CASBEE®

Property Appraisal Manual

(2009 Edition)

Edited by Japan Sustainable Building Consortium (JSBC)
Published by Institute for Building Environment and Energy Conservation (IBEC)

Indemnity

This manual and the support tools shall be used at the user's own responsibility.
Japan Sustainable Building Consortium and the Institute for Building Environment and Energy Conservation bear no responsibility for the assessment results of this manual and the support tools and for any damages caused by their use.

Content

Terminology

Terminology on property appraisal in this manual

CASBEE or Comprehensive Assessment System for Built Environment Efficiency, as its name indicates, is a system designed to assess environment efficiency as well as buildings. Properties are generally defined as "land and improvements on the land," meaning buildings and structures combined with the land.
Therefore, it should be noted that this Property Appraisal Manual applies not only to buildings but also to the sites of the buildings.
The type of "property appraisal" varies from assessments performed by qualified people "licensed real estate appraisers to those performed broadly and generally. The use of such words as "prices" and "values" used in assessment also varies.
In explaining the pricing theory, it is important to use commonly-used expressions for such unfamiliar words as "net income" and "capitalization rate" in order to make their meanings more understandable.

For these reasons, these words are defined and used as follows in this manual:

Property	Land and improvements on the land (as defined in Article 86.1 in the Civil Code)
Real estate appraisal	Price assessment by licensed real estate appraisers based on the real estate appraisal standards
Price investigation report by real estate appraisers	Price assessment by licensed real estate appraisers based on specific assessment purposes including those not based on the property appraisal standards
Property appraisal	Value assessment of real estate including the "real estate appraisal" and "price investigation report by licensed real estate appraisers" as well as those voluntarily performed by people involved in real estate business for investment and other purposes.
Price	Economic value expressed by monetary value
Value	Broad concept including economic value, other specifications and levels, etc.
Net income	Proper income from a property. Net income calculated by deducting maintenance costs, utility costs, taxes and property insurance costs, etc. from the total revenue such as rent, etc.
Capitalization rate	A rate used in directly calculating the value of the property based on the net income of a certain period (normally 1 year). It includes changes in predictions on factors that affect the future revenues and uncertainty (risks) accruing from the predictions.
Direct capitalization method	A method of calculating the value of a property by dividing the net income of a certain period (normally 1 year) by the capitalization rate. The risk of change in net income must be considered through the capitalization rate. For this reason, for properties with the same amount of expected net income, the rate is higher(lower) for a property with high(low) risk of the change and, as a result, the value tends to be lower (higher).
DCF method	Discounted Cash Flow Analysis. A method of tallying both present values of the net operating income of a property during the holding period and the reversionary value (as calculated by deducting the sales costs from the expected sales value) of the property at the end of the holding period based on the assumption that the property is held for a certain period of time (for example, 10 years).
Discount rate	A rate used in the DCF method to discount the future net income or the future reversionary value to the current value. As changes in the net income during the assumed holding period are reflected in the predictions of the net income, it is necessary to consider the other risks of changes in the net income and reversionary value.

The environmental performance assessment by CASBEE is designed as a tool to appropriately assess the asset values of buildings rather than the prices of sites, which weigh heavier in the property appraisal. In this sense, the assessment by CASBEE can be described as the "building asset value assessment." It is also important to note that CASBEE deals broadly with the assessment of both the environment of buildings and the environment of sites. In this sense, the assessment targets are the same as the property appraisal. However, CASBEE deals with the environment within a site rather than the price of a site.
The words "property appraisal," meanwhile, are used not only for real estate appraisal but also for voluntary assessment by the broad range of people involved in property business. For this reason, the discussion on the CASBEE- Property Appraisal deals mainly with the property appraisal based on the broad definition of "asset values of buildings + the environment of the sites," which could be easily understood by a wide range of people involved in property and construction businesses.

Preface Assessing environmental considerations for property based on CASBEE

The development of a low-carbon society has become one of the biggest challenges facing humankind in order to achieve green societies. The building industry needs to accept responsibility for its discharge of huge amounts of CO_2. The increase in demand for low-carbon measures will lead to a reduction in the assessment results of properties with poor low-carbon measures, and give rise to a new environmental risk for properties.
In recent years, environmental performance assessment tools for buildings such as CASBEE and LEED, etc. have been used in building markets around the world for DfE, design for environment, communications between clients and designers and for construction-related authorities to promote green buildings and to visualize building specifications. However, little progress has been made in using the tools to assess the environmental aspects of the property values.
Under such circumstances, the CASBEE R&D Committee has launched a subcommittee called “Working Group for CASBEE and Property Appraisal” in order to develop a tool to objectively and transparently assess the impact of DfE on property values. The subcommittee came up with a framework to incorporate the impact of DfE on property values into the existing CASBEE. This manual describes the subcommittee’s result.
The property industry in the United States and Europe in recent years has been pointing at the vicious cycle of stakeholders trying to avoid their responsibilities as a major reason for delays in constructing green buildings as shown in Fig. 1. One of the major reasons for triggering such a vicious cycle is the lack of a system for sharing information on environmental considerations for properties provided by the people concerned and improved added values such information brings. The most important mechanism for turning the vicious cycle into a positive cycle as shown in Fig. 2 is to assess the environmental specifications of buildings and visualize and share among the people concerned a mechanism for enhancing added values to be brought about by the DfE. The new appraisal framework has been developed for such purposes and is the first of its kind in the world. This manual identifies the similarity in concept between the environmental performance by CASBEE (environmental quality of the building / environmental load of the building) and the calculation of value indicated by the income approach of property (net income of the property / capitalization rate of the property) based on the direct capitalization method, and also identifies which CASBEE appraisal items are specifically associated with the property appraisal. While the tool is still incomplete and requires improvement, it is innovative in structurally analyzing environmental aspects of the property appraisal.

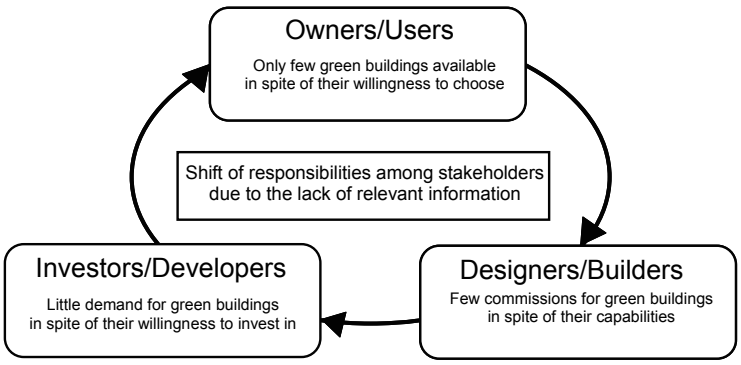


Fig.1 Vicious spiral in the construction market: State of shifting the responsibility*Reference

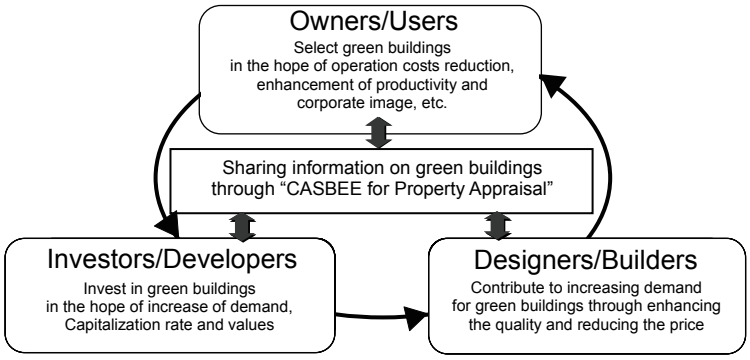


Fig.2 Onward spiral towards market transformation

In developing a low-carbon society in the future, the building industry must undergo dramatic changes because it currently produces a huge amount of CO_2. Most conventional efforts for energy saving and CO_2 reduction in the industry have mainly targeted the designing and construction industries and users. However, efforts that ignore the real estate industry, which consists of industrial groups such as finances and developers who are located on the upper stream of the building industry, have only limited ripple effects. This is because, in many cases, the real estate industry as orderers are deeply involved in determining the design specifications, in other words, the quality of the buildings. It is strongly hoped that the development of the tool will increase interest among the real estate industry in promoting green buildings, convert the above vicious cycle into a positive cycle and contribute further to the development of a low-carbon society in Japan.

* Reference document
RICS (Royal Institution of Chartered Surveyors),
"-Breaking the Vicious Circle of Blame- Making the Business Case for Sustainable Buildings," 2008

CASBEE Property Appraisal Manual (2009 Edition)

1. Domestic trend on property appraisal

1.1. CASBEE and its diversified use

1.1.1. What is CASBEE

CASBEE, the **C**omprehensive **A**ssessment **S**ystem for **B**uilt **E**nvironment **E**fficiency, is a system for assessing and rating the comprehensive environmental performance of the designated building(s) from two major aspects: 1) the environmental quality to be enhanced through its service performance, amenity, etc. and 2) the environmental loads to be reduced through energy and resource saving, etc.

Labeling based on BEE

The assessment result is determined by the value of the Built Environment Efficiency (BEE), a quotient index of Q (building environmental quality) as dividend and L (building environmental loads) as devisor (Fig. 1-1). It briefly and explicitly indicates the diverse environmental performances of a building.

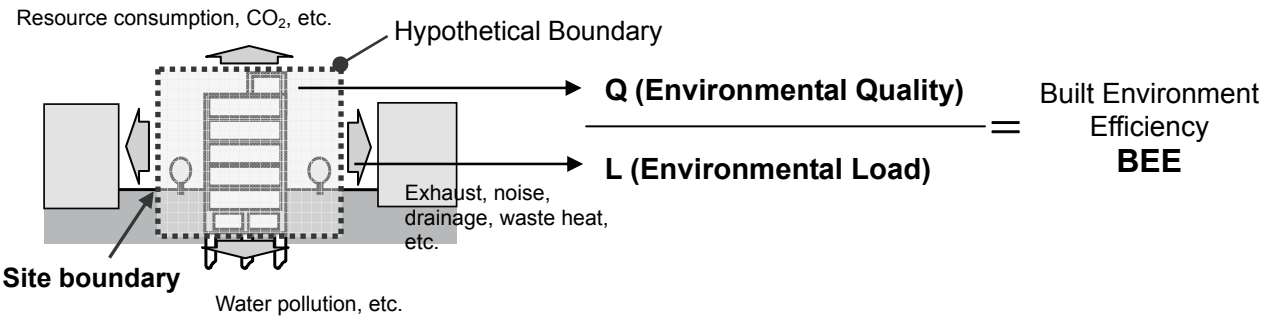


Fig. 1-1 CASBEE assessment by environmental quality (Q) and load (L)

A building with a higher BEE value (e.g. higher Q value and lower L value) is assessed to be more green. Specifically, it is ranked according to five-grade system in terms of the BEE value from "S (Excellent)" over 3.0 points to "C (Poor)" under 0.5 points. This assessment result is indicated on BEE graph of L (0-100 points) as the horizontal axis and Q (0-100 points) as the vertical axis, which graphically visualizes the environmental performance for clear comparison between different buildings (Fig. 1-2).

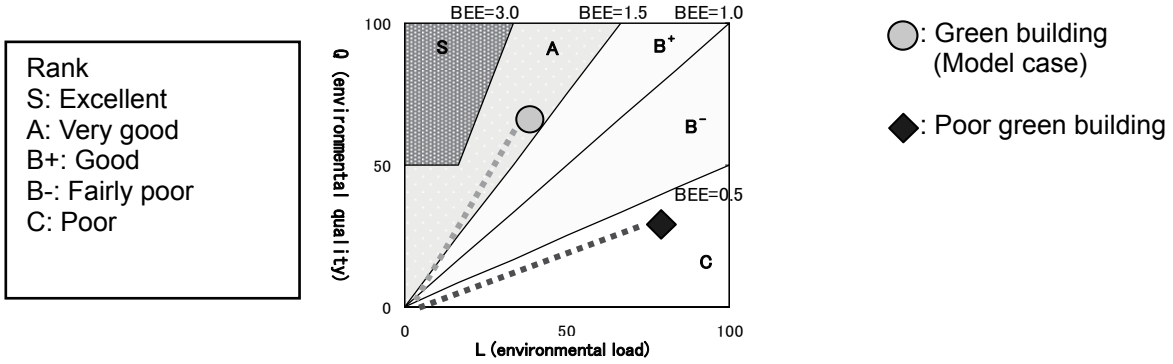


Fig. 1-2 Rating based on BEE

A committee was set up in 2001 by the Institute for the Building Environment and Energy Conservation (IBEC) under the guidance of the Ministry of Land, Infrastructure, Transport and Tourism started to develop CASBEE.

The first assessment tool “CASBEE for Office” was developed 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. Japan Sustainable Building Consortium has been responsible for the development and the promotion since 2009.
These CASBEE assessment tools have been developed based on three principles: (1) To make assessment through life cycles of buildings, (2) To make assessment of buildings in both “environmental quality (Q)” and “environmental load (L),” (3) To make assessment by using BEE (Built Environment Efficiency), which is a new assessment indicator developed based on the concept of “environment efficiency.”
CASBEE, as shown in Fig. 1-3, comprises the life cycle-based basic tools and expansion tools designed for specific individual purposes. These are collectively called the “CASBEE Family.”

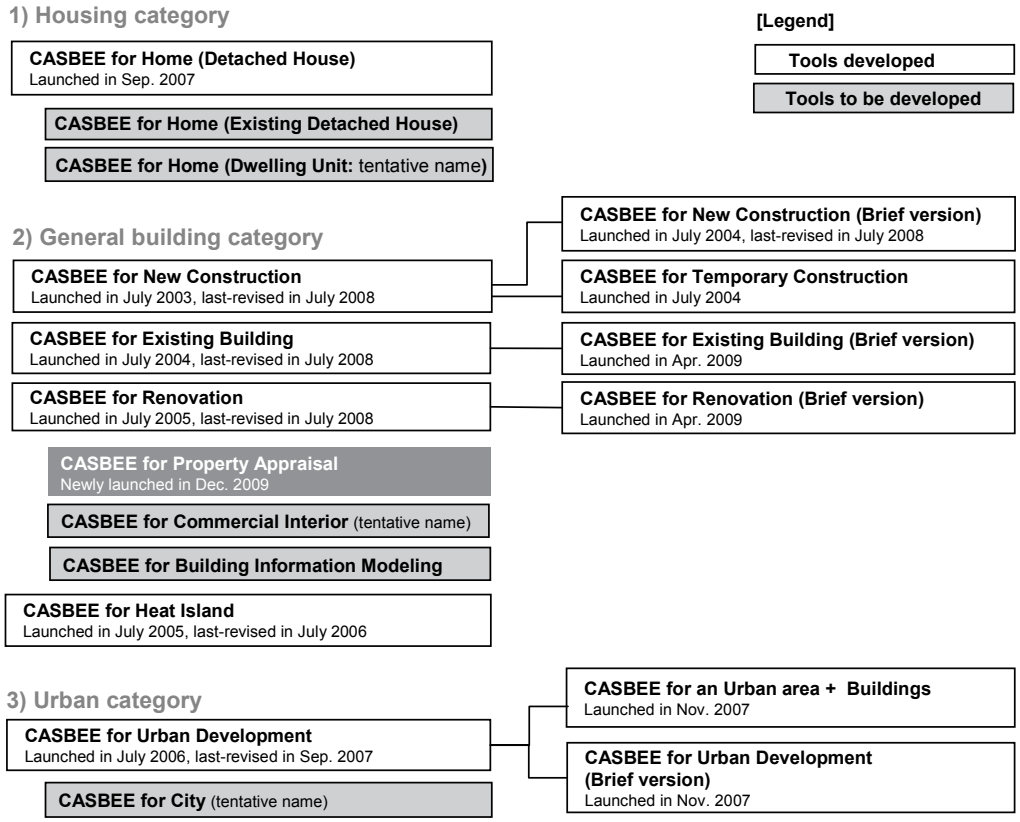


Fig. 1-3 Component of CASBEE Family

1.1.2. Use for building administration

(1) Use by central government

Amid increasing urgency to implement anti-global warming measures, CASBEE has been broadly used for introducing central government measures. The Environmental Action Plan (2004.06) clearly stipulates the (1) development and promotion of CASBEE, (2) development and publication of CASBEE for Existing Building, (3) creation of certification system and (4) support by local governments for introducing CASBEE. CASBEE also plays an important role in placing orders for public buildings based on the Green Contract Law. The Environmental Load Reduction Program on Government Facilities by the Ministry of Land, Infrastructure, Transport and Tourism (2006.08) stipulates that the Standards for the Environmental Performances of Government Building and the Guidelines for Assessment of Environmental Friendliness of Government Building Facilities and Renovation Plan used for public buildings to be constructed by the central government must conform to CASBEE. On the national policy front, the report on evaluation and review of the Kyoto Protocol Target Achievement Plan (2007.09) urges the expansion of coverage by CASBEE tools and the promotion of the tools.
Meanwhile, CASBEE is also used for subsidization programs. “The Model Project to Promote CO_2-saving

Houses and Buildings," which started a public offering in April 2008, is designed to support the development of a leading project for CO_2-saving houses and buildings. For this project, CASBEE is used as an assessment indicator to select projects to be subsidized. The new construction project in the "model project to promote CO_2-saving houses and buildings" requires the achievement of environmental performance equivalent to B+ or higher by CASBEE.

"The Leading Model Project for Excellent, Long-term Houses" based on the "Vision of the House for 200 Years" promoted by the Housing Bureau, Ministry of Land, Infrastructure and Transport and Tourism has a system in place to subsidize 2/3 or less of the construction costs for parts of buildings that use advanced materials, technologies or systems in model projects that contribute to longer life cycles of houses by introducing such advanced methods. The "model project to promote CO_2-saving houses and buildings" also has a system in place to subsidize 1/2 or less of the construction costs for parts of buildings that use advanced methods in leading projects for houses and buildings with excellent CO_2-saving effect. These subsidies are expected to play an important role in the proliferation of green buildings as the approved projects show the actual economic effects of the measures.

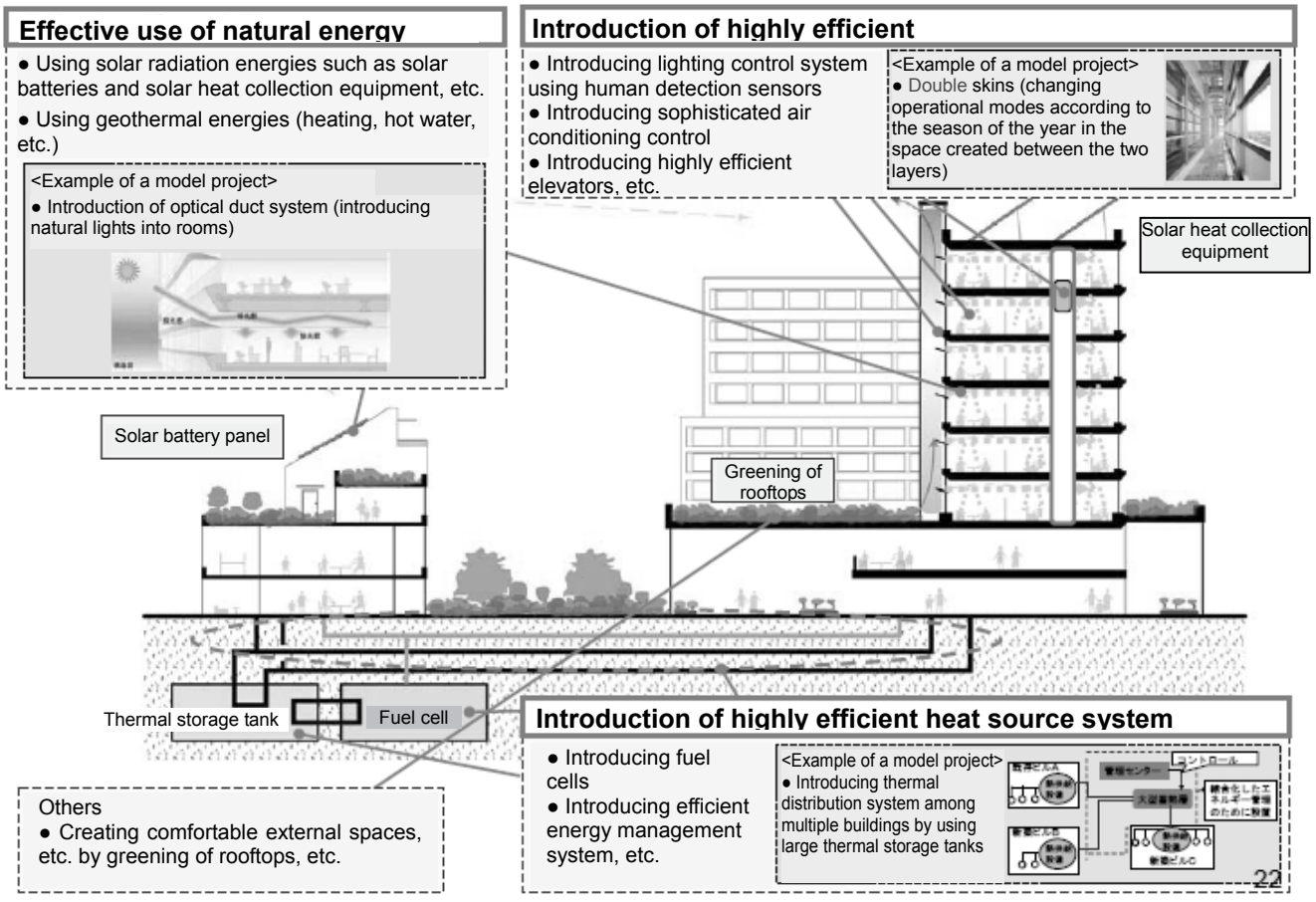


Fig. 1-4 Image of the Model Project to Promote CO2-saving Houses and Buildings * Reference 1

(2) Use by local governments

In recent years, the building administrations by local governments are also increasingly requiring building owners to use CASBEE assessment for their buildings. They are requiring building owners to submit assessment results for buildings of larger than predefined sizes. The summaries of the results submitted are publicly released on the Internet. It is designed to promote efforts for green buildings through the information disclosure. Nagoya Municipal Government has required building owners, since April 2004, to submit results based on CASBEE-Nagoya. So far, 16 local governments (as of December 2009) have introduced CASBEE.

