properly dispose of sewage — CASBEE incorporated

Evaluate efforts in order to reduce the local environmental load of sewage treatment and to prevent pollution of the surrounding environment due to unintended discharges, such as during heavy rains, will be assessed.

Efforts to be assessed
- Efforts are being made to significantly lower its contaminants from the discharge than the standards set by the Water Pollution Control Law, the Sewerage Law, and regional public organizations.

Assessment criteria
- The result of LR3.2.3.2 "Sewage load suppression" of CASBEE-BD/ NC is referred for scoring.

11.4.3 Control rain water runoff — CASBEE incorporated

Assess on-site runoff control measures to reduce the occurrence of flooding during short periods of heavy rainfall, etc.

Efforts to be assessed
- Runoff control measures, such as primary storage of rain water and underground infiltration, are in place.

Assessment criteria
- The result of LR3.2.3.1 "Reduction of rain water discharge loads" of CASBEE-BD/NC is referred for scoring

11.4.4 Preventing soil contamination — SDGs original

Efforts to control soil contamination are assessed.

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Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Conduct soil contamination survey
2) Excavation and removal of contaminated soil

Explanation
- Evaluate efforts for investigation and excavation removal to control soil contamination.

11.5 Introduction to resilient design

11.5.1 Protecting internal equipment CASBEE incorporated

Evaluate efforts with respect to improving the continuity of use of the building and protecting internal facilities that contribute to ensuring resilience.

Efforts to be assessed
- Measures are taken to protect its internal facilities.

Assessment criteria
- The results of Q2.2.1.1 "Earthquake-resistance (resistance to building breakage)" and Q2.2.1.2 "Seismic isolation, seismic & vibration control (internal equipment protection)" of CASBEE-BD/NC are referred for scoring.

11.5.2 Ensure resilience of HVAC system CASBEE incorporated

Evaluate efforts to maintain the functionality of HVAC systems in the event of a disaster, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of the HVAC system.

Assessment criteria
- The result of Q2.2.4.1 "HVAC system" of CASBEE-BD/NC is referred for scoring.

11.5.3 Ensure resilience of water supply & drainage and sanitation systems CASBEE incorporated

Evaluate efforts to maintain the functionality of water supply & drainage and sanitation facilities in the event of a disaster, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of water supply & drainage and sanitation facilities.

Assessment criteria
- The result of Q2.2.4.2 "Water supply & drainage, sanitation" of CASBEE-BD/NC is referred for scoring

11.5.4 Ensure resilience of electrical equipment CASBEE incorporated

Evaluate efforts to maintain the functionality of electrical equipment during disasters, etc.

Efforts to be assessed
- Efforts are being made to secure power supply in case of emergency, such as power failure. (e.g., The facility equipped with emergency power generation equipment and uninterruptible power supply equipment, or the facility avoiding installation in underground spaces)

Assessment criteria
- The result of Q2.2.4.3 "Electrical equipment" of CASBEE-BD/NC is referred for scoring

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11.5.5 Ensure resilience of support method of machines & ducts CASBEE incorporated

Evaluate efforts to maintain the functionality of mechanical and plumbing supports in the event of a disaster, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of mechanical and piping supports.

Assessment criteria
- The result of Q2.2.4.4 "Support method of machines & ducts" of CASBEE-BD/NC is referred for scoring

11.5.6 Ensure resilience of communication wiring CASBEE incorporated

Evaluate efforts to maintain the functionality of telecommunications and information facilities during disasters, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of communications & IT equipment.

Assessment criteria
- The result of Q2.2.4.5 "Communications & IT equipment" of CASBEE-BD/NC is referred for scoring.

11.6 Identification of site hazards

11.6.1 Identify site hazards and share information SDGs original

Efforts to confirm and share information on the possibility of natural disasters occurring in the local characteristics and possible damage will be assessed.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Confirm the hazard of the site using hazard maps, etc.
2) Share and disseminate information on disasters using digital signage, etc.

Explanation
- The above two items are used to assess whether the company confirms and shares information on the possibility of natural disasters occurring in the local characteristics and the expected damage.

11.7 Site security measures

11.7.1 Provide security measures for the site and outbuildings CASBEE incorporated

Assess crime prevention measures that contribute to improving local characteristics of safety.

Efforts to be assessed
- Crime prevention measures are being taken at the site and exterior to improve security performance.

Assessment criteria
- The result of Q3.3.1 "Attention to local characteristics & improvement of comfort - IV Consideration of crime prevention" of CASBEE-BD/NC is referred for scoring
- Measures to improve the building's security performance are assessed in 3.5.1 Building Security Measures.

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11.8 Townscape and landscape-friendly architectural planning

11.8.1 Create a favorable townscape and landscape — CASBEE incorporated

Assess how the building (the entire site including the exterior) contributes to reducing the negative impact on the surrounding townscape and landscape and creating a favorable townscape and landscape.

Efforts to be assessed
- Efforts are being made to improve the townscape and landscape of the surrounding area (e.g., use of materials suited to the characteristics of the area, creation of a favorable landscape through planting, etc.).

Assessment criteria
- The result of Q3.2 "Consideration for townscape and landscape" of CASBEE-BD/NC is referred for scoring

11.9 Consideration for biodiversity, planning of exterior structures with consideration for ecosystem preservation

11.9.1 Protecting the biological environment — CASBEE incorporated

Evaluate efforts that contribute to the conservation and creation of the biological environment as a consideration for local characteristics.

Efforts to be assessed
- Initiatives that contribute to the preservation and creation of biotope are involved.

Assessment criteria
- The result of Q3.1 "Preservation and creation of biotope" of CASBEE-BD/NC is referred for scoring

11.10 Consideration for the surrounding environment

11.10.1 Reduce noise, vibration, and odors — CASBEE incorporated

Efforts to reduce the impact of noise, vibration, and odor on the neighborhood will be assessed.

Efforts to be assessed
(i) It is devised to be significantly lower than the current regulatory standards stipulated in the Noise Regulation Law or the Large-Scale Retail Stores Location Law, local ordinances, etc.
(ii) It is devised to be significantly lower than the current regulatory standards set forth in the Vibration Regulation Law and local ordinances.
(iii) It is devised to meet the permissible limit values for the concentration of specific odor substances specified in the Odor Control Law, local ordinances, etc.

Assessment criteria
- The score will be calculated by averaging the scores from (i) through (iii) of the efforts to be assessed.
- The results of LR3.3.1.1 "Noise" for (i), LR3.3.1.2 "Vibration" for (ii), and LR3.3.1.3 "Odor" of CASBEE-BD/NC for (iii) are referred for scoring.

11.10.2 Reduce wind damage and sunlight obstruction — CASBEE incorporated

Efforts to reduce the impact of wind damage and sunlight obstruction on the neighborhood will be assessed.

Efforts to be assessed
(i) Restrictions of wind damage.
(ii) Restriction of sunlight obstruction.

Assessment criteria
- Scores will be calculated by averaging the scores from (i) and (ii) of the efforts to be assessed.
- The results of LR3.3.2.1 "Restriction of wind damage" for (i) and LR3.3.2.3 "Restriction of sunlight obstruction" of CASBEE-BD/NC for (ii) are referred for scoring.

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11.10.3 Reducing light pollution CASBEE incorporated

Evaluate efforts to reduce the impact of nighttime lighting and glare from buildings in order to maintain a positive local environment.

Efforts to be assessed
- Efforts on anti-glare measures are being made against outdoor lighting and indoor lighting that leaks light outside.

Assessment criteria
- The results of LR3.3.3 "Control of Light Pollution" of CASBEE-BD/NC is referred for scoring.

11.10.4 Reduce thermal effects on surroundings CASBEE incorporated

To maintain a favorable local thermal environment, measures to control heat islanding related to buildings and exterior structures will be assessed.

Efforts to be assessed
- Efforts are being made to contribute to the reduction of off-site heat load, such as measures to reduce the heat island effect.

Assessment criteria
- The result of LR3.2.2 "Heat Island Effect" of CASBEE-BD/NC is referred for scoring.

11.10.5 Reduce chemical dispersal to surrounding areas CASBEE incorporated

Evaluate efforts to reduce the use of chemical pollutants that may adversely affect the surrounding environment.

Efforts to be assessed
- Efforts are being made to reduce the use of chemical substances that may have an impact on the environment.

Assessment criteria
- The result of LR2.3.1 "Use of materials without harmful substances" of CASBEE-BD/NC is referred for scoring.

11.11 Creating communication space

11.11.1 Provide space and facility functions CASBEE incorporated

Evaluate efforts in terms of releasing and providing facilities to the community and encouraging many people to utilize them in order to contribute to the formation of a rich local environment for living.

Efforts to be assessed
- Efforts are being made to contribute to the community by providing space and facilities.

Assessment criteria
- The result of Q3.3.1 "Attention to local characteristics & improvement of comfort - II Contribution to the local community by providing space & facility functions" of CASBEE-BD/NC is referred for scoring.

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11.12 Architectural planning linked to smart urbanization

11.12.1 Work to make buildings smarter SDGs original

Evaluate efforts regarding the linkage with the smartening of the region that will have a positive ripple effect on the surrounding area.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

Efforts to be assessed
1) Introduction of high-speed, high-capacity, low-latency information systems, including 5G support
2) Optimal operation of facilities based on analysis of HEMS / BEMS data using AI
3) Cooperation with CEMS

Explanation

- Evaluate efforts for building smartness.

11.13 Active use of local timber

11.13.1 Engage in the use of local resources CASBEE incorporated

Evaluate efforts, such as the active use of locally produced lumber, which contribute to the revitalization of local industry and economy.

Efforts to be assessed

- The use of materials with local characteristics (for structural materials, interior materials, exterior materials, exterior construction, etc.) is being considered.

Assessment criteria

- The results of Q3.3.1 "Attention to local characteristics & improvement of comfort - I 2) Use of materials with local characteristics" and Q3.2 "Attention to townscape and landscape 4) Formation of a good landscape with materials with local characteristics" of CASBEE-BD/NC are referred for scoring.

11.14 Assessment and certification of environmental performance of houses and buildings

11.14.1 Utilize labeling and certification for built environment SDGs original

Assess efforts, such as labeling of built environment and active use of certification systems.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
Proactive use of labeling and certification systems that indicate a built environment (CASBEE tools other than CASBEE-BD/NC, BELS, various performance indicators, etc.)

Explanation

- Evaluate efforts, such as labeling of built environment and active use of certification systems.

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11.15 Inheritance of local characteristics

11.15.1 Inheriting history — CASBEE incorporated

Efforts to preserve and proactively utilize historical spaces, etc. in order to contribute to the formation of a rich local environment and the revitalization of local industries will be assessed.

Efforts to be assessed
- The historic built environment and existing natural environment are preserved, restored, and rehabilitated to carry on the local characteristics of the area.

Assessment criteria
- The results of Q3.3.1 "Attention to local characteristics & improvement of comfort - I 1) Preservation of historic architectural spaces, etc." and Q3.2 "Attention to townscape and landscape 3) Inheritance of landscape history" of CASBEE-BD/NC are referred for scoring.

Goal 12: Responsible Consumption and Production

12.1 Performance and initiatives that contribute to the longevity of housing and buildings

12.1.1 Longer use of frame materials — CASBEE incorporated

Evaluate efforts to extend the period of time before major renovation work is required.

Efforts to be assessed
- Necessary measures are taken to extend the period of time before major renovation work is required.

Assessment criteria
- The result of Q2.2.2.1 "Service life of structural materials" of CASBEE-BD/NC is referred for scoring.

12.1.2 Use exterior finish materials longer — CASBEE incorporated

Evaluate efforts to extend the time before the exterior wall finish materials require repair.

Efforts to be assessed
- Efforts are being made to lengthen the required intervals for repair of exterior wall finish materials.

Assessment criteria
- The result of Q2.2.2.2 "Necessary refurbishment interval for exterior finishes" of CASBEE-BD/NC is referred for scoring.

12.1.3 Use interior finish materials longer — CASBEE incorporated

Evaluate efforts to extend the time before major interior finish materials need to be replaced.

Efforts to be assessed
- The necessary renewal interval for main interior finishes is being extended.

Assessment criteria
- The result of Q2.2.2.3 "Necessary renewal interval for main interior finishes" of CASBEE-BD/NC is referred for scoring.

12.1.4 Use air conditioning and ventilation ducts longer — CASBEE incorporated

Evaluate efforts to extend the period of time before air conditioning and air conditioning ventilation ducts need to be replaced.

Efforts to be assessed
- Efforts are being made to lengthen the necessary replacement interval for air conditioning and ventilation ducts.

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Assessment criteria
- -The result of Q2.2.2.4 "Necessary renewal interval for air conditioning and ventilation ducts" of CASBEE-BD/NC is referred for scoring.

12.1.5 Use air conditioning and plumbing piping longer CASBEE incorporated

Evaluate efforts to extend the time before the HVAC and plumbing system needs to be replaced.

Efforts to be assessed
- Efforts are being made to extend the necessary renewal interval for water supply and drainage pipes and for HVAC and its water supply and drainage pipes.

Assessment criteria
- The result of Q2.2.2.5 "Necessary renewal interval for HVAC and water supply and drainage pipes" of CASBEE-BD/NC is referred for scoring.

12.1.6 Use major equipment longer CASBEE incorporated

Evaluate efforts to extend the period of time before major facilities and equipment need to be renewed or replaced.

Efforts to be assessed
- Necessary renewal intervals for major equipment and services are being extended.

Assessment criteria
- The result of Q2.2.2.6 "Necessary replacement interval for major equipment and services" of CASBEE-BD/NC is referred for scoring.

12.1.7 Design to withstand natural disasters SDGs original

Evaluate efforts to confirm information on the possibility of natural disasters occurring in the local characteristics and possible damage, and to share such information among stakeholders.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Confirm the hazard of the site using hazard maps, etc.
2) Other initiatives to improve resilience to natural disasters

Explanation
- The above two items are used to assess whether the company confirms and shares information on the possibility of natural disasters occurring in the local characteristics and the expected damage.

12.1.8 Improve fire protection performance SDGs original

Assess various efforts to withstand fire.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

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Efforts to be assessed
Advanced efforts to withstand fire

Explanation
- Evaluate advanced efforts in building planning, such as efforts to prevent fires from occurring or to prevent the spread of fire in the event of a fire.

12.2 Sustainable use of resources

12.2.1 Procuring timber from sustainable forestry — CASBEE incorporated

Evaluate efforts on the use of timber from sustainable forestry.

Efforts to be assessed
- Timber from sustainable forestry is used.

Assessment criteria
- The result of LR2.2.5 "Timber from sustainable forestry" of CASBEE-BD/NC is referred for scoring.

12.2.2 Engage in the use of local resources — CASBEE incorporated

Evaluate efforts, such as the active use of locally produced lumber, which contribute to the revitalization of local industry and economy.

Efforts to be assessed
- The use of materials with local characteristics (for structural materials, interior materials, exterior materials, exterior construction, etc.) is being considered.

Assessment criteria
- The results of Q3.3.1 "Attention to local characteristics & improvement of comfort - I 2) Use of materials with local characteristics" and Q3.2 "Attention to townscape and landscape 4) Formation of a good landscape with materials with local characteristics" of CASBEE-BD/NC are referred for scoring.

12.3 Periodic inspection

12.3.1 Maintain HVAC piping — CASBEE incorporated

Evaluate efforts to ensure that building functionality is not compromised when updating or repairing HVAC piping.

Efforts to be assessed
- Efforts are being made to take into account the renewal and repair of air-conditioning piping.

Assessment criteria
- The result of Q2.3.3.1 "Ease of air conditioning duct renewal" of CASBEE-BD/NC is referred for scoring.

12.3.2 Maintain water supply and drainage pipes — CASBEE incorporated

Evaluate efforts to ensure that building functions are not compromised during renewal and repair of water supply and drainage pipes.

Efforts to be assessed
- Efforts are being made to take into account the renewal and repair of water supply and drainage pipes.

Assessment criteria
- The result of Q2.3.3.2 "Ease of water supply and drain pipe renewal" of CASBEE-BD/NC is referred for scoring.

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12.3.3 Maintain electrical wiring CASBEE incorporated

Evaluate efforts to ensure that building functionality is not compromised when updating or repairing electrical wiring.

Efforts to be assessed
- Efforts are being made to take into account the renewal and repair of electrical wiring.

Assessment criteria
- The result of Q2.3.3.3 "Ease of electrical wiring renewal" of CASBEE-BD/NC is referred for scoring.

12.3.4 Maintain communication wiring CASBEE incorporated

Evaluate efforts to ensure that building functionality is not compromised during renewal and repair of communication wiring.

Efforts to be assessed
- Efforts are being made to take into account the renewal and repair of communication wiring.

Assessment criteria
- The result of Q2.3.3.4 "Ease of communications cable renewal" of CASBEE-BD/NC is referred for scoring.

12.3.5 Maintain equipment and facilities CASBEE incorporated

Evaluate efforts to ensure that building functions are not compromised when updating or repairing equipment and facilities.

Efforts to be assessed
- The building is being designed to allow renewal and repair while maintaining building functionality.

Assessment criteria
- The result of Q2.3.3.5 "ease of equipment renewal" of CASBEE-BD/NC is referred for scoring.

12.3.6 Allocate backup space CASBEE incorporated

Evaluate efforts to provide provision of backup space for backup equipment needed for renewal and repair of facilities.

Efforts to be assessed
- Backup space for installation of backup equipment is provided.

Assessment criteria
- The result of Q2.3.3.6 "Provision of backup space" of CASBEE-BD/NC is referred for scoring.

12.4 Reduction of waste during production and disposal

12.4.1 Properly control materials SDGs original

Assess whether the processes from production to processing, distribution, sales, and disposal are properly managed to reduce waste.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Ensure traceability
2) Implementation of quantity control using BIM

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Explanation
- For BIM, those used for quantity control are eligible for scoring, and those used only for 3D-CAD are not eligible.

12.4.2 Reduce material usage CASBEE incorporated

Evaluate efforts to reduce material usage.

Efforts to be assessed
- High-strength materials are used, and measures are taken to reduce the amount of material used.

Assessment criteria
- The result of LR2.2.1 "Reducing use of materials" of CASBEE-BD/NC is referred for scoring.

12.4.3 Continued use of building frame, etc. CASBEE incorporated

Evaluate efforts regarding the reuse of existing structural frames.

Efforts to be assessed
- The existing structural frame is reused.

Assessment criteria
- The result of LR2.2.2 "Continuing use of existing structural frame, etc." of CASBEE-BD/NC is referred for scoring.

12.4.4 Use recycled materials in building frame materials CASBEE incorporated

Evaluate efforts regarding the use of recycled materials in building frame materials.

Efforts to be assessed
- Recycled materials are used in major structural components.

Assessment criteria
The result of LR2.2.3 "Use of recycled materials as structural materials" of CASBEE-BD/NC is referred for scoring.

12.4.5 Use recycled materials other than building frame materials CASBEE incorporated

Evaluate efforts for the use of recycled materials other than building frame materials.

Efforts to be assessed
- Recycled materials are used in areas other than the building frame.

Assessment criteria
- The result of LR2.2.4 "Use of recycled materials as non-structural materials" of CASBEE-BD/NC is referred for scoring.

12.4.6 Work to enhance the reusability of components and materials CASBEE incorporated

Evaluate efforts to enhance the reusability of components and materials.

Efforts to be assessed
- Measures are taken to promote recycling at the time of dismantling and disposal, such as ease of sorting.

Assessment criteria
- The result of LR2.2.6 "Reusability of components and materials " of CASBEE-BD/NC is referred for scoring.

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12.5 Operational GHG emissions reduction, water use reduction, monitoring, energy management

12.5.1 Adopt water saving devices — CASBEE incorporated

Assess water saving measures that reduce water consumption in order to protect water resources.

Efforts to be assessed
- Water saving systems are being introduced.

Assessment criteria
- The result of LR2.1.1 "Water Saving" of CASBEE-BD/NC is referred for scoring.

12.5.2 Control air quality — CASBEE incorporated

Evaluate efforts for proper indoor air quality.

Efforts to be assessed
- CO_2 concentrations are monitored and controlled to maintain proper air quality.

Assessment criteria
- The result of Q1.4.3.1 "Monitoring of CO_2 " of CASBEE-BD/NC is referred for scoring.

12.5.3 Reduce waste generation — CASBEE incorporated

Evaluate efforts to promote sorting measures and volume and weight reduction in order to control the amount of waste generated from living in buildings.

Efforts to be assessed
- Efforts are being made to reduce waste generation, sorting measures, and volume and weight reduction during building operations.

Assessment criteria
- The result of LR3.2.3.4 "Reduction of waste treatment loads" of CASBEE-BD/NC is referred for scoring.

12.5.4 Managing energy — CASBEE incorporated

Evaluate efforts regarding the establishment and utilization of continuous measurement and metering systems that contribute to efficient energy use during the operational phase of the building.

Efforts to be assessed
- Monitoring is implemented and HEMS or BEMS for efficient operation of energy is installed.

Assessment criteria
- The result of LR1.4 “Initiatives for Efficient Operation” of CASBEE-BD/NC is referred for scoring.

12.6 Reduce use of materials with harmful substances

12.6.1 Properly dispose of sewage — CASBEE incorporated

Evaluate efforts in order to reduce the local environmental load of sewage treatment and to prevent pollution of the surrounding environment due to unintended discharges, such as during heavy rains, will be assessed.

Efforts to be assessed
- Any method is devised to be significantly lower than the emission standards set by the Water Pollution Control Law, the Sewerage Law, and regional public organizations.

Assessment criteria
- The result of LR3.2.3.2 "Sewage load suppression" of CASBEE-BD/NC is referred for scoring.

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12.6.2 Contribute to the prevention of air pollution CASBEE incorporated

Assess measures to prevent air pollution in order to maintain a good local environment.

Efforts to be assessed
- Any method is devised to be significantly lower than the emission standards set by Air Pollution Control Law, recommended guidelines for low NOx small-scale combustion equipment, or local ordinances, etc.

Assessment criteria
- The result of LR3.2.1 "Air pollution" of CASBEE-BD/NC is referred for scoring.

12.6.3 Preventing soil contamination SDGs original

Efforts to control soil contamination are assessed.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Conduct soil contamination survey
2) Excavation and removal of contaminated soil

Explanation
- Evaluate efforts for investigation and excavation removal to control soil contamination.

12.6.4 Reduce chemical dispersal to surrounding areas CASBEE incorporated

Evaluate efforts to reduce the use of chemical pollutants that may adversely affect the surrounding environment.

Efforts to be assessed
- Efforts are being made to reduce the use of chemical substances that may have an impact on the environment.

Assessment criteria
- The result of LR2.3.1 "Use of materials without harmful substances" of CASBEE-BD/NC is referred for scoring.

12.7 Reduce GHG emissions during construction, operation, and disposal

12.7.1 Working toward carbon neutrality CASBEE incorporated

Efforts to reduce the WLC of buildings to prevent global warming are assessed.

Efforts to be assessed
- Efforts are being made to reduce the WLC of buildings.

Assessment criteria
- The result of LR3.1 "Consideration of global warming" of CASBEE-BD/NC is referred for scoring.

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12.8 Supply chain conscious procurement

12.8.1 Procuring construction materials that take into account economic, social, and environmental considerations in the production and distribution process — SDGs original

Assess whether it is committed to procuring materials and construction materials that are economically, socially, and environmentally sound in the production and distribution process.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

Efforts to be assessed
1) Procurement is conducted in consideration of economic aspects (e.g., payment of just compensation from the perspective of Creating Shared Value (CSV)).
2) Procurement is conducted in consideration of social cremation (e.g., checking the working environment of suppliers).
3) Procurement is conducted in consideration of environmental aspects (e.g., procurement of materials in accordance with the Green Procurement Guidelines).

Explanation
- Evaluate whether it is committed to procuring materials and construction materials that are economically, socially, and environmentally sound in the production and distribution process.

Goal 13: Climate Action

13.1 Reduction of building WLC

13.1.1 Working toward carbon neutrality — CASBEE incorporated

Efforts to reduce the Whole Life Carbon of buildings to prevent global warming are assessed.

Efforts to be assessed
- Efforts are being made to reduce the WLC of buildings.

Assessment criteria
- The result of LR3.1 "Consideration of global warming" of CASBEE-BD/NC is referred for scoring.

13.2 Reducing heat gain in urban spaces

13.2.1 Reduce thermal effects on surroundings — CASBEE incorporated

To maintain a favorable local environment, measures to control heat islanding related to buildings and exterior structures will be assessed.

Efforts to be assessed
- Efforts are being made to contribute to the reduction of off-site heat load, such as measures to reduce the heat island effect.

Assessment criteria
- The result of LR3.2.2 "Heat Island Effect" of CASBEE-BD/NC is referred for scoring.

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13.3 Reducing the impact of extreme weather on building

13.3.1 Take measures against typhoons and flying debris, floods, and landslides

SDGs original

Evaluate efforts regarding typhoon and flying object countermeasures, flood countermeasures, and landslide countermeasures that can withstand extreme weather conditions, etc.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	One of the efforts to be assessed is applicable	two points
Actively engaging	Two or more of the efforts to be assessed are applicable	three points

Efforts to be assessed
1) Prepare for the possibility of increased damage from high winds in the future (design above and beyond building code, measures against flying debris in openings such as laminated glass, storm windows, shutters, etc.).
2) Preparing for flood damage that may increase in the future (confirming local characteristics that are less likely to be affected, consideration of electrical equipment, etc., and evacuation procedures).
3) Preparedness for possible increase in landslide disasters in the future (confirming local characteristics that are less likely to be affected and evacuation methods).
4) Evacuation measures for the elderly and other vulnerable groups in the event of a disaster (e.g., evacuation advisory with adequate time, transportation methods, preparation of medicines, etc.)

Explanation

- The above efforts to address the risks associated with disasters that may increase in the future will be assessed.

13.3.2 Identify site hazards and share information

SDGs original

Efforts to confirm and share information on the possibility of natural disasters occurring in the local characteristics and possible damage will be assessed.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Confirm the hazard of the site using hazard maps, etc.
2) Share and disseminate information on disasters using digital signage, etc.

Explanation

- The above two items are used to assess whether the company confirms and shares information on the possibility of natural disasters occurring in the local characteristics and the expected damage.

13.4 Reducing the Impact of climate change on building users

13.4.1 Ensure a comfortable room temperature

CASBEE incorporated

Efforts to ensure a comfortable room temperature are assessed.

Efforts to be assessed

- The air conditioning system is designed to provide a comfortable room temperature even during peak load periods.

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Assessment criteria
- The result of Q1.2.1.1 "Room temperature" of CASBEE-BD/NC is referred for scoring.

13.4.2 Improving thermal insulation CASBEE incorporated

Evaluate efforts to control heat outflow from the indoor environment in winter and heat inflow into the indoor environment in winter in order to improve the indoor thermal environment.

Efforts to be assessed
- Efforts are being made to reduce heat gain or loss from the outside of the building.

Assessment criteria
- The result of Q1.2.1.2 "Perimeter performance" of CASBEE-BD/NC is referred for scoring.

13.4.3 Create a homogeneous thermal environment CASBEE incorporated

Evaluate efforts to create a homogeneous indoor thermal environment.

Efforts to be assessed
(1) Detailed zoning air conditioning is used to eliminate uneven temperatures in the indoor environment and create a comfortable environment.
(2) A type of air conditioning system is used to reduce the vertical temperature difference and airflow velocity (residual air velocity) in the occupied area.

Assessment criteria
- Scores will be calculated by averaging the scores from (1) and (2) of the efforts to be assessed.
- The results of Q1.2.1.3 "zoned control" of CASBEE-BD/NC and Q1.2.3 "type of air conditioning system" of CASBEE-BD/NC are used for (1) and (2), respectively, are referred for scoring.

13.5 Introduction to resilient design

13.5.1 Protecting internal equipment CASBEE incorporated

Evaluate efforts with respect to improving the continuity of use of the building and protecting internal facilities that contribute to ensuring resilience.

Efforts to be assessed
- Measures are taken to protect its internal facilities.

Assessment criteria
- The results of Q2.2.1.1 "Earthquake-resistance (resistance to building breakage)" and Q2.2.1.2 "Seismic isolation, seismic & vibration control (internal equipment protection)" of CASBEE-BD/NC are referred for scoring.

13.5.2 Ensure resilience of HVAC system CASBEE incorporated

Evaluate efforts to maintain the functionality of HVAC systems in the event of a disaster, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of the HVAC system.

Assessment criteria
- The result of Q2.2.4.1 "HVAC system" of CASBEE-BD/NC is referred for scoring.

13.5.3 Ensure resilience of water supply & drainage and sanitation systems CASBEE incorporated

Evaluate efforts to maintain the functionality of water supply & drainage and sanitation facilities in the event of a disaster, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of water supply & drainage and sanitation facilities.

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Assessment criteria
- The result of Q2.2.4.2 "Water supply & drainage, sanitation" of CASBEE-BD/NC is referred for scoring.

13.5.4 Ensure resilience of electrical equipment CASBEE incorporated

Evaluate efforts to maintain the functionality of electrical equipment during disasters, etc.

Efforts to be assessed
- Efforts are being made to secure power supply in case of emergency, such as power failure. (e.g., The facility equipped with emergency power generation equipment and uninterruptible power supply equipment, or the facility avoiding installation in underground spaces)

Assessment criteria
- The result of Q2.2.4.3 "Electrical equipment" of CASBEE-BD/NC is referred for scoring.

13.5.5 Ensure resilience of support method of machines & ducts CASBEE incorporated

Evaluate efforts to maintain the functionality of mechanical and plumbing supports in the event of a disaster, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of mechanical and piping supports.

Assessment criteria
- The result of Q2.2.4.4 "Support method of machines & ducts" of CASBEE-BD/NC is referred for scoring.

13.5.6 Ensure resilience of communication wiring CASBEE incorporated

Evaluate efforts to maintain the functionality of telecommunications and information facilities during disasters, etc.

Efforts to be assessed
- Efforts are being made to improve the reliability of communications & IT equipment.

Assessment criteria
- The result of Q2.2.4.5 "Communications & IT equipment" of CASBEE-BD/NC is referred for scoring.

Goal 14: Life Below Water

Efforts to achieve Goal 14 will be collectively assessed under Goal 12 Responsible Consumption and Production, etc.

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Goal 15: Life on Land

15.1 Consideration for greening of exterior, rooftop, and wall surfaces, and biodiversity conservation

15.1.1 Conservation of the biological environment — CASBEE incorporated

Evaluate efforts that contribute to the conservation and creation of the biological environment as a consideration for local characteristics.

Efforts to be assessed
- Initiatives that contribute to the preservation and creation of biotope are involved.

Assessment criteria
- The result of Q3.1 "Preservation and creation of biotope" of CASBEE-BD/NC is referred for scoring.

15.2 Soil contamination countermeasures

15.2.1 Preventing soil contamination — SDGs original

Efforts to control soil contamination are assessed.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Conduct soil contamination survey
2) Excavation and removal of contaminated soil

Explanation
- Evaluate efforts for investigation and excavation removal to control soil contamination.

15.3 Sustainable use of resources

15.3.1 Procuring timber from sustainable forestry — CASBEE incorporated

Evaluate efforts on the use of timber from sustainable forestry.

Efforts to be assessed
- Timber from sustainable forestry is used.

Assessment criteria
- The result of LR2.2.5 "Timber from sustainable forestry" of CASBEE-BD/NC is referred for scoring.

15.3.2 Engage in the use of local resources — CASBEE incorporated

Evaluate efforts, such as the active use of locally produced lumber, which contribute to the revitalization of local industry and economy.

Efforts to be assessed
- The use of materials with local characteristics (for structural materials, interior materials, exterior materials, exterior construction, etc.) is being considered.

Assessment criteria
- The results of Q3.3.1 "Attention to local characteristics & improvement of comfort - I 2) Use of materials with local characteristics" and Q3.2 "Attention to townscape and landscape 4)

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Formation of a good landscape with materials with local characteristics" of CASBEE-BD/NC are referred for scoring.

15.4 Reuse of wood generated during building disposal

15.4.1 Reusing old materials — SDGs original

Assess architectural innovations related to the reuse of old materials.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
Reuse of domestic old wood

Explanation
- Domestic used lumber is reused to contribute to the reduction of waste and deforestation and to the reduction of GHG emissions by shortening transportation distances.

Goal 16: Peace, Justice and Strong Institutions

Efforts to achieve Goal 16 will be collectively assessed under Goal 12 Responsible Consumption and Production, etc.

Goal 17: Partnerships for the Goals

17.1 Consideration for suppliers when procuring materials

17.1.1 Procuring timber from sustainable forestry — CASBEE incorporated

Evaluate efforts on the use of timber from sustainable forestry.