Table 1-1 Status of reporting CASBEE results to local governments

Local government	Size (Minimum floor area)	Effective date	Number of reports (cases) (as of March 31, 2009)					
			FY2004	FY2005	FY2006	FY2007	FY2008	Total
Nagoya city	2,000 ㎡	2004.4	148	234	210	229	173	994
Osaka city	5,000 ㎡	2004.10	26	72	97	109	73	377
Yokohama city	2,000 ㎡	2005.7	—	93	123	113	102	431
Kyoto city	2,000 ㎡	2005.10	—	21	104	93	68	286
Kyoto pref.	2,000 ㎡	2006.4	—	—	37	45	33	115
Osaka pref.	5,000 ㎡	2006.4	—	—	60	101	115	276
Kobe city	2,000 ㎡	2006.8	—	—	68	136	104	308
Hyogo pref.	2,000 ㎡	2006.10	—	—	81	162	187	430
Kawasaki city	5,000 ㎡	2006.10	—	—	38	47	40	125
Shizuoka pref.	2,000 ㎡	2007.7	—	—	—	120	222	342
Fukuoka city	5,000 ㎡	2007.10	—	—	—	18	37	55
Sapporo city	5,000 ㎡	2007.11	—	—	—	20	77	97
Kita-kyushucity	2,000 ㎡	2007.11	—	—	—	5	18	23
Saitama city	2,000 ㎡	2009.4	—	—	—	—	—	—
Saitama pref.	2,000 ㎡	2009.10	—	—	—	—	—	—
Aichi pref.	2,000 ㎡	2009.10	—	—	—	—	—	—
							Gross total	3,859

These local governments have implemented the following policies by using CASBEE to increase the proliferation of green buildings:

1) Application conditions for comprehensive design system
Some local governments define CASBEE assessment results as application conditions for the comprehensive design system, which is an approval system for exceptions to limits on floor area ratios, etc. This is one of the advanced uses of CASBEE for improving the urban environment through building administration. Currently, the following local governments are using CASBEE for their comprehensive designing system:

- Osaka City: A construction is approved in the case of B^+ or higher (from October 2004)
- Yokohama City: A construction is approved in the case of A or higher (from April 2006)
- Nagoya City: The floor area ratio will be deregulated by up to 250% instead of the normal 200% in the case of S or higher (from June 2005)

2) Application conditions for subsidies
For new construction of multiple-dwelling houses, building owners applying for building cost subsidy programs administered by local governments are required to submit their CASBEE assessment results.

- The “Osaka City Advanced Environmental Housing Development Project” (July 2005, the project ends by the end of March 2007)
  In the case of application for subsidies for the above project for multiple-dwelling houses, building owners are required to obtain A or higher by CASBEE-Osaka, and constructions are to be approved in the order of higher BEE values.
- The “Nagoya City Downtown Apartment Supply Project” (November 2005)
  The prioritization for constructions for the above project is determined based on the results of CASBEE-Nagoya.

3) Advertisement display obligation
Kawasaki municipal government has the “Kawasaki City Environmental Performance Display for Multiple-Dwelling Houses for Sale System,” which obliges building owners of multiple-dwelling houses to display CASBEE assessment results on their advertisements. The municipal government requires that advertisements of multiple-dwelling houses for sale among all the specific buildings (new buildings with a total

floor area of over 5,000 ㎡, etc.) must display the environmental performance of the houses for sale and that documents necessary for such advertisements must be submitted to the municipal government (an obligation to display in advertisements and an obligation to report to the municipal government when displayed). The municipal government also encourages sellers of such multiple-dwelling houses for sale to explain to buyers about the environmental performance of the houses.

4) Certification systems unique to local governments

Yokohama municipal government has developed the “Yokohama city green buildings assessment certification system” to certify the assessment results. This is a certification system implemented uniquely by Yokohama municipal government based on CASBEE-Yokohama and is different from the third party certification system currently in use by the Institute for Building Environment and Energy Conservation (IBEC), etc. The system is implemented based on the “Green Building Assessment Certification System Guideline” defined by Yokohama municipal government. The Yokohama city green building assessment certification committee, which consists of academic experts, etc. assigned by the Yokohama mayor determines certifications and, if successfully certified, provides certificates.

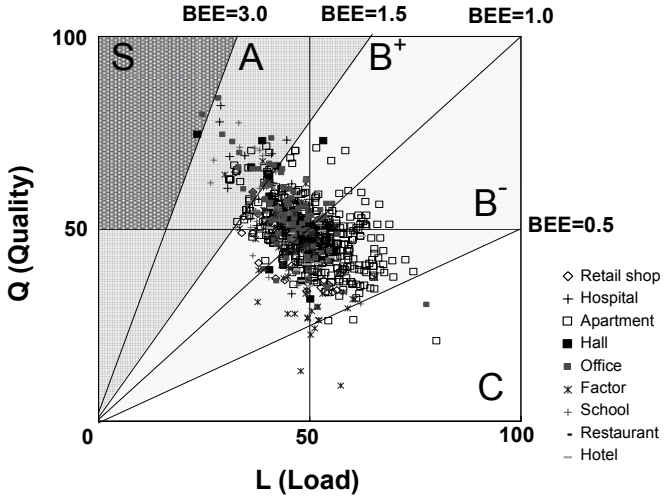


Fig. 1-6 “Status of reporting environmental performance assessment in Nagoya city

Fig. 1-5 Label for “Kawasaki city environmental performance display for multiple-dwelling houses for sale”

Table 1-2 CASBEE-related policies by local governments

Local government	Tool	Conditions	Incentives	Note
Nagoya city	New Construction (Brief version)		(1) Additional deregulation of limits on floor area ratios is provided according to the assessments by CASBEE-Nagoya when the Comprehensive designing system is applied (by up to 250% instead of the normal 200% in the case of “S”) (2) Used for prioritizing providers to be selected for the Nagoya city downtown apartment supply project	
Osaka city	New Construction (Brief version)	Used as conditions for the Comprehensive designing system (B+ or higher)	(1) The subsidy is available to those with grade “A” or higher in the Osaka city excellent environmental housing development project. In addition, constructions are to be approved in the order of higher BEE values. (To be ended by the end of March, 2007) (2) Osaka city comprehensive environmental assessment system manifestation for buildings (CASBEE-Osaka OF THE YEAR) (from 2005)	Reporting is obligatory when applying for the Comprehensive designing system for the site area of 1,000 ㎡ or more
Yokohama city	New Construction (Brief version)	(1) Used as conditions for the urban area environmental designing system (comprehensive designing system) (A or higher) (from 2005) (2) Yokohama city environmental performance display for buildings (from April 1, 2010) (3) Used as assessment items in the assessment policy for the urban plan proposal system (from 2008)	(1) Yokohama city green building assessment certification system	
Osaka pref.	New Construction (Brief version)		(1) The manifestation system “Osaka Green Building Award”	
Kawasaki city	New Construction (Brief version)	Kawasaki city environmental performance display for multiple-dwelling houses for sale	(1) Preferential interest rates in partnership with banks (Bank of Yokohama, Sumitomo Trust & Banking)	Reporting is discretionary for 5,000 ㎡ or less

Local government	Tool	Conditions	Incentives	Note
Sapporo city	New Construction (Brief version)		(1) Preferential interest rates in partnership with banks (North Pacific Bank)	Reporting is discretionary for less than 5,000 ㎡
Kita-kyushu city	New Construction (Brief version)	Used as conditions (B+ or higher) for site locations of special buildings, etc. (Article 51) and the Comprehensive designing system (Article 59.2)	(1) Used as conditions for selecting excellent regional houses for rent (2) Used as conditions for selecting Kita-kyushu downtown multiple-dwelling houses supply projects (development projects for excellent buildings, etc.) (B+ or higher) (3) Used as conditions for preferential interest rates* and interest payment subsidies** (B+ or higher)	* "Heartful preferential housing interest rate system" (Preferential interest rates for buyers of multiple-dwelling houses and detached houses. 0.1% lower in interest rate than the normal loan rate at relevant financial institutions (FY2008)) ** "Kita-kyushu city living assistance program" (The municipal government subsidizes part of the interest payment for five years. Interest rate subsidization rate: annual 1%, up to 1 million yen)
	Home (Detached House)		(1) Used as conditions for preferential interest rates* and interest payment subsidies** (B+ or higher)	

1.1.3. Use by private companies

(1) Use by designers for DfE (Design for Environment)

CASBEE is designed to check the environmental performance in the designing stage of buildings and objectively indicate to building owners the content of DfE. It can also be used by building owners and designers themselves to provide indicators for defining indirect goals for assessing ISO14000-based environmental management actions.
According to the survey*[Reference 2] conducted among companies belonging to the Building Contractors Society (BCS) (23 Design Committee members), many of the companies have already adopted CASBEE for their designing work. As shown in Fig. 1-7, 70% of the companies have their own standards proactively using CASBEE (for New Construction).

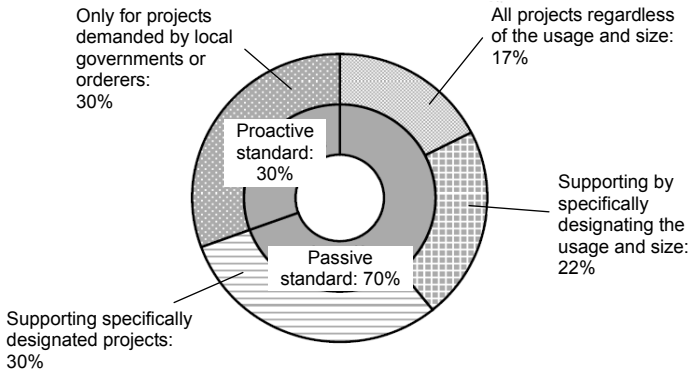


Fig. 1-7 Status of using CASBEE for New Construction (Brief version) by builders*[Reference 2]

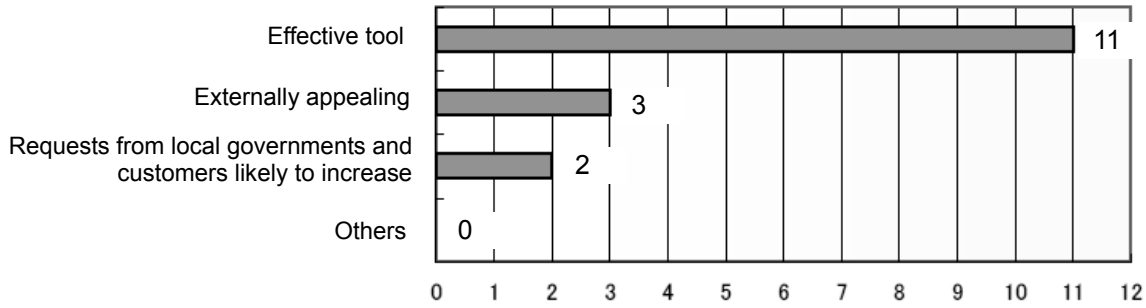


Fig. 1-8 Major reasons for proactively adopting CASBEE*[Reference 2]

(2) Use for selecting competitive design proposals, PFI providers

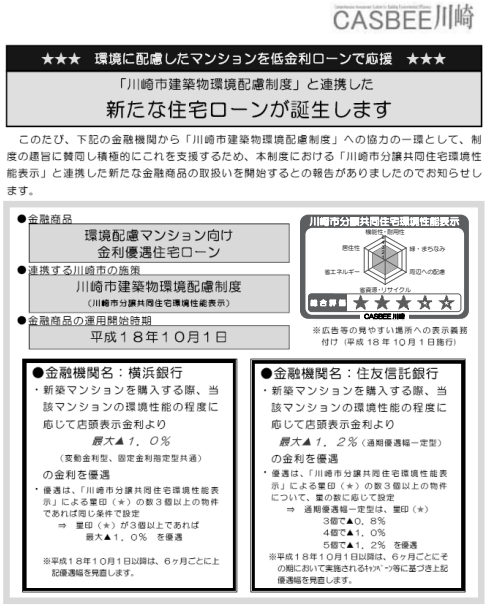
The U.S. standard “LEED” is already in wide use by state and municipal governments to order construction of public buildings and the use is prevailing also among private buildings. In Japan, too, the use of CASBEE is increasing for judging competitive design proposals, selecting PFI providers and defining environmental performance conditions for the designing stage. CASBEE is used also by builders and designers or by owners and tenants of buildings for defining environmental performance goals. It can also be used, for example, not only by local governments but also by private building owners to present to designers comprehensive environmental performance goals or to increase scores for designers who propose the maximum environmental performance within limited budgets.

(3) Use for environmental labeling for asset assessment of buildings

CASBEE can also be used as an environmental performance assessment tool for labeling by third parties, etc. This manual is expected to use as a tool for assessing the asset value of buildings.

(4) Use for determining preferential interest rate eligibility

Some private financial institutions provide preferential interest rates for housing loans to buyers of houses with good assessment results based on the advertisement display obligation system. The “Kawasaki City Environmental Performance Display for Multiple-Dwelling Houses for Sale System” by Kawasaki municipal government, for example,


CASBEE川崎

★★★ 環境に配慮したマンションを低金利ローンで応援 ★★★

「川崎市建築物環境配慮制度」と連携した

新たな住宅ローンが誕生します

このたび、下記の金融機関から「川崎市建築物環境配慮制度」への協力の一環として、制度の趣旨に賛同し積極的にこれを支援するため、本制度における「川崎市分譲共同住宅環境性能表示」と連携した新たな金融商品の取扱いを開始するとの報告がありましたのでお知らせします。

●金融商品
環境配慮マンション向け金利優遇住宅ローン

●連携する川崎市の施策
川崎市建築物環境配慮制度
（川崎市分譲共同住宅環境性能表示）

●金融商品の運用開始時期
平成１８年１０月１日

※広告等の見やすい場所への表示義務付け（平成１８年１０月１日施行）

●金融機関名：横浜銀行
・新築マンションを購入する際、当該マンションの環境性能の程度に応じて店頭表示金利より
最大▲１．０％
（変動金利型、固定金利期定型共通）
の金利を優遇
・優遇は、「川崎市分譲共同住宅環境性能表示」による星印（★）の数３個以上の物件であれば同じ条件で設定
⇒ 星印（★）が３個以上であれば最大▲１．０％ を優遇
※平成１８年１０月１日以降は、６ヶ月ごとに上記優遇幅を見直します。

●金融機関名：住友信託銀行
・新築マンションを購入する際、当該マンションの環境性能の程度に応じて店頭表示金利より
最大▲１．２％（通期優遇幅一定型）
の金利を優遇
・優遇は、「川崎市分譲共同住宅環境性能表示」による星印（★）の数３個以上の物件について、星の数に応じて設定
⇒ 通期優遇幅一定型は、星印（★）
３個で▲０．８％
４個で▲１．０％
５個で▲１．２％ を優遇
※平成１８年１０月１日以降は、６ヶ月ごとにその期において実施される｢ﾏｰｹｯﾄ等に基づき上記優遇幅を見直します。

Fig. 1-9 Preferential housing loans based on “Kawasaki city environmental performance display for multiple-dwelling houses for sale system”

provides preferential interest rates of up to 1.2% (at the start of the system) according to the results of CASBEE.

(5) Use for environmental performance diagnosis and renovation design for ESCO projects and existing building stock renovations

CASBEE can be used for proposing operational monitoring commissioning and renovation designing of buildings for the Energy Service Company (ESCO) projects and renovations of existing building stocks. CASBEE for Renovation is a tool available for energy-saving renovations, etc.

(6) Use as an international tool

The International Organization for Standardization (ISO) is also working on the development of the international standard on the method of assessing environmental performance of buildings called “TC59/SC17.” CASBEE, if it complies with the international standard, may be used internationally in the future through, for example, the multi-national cross-certification of environmental labels, etc. CASBEE has been translated and published in foreign languages such as English and Korean. In China, a group led by Professor Jiang of Qinghua University developed and publicly released in August 2003 the environmental performance assessment system “GOBAS: Green Olympic Building Assessment System” which utilized the concept of CASBEE for use in designing, building and operating facilities for the 2008 Beijing Olympic Games. Soon, the comprehensive environmental assessment system will be used for international competitive bidding in China and Asia in which Japanese companies are expected to increase their participation.

1.1.4. Use for education

An increasing number of architectural schools including universities are using CASBEE. Many universities with the faculty of architecture are using CASBEE for environmental planning trainings, etc. Architects already in business are also hoping that CASBEE is used by architecture-related craft unions and academic groups for the Continuing Professional Development (CPD).

1.1.5. Assessment certification system and assessor registration system

The CASBEE certification system and assessor registration system has been implemented by the Institute for Building Environment and Energy Conservation (IBEC). The CASBEE certification has also been implemented, since March 2008, by 11 organizations accredited by IBEC.

(1) Assessment certification system

The various usages of CASBEE are described in the previous sections of this manual. Securing reliability and transparency are of crucial importance in providing CASBEE assessment results to third parties. The assessment certification system is designed to secure reliability in providing such information and aims to achieve proper operation and proliferation of CASBEE by reaffirming the accuracy of its assessment results. It is designed to be used by designers, building owners and constructors, etc. to secure the reliability of the asset value assessments and labeling, etc. of their buildings. This certification system covers a broad range of buildings including new construction, existing buildings, renovations, urban development and homes (detached houses). As of December 2009, 93 buildings have been certified.

(2) Assessor registration system

CASBEE is in principle designed to assess the buildings quantitatively to the extent possible. However, as it also includes some qualitative assessment items, experts versed in knowledge and technology on the comprehensive environmental performance assessment of buildings are required. For this reason, the “assessor registration system” has been established. People wishing to be assessors need to take the “assessor training course” and successfully pass the “assessor exam” and make “registration.” Currently, “CASBEE for Building Assessor” who can handle CASBEE for New Construction, for Existing Building and for Renovation, and “CASBEE for Detached House Assessor” who can handle CASBEE for Home (Detached House) are available. Japanese 1st-class architects are qualified to take the “CASBEE for Building Assessor” exam. As of December 2009, there are approximately 6500 CASBEE Asessors, including Building Assessors and Detached Hosuse Assessors, across the country.

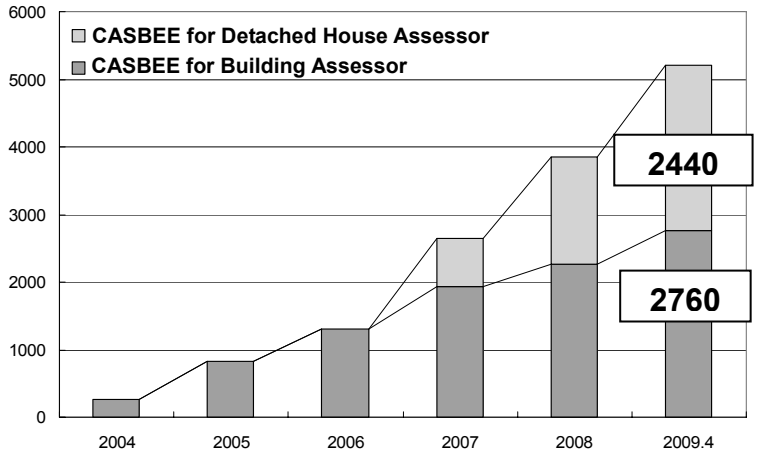


Fig. 1-10 Number of registered CASBEE assessors

1.1.6. Study on assessment tools and market reform

Japanese and Canadian experts on environmental performance assessment tools have long been involved in the joint study on the visualization of environmental performance through assessment and on the issue of market transformation as they attach special importance on these themes. Since the international workshop "Strategic market reform for proliferation of green buildings" in Tokyo in December 2006, the workshop on the themes has been held continuously as described in Table 1-3 below.
The themes have attracted global attention especially after the World Sustainable Building Conference "SB08" was held in September 2008. The conference also included forums on the themes described in

Table 1-4. In the forum on the theme of "Special Forum 8: BEAM (Building Environmental assessment methods) and Market Transformation," Professor Ray Cole of British Colombia University in Canada and other researchers and users of assessment tools of various countries presented their tools and had a discussion. At the forum, the concept of property appraisal using CASBEE was presented as a model case in Japan.

Table 1-3 Major outcomes of forums on assessment tools and market reform

Title	Date	Place	Description
International Workshop on Strategic Market Transformation for the Promotion of Sustainable Buildings	Dec. 2006	Tokyo	"Market Transformation through Assessment/Rating of Building Performance," Shuzo Murakami, and others
2nd Joint Japan-Canada Workshop on Building Environmental Assessment Methods & Market Transformation -Responding to the Urgency of Climate Change	Jun. 2007	Vancouver	"Transforming the Building Market through Assessment of Building Performance," Shuzo Murakami, and others
Workshop on Market Transformation for the Promotion of Sustainable Buildings	Apr. 2008	Tokyo	"Spread of CASBEE and Market Transformation of Building Industry," Shuzo Murakami "Impact of Building Environmental Assessment Methods," R. Cole, and others
SB08 "Special Forum 8: BEAM and Market Transformation"	Sep. 2008	Melbourne	"Market Transformation brought about by Necessity for Reducing Environmental Risks," Shuzo Murakami
Joint workshop of IEA, ISO, IEC on: International Standards to Promote Energy Efficiency and Reduce Carbon Emissions	Mar. 2009	Paris	"Assessment Tools for Building Performance to Promote Energy Efficiency in the Building Sector," Shuzo Murakami
Joint symposium by Japan Business Federation/WBCSD "Energy-saving efforts in consumer and business sectors"	Jul. 2009	Tokyo	"Global trend on energy-saving regulations for buildings" (Shuzo Murakami)

Table 1-4 Themes of relevant SB08 special sessions

Theme	Speaker
Special Forum 8: BEAM and Market Transformation	Ray Cole (British Colombia University, Canada), Vanessa Gomes de Silva (Campinas State University, Brazil), Shuzo Murakami (Building Research Institute, Japan), Paul King (UKGBC, U.K.), Tom Hicks (USGBC, U.S.A.)
Special Forum 9: Valuing Sustainability - Measuring the Financial Performance of Sustainable Buildings	Richard Lorch (Building Research & Information), Thomas Luetzkendorf (Karlsruhe University, Germany), John Goddard (RICS Oceania), Richard Reed (Deakin University, Australia), David Lorenz (RICS EU), others
Special Forum 11: Financing sustainable property	Craig Roussac (INVESTA, Australia), Daryl Browning (ISPT, Australia), Tomonari Yashiro (The University of Tokyo, Japan)

Reference

[1]Materials for the Third Symposium on CO_2-Saving Houses and Buildings, Institute for Building Environment and Energy Conservation

[2]"FY2008 Survey Report on CASBEE among BCS Design Committee Companies," Building Contractors Society

1.2. Move toward considering environmental added values in the Japanese property appraisal industry

(1) Reasons why the economic effects of green buildings were not analyzed in Japan

Despite the increasing popularity of CASBEE including those designed for local governments, its economic effects and effects of additional values have rarely been analyzed unlike the certification of buildings by LEED in the United States and Green Star. The possible reasons for this are as follows:
In 2001 when the R&D efforts for CASBEE started, the first property investment company, Japanese Real Estate Investment Trust (J-REIT), was listed on the stock market in Japan. Following the listing, property securitization-related transactions became active in the property markets in Japan until around 2007 in the "fund boom." Property for investment traded in the markets were subjected to due diligence to check overt risks for investors such as the legality, structural safety, and environmental risks (asbestos, PCB, etc.) of buildings as well as such risks as soil contamination and earthquakes, etc. Any insufficiencies in overt risk aversion were deemed as "devaluing factors."
Meanwhile, such environmental load factors as CO_2 emissions and wastes generated while building, operating and demolishing buildings or loss of bio-diversity as a result of development were not considered as the above-mentioned "overt risks." Property investment companies and private funds settled their accounts every six months or a shorter cycle and placed their emphasis on improving short-term performance and considered that environmental load risks against which there were no statutory regulations were only potential factors and low-priority items.

(2) Beginning of consideration for environmental added values and theory

Under such circumstances, the thesis report commemorating the 10th anniversary of the Tokyo Association of Real Estate Appraisers, released in October 2005, carried an article titled "A note on environmental value added for real estate" (Masato Ito) (Reference[3]). The article attempted to explain theoretically the fact that reducing "environmental risks," improving images of assets and improving cash flow through energy saving, etc., which were not considered important factors for property investment in those days, could create added values. The article can be summarized as follows:
The value of a property, like other assets, is determined by three factors – "Expense characteristics" (how much cost is assumed for it), "Marketability" (how much it's priced in markets) and "Profitability" (how much profit is expected from it).
For the "Expense characteristics," sellers have solid reasons for considering the factor. If sellers have paid reasonable additional costs for properties with high environmental performance, the sellers naturally want to add the costs to the sales prices. However, in the market, such properties cannot necessarily be traded at prices with such an additional factor in mind. For the "Profitability" of properties, the properties may be accepted by reasonable markets as long as they can generate profits in terms of investment. For this reason, the "Profitability" is important for green properties.
The value of a property that reflects the "profitability" or the "value indicated by the income approach" can be calculated by dividing "net income produced by the property" (deducting such costs as maintenance, taxes and insurance, etc. from the total revenues produced by the property including rent, etc.) by "capitalization rate of the property" (the percentage of net income to the amount of investment in the property). Formula-1 shows the formula for the value indicated by the income approach (in the case of the direct capitalization method).

$$\text{Value indicated by the income approach} = \frac{\text{Net income produced by the property}}{\text{Capitalization rate of the property}} \quad \text{(Formula-1)}$$

The above formula shows that the higher the net income the property can produce, the higher the property value becomes. It also suggests the more stable the net income is (= lower the risk of changes in the net income), the lower the capitalization rate becomes for the property investment, leading to higher property values.
Thus, the increased "net income" could lead to the increased property value. The reduction in the "capitalization rate" in the denominator could also lead to an increase in the property - value. The more stable the net income is, the lower the capitalization rate can become for investors. For example, investment in 10-year government bonds involves almost no risk of changes in the interest rate or no risk of loss of principal at maturity, making it possible for investors to invest at the capitalization rate in the range of 1.3% (as of November 17, 2009).

Property investment, meanwhile, involves depreciable assets and risk of changes in income and damage risks. For this reason, even in the Marunouchi district of Tokyo where the income is regarded as most stable, the rate is around 4% (as of November 17, 2009) and in areas where changes in rent fluctuate wildly, the rate is around 10% or even higher (as of November 17, 2009).
Fig. 1-11 shows the above points in terms of net income and capitalization rate.
As shown in the left hand graph of Fig. 1-11, reduction in utility and repair costs as a result of improved energy saving and durability could lead to increased net income and increased income as a result of improved productivity also could lead to increased net income.
For the capitalization rate, as shown in the right hand graph of Fig. 1-11, risk premiums peculiar to the property and depreciation rate are added to the capitalization rate of general financial assets (long-term government bonds, etc.). For the green property, reduction in risks related to future environment-related taxes and environmental regulations as well as reduction in the depreciation rate as a result of improved service life could lead to reduction in the capitalization rate (the rate before depreciation). Furthermore, the green property may also produce the effect of improved images and reduce marketability risks.

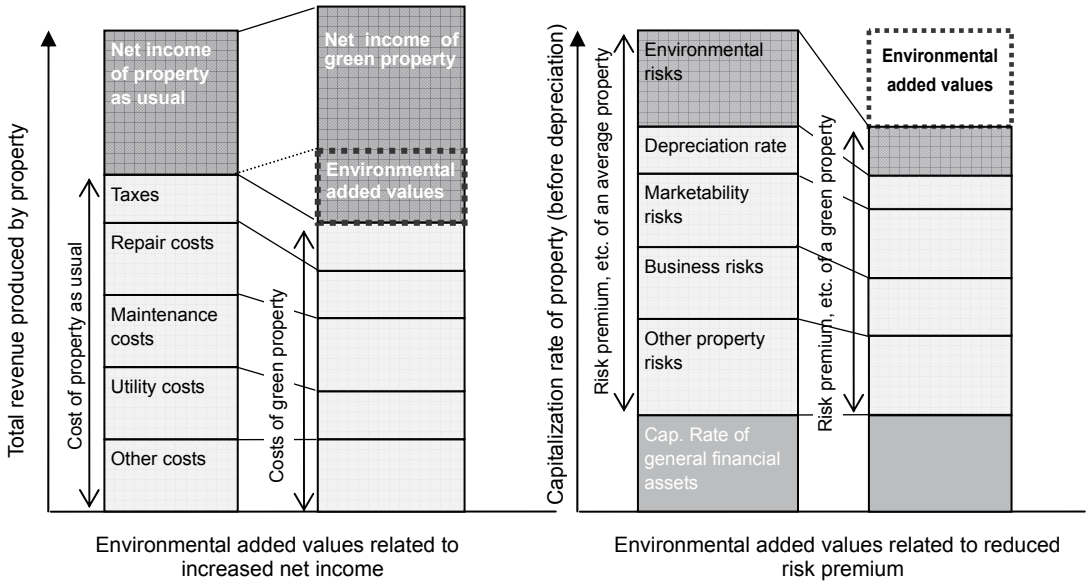


Fig. 1-11 Image of added values represented in net income and capitalization rate (partial revision of Reference[3])

(3) Expansion of environmental added value theory

The above-mentioned environmental added value theory was later discussed by the Survey and Research Committee of Japanese Association of Real Estate Appraisal and, in FY 2007, the committee launched the "Working group on environmental added value (chaired by Masato Ito)." The group studies model cases of environmental added values realized in Japan, views on environmental regulation risks and environmental performance assessment systems associated with CASBEE etc. The group also performs, on a trial basis, environmental added value assessment based on model cases. The results of these efforts are reported in the "Value of property with consideration for the environment is sure to increase – theory and implementation of 'environmental added value' of property" (June 2009) (Reference[4])

For an associating CASBEE with real estate appraisal, CASBEE(PA)WG was launched in June 2008, and the joint discussion with the Japanese Association of Real Estate Appraisal started. The study by the group was taken over by Working Group for CASBEE and Property Appraisal, which developed this manual.

The Land and Water Bureau of Ministry of Land, Infrastructure, Transport and Tourism launched in FY 2008 the "Study group on value of 'environment' in property markets." The purpose of the group is to help various stakeholders including users and investors as well as developers understand and evaluate property with consideration for environment (or "green property" termed by the group) and to study conditions required by property markets including the supply of information to secure a long-term and stable flow of funds to property

markets.
The group in FY 2008 decided to study the current status of regulatory systems on property and the advanced cases as well as property investment trends. The group conducted hearing surveys in the United States and Europe to understand the advanced status in foreign countries and studied issues and policies required for various stakeholders to understand and recognize the value of the “environment” for property. (Reference[5])

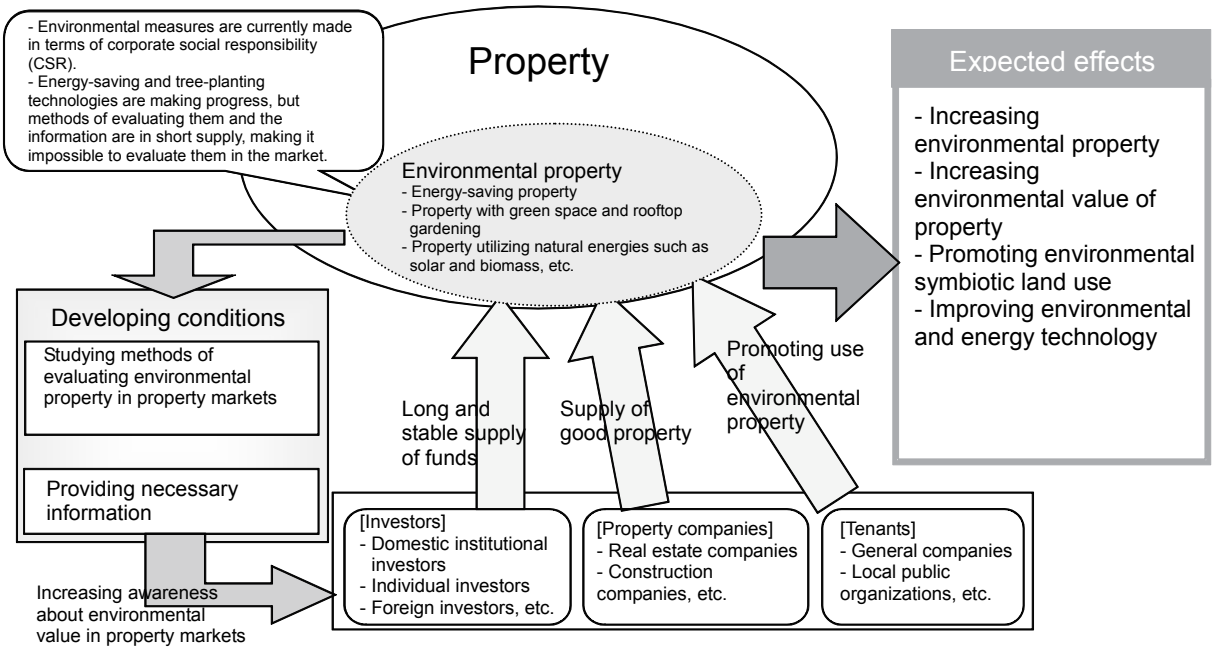


Fig. 1-12 Scheme to study developing conditions for property markets required for proliferation of green property *Reference 6

Reference
3 “A note on environmental value added for real estate” (Masato Ito), Thesis report commemorating the 10th anniversary of the Tokyo Association of Real Estate Appraisers
http: //www.tokyo-kanteishi.or.jp/sonota/rep10th.html
4 “Value of property with consideration for environment is sure to increase – theory and implementation of ’environmental added value’ of property” (Survey and Research Committee of Japanese Association of Real Estate Appraisal), Jutaku-shimpo-sha
5 “New business with consideration for environment !! – Sustainable property foreseen by the moves of multiplestakeholders” (Sustainable Property Study Group), Gyosei Corp., 2009
6 Document “Study group on value of ’environment’ in property markets”

2. Concept of manual

2.1. General description

This manual describes the importance of associating CASBEE with property appraisal first, followed by associating CASBEE assessment items with property appraisal items. These items can be classified into overt and potential items. This manual also describes how detailed items of the CASBEE assessment items can be translated into pricing factors and how they can be reflected in property values. It also explains methods of calculating property values. At the end, case studies based on this manual are presented.
By using this manual:

- People in the construction industry can create CASBEE assessment score sheets simply by following the conventional instructions of the CASBEE assessment.
- People who perform property appraisal can record increase/decrease in income and capitalization rate in environment-related items that are likely to influence the property appraisal by directly using the score sheets.
- Standard tables are available for calculating the value indicated by the income approach and the value indicated by the sales comparison approach by using the environment-related items and the table of increase/decrease in income and capitalization rate.

The CASBEE assessment table used by people in the construction industry is added with the pricing factor table used by people in the property industry and, thus, various documents to be referred for appraisal purposes can be created.

2.2. Significance and purpose of CASBEE and property appraisal

As mentioned earlier, 16 local governments in Japan have been using CASBEE in accepting applications for building permits, indicating that the use of CASBEE for New Construction is making steady progress. As of March 2009, the number of assessment results reported to local governments exceeds 3,800.
However, the use and popularity of such tools as CASBEE for Existing Building and CASBEE for Renovation, while they are already available for use, have been lagging far behind the CASBEE for New Construction. Meanwhile, Japan currently has a huge stock of existing buildings, raising the necessity for the proliferation of energy-saving renovations, renovations designed to cut CO_2 emissions and green renovations, etc. Under such circumstances, it is important to further promote the popularity of tools for existing buildings and renovations.
Environmental performance assessment for existing buildings and for renovated buildings can also be used for the assessment of buildings as assets. For this reason, it is very important to “simplify” the criteria for determining the necessity for renovating buildings in stock.

CASBEE assessment does not include cost and profitability assessment in the scope of its assessment. However, demand is on the increase for using CASBEE assessment results for property appraisal. If property transaction market participants focus more on the relationship between CASBEE items and pricing factors, the use of CASBEE in property transaction markets and even the popularity of green buildings could increase further.

2.3. Associating CASBEE with property appraisal

CASBEE and property appraisal were traditionally regarded as separate assessment methods and no tool to associate them with the value evaluation point of view was developed. Fig. 2-1 shows the association between CASBEE and property appraisal.

For appraisal of securitized property, for example, engineering reports (ER) on overt risks that are reflected in market values including the legality of buildings, necessity and costs of renovations, existence of harmful substances, soil contamination and earthquake risks, etc. must be developed by experts other than licensed real estate appraisers and licensed real estate appraisers must perform property appraisal by explicitly presenting written appraisal tables that describe their decisions and the basis for using the content of the ER for real estate appraisal.
As CASBEE has many items that can be used for determining pricing factors, as mentioned in explaining the background, it may be possible to develop a tool to associate them for use in property appraisal.