Efforts to be assessed
- Timber from sustainable forestry is used.

Assessment criteria
- The result of LR2.2.5 "Timber from sustainable forestry" of CASBEE-BD/NC is referred for scoring.

17.1.2 Engage in the use of local resources — CASBEE incorporated

Evaluate efforts, such as the active use of locally produced lumber, which contribute to the revitalization of local industry and economy.

Efforts to be assessed
- The use of materials with local characteristics (for structural materials, interior materials, exterior materials, exterior construction, etc.) is being considered.

Assessment criteria
- The results of Q3.3.1 "Attention to local characteristics & improvement of comfort - I 2) Use of materials with local characteristics" and Q3.2 "Attention to townscape and landscape 4) Formation of a good landscape with materials with local characteristics" of CASBEE-BD/NC are

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referred for scoring.

17.2 Building plans that facilitate communication

17.2.1 Create a favorable townscape and landscape CASBEE incorporated

Assess how the building (the entire site including the exterior) contributes to reducing the negative impact on the surrounding townscape and landscape and creating a favorable townscape and landscape.

Efforts to be assessed
- Efforts are being made for the surrounding townscape and landscape (use of materials suited to the characteristics of the area, planting of trees to create a good landscape) (e.g., the "Matching" of the "Matching" function).

Assessment criteria
- The result of Q3.2 "Consideration for townscape and landscape" of CASBEE-BD/NC is referred for scoring.

17.2.2 Encourage community participation CASBEE incorporated

Evaluate efforts to encourage the participation of building users and local residents in the operation and management of the building.

Efforts to be assessed
- Efforts are being made to encourage the participation of local residents in the operation and management of the building.

Assessment criteria
- The result of Q3.3.1 "Attention to local characteristics & improvement of comfort - V Involvement of building users, etc. " of CASBEE-BD/NC is referred for scoring.

17.3 Supply chain management, creating shared value

17.3.1 Work with stakeholders to improve economic, social, and environmental conditions in production and distribution processes SDGs original

Assess the collaboration with stakeholders to improve the economic, social and environmental conditions in the production and distribution process.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
1) Identify the economic, social, and environmental improvement initiatives of suppliers of parts and materials for products, and determine whether or not to collaborate with them.
2) Utilize AI and IoT technologies to enhance collaboration with stakeholders.

Explanation
- Efforts to procure materials and construction materials that are economically, socially, and environmentally sound in the production and distribution process are assessed in "12.8.1 Procurement of materials and construction materials that are economically, socially, and environmentally sound in the production and distribution process".

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17.4 Introduction of after-sales service system

17.4.1 Provide after-sales service SDGs original

Evaluate efforts for providing appropriate after-sales service.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
Management of basic building information and maintenance history to enable follow-up investigations in the event of defects

Explanation

- Efforts to provide appropriate after-sales services are assessed.

17.5 ICT environment that facilitates communication

17.5.1 Provide ICT environment t SDGs original

Evaluate efforts to promote communication through the use of ICT technology.

Assessment criteria		
Not engaging	None of the efforts to be assessed are applicable.	one point
Engaging	（no corresponding level）	two points
Actively engaging	At least one of the efforts to be assessed is applicable	three points

Efforts to be assessed
Introduction of regional communication services utilizing ICT technology (disaster prevention information, energy management, regional monitoring service, community activities, etc.)

Explanation

- Evaluate efforts for their use of ICT technology to promote communication.

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PART IV. Commentary

1. Overview of CASBEE

1.1 Measures to Promote Sustainability

Buildings, which consume and discard resources and energy in enormous quantities, are one of architectural category which we must act urgently to develop and promote techniques and policies able to assist the drive towards sustainability. Possible methods for promoting sustainable construction include environmental construction education, dissemination of information and legal regulations. However, the introduction of the market mechanism based on an assessment system is considered most feasible. There has been a growing movement towards sustainable construction since the second half of the 1980s, leading to the development of various methods for evaluating the environmental performance of buildings. Methods developed overseas include BREEAM (Building Research Establishment Environmental Assessment Method[*1] and LEED™ (Leadership in Energy & Environmental Design[*2], as an international project. These methods have attracted interest around the world. This kind of assessment, with the publication of the results, is one of the best methods now available to provide an incentive for clients, owners, designers and users to develop and promote highly sustainable construction practices.
CASBEE was developed according to the following policies:
(1) The system should be structured to award high assessments to superior buildings, thereby enhancing incentives to designers and others.
(2) The assessment system should be as simple as possible.
(3) The system should be applicable to buildings in a wide range of building types.
(4) The system should take into consideration issues and problems peculiar to Japan and Asia.

1. 2 Framework of CASBEE: CASBEE Family

1.2.1 Building Lifecycle and Four Assessment Tools

As shown in Figure III.1.1, CASBEE was developed in the suite of architectural design process[*3], starting from the pre-design stage and continuing through design and post design stages.

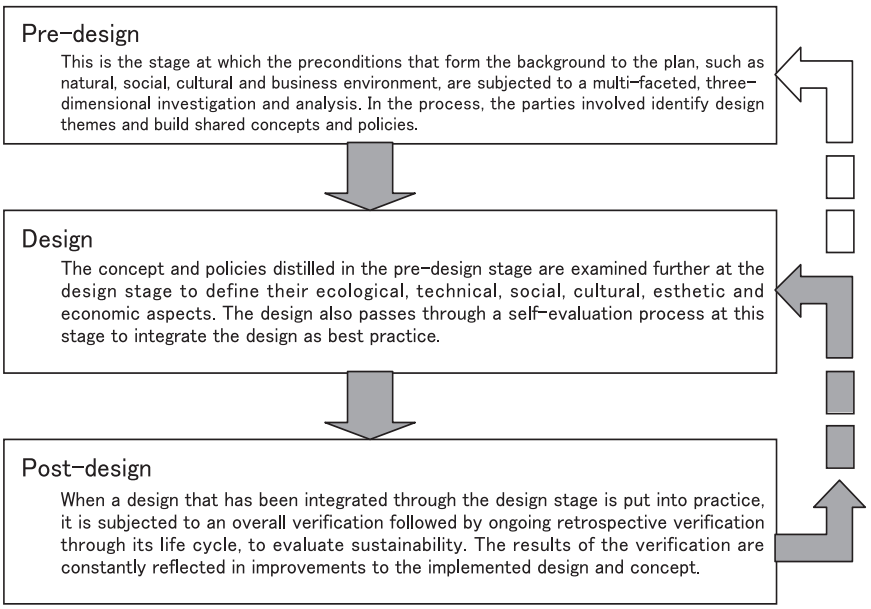

Figure IV.1.1 The cyclical process of building design

*1 Building Research Establishment (UK), 1990
*2 US Green Building Council, 1997
*3 Architectural Institute of Japan, Sub Committee on National and International Trend Research and Proposal to Promote Sustainable Buildings, 2001

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Corresponding to the building lifecycle, CASBEE is composed of four assessment tools, CASBEE for Pre-Design, CASBEE for Building Design (New Construction), CASBEE for Building Design (Existing Building) and CASBEE for Building Design (Renovation), and to serve at each stage of the design process (Figure IV.1.2). "CASBEE Family" is the collective name for these four tools and the expanded tools for specific purposes, which are listed below. Each tool is intended for a separate purpose and target user, and is designed to accommodate a wide range of uses (offices, schools, apartments, etc.) in the evaluated buildings.

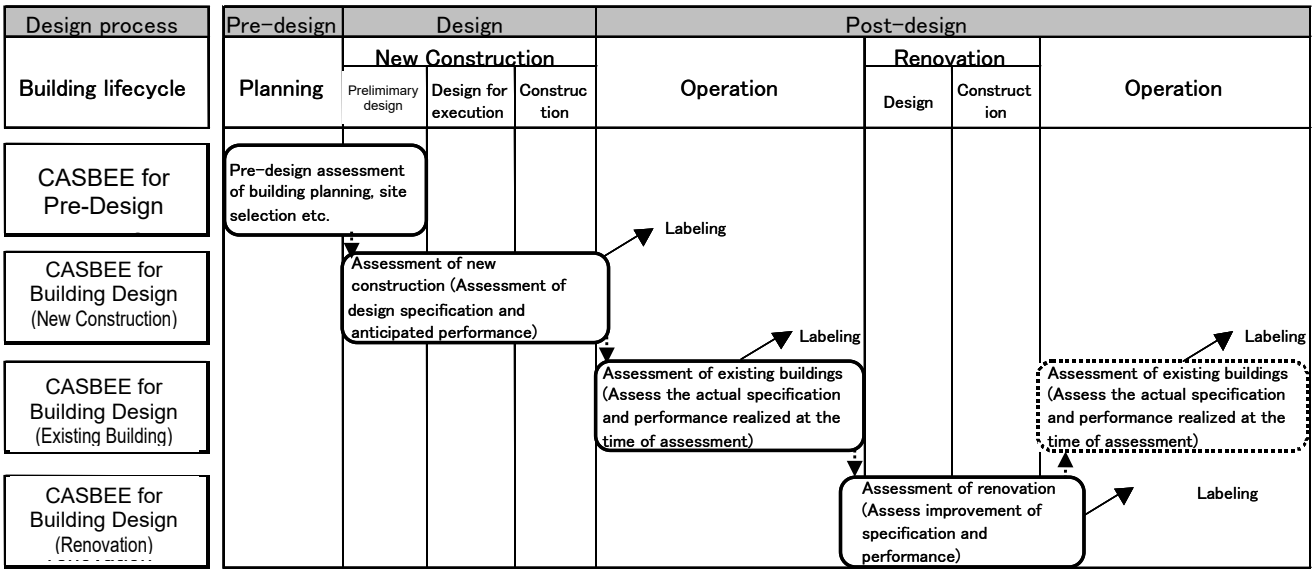

Figure IV.1.2 Building Lifecycle and Four Assessment Tools

CASBEE for Pre-Design (not published)
This tool aims to assist the owner, planner and others involved at the planning (pre-design) stage of the project. It has two main roles:
1) To assist in grasping issues such as the basic environmental impact of the project and selecting a suitable site.
2) To evaluate the environmental performance of the project at the Pre-design stage.

CASBEE for Building Design (New Construction), CASBEE-BD/NC
This is a self-assessment check system that allows architects and engineers to raise the BEE value of the building under consideration during its design process. It makes assessments based on the design specification and the anticipated performance. It can also serve as a labeling tool when the building is subjected to expert third-party assessment.

CASBEE for Building Design (Existing Building), CASBEE-BD/EB
This assessment tool targets existing building stock, based on operation records for at least one year after completion. It was developed to be applicable to asset assessment as well.

CASBEE for Building Design (Renovation), CASBEE-BD/RN
There is growing demand for building stock renovation, especially in Japanese market. In the same way as "CASBEE for Building Design (Existing Building)," this tool targets existing buildings. It can be used to generate proposals for building operation monitoring, commissioning and upgrade design with a view to ESCO (Energy Service Company) projects, which will be increasingly important in future, and for building stock renovation.

1.2.2 CASBEE for Specific Purposes

The basic CASBEE tool suite is applicable to a diverse range of individual applications.

(1) Applicability to detached houses
The CASBEE Basic Tools covered assessment of apartments, but not detached houses. As assessment tools for evaluating detached houses, CASBEE for Detached Houses for New Construction (CASBEE-DH/NC) and CASBEE for Detached Houses for Existing Building (CASBEE-DH/EB) were developed.

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(2) Assessment of dwelling units of apartments
Regarding apartments, the overall building is evaluated based on CASBEE-BD/NC. However, the performance of the individual dwelling units cannot be evaluated utilizing CASBEE-BD/NC, since the performance is thought to be different depending on the position of each unit in the housing block. As a tool for evaluating the environmental performance of individual dwelling units, CASBEE for Dwelling Unit for New Construction was developed.

(3) Application to buildings for short-term use
The tool "CASBEE for Temporary Construction," was developed as an extension to CASBEE-BD/NC for evaluating temporary buildings constructed specifically for short-term use.

(4) Consideration for regional character
As noted above, CASBEE-BD/NC can be used by local authorities in construction administration. Local authorities that use this tool can tailor it to local conditions, such as climate and prioritized policies. Changes are generally made by modifying the weighting coefficients. Such assessment can be made mandatory in the same way as an Energy Saving Plan, to be submitted to the authorities together with the building approval application, as a way to improve the environment efficiency of buildings in the region.
One example is "CASBEE-Nagoya," which began on April 2004 under building environmental consideration system of Nagoya city.
Flexible response to regional character is a common feature of all elements of the CASBEE family.

(5) Detailed assessment of heat island impact
The heat island effect is becoming a critical issue in major urban areas, such as Tokyo and Osaka. CASBEE for Heat Island was developed to evaluate efforts in buildings to alleviate the heat island effect. Its role is to make a more detailed and quantitative assessment of the heat island-related assessment items included in the basic tools.

(6) Applicability to the property market
In order to encourage broad use of eco-friendly buildings, a new framework is required, in which environmental measures taken in the building are connected to the increased added values of the property. Especially in existing buildings, intended users of the framework are stakeholders different from those involved in new construction, including building owners, investors, building users and managers. Therefore, an assessment framework that is easy to use for these stakeholders would be required. Consequently, CASBEE for Real Estate (CASBEE-RE), which is specialized in items relating to increased added values of properties in its scope of assessment, and in which the assessment standard has been significantly simplified, was developed. Buildings subject to the assessment are existing ones having operational experience of more than 1 year after the completion of construction.
In addition, the "CASBEE-Wellness Office (CASBEE-WO)" was developed to evaluate the health promotion and workplace productivity of the office.

(7) Expansion to the urban
The basic CASBEE tools evaluate individual buildings, but it is also important to evaluate environmental performance when buildings form groups. Many recent city-center redevelopment projects have been planned for integration with their surrounding districts, and in such cases, they should deliver positive effects for the surrounding environment, such as promoting the use of dispersed energy over the entire area. In short, they should raise environment quality (Q). Even if each individual building has a different owner, the application of common restrictions on buildings within a district can raise environment quality and performance throughout the area. In order to take into account the assessment of these measures taken through urban renewal and district-wide efforts involving multiple buildings, CASBEE for Urban Development (CASBEE-UD) was developed.

(8) Expansion to a city scale
CASBEE for Cities, a tool for evaluating environmental performance on a city scale that extends beyond the regional scale, was developed. The purpose of this tool is to support implementation of environmental policies by local governments, through which the public administration evaluates their own environmental policies and effects on a municipal basis.
In addition, CASBEE for Cities has a detailed version (unpublished) for evaluators to calculate GHG emissions in detail, and "CASBEE for Cities (pilot version for worldwide use),” which evaluates cities around the world outside of Japan.

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(9) Development of CASBEE checklists for general public
In general, specialized knowledge and skills are required to conduct CASBEE evaluations, but it is also necessary to promote environmental considerations in houses and buildings for the users and the residents, and it is also a major issue to spread CASBEE to general public other than specialized professionals and engineers. To address this, the following checklist has been developed.
The "Housing Health Checklist" is a tool that allows residents to easily check the factors of their home that affect their health, and to easily understand the performance of their home in terms of health and comfort. The "House Renovation Checklist" is a tool that allows residents to easily check the performance of their homes in terms of earthquake resistance, energy saving, and barrier-freeness, and is intended to lead to subsequent renovations. The "Housing Resilience Checklist" is a tool for checking the degree of countermeasures and response to natural disasters of the home and the residents. It aims to promote countermeasures by making the residents aware of the presence or absence of disaster prevention measures themselves.