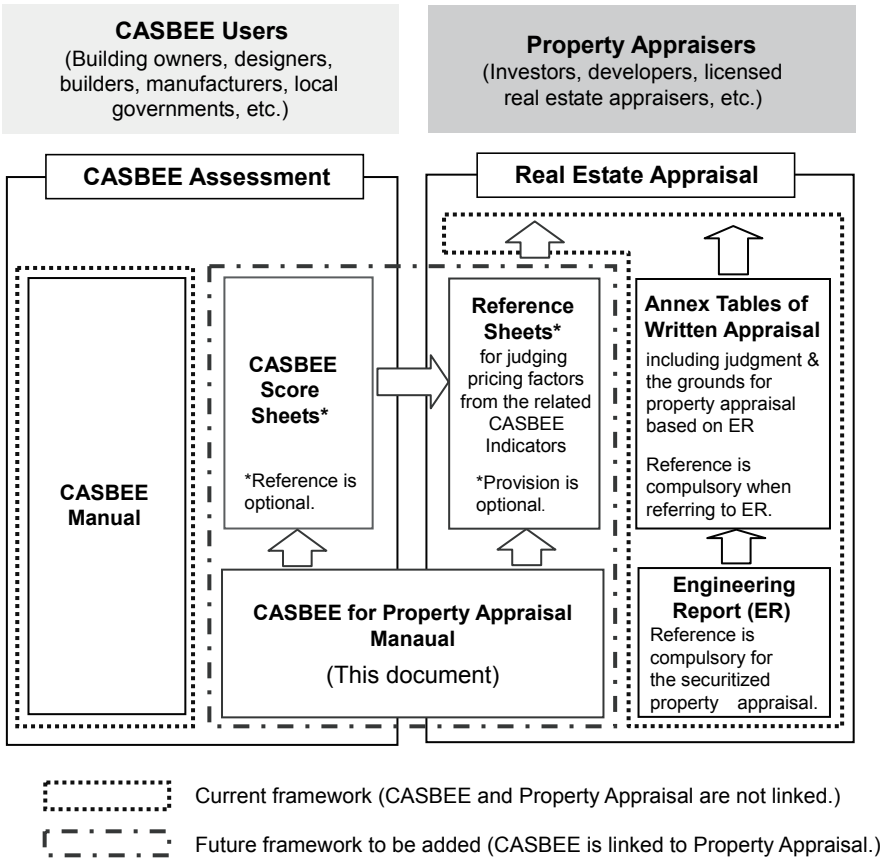


Fig. 2-1 Associating CASBEE with property appraisal (example of real estate appraisal)

The tool needs to be used by a broad range of people including the current main users of CASBEE such as building designers, building owners, builders, manufacturers and local governments as well as such market participants as investors, developers and licensed real estate appraisers. The existing CASBEE users need to understand the positioning and the use of property appraisal so that they understand that the tool can be used to assess buildings as assets and to determine the necessity for renovation of buildings in stock. People involved in property appraisal need to understand that pricing factors can also be determined by using CASBEE assessment items just as they perform property appraisal referring to engineering reports.
Mutual understanding and collaboration will be indispensable in the future between CASBEE users and property appraisers.
It must be noted, however, that the tool, just like written appraisal tables associated with engineering reports, does not cover all the pricing factors for a property and should be used for analyzing some of the factors (especially pricing factors related to environmental performance).

3. Relations with property appraisal, etc.

3.1. Similarity between CASBEE and property appraisal

This section describes the property pricing theory based on which CASBEE is used for property appraisal and also describes the related concepts.
As described in 1.2., the value that reflects the "profitability" of property, or to put it differently, the "value indicated by the income approach" can be calculated by dividing the "net income produced by the property (the income after deducting the maintenance costs, taxes and insurance costs, etc, from the total incomes produced by the property including the rent, etc.)" by the "capitalization rate of the property (the percentage of net income to the amount invested in the property)." Formula 1 shows the value indicated by the income approach calculation formula (for direct capitalization method).

$$\text{Value indicated by the income approach} = \frac{\text{Net income produced by the property}}{\text{Capitalization Rate}} \qquad \text{(Formula-1)}$$

The above formula and "Built Environment efficiency (BEE)" formula by CASBEE are very similar. (Fig. 3-1)

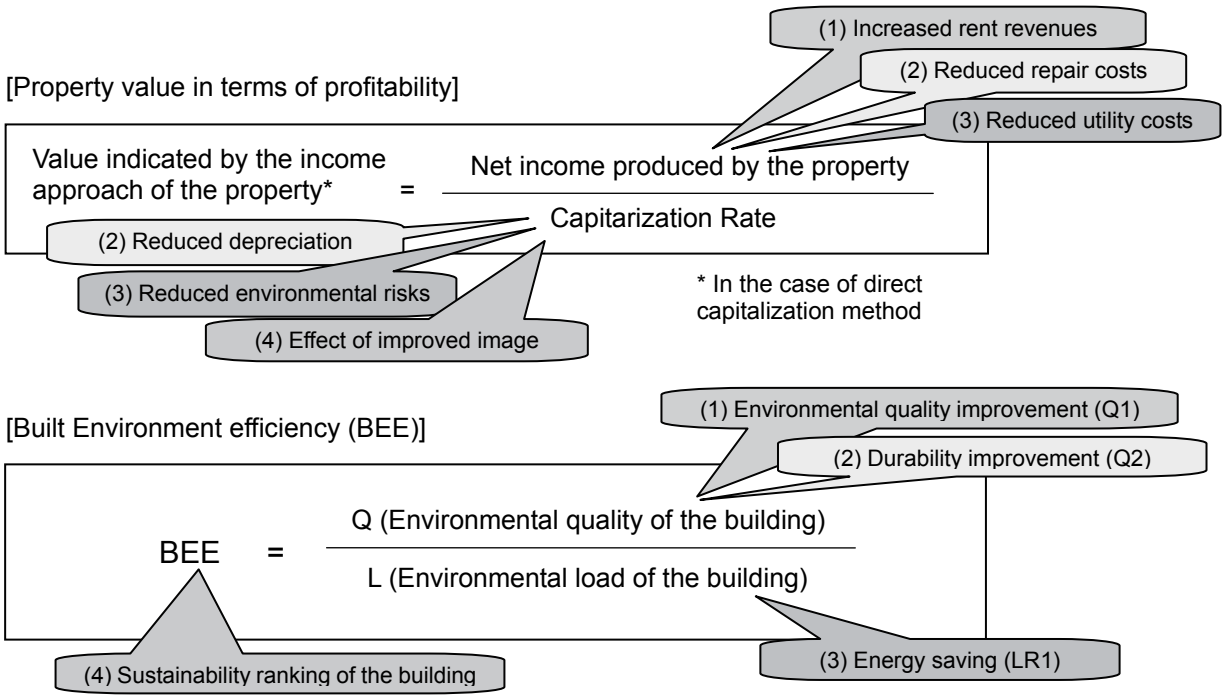


Fig. 3-1 Conceptual images of value indicated by the income approach formula (for direct capitalization method) and CASBEE environment efficiency formula (Revision of Reference[7])

For example, improved environmental quality could lead to increased rent ((1) in the above figure) while improved durability could lead to reduced repair costs and reduced depreciation ((2) in the above figure) and energy saving could lead to reduced utility costs and reduced environmental risks ((3) in the above figure). In addition, the sustainability ranking of the building eventually could be reflected in the effect of improved image ((4) in the above figure).
In the CASBEE formula, high environmental efficiency (BEE) can be achieved by reducing the environmental load in the denominator while increasing the environmental quality in the numerator. This does not represent the monetary value itself but represents the similarity of the value indicated by the income approach formula in that the value of the property increases by increasing the cash flow amount as well as by reducing risk premiums.

Table 3-1 shows the relevance between CASBEE assessment items and property appraisal items. Indoor Environment items are mainly related to the increase in the total revenues while Q2 “Quality of Service” items are mainly related to the reduction in costs and the future reduction in environmental risks. Energy items that currently attract the most attention are related to the reduction in costs and the future reduction in environmental risks. Outdoor Environment on Site items and CASBEE ranking (BEE) contribute to the improved image. It cannot be reflected in the present pricing but has potential for future pricing.

Table 3-1 Relevance between CASBEE assessment items and property appraisal items

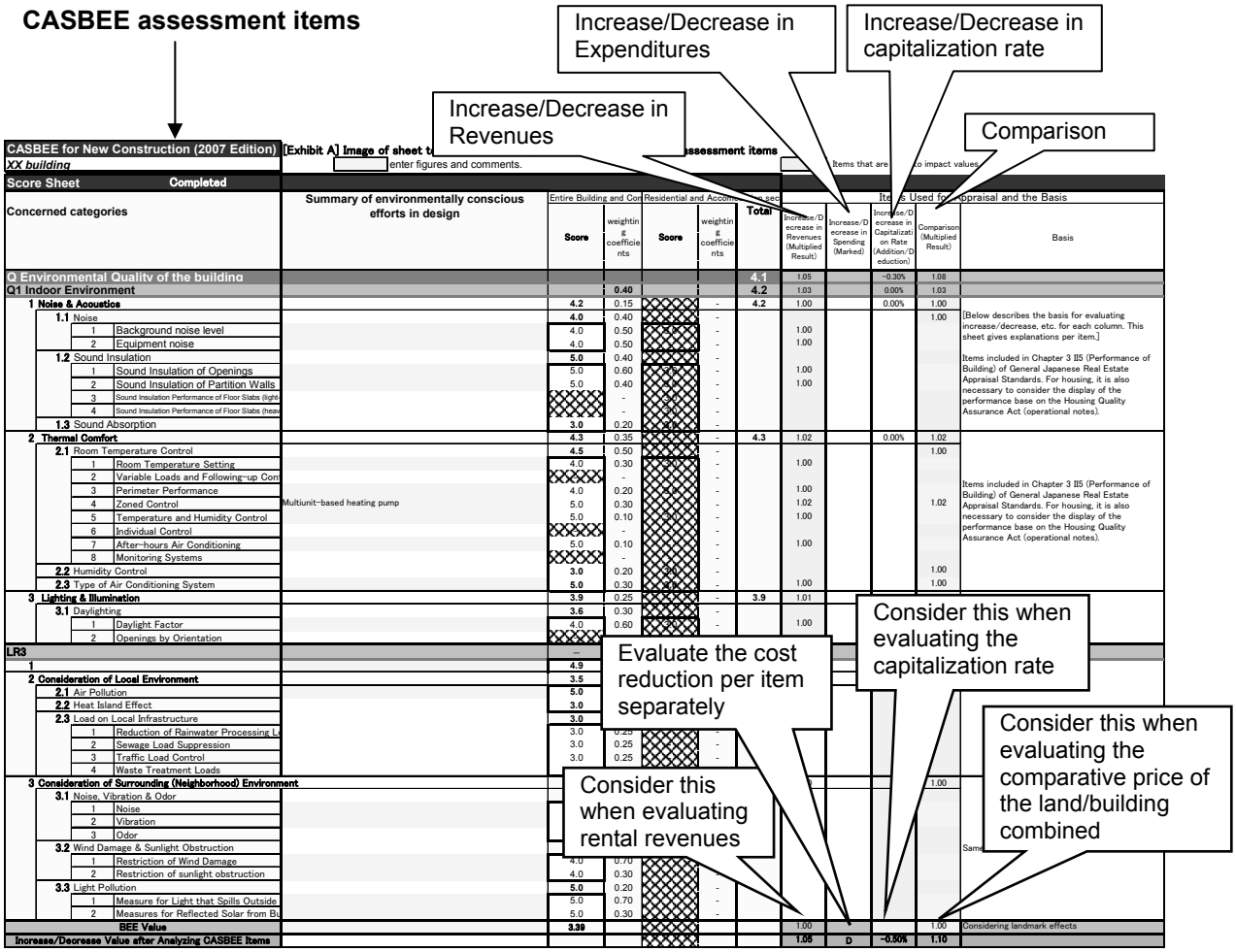
CASBEE assessment items	Property appraisal items			
	Increased total revenue	Reduced costs	Reduced risks	Improved image
Q1-1 Noise & Acoustics	○			
Q1-2 Thermal Comfort	○			
Q1-3 Lighting & Illumination	○			
Q1-4 Air Quality	○			
Q2-1 Service Ability		○	○	
Q2-2 Durability &Reliability		○	○	
Q2-3 Flexibility & Adaptability		○	○	
Q3 Outdoor Environment on Site				○
L1 Energy		○	○	
L2 Resource & Material			○	
L3 Off-site Environment			○	
CASBEE Ranking				○

3.2. Studying image of determining pricing factors from CASBEE assessment items

Table 3-2 shows the content of the above Table 3-1 compiled from the property appraisal point of view.
Fig. 3-2 shows an image of analyzing how detailed items of CASBEE assessment items can be translated into pricing factors and how they can be reflected in property values based on the property appraisal point of view. This manual represents the current results of such ongoing analysis.

Table 3-2 Viewpoint of CASBEE assessment items and property appraisal items

CASBEE assessment items	Viewpoint of property appraisal
Q1	Many of the items could lead to increased total revenue
Q2	Many of the items could lead to both reduced costs and reduced risks
L	The items are mainly related to reduced risks
L1	The items could lead to reduced cost
Q3 BEE Ranking	The items could produce the effect of improved image as a result of increased market recognition and could contribute to reduced property investment risks



CASBEE for New Construction (2007 Edition) [Exhibit A] Image of sheet t… assessment items

XX building enter figures and comments. Items that are … to impact values

Score Sheet Completed

Concerned categories	Summary of environmentally conscious efforts in design	Entire Building and Con…		Residential and Accom… sec		Total	Items Used for Appraisal and the Basis				
		Score	weighting coefficients	Score	weighting coefficients		Increase/Decrease in Revenues (Multiplied Result)	Increase/Decrease in Spending (Marked)	Increase/Decrease in Capitalization Rate (Addition/Deduction)	Comparison (Multiplied Result)	Basis
Q Environmental Quality of the building						4.1	1.05		−0.30%	1.08	
Q1 Indoor Environment			0.40			4.2	1.03		0.00%	1.03	
1 Noise & Acoustics		4.2	0.15		-	4.2	1.00		0.00%	1.00	
1.1 Noise		4.0	0.40		-					1.00	[Below describes the basis for evaluating increase/decrease, etc. for each column. This sheet gives explanations per item.]
1 Background noise level		4.0	0.50		-		1.00				
2 Equipment noise		4.0	0.50		-		1.00				
1.2 Sound Insulation		5.0	0.40		-						Items included in Chapter 3 II5 (Performance of Building) of General Japanese Real Estate Appraisal Standards. For housing, it is also necessary to consider the display of the performance base on the Housing Quality Assurance Act (operational notes).
1 Sound Insulation of Openings		5.0	0.60		-		1.00				
2 Sound Insulation of Partition Walls		5.0	0.40		-		1.00				
3 Sound Insulation Performance of Floor Slabs (light			-		-						
4 Sound Insulation Performance of Floor Slabs (hea			-		-						
1.3 Sound Absorption		3.0	0.20		-						
2 Thermal Comfort		4.3	0.35		-	4.3	1.02		0.00%	1.02	
2.1 Room Temperature Control		4.5	0.50		-					1.00	
1 Room Temperature Setting		4.0	0.30		-		1.00				
2 Variable Loads and Following-up Con			-		-						
3 Perimeter Performance		4.0	0.20		-		1.00				
4 Zoned Control	Multiunit-based heating pump	5.0	0.30		-		1.02			1.02	Items included in Chapter 3 II5 (Performance of Building) of General Japanese Real Estate Appraisal Standards. For housing, it is also necessary to consider the display of the performance base on the Housing Quality Assurance Act (operational notes).
5 Temperature and Humidity Control		5.0	0.10		-		1.00				
6 Individual Control			-		-						
7 After-hours Air Conditioning		5.0	0.10		-		1.00				
8 Monitoring Systems			-		-						
2.2 Humidity Control		3.0	0.20		-					1.00	
2.3 Type of Air Conditioning System		5.0	0.30		-		1.00			1.00	
3 Lighting & Illumination		3.9	0.25		-	3.9	1.01				
3.1 Daylighting		3.6	0.30		-						
1 Daylight Factor		4.0	0.60		-		1.00				
2 Openings by Orientation			-		-						
LR3											
1		4.9									
2 Consideration of Local Environment		3.5									
2.1 Air Pollution		5.0									
2.2 Heat Island Effect		3.0									
2.3 Load on Local Infrastructure		3.0									
1 Reduction of Rainwater Processing L		3.0	0.25		-						
2 Sewage Load Suppression		3.0	0.25		-						
3 Traffic Load Control		3.0	0.25		-						
4 Waste Treatment Loads											
3 Consideration of Surrounding (Neighborhood) Environment										1.00	
3.1 Noise, Vibration & Odor											
1 Noise											
2 Vibration											
3 Odor											
3.2 Wind Damage & Sunlight Obstruction											Same
1 Restriction of Wind Damage		4.0	0.70		-						
2 Restriction of sunlight obstruction		4.0	0.30		-						
3.3 Light Pollution		5.0	0.20		-						
1 Measure for Light that Spills Outside		5.0	0.70		-						
2 Measures for Reflected Solar from Bu		5.0	0.30		-						
BEE Value		3.39					1.00			1.00	Considering landmark effects
Increase/Decrease Value after Analyzing CASBEE Items							1.05	D	−0.50%	1.10	

Fig. 3-2 Image sheet to determine pricing factors based on CASBEE assessment items

Reference

[7]"Supplementary documents for the 8th CASBEE Open Seminar" by Ito and others, July 24th, 2008, IBEC

4. Explanation of major items in this manual

4.1. Assessment procedure

The “CASBEE Property Appraisal Support Tool” has been developed to support the property appraisal to be conducted by using this manual.
This support tool is available for free download at the CASBEE web site.

<URL for free download of the CASBEE Property Appraisal Support Tool>

http://www.ibec.or.jp/CASBEE/english/download.htm

The support tool consists of the following:
- To determine pricing factors from CASBEE assessment items “Sheet A”
- To make assessment by reflecting the above results in the value indicated by the income approach (direct capitalization method) “Sheet B”
- To make assessment by reflecting the above results in the sales comparison approach “Sheet C”

Fig. 4-1 shows the assessment workflow.

(1) First, perform the environmental performance assessment of the building by using the CASBEE assessment tool.
(2) Transfer the CASBEE scores to “Sheet A” of the support tool and determine pricing factors while reviewing the score of each of the relevant assessment items.
(3) Perform the real estate appraisal by using “Sheet B” and “Sheet C” by reflecting the results of “Sheet A” on them.

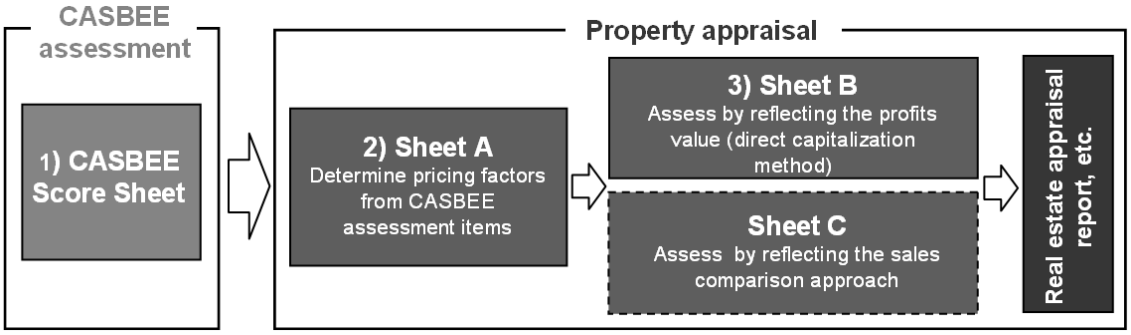


Fig. 4-1 Assessment workflow

4.2. CASBEE assessment items and pricing factor determination

This section describes the method of linking CASBEE assessment items to determination of pricing factors for property.

First, it should be noted that pricing factors consist of factors already reflected in market values (overt factors) and potential factors that are yet to be reflected in market values or factors that should be reflected in market values in the future (potential factors). The potential factors should not be included in the real estate appraisal, as the property appraisal is an act of indicating the market value of the property in monetary value. However, it is also important for property market participants to make investment decisions from long-term perspectives including the potential factors.
The property appraisal including the analysis of potential factors may include voluntary appraisals by market participants for their investment decisions and price investigation reports for which licensed real estate appraisers perform for specific purposes.

The pricing factors can be summarized as shown in Table 4-1.

Table 4-1 Application of overt and potential factors

Type of factors	Reflection in market values	Application to real estate appraisal	Application to price investigation reports by licensed real estate appraisers	Long-term investment decisions by property market participants
Overt factors	○	○	○	○
Potential factors	×	×	○	○

The subsections below describe CASBEE assessment items in view of each of the overt and potential factors.

(1) Improved environmental quality (Q-1~Q-3) and increased rents, etc.

i. Relevance with overt factors
The impact should be understood and analyzed through comparison of examples of property for rent and/or through hearing surveys with tenant brokers, etc. See References 1.2. for the method of the analysis.

ii. Relevance with potential factors
There may be some cases where the relationship between the environmental quality and rent fees cannot be clearly identified in areas where property to be assessed are located. In such an event, the rates of potential increases in rent should be estimated by referring to the general relationship (See References 1.2.2.) between scoring and the unit price of rent.
There are many potential factors that increase property values such as natural lights, natural ventilation, relaxation spaces, preservation of the biological environment, etc., but they are not overt factors (See References 1.1.(2)). Information to be provided in the future by the Intellectual Productivity Research Committee can also be used as reference for these factors.

(2)-1 Improved durability (Q-2) and reduced repair costs, etc.

i. Relevance with overt factors
Factors that can identify estimated repair costs, etc. and can be reflected in estimated cash flows may be classified as overt factors.

ii. Relevance with potential factors
If estimated repair costs, etc. cannot be identified, data on lifecycle costs per environmental consideration item should be amassed to understand and analyze the trends.