Table III.1.1 Expansion of CASBEE for specific purposes (as of March 2025)

Application	Name	Summary
Assessment on detached houses	CASBEE for Detached Houses (New Construction) CASBEE for Detached Houses (Existing Building)	CASBEE assessment for detached houses
Assessment of dwelling units of apartments	CASBEE for Dwelling Unit (New Construction)	CASBEE Assessment of dwelling units of apartments
Short-term use	CASBEE for Temporary Construction	Currently covering all purposes
For individual areas	-	Modifying CASBEE-BD/NC according to the locality
Assessment on the efforts in alleviating the heat island phenomenon	CASBEE for Heat Island	Detailed edition of CASBEE heat island assessment
Applicability to the property market	CASBEE for Real Estate	Applicability of CASBEE assessment to the property market, focusing on existing buildings
Assessment on promotion of health and workplace productivity for Offices	CASBEE-Wellness Office	Evaluation of health, comfort, workplace productivity, etc. in the office
Assessment on building groups (urban scale)	CASBEE for Urban Development	CASBEE assessment mainly about the external space on a district scale
Assessment on a city scale	CASBEE for Cities CASBEE for Cities (for worldwide use) *	The public administration evaluates their environmental policies and effects on a municipal basis. (*Pilot version)
Checklists for general public	Housing Health Checklist House Renovation Checklist Housing Resilience Checklist, etc.	Simplified assessment tool for the general public to promote environmental considerations in houses and buildings

1.3 The Background to CASBEE Development

1.3.1 Past development of environmental performance assessment

(1) Stage 1
The oldest form of environmental assessment of buildings in Japan is the performance assessment of building environments, mainly indoor environments, which is basically aimed at improving living amenities or enhancing convenience for occupants. This can be thought of as Stage 1 in the evolution of the environmental assessment of buildings. At this stage, since the local environment surrounding the building concerned and the global environment were generally considered as open systems, environmental assessments paid no attention to the fact that buildings simply discharged their environmental loadings into their surroundings. In this sense, the philosophy behind environmental assessments was very clear, but opposite to today's approach.

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(2) Stage 2
The growth of public concern over air pollution problems or the effects of wind on pedestrians, etc. in urban areas such as Tokyo in the 1960s led to the establishment of environmental impact assessments. This was the time when the concept of environmental loadings was initiated and incorporated into building environmental assessments, and this is thought of as Stage 2. Here, only the negative effects that buildings have on their surrounding environments, such as urban air pollution, wind damage, and sunlight obstruction, etc., are considered as environmental impacts, i.e. environmental loads. In Stage 1, the environment usually suggests a private space or property, whereas in Stage 2 it is a public (or non-private) space.

(3) Stage 3
Stage 3 in the evolution of the environmental assessment of buildings began after the increase in the consciousness of global environmental problems in the 1990's. A number of specific methods have already been proposed, based on extensive research experience, including BREEAM, LEED™ and SB Tool.
In recent years, building environmental performance assessment methods such as these have spread rapidly in society, particularly in developed countries, and they have also come to be used for "Design for Environment (DfE)" and building environmental labeling (rating).
The main issue in assessment at this stage is the negative impacts; in other words, the environmental loads that the buildings have on the environment. That is to say, it considers Life Cycle Assessment (LCA), evaluating the environmental loads of a building throughout its life. In addition, building performance was also included as an object in some assessments, as in Stage 1. Notably, none of the above assessment tools clearly distinguish between these two basic assessment objects (in Stage 1 and Stage 2). Also, the scope (or boundary) of the assessment objects is not clearly stated. In this sense, the concept of environmental assessment in Stage 3 lacks the clear underlying philosophy found in Stage 1 and Stage 2, while the framework of assessment has expanded in Stage 3. The assessment framework, relative to the first and second stages, but conversely, the framework of assumptions on which the environmental performance evaluation is based has become unclear.

1.3.2 Stage 4: New Stage in the Environmental Assessment of Buildings

Development of CASBEE started from perception that the above situation required a reconstruction of the current environmental performance assessment framework into a new system clearly based on the perspective of sustainability. Stage 3 in environmental assessment began when it was recognized that the capacities of local environments, and the world as a whole, were reaching a limit. As a result, the concept of closed ecosystems became essential for determining environmental capacities when conducting environmental assessments. Therefore, a virtual enclosed space bounded by the borders of the building site, as shown in Figure IV.1.3 is proposed here in making environmental assessments of buildings. The on-site space bounded by these virtual boundaries can be controlled by the parties involved in the building, including the owner and planner, but the space beyond is public (non-private) space, which is largely beyond control.
The environmental loads can thus be defined as "negative aspects of environmental impact that go beyond the virtual enclosed space boundary to the outside (the public property)." The improvement of environmental performance within the virtual enclosed space boundary is defined as "improvement in everyday amenity for the building users." Dealing with both factors, the stage 4 environmental assessment clearly defines these two factors, and distinguishes one from the other. This makes the philosophy of assessment at stage 4 much clearer, and it has been based to form the framework for CASBEE.

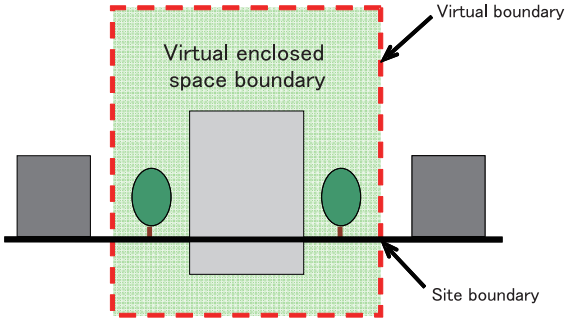

Figure IV.1.3 Virtual enclosed space boundary divided by the site boundary

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1.3.3 From Eco-efficiency to Built Environment Efficiency (BEE)

The concept of Eco-efficiency has been introduced for CASBEE to enable the integrated assessment of two factors, inside and outside the building site. Eco-efficiency is normally defined as "Value of products and services per unit environmental load."[*4] Efficiency is commonly defined in terms of input and output quantities, so a new model can be proposed for an expanded definition of Eco-efficiency, as "(productive output) / (input + non-productive output)." As Figure IV.1.4 shows, this new model of environment efficiency can be extended to define Built Environment Efficiency (BEE), which CASBEE uses as its assessment indicator.

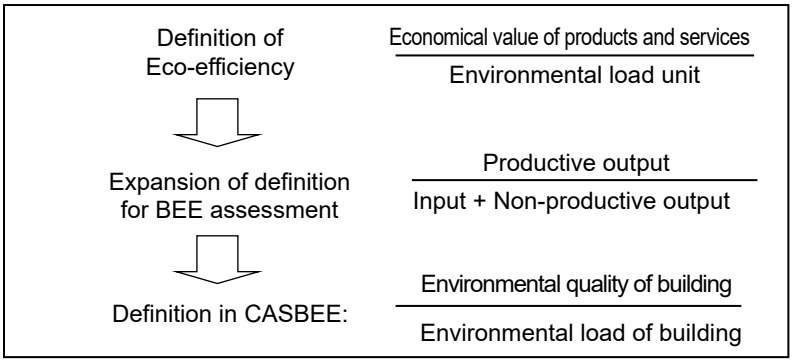

Figure IV.1.4 Development from the Eco-efficiency concept to BEE

*4 From the World Business Council for Sustainable Development (WBCSD)

1.4 Assessment using CASBEE

1.4.1 Two Categories of Assessment: Q and L

Under CASBEE there are two spaces, internal and external, divided by the virtual boundary, which is defined by the site boundary and other elements, with two factors related to the two spaces. Thus, we have put forward CASBEE in which the "negative aspects of environmental impact that go beyond the virtual enclosed space boundary to the outside (the public property)" and "improvement in everyday amenity for the building users, within the virtual enclosed space boundary" are considered side by side. Under CASBEE, these two factors are defined below as Q and L, the main assessment categories, and evaluated separately.

- Q (Quality): Environmental quality of building:
Evaluates "improvement in everyday amenity for the building users, within the virtual enclosed space boundary"

- L (Load): Environmental load of building:
Evaluates "negative aspects of environmental impact that go beyond the virtual enclosed space boundary to the outside (the public property)"

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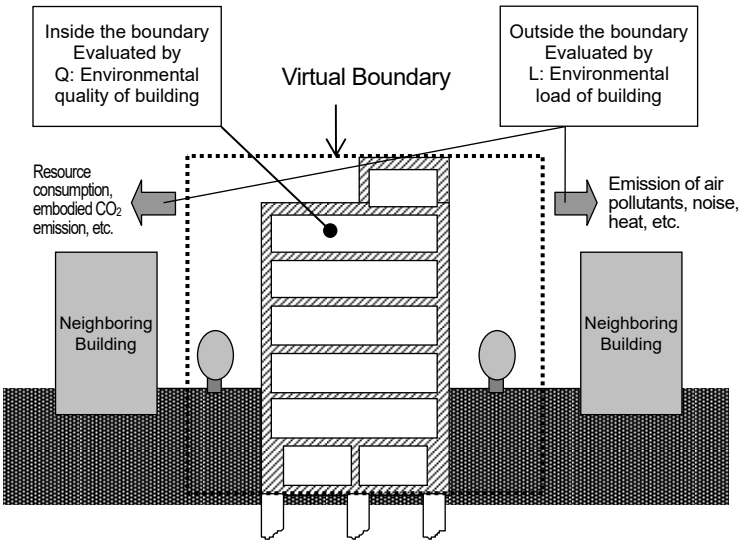

Figure IV. 1.5 Division of the assessment categories for Q: Environmental quality of building and L: Environmental load of building based on the virtual boundary

1.4.2 Four Target Fields of CASBEE and the Rearrangement

CASBEE covers the following four assessment fields: (1) Energy efficiency (2) Resource efficiency (3) Local environment (4) Indoor environment. These four fields are largely the same as the target fields for the existing assessment tools described above in Japan and abroad, but they do not necessarily represent the same concepts, so it is difficult to deal with them on the same basis. Therefore, the assessment categories contained within these four fields had to be examined and reorganized.

As a result, the assessment categories were classified as shown in Figure IV. 1.6 into BEE numerator Q (Environmental quality of building) and BEE denominator L (Environmental load of building). Q is further divided into three items for assessment: Q1 Indoor environment, Q2 Quality of service and Q3 Outdoor Environment (On-site). Similarly, L is divided into L1 Energy, L2 Resources & Materials and L3 Off-site Environment.

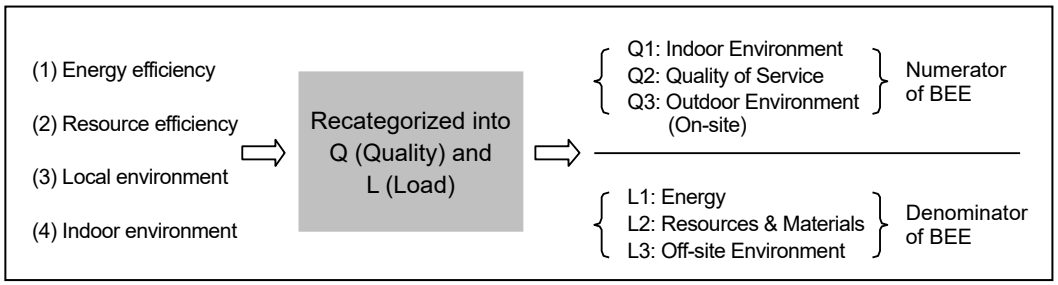

Figure IV.1.6 Classification and rearrangement of assessment items into Q (Environmental quality of building) and L (Environmental load of building)

1.4.3 Environmental Labeling Using Built Environment Efficiency (BEE)

As explained above, BEE (Built Environment Efficiency), using Q and L as the two assessment categories, is the core concept of CASBEE. BEE, as used here, is an indicator calculated from Q (Environmental quality of building) as the numerator and L (Environmental load of building) as the denominator.

$$\text{Built Environment Efficiency (BEE)} = \frac{\text{Q (Environmental Quality of Building)}}{\text{L (Environmental Load of Building)}}$$

The use of BEE enabled simpler and clearer presentation of building environmental performance assessment results. BEE values are represented on the graph by plotting L on the x axis and Q on

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the y axis. The BEE value assessment result is expressed as the gradient of the straight line passing through the origin (0,0). The higher the Q value and the lower the L value, the steeper the gradient and the more sustainable the building is. Using this approach, it becomes possible to graphically present the results of built environment assessments using areas bounded by these gradients. The figure shows how the assessment results for buildings can be ranked on a diagram as class C (Poor), class B-, class B+, class A, and class S (Excellent), in order of increasing BEE value.

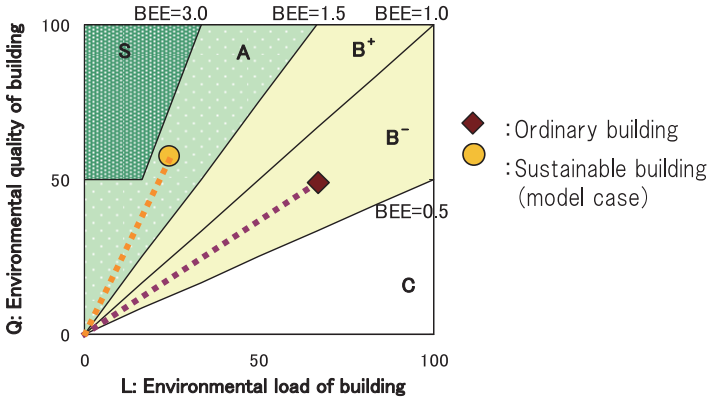

Figure IV.1.7 Environmental labeling based on BEE

1.5 Basic Approach to Subjects for Assessment by CASBEE

CASBEE is a comprehensive tool focused on evaluating the environmental performance of buildings. Therefore, it is not intended to evaluate all aspects of building performance and quality. In particular, specialized assessment systems already exist for fields such as aesthetic and economic performance, so they are excluded from consideration by CASBEE.

(1) Aesthetic assessment

CASBEE emphasizes everyday amenity and working convenience for building users as the key aspects of the environmental quality of buildings. Scenic consideration in matters such as building position, form and exterior materials, and efforts to adapt to regional character are considered here, but we have decided not to evaluate aesthetic design characteristics, such as building beauty, which are difficult to evaluate objectively.

(2) Assessment of Cost and Profitability

CASBEE is intended to be an assessment tool applicable to a wide range of building types in both the public and private sectors. As such we have decided that assessment of cost-effectiveness should be left for building owners to judge according to their individual business situations. The market value of the completed building, the profitability of business conducted in the building and other aspects less related to global environmental problems play a large part in the project client's judgment of how much to invest in improving a building's environmental performance.
CASBEE serves as an indicator for considering the "best balance of quality and the environment," based on the assumption of broadly economic buildings, and its assessment items include social perspectives such as consideration for regional character.

1.6 Application of CASBEE

CASBEE is currently utilized for various purposes described below.

1.6.1 Administrative Applications of CASBEE

The City of Nagoya has been operating its environmentally-responsible building program under the Environmental Conservation Ordinance since April 2004. The program mandates that, for new construction, extensions or renovation projects for buildings with a total floor space exceeding 2,000 m^2, owners must conduct assessment using CASBEE-Nagoya and report results to the City. Also, the City of Yokohama also started its own CASBEE reporting program in July 2005. As of March 2025, CASBEE programs have been implemented in 24 regional authorities and implementation is under consideration in more municipalities. Refer to the CASBEE website for further details.

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1.6.2 Use in the Private Sector

(1) For designers to employ in Design for Environment (DfE)

CASBEE can serve as an assessment tool that designers can use to check the environmental performance of buildings at the design stage and provide their clients and others with objective information on environmental considerations. It can also be used as an indicator for the indirect setting of targets that clients, designers and others can use to evaluate their own environmental management activities under ISO14000 and other systems.

(2) Environmental labeling that can be used in the asset valuation of buildings

CASBEE can be used as an environmental labeling tool available at the time of property appraisal of buildings. Particularly, by obtaining a third-party certification, the labeling represents official reliability and can be easily taken into account upon realty appraisal.

(3) Environmental performance diagnosis and upgrade design with a view to ESCO projects and building stock refurbishment

CASBEE can be used as a tool to generate proposals for building operation monitoring, commissioning and upgrade design with a view to ESCO (Energy Service Company) projects and building stock refurbishment. Assessment under CASBEE for Building (Renovation) is a tool that can be applied to energy-saving remodeling, etc.

(4) Selection of contractors for design competitions, proposals and PFI projects

CASBEE is now being applied in the scoring process of design competitions and proposals, in evaluation of PFI project operators and in design-stage verification of environmental performances. CASBEE's comprehensive environmental performance indicators can be used to co-establish environmental targets between clients and designers, or between building owners and tenants. Further, not only municipal authorities but also building clients in the private sector could propose their target conditions of the comprehensive environmental performance to designers. Other possible applications include giving high points to designers who made design proposals achieving the optimum environmental performance on a limited budget.

(5) International building assessment tool

As for the use of CASBEE overseas, the TEDA MSD Low Carbon Model Building (H2 Building) built in Tianjin, China, received S rank certification for CASBEE-New Construction in March 2014.In December 2015, " CASBEE for Cities (Pilot version) for worldwide use " was released at the Japan Pavilion at COP21 as a city-level environmental performance evaluation tool, making it possible to evaluate all cities around the world based on the concept of BEE, which is the philosophy of CASBEE. In 2016, a pilot version of the "CASBEE-Iskandar" evaluation manual was developed through joint research between the Malaysian Iskandar Development Agency, University of Technology Malaysia and Japan. The International Organization for Standardization (ISO) published ISO 21931-1: Framework for methods of assessment of the environmental performance of construction works-Part I: Buildings, in June 2010, and a number of international standardization work is underway on environmental performance evaluation methods for buildings, city blocks, and cities. Such international standardization is expected to lead to the further international dissemination of environmental performance evaluation methods for buildings, urban blocks, and cities in the future through multilateral mutual certification of environmental labels.
In the near future, a comprehensive environmental performance assessment system is likely to be utilized at international design competitions held in China and other Asian countries, offering growing opportunities for Japanese companies to participate.

1.6.3 Application to Education

Use of CASBEE is also progressing in construction-related education in universities and elsewhere. At present, it is used for environmental planning training in most universities with faculties of architecture. We hope that construction-related professional bodies and academic bodies will use CASBEE in continuing professional development (CPD) for construction professionals who are already in practice.

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1.7 CASBEE Assessment Certification System and Accredited Professional Registration System

The CASBEE Assessment Certification System and the Accredited Professional Registration System are implemented by the Institute for Built Environment and Carbon Neutral for SDGs (IBECs). The CASBEE Assessment Certification System also operated by accredited organizations designated by the institute.

1.7.1 Assessment Certification System

When the assessment results produced by CASBEE are provide to third parties, it becomes increasingly important to ensure their reliability and transparency. The assessment certification system is a system established to ensure reliability in information provided to third parties in order to confirm the accuracy of results generated by CASBEE, and thereby promote its proper and more widespread use. This is a system used to ensure the reliability of asset appraisal and labeling for evaluated buildings by designers, owners and builders. Buildings subject to the certification include not only those evaluated by CASBEE for Building Design for New Construction, but also a wide range of buildings including those evaluated by CASBEE for Building Design for Existing Building, CASBEE for Building Design for Renovation, CASBEE for Detached Houses, CASBEE for Real Estate and CASBEE for Urban Development, CASBEE-Wellness Office. As of February 2025, more than 4,000 buildings and projects have been certified, and this number is expected to continue to increase.

1.7.2 Accredited Professional Registration System

CASBEE is based on making assessment as quantitative as possible, but it includes assessment items that are qualitative in nature. As such, it requires a specialized engineer with expertise and knowledge in the comprehensive environmental performance evaluation of buildings. That is why the CASBEE Accredited Professional Registration System was established. Those aiming to become accredited professionals must attend the training course, pass the examination and complete registration. Currently, we have CASBEE Building Accredited Professionals as specialist engineers who handle CASBEE-BD/NC, /EB, /RN, CASBEE Detached House Accredited Professionals who specialize in CASBEE-DH, and CASBEE Real Estate Accredited Professionals who handle CASBEE-RE. In addition, CASBEE Wellness Office Accredited Professionals are experts who handle CASBEE-WO. As of April 2024, the total number of registrants for these four types of experts has exceeded 11,800.

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2. Whole Life Carbon

2.1 What is WLC

When evaluating impact of a building on the global environment, it is important to evaluate the entire existence of the building from construction to demolition (called its "lifecycle"). Among impacts on the global environment, the one currently regarded as the most important is global warming, and the method generally used when gauging impact on global warming is to calculate total emission of GHG, for comparison. For GHG calculation, the unit is used, that converts impact on global warming to an equivalent CO_2 weight, such as [kg-CO_{2eq}] etc. Whole Life Carbon (WLC), as well as Lifecycle CO_2 ($LCCO_2$), is the total amount of GHG emission generated by the building in its entire lifespan.
The lifecycle of a building is divided into stages, including construction, operation, renewal, demolition and disposal, and the building impacts global warming at each stage, so it is necessary to evaluate the total impact. For example, at the construction stage, there is the manufacture of the materials used on the construction site, transportation of those materials to the site, and the use of materials and energy by heavy machinery on site. At the operation stage, there is energy consumption, such as for heating and cooling, hot water supply, lighting, and OA equipment, and refurbishment work performed once a decade or so uses energy for the manufacture of newly added materials, and for the disposal of removed materials. At the final demolition stage, energy is used for the demolition work, and for disposal of the demolished materials. The materials and energy used in these ways are converted to GHG emissions for the purpose of gauging impact on global warming, and the total of all such emissions is the Whole Life Carbon (Hereinafter, WLC).

Figure IV.2.1 Impact on the global environment generated from buildings (Ikaga)

2.2 Basic Approach to WLC Assessment Using CASBEE for Building Design

In general, the task of evaluating the WLC of a building takes large amounts of time and effort. Taking the construction stage as an example, the first step is to investigate the types and amounts of energy resources used in each stage of the extraction, transportations and processing of the resources used to make every one of the materials and parts that make up the building, then multiply each by the GHG emission intensity specific to the material (the GHG emission per unit weight of the material), and add together all the results. Next, calculate the GHG emissions corresponding to the energy consumed in the construction, and multiply each by the GHG emission factor* for each energy type (the GHG emission per unit energy consumption), and add the result to the previous result. This kind of process must also be performed for all stages to find the WLC.
The collection of all these types of information, and the setting of assessment conditions, require expert knowledge. Also, buildings have different applications, component elements, locations, uses and other attributes, so each one must be evaluated individually. Performing this kind of task at the design and construction stages would be extremely difficult for most users of CASBEE-BD, damaging the simplicity which was a key development concept for CASBEE.
Therefore, the following method is used for assessment.

* In this manual, the GHG emissions per unit material weight is referred to as GHG emission intensity, while the GHG emissions per unit energy consumption for each energy type is separately called the GHG emission factor. The GHG emissions per 1 MJ primary energy consumption based on the primary energy source composition ratios by building type is referred to as the GHG conversion coefficient by building type (See 2.3.3).

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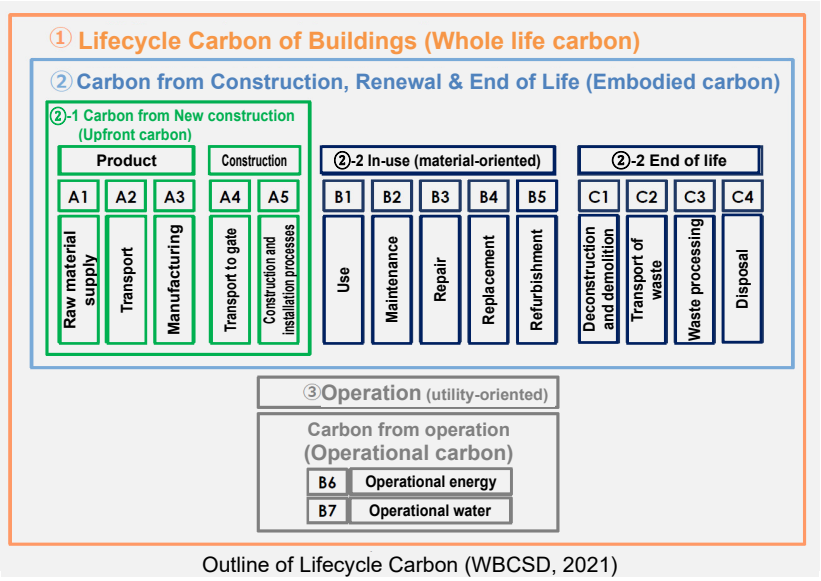
(1) To minimize the burden of assessment work, there is no need to gather extra information or set conditions solely for the WLC calculation. Instead, WLC is calculated automatically from the results of assessment items particularly related to GHG emissions, which have already been evaluated for CASBEE. This is called the "Standard Calculation."
(2) In the Standard Calculation, the assessment subjects are narrowed down to those which are important and can be evaluated, which means that not all of the efforts addressed in CASBEE assessment relevant to WLC are evaluated for calculation of WLC. Nevertheless, it indicates WLC with the primary purpose of informing the user of an approximate figure for GHG emission, reduction effects, and other aspects related to GHG emissions.
(3) If the assessor personally gathers detailed data and calculates a more accurate WLC value, that value can be displayed in CASBEE-BD/NC as "Individual Calculation" on the Evaluation Results Presentation Sheet under "2.2 WLC (Global Warming Impact Chart)." The results of individual calculations are not reflected in "LR3.1 Consideration of Global Warming" and BEE. (See 2.3.6)
(4) In order to simplify the process, calculation of GHG emissions at the operation stage is based on the conversion of primary energy consumption into GHG emissions.

2.3 Assessment Method

The following figure shows the outline of WLC for buildings.

WLC in CASBEE-BD evaluates the following items within the building's lifecycle. The sum of these three classifications is the WLC, which is used in the assessment of "LR3.1 Consideration of Global Warming," and is indicated with a breakdown on a bar chart in the Global Warming Impact Chart of the assessment software.

Construction: Manufacture, transportation and construction of materials and components used at the new construction stage. (②-1 in the figure)
Maintenance/Renewal/Demolition: Manufacture and transportation of materials and components used at the maintenance and upgrade stage (②-2 in the figure), and transportation to treatment facilities for demolition materials generated at the demolition stage (②-3 in the figure).
Operation: Energy consumed during operation. (③ in the figure)



Outline of Lifecycle Carbon (WBCSD, 2021)

Figure IV.2.2 Outline of Whole Life Carbon (Source: J-CAT® operation manual v2.0)

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2.3.1 Basic components of WLC assessment

An example of WLC assessment results using CASBEE-BD/NC is shown. WLC is indicated in terms of the following items (1) to (4).

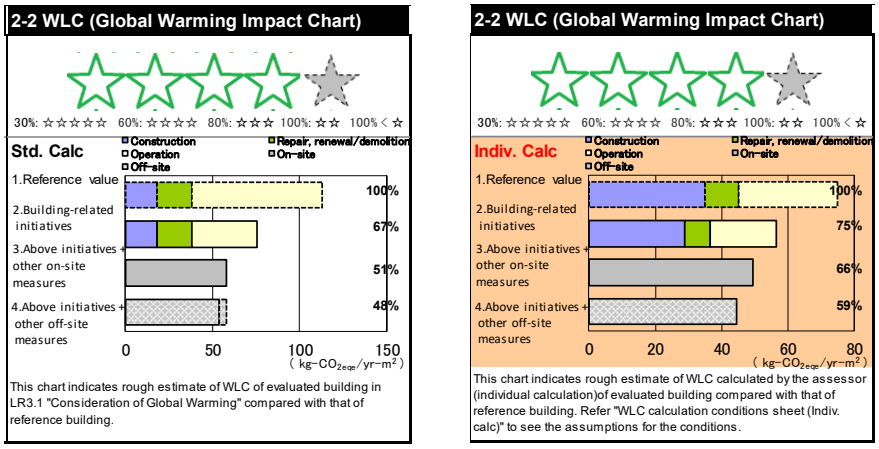
(1) Reference value (WLC emissions of a reference building that earns “Level 3" for all evaluation items except LR1 Energy, and energy efficiency standards in the Building Energy Efficiency Act) at each stage of a building's lifecycle (i.e. construction, maintenance/renewal/demolition and operation).

(2) WLC emissions of subject building based on assessment of building-related initiatives (e.g. energy efficiency improvement, use of ecological materials and extended building lifespan) at each stage of a building's lifecycle (i.e. construction, maintenance/renewal/demolition and operation).

(3) Assessment of above initiatives + other on-site measures (e.g. on-site solar power generation)

(4) Assessment of above initiatives + off-site measures (e.g. procurement of renewable energy certificates and carbon credits, in addition to private line supply, self-wheeling, and off-site PPA with additionality)

Regarding the GHG reduction due to the application of off-site measures in above (4), since there are various possible applications in the future, the assessment thereof is allowed only in the individual WLC calculation. However, for information, when LR1.3 “Efficiency in Building Service System” is evaluated with BEI+, a bar graph reflecting this is displayed in the standard calculation, but it is not reflected in the green star of the WLC. The green star reflects the result of (3).
Furthermore, bar charts in (3) and (4) do not show the breakdown of each stage of a building lifecycle.



(a)Standard Calculation Results (b) Individual Calculation Results

Figure IV. 2.3 Examples of WLC Assessment (Global Warming Impact Chart) for CASBEE-BD/NC

2.3.2 GHG emissions at construction and maintenance/renewal/demolition stages

As described above, it is difficult to calculate the emission volume for each block of an individual building. The figures used here are statistical values, for which the results of GHG emission calculations for typical examples of each building type and structure type have been prepared in advance as reference values and databased. The reference values are the GHG emissions for the reference building, which is a building scored with level 3 for every item. Quantitative effects relative to these reference values have also been calculated, corresponding to the various scoring levels for relevant CASBEE assessment items, and databased. This database preparation means that users of CASBEE-BD/NC do not have to gather data for themselves. Instead, they can obtain rough calculated values for WLC just by inputting the building type and size, and performing the usually scoring for assessment items in CASBEE (some numerical input is required).

(1) Method of LCA calculation tools used

Calculations were performed using the standard calculation methods of Whole Life Carbon calculation tool for buildings “J-CAT®” (Institute for Built Environment and Carbon Neutral for SDGs ;IBECs). Figure IV.2.4 shows the method of totaling GHG emissions using the calculation tools concerned. At each stage, multiply the quantities of materials required for the construction and maintenance/renewal/demolition of the building by the GHG emission intensity for each material,

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then total the results. The following conditions were used in the reference values of GHG emission calculations (Standard Calculation).

- GHG emission intensities are from "AIJ-LCA intensity database by analytical data of the 2015 Industrial Input-Output Table, ver.1.00" (Architectural Institute of Japan) installed in J-CAT®, and boundaries used for GHG emission intensities up to the international final consumption, but excluding both national and international fixed capital formation.
- Building service life settings: 60 years for offices, hospitals, hotels, schools and halls, 30 years for stores, restaurants, factories and apartments.
- Renewal intervals (years), repair rates, etc. are set for each material according to the standard calculation methods of J-CAT®.
- At demolition stage, waste transport is assumed at 30 km for the road transport distance.
-Assessment of refrigerators, circuit breakers, etc. comply with the "J-CAT®" evaluation method, which adjusted the AIJ-LCA intensity database (GHG) to ensure that the impacts of CFCs, halons, SF6, etc. are appropriate.
- From this revision, GHG emissions from installed facilities related to renewable energy will be evaluated.

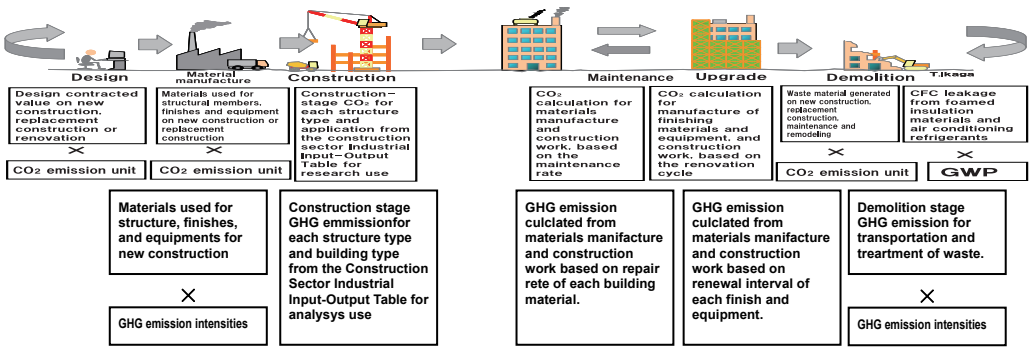

Figure IV.2.4 Total of GHG missions in the standard calculation methods of J-CAT®
("Material manufacture/Construction" and "Maintenance/Renewal/Demolition" stages)

Table IV.2.1 GHG emission intensities for representative materials

Materials	GHG emission intensities
Regular concrete	315.84 kg-CO_{2eq}/m^3
Blast furnace cement concrete	257.14 kg-CO_{2eq}/m^3
Steel frame*	1.41 kg-CO_{2eq}/kg
Reinforcing bars	1.00 kg-CO_{2eq}/kg
Formwork	7.45 kg-CO_{2eq}/m^2
Deck plate	37.64 kg-CO_{2eq}/m^2

* Not distinguished between electric furnace steel and blast furnace steel.