(2)-2 Improved durability (Q-2) and reduced depreciation ratio

i. Relevance with overt factors
If the durable years of the materials of the building including the structural frame are available and the differences in the depreciation ratio with the durable years of standard materials can be calculated, such factors may be classified as overt factors. In such an event, the factors should be quantified by understanding the percentage of composition between the land and the building (structural frame and facilities) and the durable years.

ii. Relevance with potential factors
If the durable years of the materials are not available, data on durable years of the same material should be amassed to understand and analyze the trends.

(3)-1 Energy saving (LR-1) and reduced utility costs

i. Relevance with overt factors
The utility costs should be estimated based on the specifications of the facilities. If the estimated costs can be reflected in the cash flows, they may be classified as overt factors.

ii. Relevance with potential factors
If the utility costs cannot be estimated, such indicators as PAL and ERR, etc. and such data as reduced energy costs should be amassed to understand and analyze the trends.

(3)-2 Energy saving (LR-1) and reduced environmental risks

i. Relevance with overt factors
It is currently impossible to associate reduced environmental risks with overt factors.
ii. Relevance with potential factors
The reduction (purchasing emissions rights, etc.) in net incomes as a result of systematized emissions control should be estimated to calculate risk premiums for reference purposes also by taking into consideration the presumed probability.

(4) Sustainability ranking and improved image

i. Relevance with overt factors
It is currently impossible to associate reduced environmental risks with overt factors.
ii. Relevance with potential factors
The relationship with BEE scores should be analyzed for a property whose capitalization rates can be identified (It should be noted that it is time-consuming to make significant analysis).

4.3. Value indicated by the income approach (Direct capitalization method)

See “Case Study Sheet B” for application to the value indicated by the income approach (the direct capitalization method).

For increase or decrease in revenues, the multiplied results of increased or decreased values on Sheet A should be reflected in the evaluation of revenues.
For increase or decrease in costs, as it is difficult to reflect numerical values directly on Sheet A, costs in items that could affect the increase or decrease in costs (represented by “D” on Sheet A) should be evaluated.
For increase or decrease in capitalization rates, added or deducted results of increased or decreased values on Sheet A should be reflected in “Increase or decrease by CASBEE factors” of the capitalization rate evaluation table on the Direct Capitalization Method Sheet.
The calculation principles are shown in the table below.

Table 4-2 Relevant environmental effect and increased/decreased values

Environment-related effect	Increase/decrease	Type of factor	Increased/ decreased value	Reason
Improved thermal comfort	Revenues	Overt	Increased by about XX%	Based on comparison of rent cases and the opinions of tenant brokers
Improved lighting & illumination	Revenues	Overt	Increased by about XX%	Based on comparison of rent cases and the opinions of tenant brokers
Improved quality of service	Revenues	Overt	Increased by about XX%	Based on comparison of rent cases and the opinions of tenant brokers
Improved reliability	Capitalization rate	Overt	Decreased by XX P	Improved durability as a result of using the seismic response control structure and stabilized tenant demands were taken into consideration for the evaluation.
Reduced pre-depreciation yield as a result of increased service life	Capitalization rate	Overt	Decreased by XXP	The difference in the depreciation rate between the service life of 50 years and 100 years each was calculated assuming the percentage of the building value is at 0.3 and the percentage of the structural frame is at 0.7. (1×0.3×0.7÷50)-(1×0.3×0.7÷100)

Excluding risk premium on possible enhancement in CO2 emissions control in the future	Capitalization rate	Potential	Decreased by XX P	The percentage of obligatory reduction in the total CO2 emissions was estimated based on the expected emissions regulation. And the risk of loss in revenues as a result of purchasing the Green Power Certificate worth the percentage was converted into risk premium. For example, …
Comprehensive effect of the above items	Value indicated by the income approach by the direct capitalization method		＋XX%	See attached table.

4.4. Sales comparison approach

See “Case Study Sheet C” for application to the sales comparison approach.

The sales comparison approach is used, in many cases, only for land in the current real estate appraisal. It is rarely used for transactions that combine buildings (houses for rent such as tenant buildings, etc.) and the sites. However, this approach can also be effective as transaction prices are often determined based on the unit price per total floor area or rental area (dedicated to rent) in the property investment markets.
As the direct capitalization method considers the percentage of each of the CASBEE assessment items: “increase/decrease in revenues,” “increase/decrease in costs” and “increase/decrease in capitalization rates,” the theoretical percentage of increase/decrease in values can also be estimated based on the outcomes of the method. (See the “Comparison” column on Case Study Sheet A.)
The sales comparison approach for buildings and sites combined, as mentioned earlier, is not yet a popular real estate appraisal method. And as it employs theoretical increase/decrease in values, it may be suited more for price investigation reports by licensed real estate appraisers and voluntary assessments by investors rather than for real estate appraisal.

4.5. How to use the support tool

4.5.1. Transferring CASBEE assessment results

First, the applicable CASBEE assessment results should be transferred into this support tool.

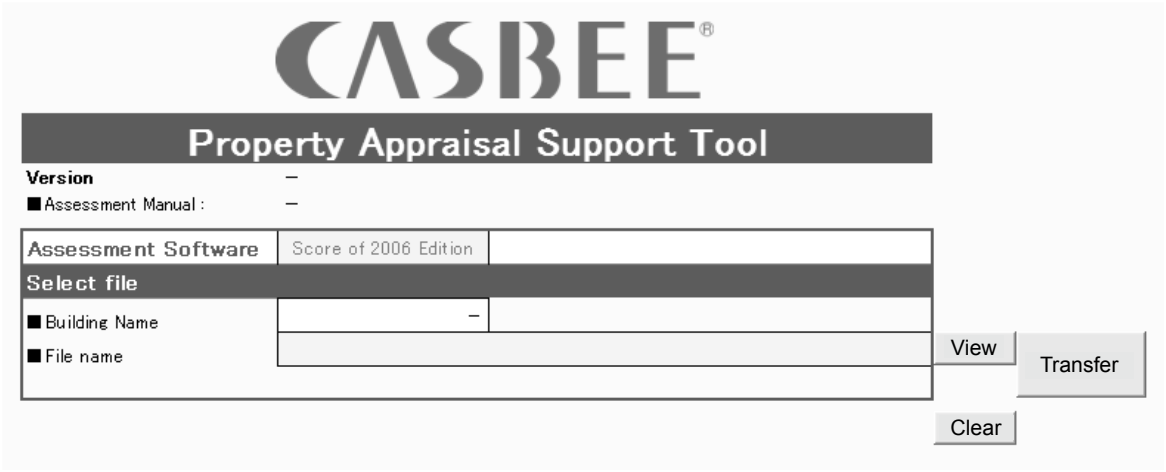


Fig. 4-2 Main screen of CASBEE Property Appraisal Support Tool

On the main screen, select from the pull-down menu a version (2008 or 2006 version) of the assessment software.
Then, on the score sheet of the assessment software, specify an area of the results to be transferred, and copy & paste the specified area to inside the area marked in red on the “Score Transfer Sheet.” For items outside the red-marked area, transfer necessary information to each of the cells marked in light blue.
On PCs equipped with macro functions, specify files that contain data to be transferred by pressing the “View” button on the main screen and click the “Transfer” button to automatically transfer the necessary information and scores to the support tool.

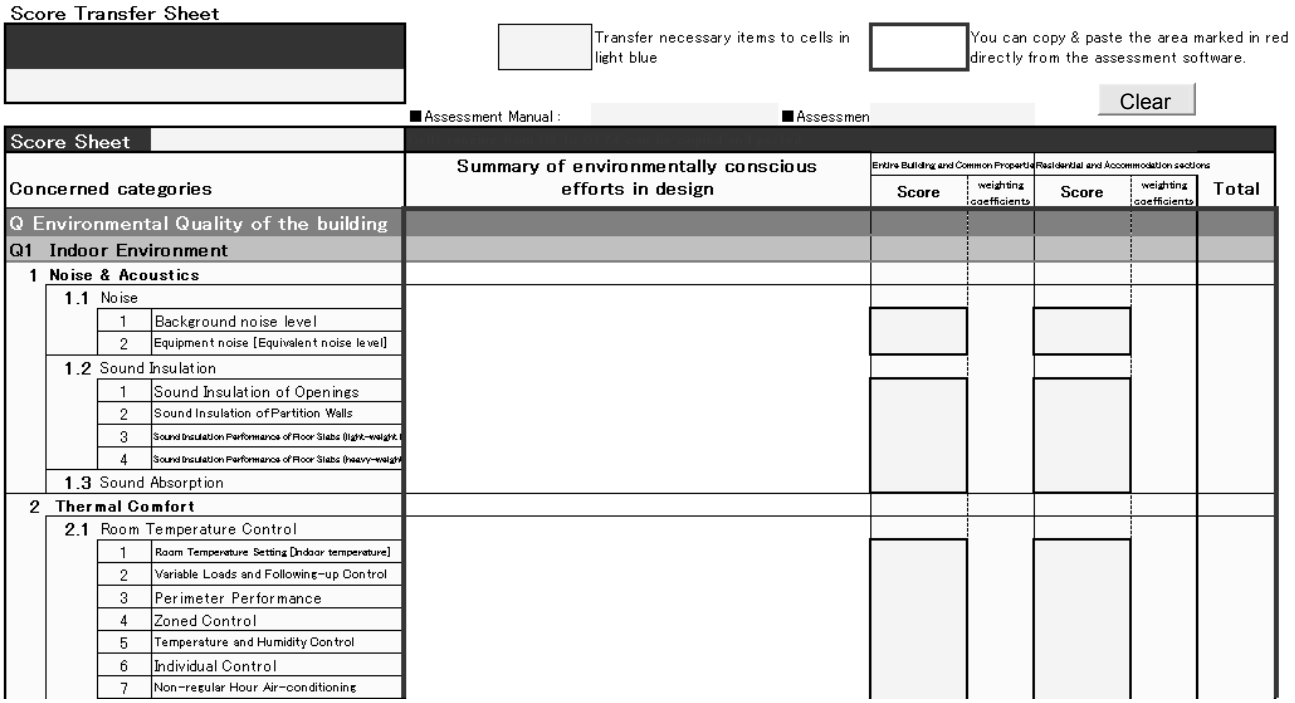


Fig. 4-3 Score Transfer Sheet to transfer CASBEE results (excerpt)

4.5.2. Sheet A "Analyzing pricing factors by CASBEE score sheet"

CASBEE assessment results transferred are indicated on the left side of Sheet A "Analyzing pricing factors by CASBEE score sheet." The factors should be analyzed by reviewing the results and should be entered into the "Items Used for Appraisal and the Reasons" column (in blue cells on the right).

(1) Increase/Decrease in Revenues

For example, an item that is expected to see a 1% increase in rent should be entered as "1.01". The multiplied results of major items (Q, L and rankings), middle items (Q1, Q2…, L1,L2… levels), minor items (1,2… levels) and the result of the total tally are displayed.

(2) Increase/Decrease in spending

The symbol U (up) or D (down) instead of numerical values should be entered for cost evaluation.

(3) Increase/Decrease in capitalization rate

Increase/decrease should be entered by +/- XX% per item. The added or deducted results of major, middle and minor items and the result of the total tally are indicated.

(4) About Comparison

For example, in view of increase/decrease in revenues, increase/decrease in spending, increase/decrease in capitalization rate and other effects, an item that is expected to see a 1% increase in value should be entered as "1.01". The multiplied results of major, middle and minor items and the result of the total tally are displayed.

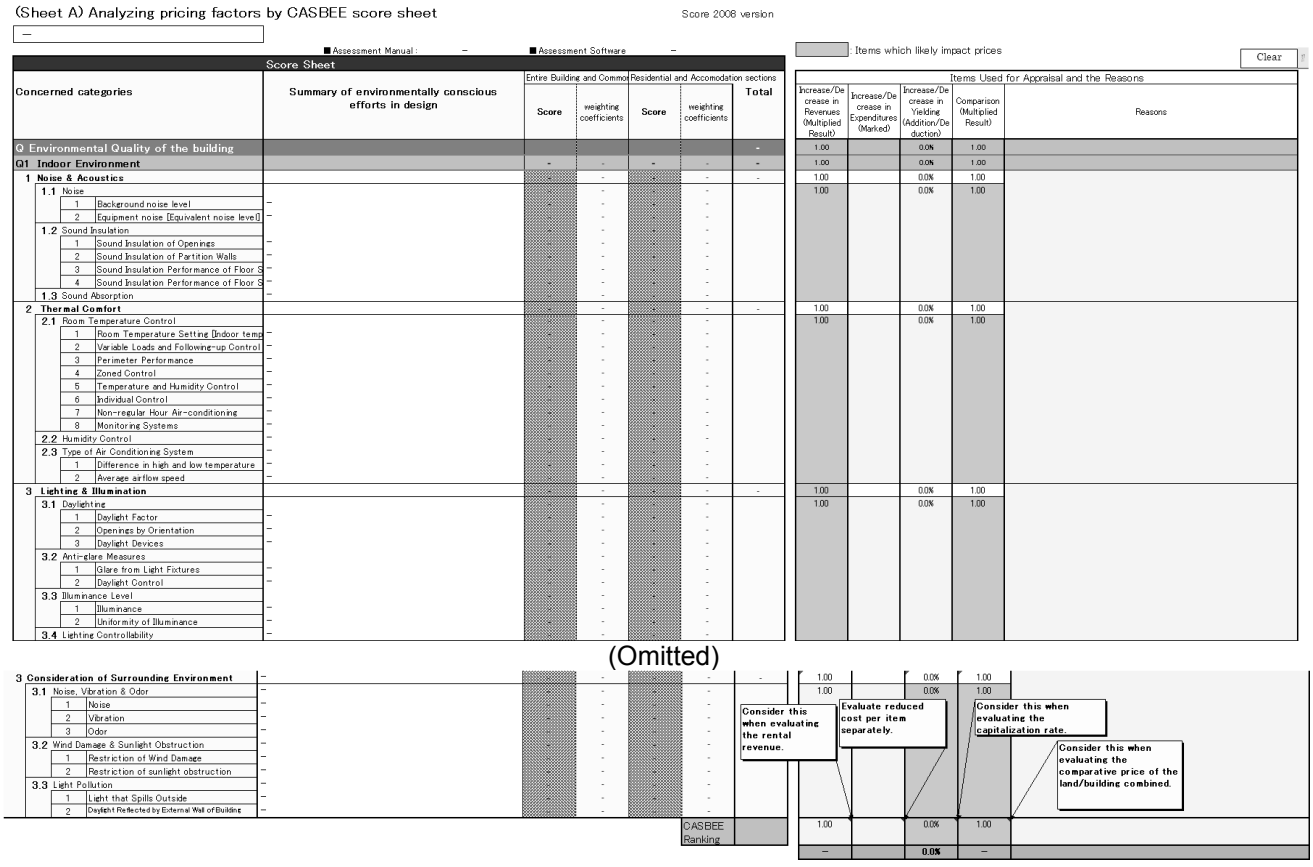


Fig. 4-4 Sheet A "Analyzing pricing factors by CASBEE score sheet" (Excerpt)

4.5.3. Property appraisal

The results of pricing factor analysis of environmental performance by using CASBEE assessed in the previously-mentioned Sheet A "Analyzing pricing factors by CASBEE score sheet" are quoted by Sheet B "Value indicated by the income approach (direct capitalization method)" and Sheet C "sales comparison

approach." Property appraisal should be performed (by entering in blue cells) based on the "Value indicated by the income approach (the direct capitalization method)" or the "sales comparison approach" while reviewing the results.

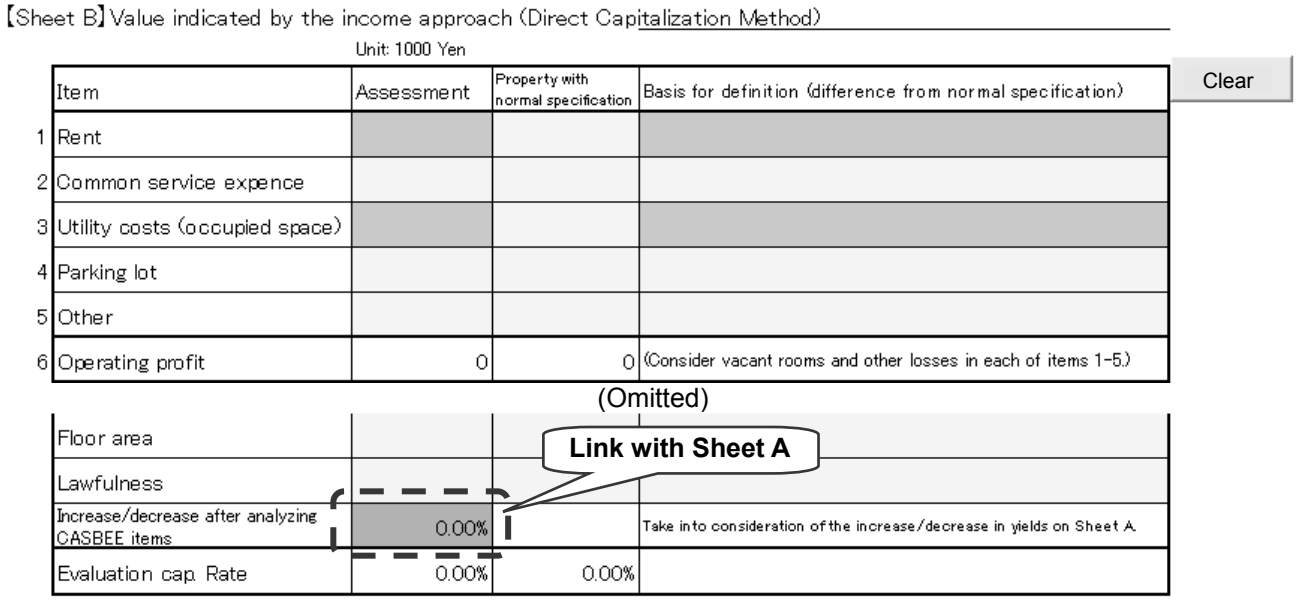


Fig. 4-5 Sheet B "Value indicated by the income approach (direct capitalization method)" (excerpt)

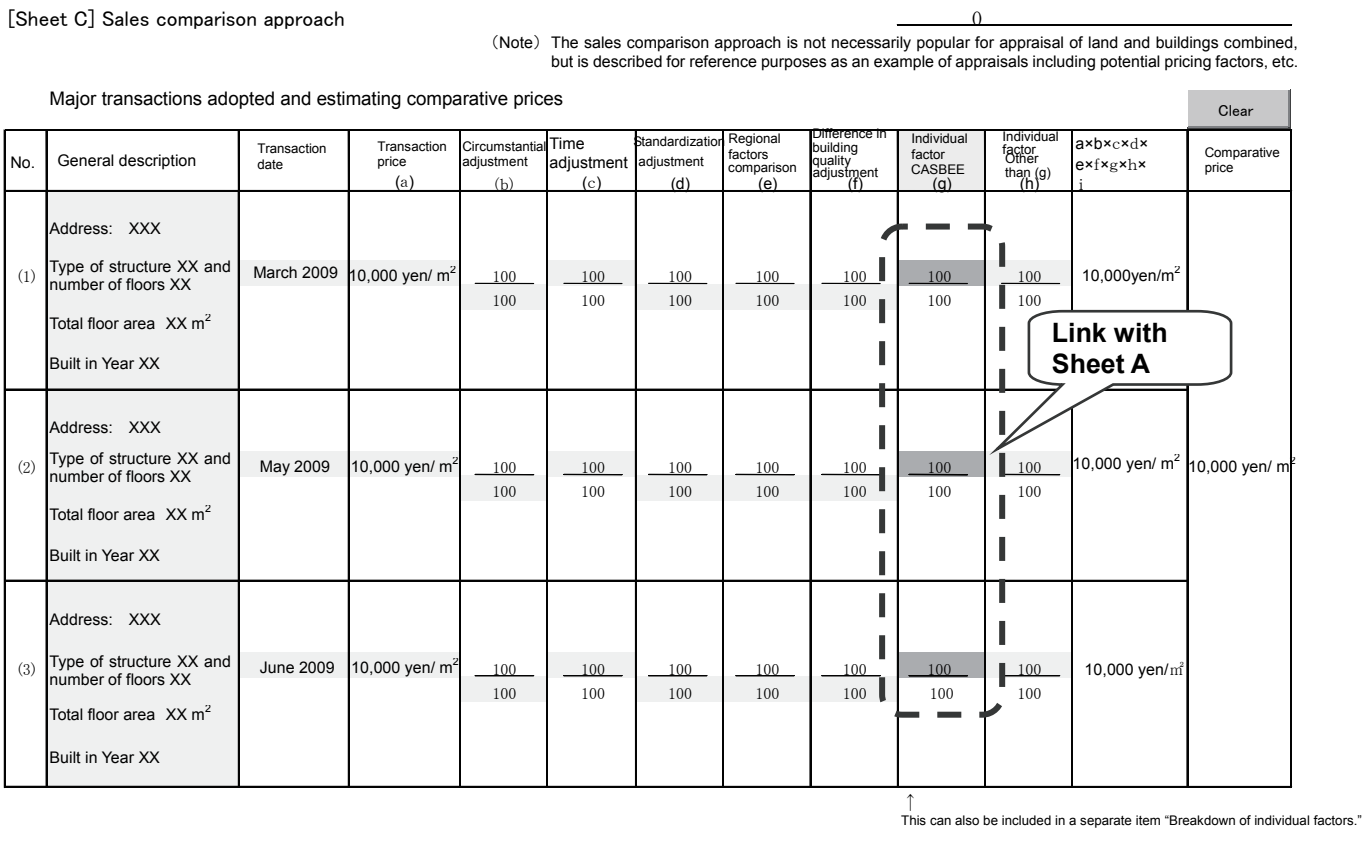


Fig. 4-6 Sheet C "Sales comparison approach"

4.5.4. Notes

i. As shown in Fig. 2-1, the work of linking the CASBEE scoring sheet with the property appraisal by using this manual is basically discretionary.

ii. The sheets of the support tool shown in this manual are an example and can be modified at the appraisers' own discretion. As appraisers usually have their own forms for the "direct capitalization method" and "sales comparison approach," etc., appraisers can replace them with their own.

iii. This manual and the support tool are provided solely for the purpose of showing the concept of performing property appraisal by using CASBEE, and appraisers must determine each numerical value and the basis at their own responsibility.

iv. Appraisers must abide by relevant laws and standards including laws on real estate appraisal and real estate appraisal standards and other notes and guidelines, etc. in the event of using this manual and the support tool.

5. Case studies based on this manual

It has been so far explained the concept of this manual, the relevance with property appraisal, the theory of "environmental added value" of property and potential applications to future assessment methods, etc. This chapter describes applications of assessment methods described in the previous chapters based on one model case.

This model case assumes that the assessment purpose is to make long-term investment decisions. For this purpose, both the overt and the potential factors as explained in 4.2. will be considered. This model case, in summary, is assumed to be Table 4-1 "Price investigation reports by licensed real estate appraisers."

5.1. General description of the model case

[Display of land]

Location	Lot number	District number XXX	Registered area
XXX XXX XXX Ward, Tokyo	XXXXX	Building site	3,400 m^2

Percentage of fee simple co-ownership of the above: 69/100

[Display of one building]

Location Address: XX-XXX, XXX Ward, Tokyo
Structure: Steel framed reinforced concrete structure and steel framed, three floors under the ground, 21 floors above the ground
Building type: Offices, shops, parking lots
Gross floor area: 35,000.00 m^2

[Display of condominium unit]

Building number: XX - XX
Structure: Steel framed, 1 floor under the ground, 21 floors above the ground
Exclusive area: 24,000 m^2
(Area for rent: 18,000 m^2)

5.2. Assessment conditions for the model case

5.2.1. Understanding the area in terms of regional environment

To understand the regional environment of the area to which the property belongs, it is necessary to consider the scope of influence the planned building will have, the regional vegetation and the ecosystem as well as the usage of the land, etc.
For this survey, the scope was defined as the whole XX Ward in Tokyo by taking into consideration the usage and the size, etc. of the planned building and the fact that environmental data such as the locations of off-shores and distribution of vegetation, etc. are readily available.

5.2.2. Regional environmental status

A) Current status of land usage and the ratio of green coverage, etc.

According to the "Basic Policy of XX Ward," while XX Ward has abundant green areas such as temples, shrines and gardens, the ratio of green coverage is only about 18%. XX Ward faces Tokyo Bay, but the entire shore is covered by artificial sea walls. While the boom for large-scale development projects for business offices has somewhat subdued, the number of multi-family building constructions remains high based on the trend of people returning to live downtown from the suburbs, reducing the ratio of green coverage.

B) Status of regional vegetation

According to the "Handbook of Japanese Vegetation (Akira Miyawaki, Shibundo Publishing)," this area belongs to Tokyo Bay Area and the "potential natural vegetation" where vegetation peculiar to the entire natural environment is available and the ability of the area is classified as the "Machilus Group" where the evergreen broad-leaved trees of machilus dominate the high tree layer. However, such vegetation remains only in limited places such as gardens, etc.

Some of the recent redevelopment projects including those in the neighboring wards include measures to restore such vegetation, but some of the tree-planting measures include many foreign species.

C) Status of ecosystem

It is difficult at a glance to observe the natural ecosystem in this area where highly mature commercial and business districts or high-rising residential building districts are located. However, according to the "Basic Policy of XX Ward," the quality of the seawater is improving as a result of proliferation of the sewage system. Various fishes including goby, conger eels, large-eyed herrings, rockfish, greenlings, gray mullets, and sea bass can be observed along the shore. For birds, while the majority of birds observed are those commonly seen in cities such as jungle crows, sparrows, bulbuls, gray starlings, etc., black-headed gulls, Japanese wagtails, spotbill ducks, etc. can also be observed often at watersides and white-eyes, great tits and Japanese pygmy woodpeckers at gardens and temples/shrines.
However, no raptores such as goshawks, kestrels, and owls, which inhabit more sophisticated ecosystems, can be observed, allowing jungle crows to thrive without their natural enemy and to make a mess of garbage collection sites, which has given rise to a major social issue. Thus, the ecosystem pyramid is in an incomplete shape.

D) Status of air and heat island

The issue of sea breezes blocked by groups of high-rising buildings and the issue of the heat island phenomenon in inner land associated with it have also been increasingly pointed out.

5.2.3. Right direction of regional environment

As mentioned in the "Basic Policy of XX Ward," the future direction of the regional environment should be to improve the air pollution and the heat island phenomenon and restore the natural ecosystem by restoring the natural vegetation of the area, preserving large green areas such as temples/shrines and gardens and developing green networks that link such green areas with roads, shores, rivers and developed land.

5.2.4. Status of property

(1) Land

The site conditions are as follows:

Table 5-1 Conditions for site

Local transportation system	Direct to XX Station on XX Line
Street	Facing the Tokyo metropolitan road of about 30m in width at equal height
Administrative requirement	Commercial zone, fire-prevention district, building coverage ratio 80%, designated floor-area ratio 700% Permitted floor-area ratio 900% (increase in floor-area ratio may be possible due to the redevelopment area plan)
Supply/treatment systems	Electricity, gas, water supply, sewage already available
Buried cultural assets and their status	The site is not designated as a buried cultural assets area.
Soil contamination and the status	The engineering reports, etc. say, as a result of geographical history surveys, no sign of usage that could cause soil contamination was found and there is little concern for soil contamination. For this reason, it was determined soil contamination does not affect the pricing of the property. (However, in the event any soil contamination is found as a result of detailed surveys, the surveyed value of this model case may be affected depending on the content of the result.)
Plot requirement	About 60m in lot width, about 50m in depth, located at the corner, shaped almost in a rectangle and is flat.
Others	A park is located in the south as well as a large garden across a Tokyo Metropolitan road. The property faces Tokyo Bay across two blocks in the east.

<Determining the most effective use of the land>
Based on the above factors, it was determined the land can be used most effectively as a site for a high-rising building with offices and shops. As the land is likely to play a major role in fostering the regional environment

together with Tokyo Bay and the neighboring gardens, it is also necessary to create corridors for sea breezes and to plan the introduction of regional vegetation.

(2) Building

The building is a new construction to be completed in XX, 200X. Based on the instructions of the building owner, the plan includes more green specifications than the normal building specifications. The highlights of such specifications are as follows:

Table 5-2 Conditions for building

Environmental consideration item	Major item	General description and expected effect
Improved surrounding environment	Tree-planting on pedestrian deck	Alleviating heat island phenomenon, recharging underground water, tie-up with the surrounding green area (property with normal specifications must also make similar considerations for the tie-up)
	Tree-planting in open space	
	Temporary storage of rainwater	Reducing loads on regional infrastructures
Energy saving / resource saving	High heat insulating/high airtight walls	Using high heat shielding/insulating Low-ε pair glass and simple air flow. Also using many stone-pitching single window PCa plates to reinforce heat insulation
	Design for natural light intake	Taking in natural light through a combination of glass curtain walls at the corners
	Hybrid natural ventilation system	Installed at offices on each floor. Natural ventilation dampers are installed at three faces of the building to take external air naturally into offices and ceilings and to discharge internal air on the suction faces through natural ventilation
	Individual air-conditioning	Creating VAV zones consisting of 28 segments per floor. Each zone is controlled by sensors.
	Lights	Creating dimmed zones consisting of 20 segments per floor where the initial lighting adjustment is made and daylight is controlled. Turning on/off (dimming) lights at toilets and emergency evacuation stairs by using human detection sensors
	Cogeneration system	Generating power by gas engines and supplying the exhaust heat to an exhaust heat recovery absorption-based hot and chilled water generator
	Ice thermal storage system Highly efficient turbo refrigerator	Using night-time discount electric power based on the heat storage type-based load shift contract. Also reducing environmental loads through peak-cut. Using highly efficient turbo refrigerators at offices
Water saving	Extensive recycled water intake	Using water recycled in Tokyo for flushing toilets
Long life cycle	Seismic resistant grade: S (skyscraper + seismic response)	Increased life cycle
	Ceiling height 3000mm Electric outlet 60VA	Improving functionality and securing flexibility in upgrading facilities
Eco-material	Using circulation materials/low environmental load materials	Possibly for resource recycling, etc.

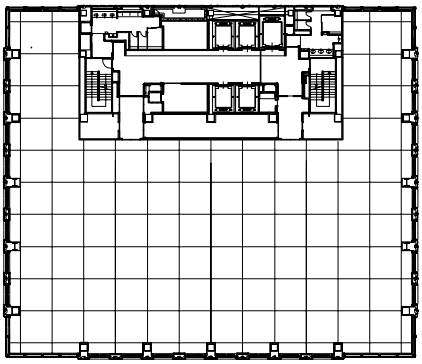


Fig. 5-2 Standard floor plan

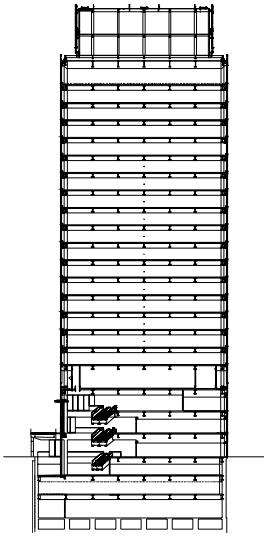


Fig. 5-1 Whole cross-section

5.3. Relationship between the most effective usage of property in view of the environment and the planned usage

As a result of considerations for 5.2.3. Right direction of regional environment and 5.2.4. Status of property, it was determined the property can be used most effectively as an green large-scale building with offices and shops and achieving the status of the most effective use is feasible.

5.4. Analyzing environmental added value factors by CASBEE and applying methods of the surveyed value

The surveyed value of the property was determined by the cost approach, sales comparison approach and income capitalization method (direct capitalization method and DCF method). As the property has already gone through the scoring of environmental performances by CASBEE, the environmental added value factors were also analyzed by using the CASBEE scoring sheet.

5.4.1. Analyzing pricing factors by CASBEE scoring sheet

As the CASBEE scoring sheet comprehensively covers items related to improving the environmental quality of green buildings (indoor environment, quality of service, outdoor environment) and to reducing environmental loads (energy, resources & materials, off-site environment), pricing factors were analyzed by using the score.
The results of the analysis are shown in [Sheet A] Table 5-7. The following elements were included in applying a method to determine surveyed values.

Effect of increase in revenues	5%
Effect of spending cut	Yes (the specific amount should be evaluated separately)
Effect of capitalization rate reduction	-0.5%

5.4.2. Applying cost approach

i. Reproduction cost of land for a site of a building
The reproduction cost of the land was calculated at 25,500,000,000 yen (7,500,000 yen/㎡) by the sales comparison approach. (The table was omitted.)

ii. Reproduction cost of a building
The reproduction cost of a building was calculated at 8,300,000,000 yen (237,000 yen/㎡) based on the construction agreement and engineering reports, etc.
The breakdown and additional costs for green specifications are as follows:

Table 5-3 Additional costs for green specifications for the model building

Construction item	Amount	Amount of green specifications	Note
Main body	5,600,000,000	48,000,000	Natural ventilation system, Low-ε glass, others (seismic response control equipment is excluded from the amount of green specifications)
Electricity	900,000,000	15,000,000	Dimming lighting systems, etc.
Plumbing and sanitation	400,000,000		
Air-conditioning	1,000,000,000	207,000,000	Natural ventilation control holes, chambers, control systems, heat reservoirs, etc.
Elevator	300,000,000		
Exterior	100,000,000	12,000,000	
Total	8,300,000,000	282,000,000	

iii. Reproduction cost of a building and the site
Based on the above, the reproduction cost of a building and the site was calculated at 33,800,000,000 yen (land: 25,500,000,000 yen, building: 8,300,000,000 yen).

iv. Accrued depreciation and value indicated by the cost approach of a building and the site
As the compatibility between a building and the site is good and the building is new, the accrued depreciation was determined to be unnecessary and the value indicated by the cost approach of a building and the site was calculated at 33,800,000,000 yen (land: 25,500,000,000 yen, building: 8,300,000,000 yen).

v. Value indicated by the cost approach of property
The percentage of the right to the property at 69% as stated in the "Memorandum on Constructing Kyodo Building" was determined to be appropriate and the value indicated by the cost approach value of the property was calculated as follows:
(the value indicated by the cost approach value of a building and the site) X (the percentage of the right) ≒ (the value indicated by the cost approach value of the property)

33,800,000,000 yen X 69% ≒ 23,300,000,000 yen

5.4.3. Applying income capitalization method

i. Value indicated by the income approach by direct capitalization method
By indefinitely earning a stable net income at the capitalization rate, the value indicated by the income approach was calculated at 27,209,000,000 yen by using the direct capitalization method as shown in [Sheet B] Table 5-8 Profit value of the model case (by direct capitalization method, Sheet B).
The effect of constructing the planned building with more green specifications than the normal specifications can be summarized as shown in Table 5-4. Table 5-5 shows the breakdown of the energy effects.

Table 5-4 Environmental effect and increased/decreased values of the model building

Environment-related effect	Increase/decrease	Increased/decreased value	Reason
Improved thermal comfort	Revenues	Increased by about 2%	The precise air-conditioning control at 28 zones of the standard floor was evaluated by taking into consideration the opinions of tenant brokers, etc.
Improved lighting & illumination	Revenues	Increased by about 1%	The precise air-conditioning control at 20 zones of the standard floor was evaluated by taking into consideration the opinions of tenant brokers, etc.
Improved quality of service	Revenues	Increased by about 2%	The large capacity electric outlet of 60VA and the ceiling height of 3,000mm were evaluated by taking into consideration the opinions of tenant brokers, etc.
Improved reliability	Capitalization rate	Decreased by 0.1P	Improved durability as a result of using the seismic response control structure and stabilized tenant demands were taken into consideration for the evaluation.
Reduced pre-depreciation capitalization rate as a result of increased life cycle	Capitalization rate	Decreased by 0.2P	For the service life of over 100 years, the difference in depreciation between the service life of 50 years and 100 years each was calculated, assuming that the percentage of the building value is at 0.3 and the percentage of the structural frames is at 0.7. (1×0.3×0.7÷50) - (1×0.3×0.7÷100)
Excluding risk premium on possible enhancement in CO2 emissions control in the future	Capitalization rate	Decreased by 0.2P	The energy consumption in the case of the normal specifications is 75,000GJ (2.1GJ/㎡), which can be translated into over 1,500kl in crude oil. For this reason, it is likely the property is subject to the environmental protection ordinance of the Tokyo Metropolitan government, which obligates certain businesses to reduce the total amount of CO_2 emissions. On the assumption that the CO_2 emissions must be reduced by about 800t, which is about 25% of the about 3200t-CO_2 emitted by the normal specifications and that a Green Power Certificate worth about 800t must be purchased, the risk of loss in revenue could be about 40 million yen per year. The amount was converted into the risk premium.*

Comprehensive effect of the above items	Value indicated by the income approach by the direct capitalizatio n method	+19%	See Exhibit.

*This is different calculation basis from "Tokyo Cap-and-Trade Program" of Tokyo Metropolitan Government. Please refer to the latest information when implementing an assessment.

Table 5-5 Energy effects of the model building

	Item	Energy saving	Amount of reduction in energy	
Building	Exterior	Low-ε glass	2,460	GJ/year
Lighting	Base lighting at exclusive area	Daylight control/initial lighting adjustment	2,350	GJ/year
	Lighting at toilet	Turning on/off lights by human detection sensors	300	GJ/year
Air-conditioning	Ventilation	Natural ventilation/night purge	3,920	GJ/year
	Heat source	Complex heat sources (turbo + absorption + cogeneration)	12,260	GJ/year
		Sub-total	21,290	GJ/year

ii. Value indicated by the income approach by DCF method
Based on the assumption that the property is sold after retaining it for a certain period of time, the total net income at the current value during the retaining period and the resale value at the current value after the retaining period were added to calculate the value indicated by the income approach of the property at 26,963,000,000 yen as shown in Table 5-10.
In applying the DCF method, the amount equivalent to the risk premium related to environmental regulations was excluded while evaluating the discount rate and the final capitalization rate for a property with normal specifications as the potential decline in revenue for a property with normal specifications related to environmental regulations was reflected in the cash flow (See the table below).

Table 5-6 Value indicated by the income approach of the model building

	Property	Property with normal spec.	Reason
Capitalization rate a	5.0%	5.5%	Evaluated by the direct capitalization method
Environmental regulatory risk premium b		-0.2P	Possible reduction in revenues already reflected in the cash flow
Future uncertainty c	+0.3P	+0.3P	Uncertainty over revenue projections after the retaining period ended was reflected.
Final capitalization rate d	5.3%	5.6%	d=a+b+c
Revenue stability during retaining period e	-0.5p	-0.5P	Stable revenues based on periodic building lease contracts were considered.
Discount rate f	4.5%	4.8%	f=a+b+e

The DCF method [Note)] also produced an added value of about +17% as the direct capitalization method did.

iii. Value indicated by the income approach
Based on the above, the following values were produced:
Value indicated by the income approach by the direct capitalization method: 27,209,000,000 yen
Value indicated by the income approach by the DCF method: 26,963,000,000 yen
Both of the values are almost equal, which confirms that the value calculated by the DCF method can be verified by the value calculated by the direct capitalization method, which tends to be more substantiative.
Based on the above, the value indicated by the income approach was estimated at 27,000,000,000 yen.

5.4.4. Applying sales comparison approach

Appropriate cases are selected after collecting many transaction cases of houses for rent and their sites that are similar to the model property, and their transaction values, if necessary, are adjusted according to the circumstances and the timing of the transactions, and then, values produced after comparing regional factors and individual factors are compared to calculate the estimated value of the property.

The sales comparison approach for houses for rent and their sites is not necessarily used generally for the property appraisal. However, the method is applied in this report as cases of sophisticated office buildings for rent that are similar to the model case are available from buildings owned by property investment companies.

For environmental consideration items, as the impact on value indicated by the income approach (increased revenues, reduced costs, reduced capitalization rates, etc.), which was considered on [Sheet A] CASBEE scoring sheet can be used also for considering the impact on the value itself, the [Sheet A] also calculated the comparative percentage (percentage of increased/decreased values) of individual factors of CASBEE.

As a result of adjustment according to the circumstances and the timing of the transactions, regional factors and individual factors (differences in grades of land and buildings) as stated in the [Sheet C] Table 5-11 as well as the consideration for individual factors of CASBEE, the value indicated by the sales comparison approach of the property was calculated at 27,200,000,000 yen (1,510,000 yen per area for rent).