(2) Statistical values used in calculations

A database has been prepared from statistical data produced by analysis of construction works of each size. For structural construction works, the weights of materials are set for each building type and structure type, on the basis of statistical data ("Analytical data on building construction unit prices," edited by the Construction and Industrial Management Research Group).

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Table IV.2.2 Quantities of Representative Materials in Structural Works

Building type	Structure	Concrete [m^3/m^2]	Formwork * [m^2/m^2]	Reinforcing bars [t/m^2]	Steel frame [t/m^2]	Deck plate ** [m^2/m^2]
[1] Apartments	SRC	0.75	1.0425	0.136	0.052	
	RC	0.734	1.1075	0.1	0.012	
	S	0.323	0.165	0.019	0.048	1.0
[2] Offices	SRC	0.696	0.6675	0.078	0.1	
	RC	0.772	1.05	0.103	0.038	
	S	0.567	0.4325	0.07	0.136	1.0
[3] Elementary, junior high & high schools	SRC	0.958	0.9725	0.11	0.078	
	RC	0.865	1.225	0.112	0.005	
	S	0.352	0.17	0.045	0.105	1.0
[4] Medical care and welfare facilities	SRC	0.812	0.8075	0.089	0.066	
	RC	0.766	1.12	0.096	0.012	
	S	0.317	0.17	0.034	0.074	1.0
[6] Restaurants, retailers & discount stores	SRC	0.307	0.4025	0.053	0.071	
	RC	0.912	1.435	0.133	-	
	S	0.342	0.155	0.024	0.072	1.0
[7] Hotels	SRC	0.816	1.04	0.093	0.084	
	RC	0.999	1.195	0.111	0.004	
	S	0.436	0.3925	0.034	0.103	1.0
[8] Gymnasia, halls & meeting facilities	SRC	0.862	1.0225	0.1	0.059	
	RC	0.888	1.235	0.118	0.017	
	S	0.345	0.3625	0.04	0.139	1.0
[9] Warehouses and logistics facilities	SRC	0.669	0.5575	0.08	0.077	
	RC	0.77	0.7625	0.108	0.01	
	S	0.354	0.175	0.031	0.088	1.0

* For formwork the figure is one quarter of the density of 12 kg/m^2, assuming it is reused four times.
** It was assumed to be laid equivalent to the total floor area.

(3) Calculation of effects of measures

Efforts related to reduction of GHG emissions are handled as described below in CASBEE assessment items.

1) Efforts for lifespan extension

Extension of service life is evaluated under "Q2 Quality of Service." However, it is difficult to estimate the actual extension of service life with sufficient precision to use as a calculation condition for WLC. Therefore, take service life as a constant for all non-residential buildings for WLC estimation.

- Offices, hospitals, hotels, schools and halls: Fixed 60 years
- Retailers, restaurants and factories: Fixed 30 years
- Apartments: 30, 60 or 90 years, according to the deterioration countermeasure grades in the Japan Housing Performance Standard.

Table IV.2.3 Scoring level and condition of GHG assessment of "Q2/ 2.2.1 Service Life of Structural Materials"

Level	Standard	Condition of GHG assessment
Level 1	(No corresponding level)	-
Level 2	(No corresponding level)	-
Level 3	Level equivalent to Grade 1 of “3-1. Durability Grade (Structural Frame, etc.)” in the Japan Housing Performance Indication Standards.	Lifespan of structure and foundation: 30 years
Level 4	Level equivalent to Grade 2 “3-1. Durability Grade (Structural Frame, etc.)” in the Japan Housing Performance Indication Standards.	Lifespan of structure and foundation: 60 years
Level 5	Level equivalent to Grade 3 “3-1. Durability Grade (Structural Frame, etc.)” in the Japan Housing Performance Indication Standards.	Lifespan of structure and foundation: 90 years

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2) Resource-saving efforts
"Continuing Use of Existing Structural Frame, etc." and "Use of Recycled Materials" are evaluated under LR2 Resources & Materials, and the GHG emissions related to the manufacture of these materials (so called embodied carbon), taking these measures into account, can be evaluated. For usage rates of existing structural skeletons and of blast furnace cement, relative to the entire new structure as 100%, the corresponding GHG emissions have been calculated in advance, as shown below for each usage rate at 100%, and the results databased. The effect magnitude is approximately calculated according to the value of usage rate (by %) input by the assessor for the evaluated building, based on the database.

- The GHG reduction amount for a structural member reuse rate of 100% is calculated with amounts of all representative materials (concrete, formwork, reinforcing bars, steel frame, deck plate) set to zero.
- The GHG reduction amount for a blast furnace cement usage rate of 100% is calculated with the amount of concrete set entirely to blast furnace cement.

(4) GHG emissions at Construction and Maintenance/Renewal/Demolition stages
GHG emission data as described in (1)-(3) above are shown.
Wooden buildings are evaluated as S (Steel) structures here.

Table IV.2.4 GHG emissions at the construction stage (kg-CO_{2eq}/year-m^2)

Bldg. type	Countermeasure		S/Wood	RC	SRC
Offices	No measures		19.23	17.62	18.22
Evaluation period 60 years	LR2.2.2 Existing structural frame	100%	8.05	8.09	7.99
	LR2.2.3 Recycled materials (Use of blast furnace cement)	100%	18.46	16.56	17.28
Schools	No measures		14.38	16.10	18.59
Evaluation period 60 years	LR2.2.2 Existing structural frame	100%	6.41	6.56	6.37
	LR2.2.3 Recycled materials (Use of blast furnace cement)	100%	13.90	14.89	17.29
Retailers	No measures		23.93	31.51	22.88
Evaluation period 30 years	LR2.2.2 Existing structural frame	100%	11.29	11.35	11.21
	LR2.2.3 Recycled materials (Use of blast furnace cement)	100%	23.00	29.02	22.05
Restaurants	No measures		23.93	31.51	22.88
Evaluation period 30 years	LR2.2.2 Existing structural frame	100%	11.29	11.35	11.21
	LR2.2.3 Recycled materials (Use of blast furnace cement)	100%	23.00	29.02	22.05
Halls	No measures		16.23	17.41	17.92
Evaluation period 60 years	LR2.2.2 Existing structural frame	100%	7.29	7.33	7.24
	LR2.2.3 Recycled materials (Use of blast furnace cement)	100%	15.76	16.19	16.75
Factories	No measures		25.13	28.40	30.17
Evaluation period 30 years	LR2.2.2 Existing structural frame	100%	11.03	11.13	11.22
	LR2.2.3 Recycled materials (Use of blast furnace cement)	100%	24.17	26.30	28.32
Hospitals	No measures		14.42	16.50	18.17
Evaluation period 60 years	LR2.2.2 Existing structural frame	100%	7.98	8.02	7.92
	LR2.2.3 Recycled materials (Use of blast furnace cement)	100%	13.99	15.45	17.08
Hotels	No measures		17.08	19.13	19.72
Evaluation period 60 years	LR2.2.2 Existing structural frame	100%	8.78	8.83	8.72
	LR2.2.3 Recycled materials (Use of blast furnace cement)	100%	16.49	17.76	18.61

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Apartments

Q2/2.2.1	Service Life of Structural Materials		S/Wood	RC	SRC
Level 3	No measures		21.95	28.77	33.92
Evaluation period 30 years	LR2.2.2 Existing structural frame	100%	10.95	11.17	11.28
	LR2.2.3 Recycled materials (Use of blast furnace cement)	100%	21.03	26.65	31.73
Level 4	No measures		10.97	14.39	16.96
Evaluation period 60 years	LR2.2.2 Existing structural frame	100%	5.47	5.58	5.64
	LR2.2.3 Recycled materials (Use of blast furnace cement)	100%	10.52	13.32	15.86
Level 5	No measures		7.32	9.59	11.31
Evaluation period 90 years	LR2.2.2 Existing structural frame	100%	3.65	3.72	3.76
	LR2.2.3 Recycled materials (Use of blast furnace cement)	100%	7.01	8.88	10.58

Table IV.2.5 GHG emissions at Maintenance/Renewal/Demolition stage (kg-CO_{2eq}/year-m^2)

Building type	Evaluation period	S/Wood	RC	SRC
Offices	60 years	20.11	20.42	20.11
Schools	60 years	13.93	14.83	14.59
Retailers	30 years	8.82	10.28	8.71
Restaurants	30 years	8.82	10.28	8.71
Halls	60 years	17.05	17.76	17.54
Factories	30 years	9.04	10.10	9.96
Hospitals	60 years	19.17	19.54	19.66
Hotels	60 years	21.92	22.70	22.25

Apartments

Q2/2.2.1	Evaluation period	S/Wood	RC	SRC
Level 3	30 years	9.48	10.68	10.89
Level 4	60 years	11.33	12.06	12.24
Level 5	90 years	11.82	12.39	12.55

(5) Addition of GHG emissions related to equipment installation

For renewable energy evaluated under "LR1. Energy", the GHG emission reduction effect on "operation stage" is included (see 2.3.3). On the other hand, add GHG emissions related to the installed equipment. "Solar power generation systems" and " Battery" were included in the following based on installed capacity. These emissions are added to “(3) Assessment of above initiatives + other on-site measure” explained in “2.3.1 Basic components of WLC assessment.”

Table IV.2.6 GHG emission intensities of equipment installed

Equipment	GHG emission intensity		Remarks
Solar power generation system	1160.406	kg-CO_{2eq}/kW	Solar arrays: 1143 PCS/Junction Box: 17.406
Battery	199.725	kg-CO_{2eq}/kWh	Emission intensity of Row Sector Name "Battery" is adapted.

Source: Electrical Equipment Society of Japan Global Environment Committee WLC Intensity and Coefficient of Electrical Equipment (Main Table)
(Attached Table) Part 5_Power Generation Equipment Construction

Table IV.2.7 GHG emissions of equipment installed

Equipment	Evaluation period	Construction stage	Maintenance/Renewal/Demolition stages *	Units
Solar power generation system	30 years	38.68	39.12	kg-CO_{2eq}/y-kW
	60 years	19.34	39.01	
	90 years	12.89	38.97	
Battery	30 years	6.66	6.72	kg-CO_{2eq}/y-kWh
	60 years	3.33	6.70	
	90 years	2.22	6.70	

* Renewal intervals: 25 years (1 time for the evaluation period of 30 years, 2 times for 60 years, and 3 times for 90 years), Repair rate=0%, Waste related GHG is calculated based on the calculation method in J-CAT®

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2.3.3 GHG emissions at operation stage

(1) Basic guidelines and key points

The key points of the calculation method (standard calculation) in CASBEE-BD/NC for GHG emission at the operation stage are described below.

1) Calculate GHG emissions volume based on assessment results of middle items evaluated under "LR1 Energy."
2) the followings are excluded from standard calculation;
- Water consumption (B7 in WLC) is not included in the calculation because sufficient data and knowledge were not available to set reference values.
- The leakage amount of refrigerant HFC (B1 in WLC) was not included in CASBEE's WLC standard calculation because it was difficult to grasp the amount of leakage per building. In addition, individual calculations are recommended when the impact of the leakage is large.

3) Select the appropriate GHG emission factor for electricity use specific to the assessment objective. The assessment software for the 2024 edition allows use of the most recent basic emission factor and alternative values (i.e. the basic values in 2022). These values are based on Article 2-4 of the Ordinance on Calculation of Greenhouse Gas Emissions from Business Activities of Specified Emitters. The assessor may also apply other appropriate emission factor of choice (optional).
4) To simplify the process, calculation of GHG emissions at the operation stage is based on the conversion of primary energy consumption into GHG emissions.
5) When calculating GHG emissions in buildings (excluding apartments), establish reference values of primary energy consumption specific to building type. Convert the primary energy consumption to GHG using conversion factors based on primary energy source composition ratios according to statistical data. This method offers a simplified GHG emission conversion from primary energy consumption at the operation stage obtained according to the Building Energy Efficiency Act.

As indicated above in 4), the assessment of energy efficiency in CASBEE is based on the BEI and other related factors. Therefore, CASBEE utilizes a method in which the primary energy consumption of the reference building and the building subject to the assessment is calculated, which is converted into the GHG emissions. This approach enables a simplified calculation of GHG emissions using energy efficiency calculation results submitted to the government. At the same time, however, it means that the primary energy source composition ratio of the subject building is no longer reflected in the assessment result. Furthermore, GHG conversion coefficients used for the conversion of primary energy consumption into GHG emissions are determined from the statistical data of the primary energy source composition , as described above in 5). As the same factors are applied to both reference and subject buildings, problems in effectiveness of comparative evaluation are also noted.

This edition follows the conventional method in the standard calculation, in order to take into account the consistency and sequentiality in the assessment of new construction and existing buildings, and calculation methods other than the Web program provided by the government, and to apply the same calculation rules to the Model Building Method and simplified calculations that cover small-scale buildings.

These issues relating to the standard calculation due to the simplified assessment of WLC in CASBEE, in which energy efficiency calculation results are utilized in accordance with the Building Energy Efficiency Act, were not fully resolved. Thus, further discussions thereon will continue.

(2) Buildings excluding apartments

In addition to the key points indicated in (1) above,

1) The GHG emissions (per floor area) of the reference building are called as “Reference values,” and assumed equal to the GHG emissions estimated based on the statistical average of energy consumption. Note that the "reference value" does not necessarily correspond to the GHG emissions from a building equivalent to Level 3 in LR1 Energy.
2) Similarly in the evaluated building, the primary energy source composition ratios by building type is the same as the composition obtained from the statistical data of 1).
3) The GHG emissions of the evaluated building is calculated by multiplying the primary energy consumption of the evaluated building estimated by increasing or decreasing the primary energy consumption of the reference building depending on the assessment levels of middle items under LR1 by the GHG conversion coefficient.

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A. GHG emission for the reference building

In terms of building type and scales, based on statistical data, the primary energy consumption intensity and composition ratios, are determined (Table IV.2.8). Based on the data, the consumption of individual energy source types by building type is estimated, which is multiplied by the GHG emission factor in order to obtain the GHG emissions.
The GHG emission factor used in the standard calculation are as shown in Table IV.2.9.

GHG emission for the reference building [kg-CO_{2eq}/year]
= Σ (Primary energy consumption of the reference building [MJ/year]
x Ratio of primary energy consumption of energy source type i by building type
x GHG emission factor for energy source type i [kg-CO_{2eq}/MJ])

(1) Primary energy consumption of the reference building
The primary energy consumption of the reference building is obtained based on the primary energy consumption intensity (the average of sample values in the corresponding classification) by building types and scales (by regions for elementary and junior high schools) indicated in Table IV.2.8. As for building complexes, a value for the entire building is obtained by weighting the primary energy consumption intensity by the floor area in each building type.

Table IV.2.8 Statistical data of primary energy consumption

Building Type			Primary energy consumption intensites by building size [MJ/m2-y]					Primary energy source composition ratio					GHG conversion coefficients
			less than 300m2	over 300m2 and less that 2,000m2	over 2,000m2 and less that 10,000m2	over 10,000m2 and less that 30,000m2	over 30,000m2	Electricity	Town gas	Other *	LPG	Heat	kg-CO_{2eq}/MJ
Office	Office		1,250	1,250	1,550	1,850	2,150	78.0%	6.0%	16.0%	-	-	0.0482
	Government buildings		1,050	1,050	1,050	1,050	1,050	77.0%	9.0%	14.0%	-	-	0.0477
	Research institutes		2,350	2,350	2,350	2,350	2,350	63.0%	8.0%	29.0%	-	-	0.0516
School	Kindergartens/ nursery schools		540	540	540	540	540	70.0%	12.0%	18.0%	-	-	0.0488
	ES/JHS	Hokkaido	510	510	510	510	510	67.0%	20.0%	13.0%	-	-	0.0476
		Other area	320	320	320	320	320	74.0%	12.0%	14.0%	-	-	0.0478
	High schools		360	360	360	360	360	74.0%	7.0%	19.0%	-	-	0.0490
	Universities/ colleges		860	860	860	860	1,100	66.0%	11.0%	23.0%	-	-	0.0501
Retailers	Department, supermarkets		7,250	7,250	5,000	2,950	2,950	73.0%	4.0%	23.0%	-	-	0.0499
	Conviniens store		12,900	12,900	12,900	12,900	12,900	100.0%	0.0%	0.0%	-	-	0.0440
	Electronics retailers,		2,850	2,850	2,850	2,850	2,850	71.0%	1.0%	28.0%	-	-	0.0512
	Other stores		2,300	2,300	2,300	2,300	2,300	89.0%	3.0%	8.0%	-	-	0.0461
Restaurants			19,350	11,950	3,150	3,150	3,150	51.0%	33.0%	16.0%	-	-	0.0486
Halls	Theatres/halls		1,350	1,350	1,350	1,400	1,400	73.0%	13.0%	14.0%	-	-	0.0478
	Exhibition facilities		1,100	1,100	1,100	1,100	1,100	77.0%	7.0%	16.0%	-	-	0.0482
	Sports facilities		1,850	1,850	1,850	1,850	1,850	69.0%	16.0%	15.0%	-	-	0.0481
Factories			500	500	500	500	500	100.0%	0.0%	0.0%	-	-	0.0440
Hospitals			2,200	2,200	2,200	2,450	2,950	48.0%	13.0%	39.0%	-	-	0.0542
Hotels			2,450	2,450	2,450	2,750	2,750	42.0%	14.0%	44.0%	-	-	0.0555
Apartments	Dwelling area		-	-	-	-	-	52.1%	22.7%	14.7%	10.1%	0.1%	0.0496
	Common area		522 (outdoor corridor) /801 (indoor corridor)					100%	0%	0%	-	-	0.0440

Source:
- Data summarized from DECC data-base for Energy Consumption of Commercial Building (released in 2019, JSBC).
- The primary energy source composition ratio for dwelling area of apartments is in reference to "Transition of final energy consumption by energy source type in residential sector (Energy demand and supply record in FY 2022, General Affairs Division Strategic Planning Office, the Agency of Natural Resources and Energy)."
- Regarding factories, since there is no statistical data available, the energy consumption for lighting in office buildings under the Notification No. 265 of MLIT of 2016 is used.
- For the primary energy source composition ratio for common area of apartments, the CASBEE for Real Estate evaluation standard (average of statistical values of DECC data) was applied, and the primary energy source composition ratio was 100% electricity set in the 2016 edition.

* "Other" energy source for Apartments; Kerosene

Table IV. 2.9 GHG emission factors for each energy source type for calculation

Type	GHG emission factor		Notes
Electricity	*	kg-CO_2eq/MJ	* Value selected by assessor in [kg-CO_2/kWh] converted at 9.76 MJ/kWh (All day average, in Notification No. 265 of MLIT, 2016)
Town gas	0.0456	kg-CO_2eq/MJ	
DHC (heat energy)	0.0532	kg-CO_2eq/MJ	Apply for apartments in Standard calculation
Kerosene	0.0686	kg-CO_2eq/MJ	
Type A heavy oil	0.0708	kg-CO_2eq/MJ	
Other	0.0697	kg-CO_2eq/MJ	(Average value for kerosene + type A heavy oil)
LPG	0.0598	kg-CO_2eq/MJ	Apply for apartments in Standard calculation

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Source:
- Kerosene, Type A heavy oil, LPG: Calculation Methods and Emission Factors List under the Calculation, Reporting, and Disclosure System (MOE, Updated December 12, 2024 (Partially revised July 11, 2025))
- Town Gas: alternative coefficient value=2.05 [t-CO_2/kilo-m^3] / [45MJ/m^3] (List of emission factors by gas supplier (for submission in 2024), June 28, 2024)
- DHC(Heat): alternative coefficient value=0.0532 [t-CO_2/GJ] (List of emission factors by heat supplier (for submission in 2024), June 28, 2024)

(2) Estimated GHG conversion coefficient by building type

The GHG conversion coefficient (the GHG emissions per unit of primary energy consumption by building type) is derived from the primary energy consumption and GHG emissions of the reference building. Energy consumption volumes are estimated from LR1 scoring levels for the evaluated building. When estimating GHG emissions in the evaluated building, the GHG conversion coefficient by building type is utilized in order to convert the primary energy consumption into GHG emissions.

GHG conversion coefficient by building type [kg-CO_{2eq}/MJ]
= GHG emission for the reference building [kg-CO_{2eq}/year] / Primary energy consumption of the reference building [MJ/year]

B. GHG emissions from the evaluated building

The GHG emissions of the evaluated building are evaluated by assuming that the reference building is equivalent to the standard value for the primary energy consumption under the Building Energy Efficiency Act, and by combining with GHG reduction effects achieved through the introduction of various energy saving measures in the evaluated building. Thus, as Figure IV.2.5 shows, start from energy consumption quantity A for the reference building, then estimate the GHG reduction quantities (effect magnitudes) for the energy-saving effects and promotion for renewables under each of the two items in LR1 assessment (LR1-3. Efficiency in Building Service System and LR1-4. Initiatives for Efficient Operation), and subtract those reduction quantities from A to derive energy consumption C for the evaluated building. Multiply C by the GHG conversion coefficient to obtain the GHG emissions volume. According to the new energy conservation standards, when the assessment is based on the BEI utilizing the Web program, the BEI assessment includes increased efficiency in building service systems as well as the reduced primary energy consumption due to the reduction in thermal load. Therefore, the scoring level of "LR1-1. Control of Heat Load on the Building envelopes" is evaluated as included in (a). In addition, the amount of direct use of renewable energy is also considered to be included in (a) because it is reflected in BEI as "Undetermined Technologies".

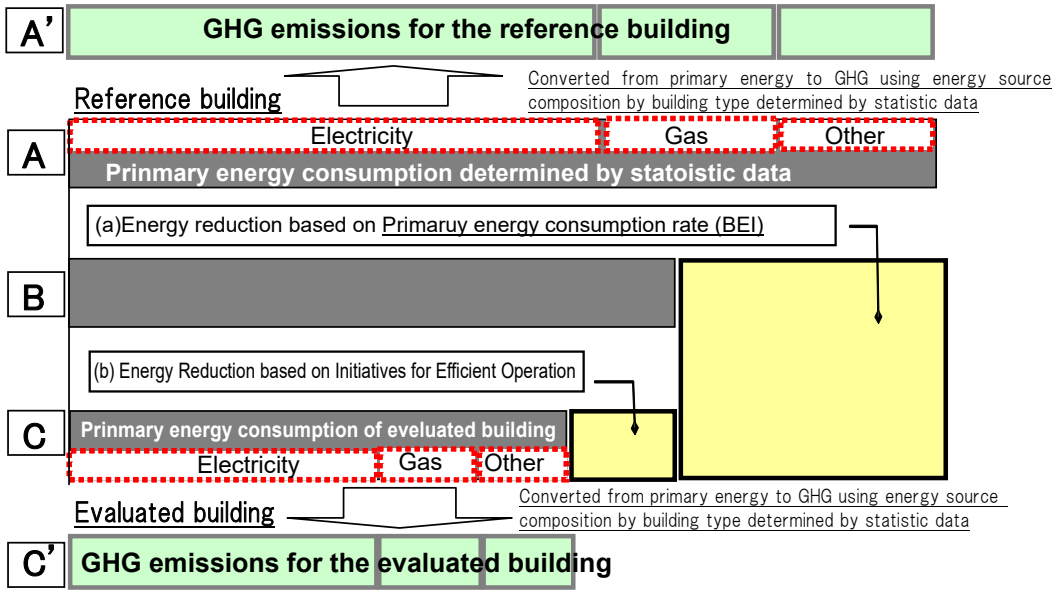

Figure IV.2.5 Approach to calculating GHG emissions of the evaluated building for new construction

GHG emissions C' for the evaluated building [kg-CO_{2eq}/year]
= GHG emissions for the reference building A' [kg-CO_{2eq}/year]
- GHG reduction due to BEI [kg-CO_{2eq}/year]
- GHG reduction due to efficient operation [kg-CO_{2eq}/year]

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= (Primary energy consumption of the reference building A [MJ/year]
- Primary energy consumption reduction due to BEI (a) [MJ/year]
- Primary energy consumption reduction due to efficient operation (b) [MJ/year])
x GHG conversion coefficient by building type [kg-CO_{2eq}/MJ]

(1) Calculation method for effect magnitudes

a. BEI

The assessment is conducted based on the BEI used for the rating in LR1-3 Efficiency in Building Service System. (When based on the Model Building Method, utilize BEIm.)

In this regard, assessments of the on-site technique should be excluded from the BEI assessment.

In addition, for BEI in the following formula, use [BEI*] for (2) building initiatives and [BEI] for (3) on-site initiatives shown in "2.3.1 Basic components of WLC assessment". In addition, as information, the calculation results by [BEI+] are displayed in (4) Off-site initiatives.

Primary energy consumption reduction due to BEI (a) [MJ/year]
= (1 - BEI of the evaluated building [-])
x (Primary energy consumption of the reference building [MJ/year])

b. Initiatives for Efficient operation

The assessment is conducted utilizing the weight averaged scoring level of "4.1 Monitoring" and "4.2 Operation & Management System" in LR1-4 (Initiatives for Efficient Operation) as well as the energy consumption of the evaluated building after taking into account the BEI, based on the correction coefficient that corresponds to the level. Level 5 is assumed as if appropriate operation is possible to avoid problems at the operation stage (i.e. the anticipated performance is realized), then as the level decreases, it is evaluated as more energy is wasted than expected.

Table IV.2.10 Correction coefficients for each averaged scoring level of "4.1 Monitoring" and "4.2 Operation & Management System" of LR1-4 (Initiatives for Efficient Operation)

Averaged Scoring Level	Correction coefficient
Level 1	1.000
Level 2	1.000
Level 3	1.000
Level 4	0.975
Level 5	0.950

(2) Conversion of primary energy consumption into GHG emissions

The GHG emissions of the evaluated building at the operation stage is estimated by multiplying the energy consumption of the evaluated building calculated in the above (1) by the GHG conversion coefficient by building type obtained in A.

(3) For apartments

In addition to the points shown in (1) above,

1) For dwelling area, the GHG emissions of the reference building are called as "Reference values," and assumed equal to the GHG emissions of the apartment with the specifications for the "standard primary energy consumption" calculation by the Web Program etc. For the common area, it is assumed equal to the GHG emissions estimated from the average value in the actual energy consumption statistics, and this is used as a "reference value". Note that the "reference value" does not necessarily correspond to the GHG emissions from a building equivalent to Level 3 in LR1 Energy.
2) Similarly in the evaluated building, the primary energy source composition ratios by building type are the same as the composition ratios used for the reference building.
3) The GHG emissions of the evaluated building are calculated by multiplying the primary energy consumption of the evaluated building estimated by increasing or decreasing the primary energy consumption of the reference building depending on the assessment levels of middle items under LR1 by the GHG conversion coefficient.

A. GHG emissions for the reference building

The primary energy consumption and composition ratio used in the reference building are determined (Table IV.2.8). Based on the data, the consumption of individual energy source types is estimated, which is multiplied by the GHG emission factor in order to obtain the GHG emissions.

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The GHG emission factor used in the standard calculation are as shown in Table IV.2.9.

GHG emission for the reference building [kg-CO_{2eq}/year]
= Σ (Primary energy consumption of the reference building [MJ/year]
x Primary energy source composition ratio of energy source type i for apartment
x GHG emission factor for energy source type i [kg-CO_{2eq}/MJ])

(1) Primary energy consumption of the reference building
(a) Dwelling areas
For the primary energy consumption of the reference building, the sum of the standard primary energy consumption of individual dwelling units in the entire building calculated by a Web Program etc.

Primary energy consumption of the reference building [MJ/year]
= Σ {(Standard primary energy consumption of Dwelling unit n
- Other energy consumption by home appliances etc. of Dwelling unit n) x 1.0
+ Other energy consumption by home appliances etc. of Dwelling unit n} [MJ/year]

(b) Common areas
For the primary energy consumption of the reference building, values are obtained from the statistical primary energy consumption record data in Table IV.2.8.

Primary energy consumption of the reference building [MJ/year]
= Primary energy consumption determined by statistical record data [MJ/year]

(2) Estimated GHG conversion coefficient for apartments
The GHG conversion coefficient in terms of dwelling areas and common areas is obtained by multiplying the statistical record data of the primary energy source composition ratio for apartments (Table IV.2.8) by GHG emission factors by energy source type (Table IV.2.9).

GHG conversion coefficient for apartments [kg-CO_{2eq}/MJ]
= Σ (Primary energy source composition ratio of energy source type i for apartment
x GHG emission factor for energy source type i [kg-CO_{2eq}/MJ])

B. GHG emissions from the evaluated building
The GHG emissions of the evaluated building at the operation stage is estimated by multiplying the energy consumption of the evaluated building by GHG conversion coefficients listed in Table IV.2.8.

GHG emission for the evaluated building [kg-CO_{2eq}/year]
= Σ (Primary energy consumption of the evaluated building [MJ/year]
x GHG conversion coefficient for apartments [kg-CO_{2eq}/MJ])

(1) Calculation of effect magnitude
The design primary energy consumption calculated in accordance with the energy efficiency calculation under the Building Energy Efficiency Act by the government is used for the primary energy consumption of the evaluated building. Effects of the HEMS and MEMS are left out of the consideration for the time being.
If the design primary energy consumption includes the on-site renewables (i.e., solar power generation, etc.), the followings are applied in the formula shown above.
For the components explained in “2.3.1 Basic components of WLC assessment,”
- for (2) building initiatives, renewable energy shall be excluded in primary energy consumption.
- for (3) on-site initiatives, renewable energy (including soled electricity) can be included in primary energy consumption.

(a) Dwelling areas
Primary energy consumption of the evaluated building [MJ/year]
= Σ Design primary energy consumption of Dwelling unit n [MJ/year]

In cases where the level assessment is conducted based on specification standards without carrying out the energy calculation in LR1-3. Efficiency in Building Service System, the GHG emissions are calculated by utilizing the predetermined primary energy consumption indicated in Table IV.2.11.

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Table IV.2.10 Primary energy consumption intensities based on housing specification standards for GHG emissions calculation

Type of HVAC		Assessment level	Regional classification							[MJ/yr-m^2]
Heating	Cooling	in LR1-3	1	2	3	4	5	6	7	8
A	a	Level 1	1,552	1,366	1,214	1,215	1,122	1,017	881	921
		Reference value	1,427	1,258	1,120	1,120	1,036	941	817	853
		Level 4	1,177	1,042	931	932	864	788	689	718
A	b	Level 1	1,537	1,352	1,191	1,175	1,084	933	773	613
		Reference value	1,414	1,245	1,099	1,085	1,002	865	719	574
		Level 4	1,166	1,032	915	903	837	727	610	494
B	a	Level 1	1,082	1,020	954	975	910	893	808	921
		Reference value	1,000	944	884	902	843	828	751	853
		Level 4	835	790	742	757	710	698	636	718
B	b	Level 1	1,067	1,007	932	935	872	810	699	613
		Reference value	986	931	863	866	809	752	652	574
		Level 4	824	780	726	729	683	637	557	494
C	a	Level 1	1,013	955	888	897	802	805	758	921
		Reference value	937	884	823	832	745	748	706	853
		Level 4	785	743	694	701	632	634	600	718
C	b	Level 1	998	941	865	858	764	721	650	613
		Reference value	924	872	803	796	711	672	607	574
		Level 4	774	733	677	672	604	573	521	494

*1) Heating system A: Heating the entire dwelling unit B: Heating living space only (Continuous heating)
C: Heating living space only (Intermittent heating)
*2) Cooling system a: Cooling the entire dwelling unit b: Cooling living space only (Intermittent cooling)
3) Reference value is Level 2 equivalent. Note that Reference value is Level 3 (BEI=0.8) equivalent in CASBEE for Detached Houses for New Construction 2025 edition.

The primary energy consumption in this table is the values converted by BEI shown in each level of building type [5] (Apartments) in LR1-3. Efficiency in Building Service System based on the standard primary energy consumption as reference value calculated with conditions according to the specification standards. Therefore, reference values of primary energy consumption are converted values as Level 2 (BEI＊=1.0) equivalent of building type [5] (Apartments) in LR1-3. Efficiency in Building Service System.
There are specification criteria for both heating and cooling system in the specification standards. Since the standard primary energy consumption differs depending on the types of system, various values corresponding to the individual system types are used in the primary energy consumption required for the GHG emissions calculation.

(b) Common areas
The primary energy consumption of the evaluated building is obtained using the statistical primary energy consumption record data in Table IV.2.8, similarly the reference building, multiplied by the BEI of the dwelling area, assuming that common area has the same energy performance as the dwelling area.

Primary energy consumption of the reference building [MJ/year]
= Primary energy consumption determined by statistical record data X BEI [MJ/year]

(2) Conversion from primary energy consumption into GHG emissions
The GHG emissions of the evaluated building at the operation stage is estimated by multiplying the energy consumption of the evaluated building calculated in above (1) by the GHG conversion coefficient for apartments obtained in A.