Note)

It stands for “Discounted Cash Flow Analysis.” It is a method of producing an indicated value by the following procedure: define the assumed retaining period of a property by investors (10 years in this case study) and predict the net income (net cash flow) to be produced during the retaining period and the resale value at the end of the retaining period (after deducting sales costs) and, then, apply a discount rate to both the net income and the resale value to calculate the current values and, then, aggregate them to produce the indicated value. For the capitalization rate, while the direct capitalization method employs the capitalization rate, the DCF method employs the discount rate and the final capitalization rate (the capitalization rate used for calculating the resale value). In this case study, as shown in Table 5-6, the discount rate and the final capitalization rate are calculated by considering the future uncertainty about the capitalization rate and the revenue stability during the retaining period, etc.

Table 5-7 Analyzing pricing factors in model case (Sheet A)

CASBEE for New Construction (2007 Edition) — **[Exhibit A] Image of sheet to determine pricing factors based on CASBEE assessment items**

XX building — enter figures and comments. : Items which likely impact prices

Score Sheet **Completed**

Concerned categories			Summary of environmentally conscious efforts in design	Entire Building and Con Score	Entire Building and Con weighting coefficient	Residential and Accomodation sec Score	Residential and Accomodation sec weighting coefficient	Total	Items Used for Appraisal and the Basis: Increase/ Decrease in	Increase/ Decrease in	Increase/ Decrease in	Comparison (Multiplied)	Basis
Q Environmental Quality of the building								**4.1**	1.05		-0.30%	1.08	
Q1 Indoor Environment					**0.40**			**4.2**	1.03		0.00%	1.03	
1 Noise & Acoustics				**4.2**	0.15		-	**4.2**	1.00		0.00%	1.00	
1.1 Noise				**4.0**	0.40		-					1.00	
	1	Background noise level		4.0	0.50		-		1.00				
	2	Equipment noise		4.0	0.50		-		1.00				
1.2 Sound Insulation				**5.0**	0.40		-						
	1	Sound Insulation of Openings	Securing External Wall Performance (T-2)	5.0	0.60		-		1.00				
	2	Sound Insulation of Partition Walls		5.0	0.40		-		1.00				
	3	Sound Insulation Performance of Floor Slabs (light-we			-		-						
	4	Sound Insulation Performance of Floor Slabs (heavy-			-		-						
1.3 Sound Absorption				**3.0**	0.20		-						
2 Thermal Comfort				**4.3**	0.35		-	**4.3**	1.02		0.00%	1.02	
2.1 Room Temperature Control				**4.5**	0.50		-					1.00	
	1	Room Temperature Setting		4.0	0.30		-		1.00				
	2	Variable Loads and Following-up Con			-		-						
	3	Perimeter Performance	Using LOW-ε Glass	4.0	0.20		-		1.00				
	4	Zoned Control	Standard Floor Zone VAV28	5.0	0.30		-		1.02			1.02	The precise air-conditioning control at 28 zones of the standard floor was evaluated by taking into consideration the opinions of tenant brokers, etc.
	5	Temperature and Humidity Control	Controlled by Sensors Installed Per Zone	5.0	0.10		-		1.00				
	6	Individual Control			-		-						
	7	Non-regular Hour Air-conditioning		5.0	0.10		-		1.00				
	8	Monitoring Systems			-		-						
2.2 Humidity Control				**3.0**	0.20		-					1.00	
2.3 Type of Air Conditioning System				**5.0**	0.30		-		1.00			1.00	
3 Lighting & Illumination				**3.9**	0.25		-	**3.9**	1.01		0.00%	1.01	
3.1 Daylighting				**3.6**	0.30		-					1.00	
	1	Daylight Factor		4.0	0.60		-		1.00				
	2	Openings by Orientation			-		-						
	3	Daylight Devices		3.0	0.40		-						
3.2 Anti-glare Measures				**3.0**	0.30		-					1.00	The precise sensor control at 20 zones of the standard floor was evaluated by taking into consideration the opinions of tenant brokers, etc.
	1	Glare from Light Fixtures		3.0	0.40		-						
	2	Daylight Control		3.0	0.60		-						
3.3 Illuminance Level				**5.0**	0.15		-					1.00	
	1	Illuminance	Up to 1200Lx by Specifications (Dimmed to 700Lx by Sensors)	5.0	0.70		-		1.01			1.01	
	2	Uniformity of Illuminance		5.0	0.30		-		1.00				
3.4 Lighting Controllability			Precise Zoning by Sensors	**5.0**	0.25		-		1.00				
4 Air Quality				**4.2**	0.25		-	**4.2**	1.00		0.00%	1.00	
4.1 Source Control				**4.6**	0.50		-		1.00			1.00	
	1	Chemical Pollutants		4.0	0.33		-		1.00				
	2	Asbestos			-		-						
	3	Mites, Mold etc		5.0	0.33		-		1.00				
	4	Legionella		5.0	0.33		-		1.00				
4.2 Ventilation				**3.7**	0.30		-		1.00			1.00	
	1	Ventilation Rate	Using Natural Ventilation on Standard Floor	4.0	0.25		-		1.00				
	2	Natural Ventilation Performance		3.0	0.25		-						
	3	Consideration for Outside Air Intake	Different External Walls for Air Intake and Discharge	5.0	0.25		-		1.00				
	4	Air Supply Planning		3.0	0.25		-						
4.3 Operation Plan				**4.0**	0.20		-		1.00			1.00	
	1	CO_2 Monitoring		3.0	0.50		-						
	2	Control of Smoking		5.0	0.50		-		1.00				

Q2 Quality of Service			–	**0.30**	-	-	**4.0**	1.02		−0.30%	1.05	
1 Service Ability			**4.1**	0.40		-	**4.1**	1.02		0.00%	1.02	
1.1 Functionality & Usability			**4.0**	0.60		-					1.00	
1	Provision of Space & Storage		3.0	0.33	3.0	-						
2	Use of Advanced Information System	Electric Outlet Capacity 60VA/㎡	5.0	0.33	5.0	-		1.01			1.01	The large capacity electric outlet of 60VA and the ceiling height of 3,000mm were evaluated by taking into consideration the opinions of tenant brokers, etc.
3	Barrier-free Planning		4.0	0.33		-		1.00				
1.2 Amenity			**4.3**	0.40		-					1.00	
1	Perceived Spaciousness & Access to View	Height of Ceiling 3000mm	5.0	0.33	5.0	-		1.01			1.01	
2	Space for Refreshment		3.0	0.33		-						
3	Décor Planning		5.0	0.33		-		1.00				
2 Durability & Reliability			**3.5**	0.31		-	**3.5**	1.00		−0.30%	1.03	
2.1 Earthquake Resistance			**3.2**	0.48		-					1.00	
1	Earthquake-resistance		3.0	0.80		-						
2	Seismic Isolation & Vibration Damping	Seismic Response Control Structure	4.0	0.20		-		1.00		−0.10%	1.01	Improved durability as a result of using the seismic response control structure and stabilized tenant demands were taken into consideration for the evaluation.
2.2 Service Life of Components			**3.6**	0.33		-					1.00	
1	Service Life of Structural Frame Materials	Service Life of Over 100 Years by Specifications	5.0	0.23		-				−0.20%	1.02	
2	Necessary Refurbishment Interval for Exterior		3.0	0.23		-						For the service life of over 100 years, the difference in depreciation between the service life of 50 years and 100 years each was calculated assuming the percentage of the building price is at 0.3 and the percentage of the building is at 0.7. (1×0.3×0.7÷50)-(1×0.3×0.7÷100)
3	Necessary Renewal Interval for Main Interior F		3.0	0.09		-						
4	Necessary Renewal Interval of Replacing Pipes		3.0	0.23		-						
5	Necessary Renewal Interval for Major Equipment and Services		4.0	0.23		-						
2.4 Reliability			**4.0**	0.19		-						
1	HVAC System		4.0	0.20		-					1.00	
2	Water Supply & Drainage		4.0	0.20		-						
3	Electrical Equipment		4.0	0.20		-						
4	Support Method of Machines & Ducts		4.0	0.20		-						
5	Communications & IT Equipment		4.0	0.20		-						
3 Flexibility & Adaptability			**4.4**	0.29		-	**4.4**	1.00		0.00%	1.00	
3.1 Spatial Margin			**4.6**	0.31		-					1.00	
1	Allowance for Floor-to-floor Height	Floor-to-Floor Height 4350mm	5.0	0.60	5.0	-		1.00				
2	Adaptability of Floor Layout		4.0	0.40	4.0	-		1.00				
3.2 Floor Load Margin			**5.0**	0.31	5.0	-		1.00			1.00	
3.3 Adaptability of Facilities			**3.9**	0.38		-					1.00	
1	Ease of Air Conditioning Duct Renew		4.0	0.17		-		1.00				
2	Ease of Water Supply and Drain Pipe Renewal		5.0	0.17		-		1.00				
3	Ease of Electrical Wiring Renewal		5.0	0.11		-		1.00				
4	Ease of Communications Cable Renewal		3.0	0.11		-						
5	Ease of Equipment Renewal		3.0	0.22		-						
6	Provision of Backup Space		4.0	0.22		-		1.00				
Q3 Outdoor Environment on Site			–	**0.30**	-	-	**4.1**	1.00		0.00%	1.00	
1 Preservation & Creation of Biotope		Planting on Pedestrian Deck to Coordinate with Surrounding Green Land	**3.0**	0.30		-	**3.0**	1.00			1.00	
2 Townscape & Landscape		Implementing Such Efforts as Open Spaces, Tree-planting, Joint efforts with Shiodome Town Development Council	**5.0**	0.40		-	**5.0**	1.00			1.00	
3 Local Characteristics & Outdoor Amenity			**4.0**	0.30		-	**4.0**	1.00			1.00	
3.1 Attention to Local Charcter & Improvement of Comfort			**4.0**	0.50		-		1.00			1.00	
3.2 Improvement of the Thermal Environment on Site			**4.0**	0.50		-		1.00			1.00	
LR Environmental Load Reduction of the building			–	-	-	-	**4.0**	1.00		−0.20%	1.02	
LR1 Energy			–	**0.40**	-	-	**4.7**	1.00		0.00%	1.00	
1 Building Thermal Load			**4.0**	0.30		-	**4.0**	1.00			1.00	Reflecting the yields will be considered in LR3.
2 Natural Energy Utilization			**5.0**	0.20		-	**5.0**	1.00			1.00	
2.1 Dirct Use of Natural Energy				-		-						
2.2 Converted Use of Renewable Energy		Conduit for Natural Wind, Night Purge, etc.		-		-						
3 Efficiency in Building Service System		ERR25% or higher	**5.0**	0.30		-	**5.0**	1.00	D	0.00%	1.00	
4 Efficient Operation			**5.0**	0.20		-	**5.0**	1.00			1.00	
4.1 Monitoring		Monitoring Per System, Equipment	**5.0**	0.50		-						
4.2 Operation & Management System			**5.0**	0.50		-						

LR2 Resources & Materials		—	**0.30**	-	-	**3.1**	1.00		0.00%	1.00	
1 Water Resources		**3.6**	0.15		-	**3.6**	1.00			1.00	
1.1 Water Saving		**4.0**	0.40		-			D			
1.2 Rainwater & Gray Water		**3.3**	0.60		-						
1 Rainwater Use System		3.0	0.67		-						
2 Gray Water Reuse System		4.0	0.33		-						
2 Reducing Usage of Non-renewable Resources		**3.0**	0.63		-	**3.0**	1.00			1.00	
2.1 Reducing Usage of Materials		3.0	0.07		-						
2.2 Continuing Use of Existing Building Skeleton et		3.0	0.24		-						
2.3 Use of Recycled Materials as Structural Frame Materials		3.0	0.20		-						
2.4 Use of Recycled Materials as Non-structural Materials		3.0	0.20		-						
2.5 Timber from Sustainable Forestry		3.0	0.05		-						
2.6 Reusability of Components and Materials		3.0	0.24		-						
3 Avoiding the Use of Materials with Pollutant Content		**3.2**	0.22		-	**3.2**	1.00			1.00	
3.1 Use of Materials without Harmful Substances		3.0	0.32		-						
3.2 Avoidance of CFCs and Halons		**3.3**	0.68		-						
1 Fire Retardant		4.0	0.33		-						
2 Insulation Materials		3.0	0.33		-						
3 Refrigerants		3.0	0.33		-						
LR3 Off-site Environment		—	**0.30**	-	-	**4.2**	1.00		−0.20%	1.02	
1 Consideration of Global Warming	LCCO2 Emission Rate 72%	**4.9**	0.33		-	**4.9**	1.00		−0.20%	1.02	Averting risks for reduced revenues as a result of adopting the Environment Protection Ordinance was reflected.
2 Consideration of Local Environment		**3.5**	0.33		-	**3.5**	1.00			1.00	
2.1 Air Pollution		**5.0**	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 Processing L	Temporary Storage of Rainwater	3.0	0.25		-						
2 Sewage Load Suppression		3.0	0.25		-						
3 Traffic Load Control		3.0	0.25		-						
4 Waste Treatment Loads		3.0	0.25		-						
3 Consideration of Surrounding (Neighborhood) Environment		**4.3**	0.33		-	**4.3**	1.00			1.00	
3.1 Noise, Vibration & Odor		**4.3**	0.40		-						
1 Noise		5.0	0.33		-						
2 Vibration		5.0	0.33		-						
3 Odor	Installing Deodorizer at Kitchen Ventilation	3.0	0.33		-						
3.2 Wind Damage & Sunlight Obstruction		**4.0**	0.40		-						Same as 2
1 Restriction of Wind Damage		4.0	0.70		-						
2 Restriction of sunlight obstruction		4.0	0.30		-						
3.3 Light Pollution		**5.0**	0.20		-						
1 Light that Spills Outside		5.0	0.70		-						
2 Daylight Reflected by External Wall of		5.0	0.30		-						
BEE Value		**3.39**					1.00			1.00	
Increase/Decrease Value After Analyzing CASBEE Items							**1.05**	**D**	**−0.50%**	**1.10**	

Table 5-8 Profit value of the model case (by direct capitalization method, Sheet B)

Unit: 1,000 yen

	Items	Designated Property (DP)	Property as usual (PaU)	Calculation basis (in comparison between DP and PaU)
1	Rent	1,737,481	1,641,600	8000 yen/month/㎡ for PaU to which the percentage of increased CASBEE income and a half of the reduced amount of utility costs within the occupied area are added for DP (Rate of operation is 95% for both.)
2	Common service costs			Included in the rent
3	Utility costs	98,496	123,120	600 yen/month/㎡ for PaU, while 20% less for DP through its energy-saving design （Rate of operation is 95% for both, and the budget table is referred to for calculation.)
4	Parking lot			Not added up due to the operation by the property management union.
5	Others	1,000	1,000	Income from renting places for vending machines and antennas, etc.
6	Operating earnings	1,836,977	1,765,720	
7	Taxes	170,000	170,000	The land is based on the actual cost while the building is based on an assumption.
8	Maintenance costs	144,000	144,000	Assumed to be 750 yen/month/㎡ per area for rent (including PM fee)
9	Utility costs (exclusive area)	98,496	123,120	Same as utility cost income
10	Utility costs (common area)	25,920	32,400	150 yen/month/㎡ per area for rent, the property to be assessed can be reduced by 20% for energy-saving design
11	Insurance premium	8,100	8,100	
12	Operating expenses	446,516	477,620	
13	OER（Operating expenses/operating income）	24.3%	27.0%	(12÷6)
14	Net operating income	1,390,461	1,288,100	(6-12)
15	Profit from operating deposits (+)	0	0	Not considered as this is classified as liquid deposits
16	Capital expenses (-)	30,000	30,000	To be assessed by referring to engineering reports, etc.
17	Net income	1,360,461	1,258,100	
18	Capitalization rate	5.00%	5.50%	Consideration of the rate increase and decrease through the analysis of relevant CASBEE assessment itmes
19	**The value indicated by the income approach using the direct capitalization method**	**27,209,000**	**22,875,000**	**(17÷18)**
	(comparison with PaU)	119	100	

[Assessing capitalization rate]

Item	Property to be assessed	Property with normal specifications	Configuration basis
Standard capitalization rate in an area	5.50%	5.50%	To be assessed based on cap. rates of transaction cases
Location	-0.20%	-0.20%	Direct route to a nearby station
Tenant risks	0.00%	0.00%	Normal multi-tenant building
Ownership-related risks	0.20%	0.20%	Segmented ownership
Number of years after built	0.00%	0.00%	10 years or less
Floor area	0.00%	0.00%	Standard size
Legality	0.00%	0.00%	ER says there is no problem
Increase/decrease by CASBEE item analysis	-0.50%		See Exhibit A
Capitalization rate for	5.00%	5.50%	

Table 5-9 DCF method (1)

	Property to be assessed	Property with normal specifications	Basis of assessment
Discount rate	4.50%	4.80%	Removing environmental risk of property with normal specifications (-0.2P). Consideration for income stability through periodic building lease contracts (-0.5P for each)
Final capitalization rate	5.30%	5.60%	Assessing with the capitalization rate (after removing the environmental risk for a property with normal specifications) of around +0.3% by taking into consideration the uncertainties, etc, over predicted income at the end of the holding period.
Transfer cost rate	2.00%	2.00%	Rate of property brokerage fee, etc. (by taking the sizes into consideration)

The utility costs are assumed to increase 2% per year from the 5th year.
The rent and other incomes and operating expenses (excluding the utility) are assumed to increase 1% per year from the 5th year.