2.3.4 Calculation of GHG emissions with on-site measures

Since 2010 edition, WLC emissions with on-site measures (e.g. renewable energy use within the property) are displayed separately from that with building-related initiatives (e.g. use of ecological materials, extended building lifespan, energy-saving measures within the building).
This is to clarify the idea that "energy conservation" to reduce energy consumption is the first priority in the order of efforts to reduce GHG emissions at the operational stage, and it was decided to display cases that do not include renewable energy in the evaluation of WLC separately from cases that include renewable energy.
In order to promote solar power generation, excess electricity generated from solar systems which is not used in the building can be sold to the energy provider at a higher price than the provider's retail

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prices. With such energy sales, the environmental value (GHG reduction effect) of solar power generation is also passed on. From this perspective, environmental assessment of the building should not include the GHG reduction effect of solar-generated power that is sold.
On the other hand, as solar power generation plays an important role in building a low-carbon society, CASBEE assessment recognizes that the inclusion of physical measures on-site or of the building (i.e. use of solar panels) contributes to Japan's GHG reduction efforts. Thus, the GHG reduction effect of excess electricity sold to energy providers can be included in assessment of on-site measures*. However, the amount sold to others through Feed-in-Tariffs is excluded from the assessment. Note that, as programs regarding the environmental value of solar-generated electricity are currently under review by the government and municipalities, assessment method may be revised accordingly in the future.
Further, in the Standard Calculation, when BEI or BEI＊ is entered into the Planning Sheet in which figures from the energy efficiency calculation, to be submitted to the government under the Building Energy Efficiency Act, are entered, the effect thereof is automatically calculated utilizing the GHG conversion coefficient by building type. While Individual Calculation requires the assessor to calculate such effects, the assessor can use reference data shown in the WLC Calculation Conditions Sheet (Individual Calculation) as shown in Figure IV.2.7.

* According to the condition of indicator BEI in LR1-3 Efficiency in Building Service System, soled electricity is excluded from BEI for non-Apt at lower than level 3 (certification standard equivalent).

2.3.5 Calculation of GHG emissions with off-site measures

Carbon offsetting through earning renewable energy certificates or carbon credits is being promoted as a climate change countermeasure. Recently, efforts such as private line supply, self-wheeling, and off-site PPA through power generation facilities with additionality have also been observed. These mechanisms do not necessarily indicate the environmental performance of buildings; however, they are nonetheless effective and valuable in realizing the climate change-related commitments of Japan. In CASBEE, these efforts made off-site are organized as the off-site technique and are added to the WLC assessment.
The following off-site measures are evaluated in this category:

- Measures implemented by building owners or users
  - Renewable electric power certificates / heat certifications
  - J-Credit System, etc.
- Carbon offsetting measures implemented by energy providers
- Private line supply, self-wheeling, and off-site PPA through power generation facilities with additionality (evaluated in LR1-3 Efficiency in Building Service System)

For the measures implemented by building owners or users, the purchase of applicable credits with the same validity period as the CASBEE-BD assessment tools must have already been completed or should be committed.
Effects of carbon offsetting measures implemented by energy providers can be evaluated, for example, by multiplying the difference between the most-recent basic emission factors[*1] and the adjusted emission factors[*2] with electricity purchased from energy providers (refer to Figure IV.2.7).
The PPS-specific emission factors (actual coefficient/adjusted coefficient) and the alternative coefficient values are revised and published annually by the government. Check if the values are current according to the CASBEE assessment manual or software. If revisions are not reflected in the manual or software, verify the latest coefficients available on MOE website and apply these in the calculation.

If evaluated with BEI+ in LR1-3 Efficiency in Building Service System, GHG reduction using off-site measures such as private line supply, self-wheeling, and off-site PPA through power generation facilities with additionality is evaluated, and is thus included in BEE. As the addition of further off-site measures is expected, the 2024 edition allows this assessment in individual WLC calculations only. However, for information, when LR1-3 Efficiency in Building Service System is evaluated with BEI+, a bar graph reflecting this is also displayed in standard calculations. As applications of off-site measures are expected to increase, an ongoing review of CASBEE assessment methods is being conducted.

*1 Values are based on Article 2-4 of the Ordinance on Calculation of Greenhouse Gas Emissions from Business Activities of Specified Emitters (MOE et al).
*2 Values are based on Article 20-2 of the Ordinance on Reporting of Greenhouse Gas Emissions (MOE et al).

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2.3.6 WLC assessment process (Individual Calculation)

In the individual calculation, when a detailed WLC calculation is conducted according to any published LCA method, the assessor can apply the calculation conditions and results to the individual calculation for CASBEE WLC assessment (Global Warming Impact Chart). In this case, the assessor must use WLC Calculation Conditions Sheet (Individual Calculation) as shown in Figure IV.2.6 to enter the conditions and results specified below. Alternatively, a majority of results from the CASBEE standard calculation can also be applied in combination with other individually-calculated valid data. Specifically, the assessor can enter conditions and results for the standard calculation, while adding individually-calculated results of off-site measures.
Furthermore, refer to Figure IV.2.7 for calculation results of GHG reduction with on-site measures (e.g. solar power generation) and with carbon offsetting measures implemented by energy providers.
The entry items include the following calculation conditions and results:

- Building overview (type/size/structure)
- Life cycle (estimated service life)
- GHG emissions at construction stage (calculation results)
- The above calculation method (e.g. Building LCA Tool Ver.5.00 developed by the Architectural Institute of Japan)
- Reference for GHG emission intensities (e.g. 2005 Industrial Input-Output Table published by the Architectural Institute of Japan)
- Boundary of GHG calculation (e.g. domestic consumption expenditure)
- Main materials: regular concrete (m^3/m^2), blast furnace cement concrete (m^3/m^2), steel frame (t/m^2), steel frame (electric furnace) (t/m^2), steel reinforced (t/m^2), etc.
- Environmental load of main materials: regular concrete ($kg\text{-}CO_{2eq}/m^3$), blast furnace cement concrete ($kg\text{-}CO_{2eq}/m^3$), steel frame ($kg\text{-}CO_{2eq}/t$), steel frame (electric furnace) ($kg\text{-}CO_{2eq}/t$), steel reinforced ($kg\text{-}CO_{2eq}/t$), etc.
- Main recycled materials and usage: blast furnace cement (structure use), existing frame materials (structural use), electric furnace steel (reinforcement), electric furnace steel (steel materials), etc.
- GHG emissions at maintenance/renewal/demolition stage (calculation results)
- Maintenance period (year) (exterior/interior/service systems)
- Average repair rate (%/year) (exterior/interior/service systems)
- Calculation method for demolition-related GHG emissions (e.g. estimated with assumption of demolition material transport distance of XX km)
- GHG emissions at operation stage (calculation results)
  1. Reference value
  2. Building-related initiatives
  3. Above + other on-site initiatives
  4. Above + other off-site initiatives
- Calculation method for primary energy consumption
- GHG emission factor by energy source (electricity, gas and other fuels)
- Other

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■ WLC Calculation Conditions Sheet (Individual Calc) ■ Building Name XXX Building

CASBEE-BD_NCe_2024_v1.2

Items		Reference Building	Evaluated Building	Note
Building Overview	Building type	Offices,	Offices,	
	Gross floor area	7,000㎡	7,000㎡	
	Structure	RC	RC	
Life Cycle	Estimated service life	○○	○○	
Con-struction Stage	GHG emissions	35.00	30.00	kg-CO_{2eq}/yr-m²
	(Included GHG by installation of renewables)	–	1.00	kg-CO_{2eq}/yr-m²
	Embodied carbon calculation method	○○	○○	
	Reference for GHG emission intensity	○○	○○	
	Boundary	○○	○○	
	Quantities of Representative Materials			
	Regular concrete	○○	○○	m³/m²
	Blast furnace cement concrete	○○	○○	m³/m²
	Steel frame	○○	○○	t/m²
	Deck plate	○○	○○	t/m²
	Reinforcing bars	○○	○○	t/m²
	Formwork	○○	○○	
	□ □	○○	○○	
	GHG emission intensities of Representative Materials			
	Regular concrete	○○	See reference building	kg-CO_{2eq}/m³
	Blast furnace cement concrete	○○	See reference building	kg-CO_{2eq}/m³
	Steel frame	○○	See reference building	kg-CO_{2eq}/kg
	Steel frame (blast furnace)	○○	See reference building	kg-CO_{2eq}/kg
	Reinforcing bars	○○	See reference building	kg-CO_{2eq}/kg
	Formwork	○○	See reference building	
	Deck plate	○○	See reference building	
	Main recycled materials and usage			
	Blast furnace cement (structural use)	○○	○○	
	Existing frame materials (structural use)	○○	○○	
	Electric furnace steel (reinforcement)	○○	○○	
	Electric furnace steel (steel materials)	○○	○○	
Repair, Renewal/ Demolition Stage	GHG emissions	10.00	8.00	kg-CO_{2eq}/yr-m²
	(Included GHG by installation of renewables)	–	0.50	kg-CO_{2eq}/yr-m²
	Upgrade period (year)			
	Exterior	○○	○○	
	Interior	○○	○○	
	Building Service	○○	○○	
	Average repair rate (%/year)			
	Exterior	○○	○○	
	Interior	○○	○○	
	Building Service	○○	○○	
	Calc method for demolition-related GH	○○	○○	
Operation stage	GHG emissions			
	[1] Reference value/ [2] Building-related initiatives	30.00	20.00	kg-CO_{2eq}/yr-m²
	[3] Above + other on-site initiatives	–	10.00	kg-CO_{2eq}/yr-m²
		Reduced GHG by PV	10.00	kg-CO_{2eq}/yr-m²
		(Breakdown) In-house consumption	5.00	kg-CO_{2eq}/yr-m²
		Excess power sold	5.00	kg-CO_{2eq}/yr-m²
		Other renewable energy		
	[4] Above + other off-site measures	–	5.00	kg-CO_{2eq}/yr-m²
	Reference	(a) Carbon offsetting with renewable energy certificates	5.00	kg-CO_{2eq}/yr-m²
		(b) Carbon offsetting with green heat certificate		
		(c) Other carbon credit		
		(d) Difference between basic and adjusted emissions (obtained from the adjusted emission factor)		
	Calculation method for energy consumption	○○	○○	
	Primary energy consumption	○○	○○	GJ/年
	GHG emission factors for energy			
	Primary energy Non-residential buildings	○○	See reference building	kg-CO_{2eq}/MJ
	Primary energy Residential buildings (Dwelling areas)	○○	See reference building	kg-CO_{2eq}/MJ
	Electricity	○○	See reference building	kg-CO_{2eq}/kWh
	Gas	○○	See reference building	kg-CO_{2eq}/MJ
	Other fuels ( )	○○	See reference building	kg-CO_{2eq}/MJ
	Potable water			
Other				

Figure IV.2.6 WLC Calculation Conditions Sheet (Individual Calculation)

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<Ref.> Values available for individual calculation

Operation Stage	Reduction in GHG emissions with use of solar power (when the amount of power generated is equivalent to the reduction in "3. On-site measures," and when the emission factor for electricity is used to estimate the reduced amount.)			
	Solar-generated power	Total	283,955	kWh/yr
		In-house consumption	328,217	kWh/yr
		Excess power sold	-44,262	kWh/yr
	Reduction in GHG emission	Total [1]	17.40	kg-CO_2/yr-㎡
		In-house consumption	20.12	kg-CO_2/yr-㎡
		Excess power sold	-2.71	kg-CO_2/yr-㎡
	Difference between basic emissions and emission using adjusted emission factor			
	Electricity consumption of the eval. bldg. in "3. On-site measur		371,108	kWh/yr
	Emission factors	Basic emission factor	0.044	kg-CO_2/kWh
		Adjusted emisshon factor	0.040	kg-CO_2/kWh
	Difference over basic emission	Entire building	1,468	kg-CO2/yr-㎡
		Per gross floor area [2]	0.21	kg-CO_2/yr-㎡

Figure IV.2.7 Examples of reference values used in WLC Calculation Conditions Sheet (Individual Calculation)

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Afterword

This publication is based on the achievement by the Research Committee on Comprehensive Environmental Assessment of Buildings (Chairperson: Shuzo Murakami, Advisor, Institute for Built Environment and Carbon Neutral for SDGs), which was established at the Japan Sustainable Building Consortium (JSBC) as part of a joint industrial/government/academic project with the support of the Housing and Building Bureau of the Ministry of Land, Infrastructure, Transport and Tourism. It is expected to contribute to the construction of a sustainable society.

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Project Organization

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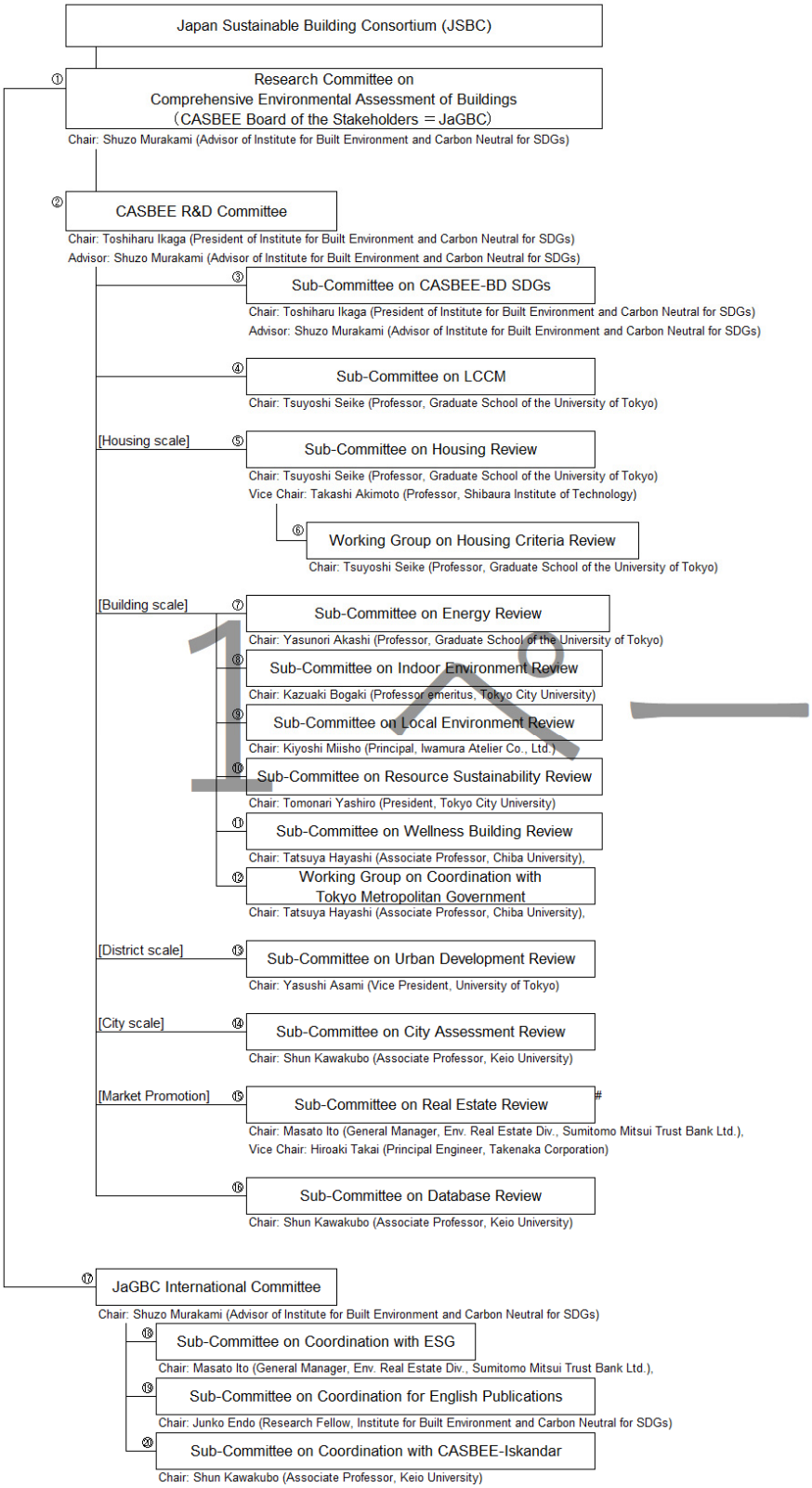

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