Table 5-10 DCF method (2)

DCF assessment for property to be assessed

	1	2	3	4	5	6	7	8	9	10	11	
Rent	1,737,481	1,737,481	1,737,481	1,737,481	1,737,481	1,737,481	1,737,481	1,737,481	1,737,481	1,737,481	1,737,481	
Common area charges	0	0	0	0	0	0	0	0	0	0	0	
Utility costs (exclusive area)	98,496	98,496	98,496	98,496	98,496	98,496	98,496	98,496	98,496	98,496	98,496	
Parking	0	0	0	0	0	0	0	0	0	0	0	
Other	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
Operating income	1,836,977	1,836,977	1,836,977	1,836,977	1,836,977	1,836,977	1,836,977	1,836,977	1,836,977	1,836,977	1,836,977	
Taxes	170,000	170,000	170,000	170,000	170,000	170,000	170,000	170,000	170,000	170,000	170,000	
Maintenance and management fee	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	
Utility costs (exclusive area)	98,496	98,496	98,496	98,496	98,496	98,496	98,496	98,496	98,496	98,496	98,496	
Utility costs (common area)	25,920	25,920	25,920	25,920	25,920	25,920	25,920	25,920	25,920	25,920	25,920	
Insurance premium	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	
Operating expenses	446,516	446,516	446,516	446,516	446,516	446,516	446,516	446,516	446,516	446,516	446,516	
OER (operating expenses/operating income)	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	
Operating income	1,390,461	1,390,461	1,390,461	1,390,461	1,390,461	1,390,461	1,390,461	1,390,461	1,390,461	1,390,461	1,390,461	
Profit from operating deposits (+)												
Capital expenses (-)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
Net income	1,360,461	1,360,461	1,360,461	1,360,461	1,360,461	1,360,461	1,360,461	1,360,461	1,360,461	1,360,461	1,360,461	
Present value rate	0.95694	0.91573	0.87630	0.83856	0.80245	0.76790	0.73483	0.70319	0.67290	0.64393	Total of present value of net income	
Present value of net income	1,301,877	1,245,815	1,192,167	1,140,830	1,091,703	1,044,692	999,705	956,656	915,460	876,038	10,764,944	

Net income at sales	1,360,461
Recoverable price	25,669,075
Transfer costs	513,381
Recoverable value	25,155,693
Present value rate	0.64393

Present value of recoverable price	16,198,447
Present value of net income	10,764,944
DCF assessment value	**26,963,000**

DCF assessment for property with normal specifications

	1	2	3	4	5	6	7	8	9	10	11	
Rent	1,641,600	1,641,600	1,641,600	1,641,600	1,641,600	1,641,600	1,641,600	1,641,600	1,641,600	1,641,600	1,641,600	
Common area charges	0	0	0	0	0	0	0	0	0	0	0	
Utility costs (exclusive area)	123,120	123,120	123,120	123,120	123,120	123,120	123,120	123,120	123,120	123,120	123,120	
Parking	0	0	0	0	0	0	0	0	0	0	0	
Other	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
Operating income	1,765,720	1,765,720	1,765,720	1,765,720	1,765,720	1,765,720	1,765,720	1,765,720	1,765,720	1,765,720	1,765,720	
Taxes	170,000	170,000	170,000	170,000	170,000	170,000	170,000	170,000	170,000	170,000	170,000	
Maintenance and management fee	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	
Utility costs (exclusive area)	123,120	123,120	123,120	123,120	123,120	123,120	123,120	123,120	123,120	123,120	123,120	
Utility costs (common area)	32,400	32,400	32,400	32,400	32,400	32,400	32,400	32,400	32,400	32,400	32,400	
Insurance premium	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	
Carbon credit Trading					12,800	12,800	12,800	12,800	12,800	40,000	40,000	
Operating expenses	477,620	477,620	477,620	477,620	490,420	490,420	490,420	490,420	490,420	517,620	517,620	
OER (operating expenses/operating income)	27.0%	27.0%	27.0%	27.0%	27.8%	27.8%	27.8%	27.8%	27.8%	29.3%	29.3%	
Operating income	1,288,100	1,288,100	1,288,100	1,288,100	1,275,300	1,275,300	1,275,300	1,275,300	1,275,300	1,248,100	1,248,100	
Profit from operating deposits (+)												
Capital expenses (-)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
Net income	1,258,100	1,258,100	1,258,100	1,258,100	1,245,300	1,245,300	1,245,300	1,245,300	1,245,300	1,218,100	1,218,100	
Present value rate	0.95420	0.91049	0.86879	0.82900	0.07910	0.75480	0.72023	0.68724	0.65577	0.62573	Total of present value of net income	
Present value of net income	1,200,477	1,145,493	1,093,028	1,042,966	985,071	939,953	896,902	855,823	816,625	762,202	9,738,540	

Net income at sales	1,218,100
Recoverable price	21,751,786
Transfer costs	435,036
Recoverable value	21,316,750
Present value rate	0.62573

Present value of recoverable price	13,338,536
Present value of net income	9,738,540
DCF assessment value	**23,077,000**

Table 5-11 Price evaluation in model case (Market comparison approach Sheet C)

No.	General description	Transaction date	Transaction value (a)	Circumstantial adjustment (b)	Time adjustment (c)	Standardization adjustment (d)	Regional factors comparison (e)	Difference in building quality adjustment (f)	Individual factor CASBEE (g)	Individual factor Other than (g) (h)	a×b×c×d×e×f×g×h×i	Value indicated by the sales comparison approach
(1)	Address: XXX Type of structure XX and number of floors XX Total floor area XX m^2 Built in Year XX	August 2008	1,250,000 yen/ m^2	100/100	97/100	100/98	100/95	100/95	110/100	100/100	1,508,000 yen/m^2	1,510,000 yen/ m^2
(2)	Address: XXX Type of structure XX and number of floors XX Total floor area XX m^2 Built in Year XX	August 2008	1,400,000 yen/ m^2	100/100	97/100	100/100	100/100	100/100	110/100	100/100	1,493,800 yen/ m^2	
(3)	Address: XXX Type of structure XX and number of floors XX Total floor area XX m^2 Built in Year XX	July 2008	1,600,000 yen/ m^2	100/100	96/100	100/100	100/110	100/100	110/100	100/100	1,536,000 yen/ m^2	

5.5. Adjusting estimated values and determining the surveyed value

3 estimated values were obtained based on the above.

Value indicated by the cost approach	23,300,000,000 yen
Value indicated by the income approach	27,000,000,000 yen
Value indicated by the sales comparison approach	27,200,000,000 yen

The value indicated by the cost approach was somewhat lower than the value indicated by the income approach. This is probably because the demand for sophisticated large buildings in downtown Tokyo remains relatively high amid declining demand for investment in property, especially for land transactions.

The income capitalization approach calculates theoretical values by focusing on property revenues. For this survey, the values were estimated by using the direct capitalization method and the DCF method while mutually verifying them. The property for this survey is retained for revenues and the market participants (users) also will likely focus on revenues in determining the value. In this survey, the net income and the capitalization rate, etc. were also calculated in view of the green construction plan. Such evaluations seem reasonable enough under the current circumstances where the corporate social responsibility (CSR), etc. are emphasized.

The value indicated by the sales comparison approach is rarely used for property appraisal. However, the indicated value is believed to be a useful reference as it is based on a collection of many similar transaction cases of property for investment and sufficient study on individual factors related to environmental considerations.

As a result of considering all of the above, focusing on the value indicated by the income approach and referring to the value indicated by the sales comparison approach and the value indicated by the cost approach, the surveyed value was calculated as follows:

Surveyed value	27,000,000,000 yen

6. Conclusion: Issues surrounding property appraisal in the low-carbon era

All the countries in the world including Japan have been accelerating their efforts for the post-Kyoto Protocol agreement including requests and efforts for a low-carbon society. However, the past energy consumption records indicate that energy consumption continues to increase sharply in the private sector with no sign of abatement. Efforts for a low-carbon society in this sector are crucial, and the private sector should play a central role in realizing a low-carbon society. To that end, the private-sector building markets such as offices and houses should be designed in a way that reflects green in property values and promotes green properties to the whole society. Mechanisms and tools to visualize such systems are urgently required.

Based on these backgrounds, this manual describes the national and international trends on the property appraisal at the beginning, followed by the property appraisal manual in the main section of the document. In the conclusion, this manual describes issues surrounding property appraisal in the low-carbon era.

<Future issues>

(1) Clarification and addition of overt items: Partially modify or add names of items that overtly impact the property appraisal so that people in the property industry can easily understand. Such items include assessment of security and sites, etc.

(2) Turning items potentially impacting property appraisal into overt items: Turn CASBEE assessment items that potentially impact the property appraisal into overt items and develop effective tools. Such items include tree-planting at sites, preserving the eco-system, bio-diversity, landscape in harmony with the townscape, intellectual productivity, etc. However, doing so requires verifications and time.

(3) Database of CASBEE assessment-based property appraisal cases: Create a database of case verifications and study models.
   i. Comparison between CASBEE scoring and rent (per area): Create a statistical database of CASBEE rankings and rent in the same area of the same city.
   ii. Comparison between CASBEE scoring and rent (per building): Compare specifications, environmental performances and rent in the same district. Create a database of cash flow items such as energy costs, maintenance and management costs and the stability of such items.
   iii. Conduct opinion surveys among stakeholders.
   iv. Expand verifications of model cases and increase the number of model cases.

(4) Proposing to foreign countries: Propose, discuss and improve this proposal for overseas use. Try to make mutual use or unify with proposals from overseas.

(5) Developing mechanisms to share the values of green investment: Study how to develop and proliferate mechanisms to share the values of green investment such as a mechanism for properly sharing the benefits of energy-saving renovations between owners and tenants, etc. (See Fig. 6-1 for Limited Liability Partnership)

(6) Developing common tools: Continue to develop common tools between the building and the property industries (CASBEE and property appraisal manual for property appraisal use, a tool for the building industry to find from CASBEE assessment results any impact on the property appraisal, etc.)

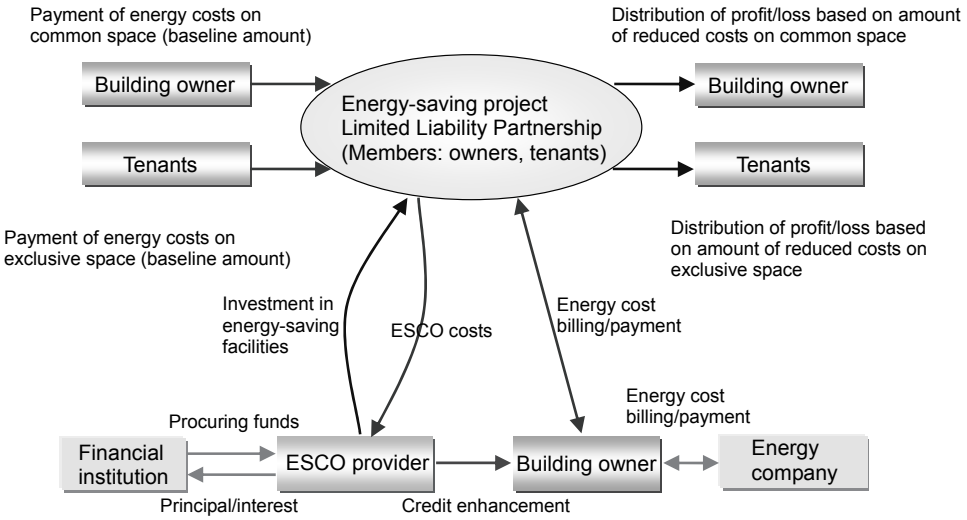


Fig. 6-1 Example of a mechanism to share values of environmentally-friendly investment

(2006 Feasibility study project on global warming countermeasures in the private sector (FS project) “Collaborative energy-saving model project among multiple providers (building owners, tenants) of property for rental income (tenant buildings)” Excerpt from NEDO Report)

References

1. Objective surveys and subjective surveys on property markets

1.1. Results of opinion surveys on the environment among investors and tenants

(1) Opinion survey among investors

Japan Real Estate Institute released in June 2009 the results (53 companies responded) of a survey conducted in April 2009 among 170 property investors on environmental performances on which they place emphasis when they invest in property.
The results show that property investors place great importance on environmental performances related to serious social issues (soil contamination and seismic response control, etc.) and environmental performances directly related to revenues (rent and occupancy rate, etc.) with explicit cost effectiveness (proper maintenance and facility upgrades, etc.). While they place emphasis environmental performances necessary to bolster social credibility such as preventing problems with the community and BCP, etc., they place less emphasis on environmental performances such as energy saving and resource saving, which they cannot easily understand or verify the return on investment. The results indicate that it is necessary to raise social awareness and importance in the markets for environmental performances on which investors place less emphasis including energy saving and resource saving, etc. in order for the markets to properly evaluate economic values of green properties Fig. 1-1, Reference[8]).

This survey truly depicts the current status of the Japanese property investment as stated at the preface.

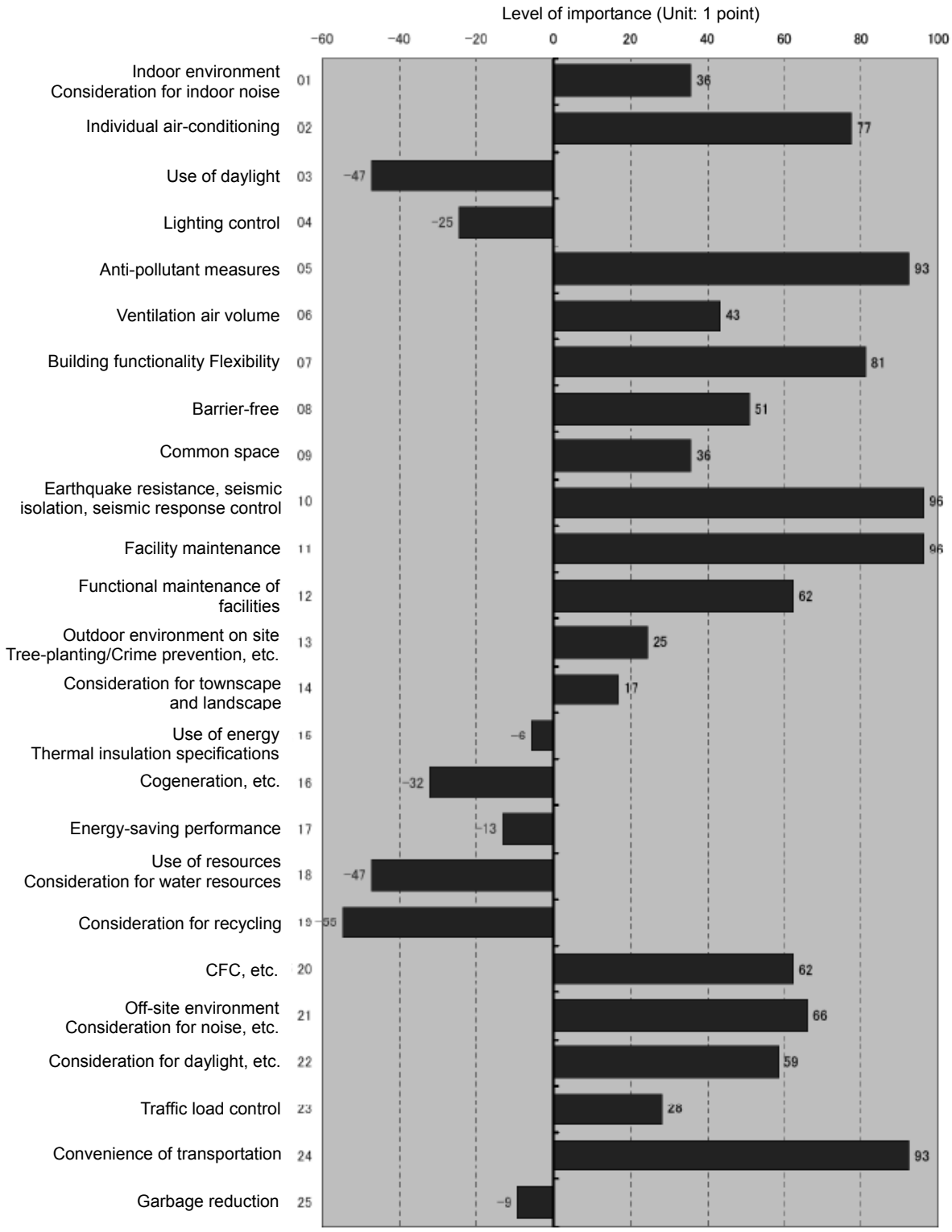


Fig. 1-1 List of important environmental performances determined by investors *Reference 8

(2) Opinion survey among tenants

Sumitomo Trust & Banking and STB Research Institute conducted the "Opinion survey among companies on green buildings"[Reference 9]. This is an opinion survey among tenants of buildings for rent including property for investment (released in July 2009).
The survey was conducted among a total of 2,505 companies listed on the first and second sections of the Tokyo Stock Exchange and the Osaka Stock Exchange as well as unlisted companies capitalized at over 50 billion yen and mutual insurance companies. 148 companies responded to the survey. The survey shows interesting results that contrast with the above (1) though the items on environmental performances and the methods of measuring the importance were slightly different from the above (1).
On the importance of each of the items related to "Consideration for environment," items closely related to business efficiency such as "high speed network connection," "OA floor" and "electricity outlet capacity," etc. as well as items visibly related to the consideration for the environment such as "energy-saving performance," CO2 emissions reduction" and "classification and reduction of garbage" ranked high on the list of importance (Fig. 1-2)

The survey also asked the respondents how much additional rent they would be required to pay for an green building in which tenants could "reduce the running costs equivalent to about 5% of the rent." Of all the respondent companies, 48% said they were willing to pay the additional rent of 5% while 5% of the companies were willing to pay the additional rent of 6-8%, indicating that a majority of the companies accept additional rent payment worth more than the cost reduction (Fig. 1-3)
The survey also asked seven respondent companies for reasons why they were willing to pay additional rent worth more than the reduced amount of the running costs. All of the seven companies cited "corporate social responsibility (CSR)" as their reason while four companies also cited "consideration for stricter regulatory control on the environment," indicating that they believe being tenants of green buildings is a way of averting risks. Three companies also cited such reasons as "employees' improved work efficiency" and "employees' improved intellectual creativity" by defining broadly the value of green buildings (Fig. 1-4)
(Reference [9])
The opinion survey was conducted among the so-called large companies, which are thought to be more conscious about the environment. However, the item "Energy saving," which ranked low also in the survey among property owners, for example, can be an effective environmental performance indicator for investment if the economic effects of the item can be presented explicitly to tenants.
Items related to tree-planting such as "preservation of biological environment" ranked low on the list of importance also in the opinion survey among tenants. The result of the "Opinion survey on environment among office workers in downtown" by Mori Building (March 12, 2008) shows the largest number of respondents or 39% cited "tree-planting" as the most significant environmental preservation effort for office buildings. The result may suggest potential factors that are yet to be visible in the tenant demand.

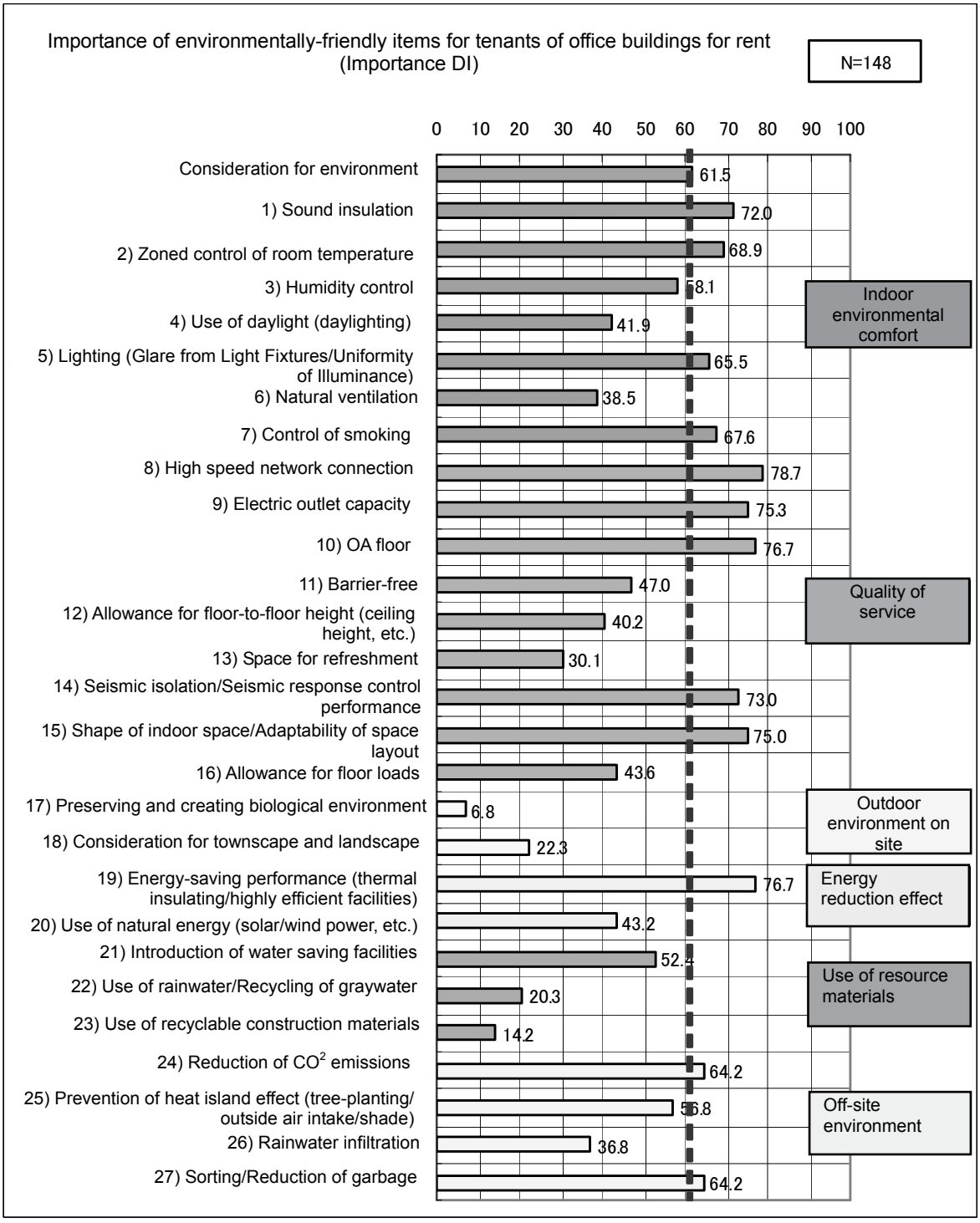


Fig. 1-2 Importance of green items for tenants of office buildings for rent

(Importance DI)

(Source) "Opinion survey among companies on green buildings," STB Research Institute
(Note) Importance DI = (the ratio of companies answering "Important" X 1 + the ratio of companies answering "Somewhat important" X 0.5) - (the ratio of companies answering "Not so important" X 0.5 + the ratio of companies answering "Not important" X 1)

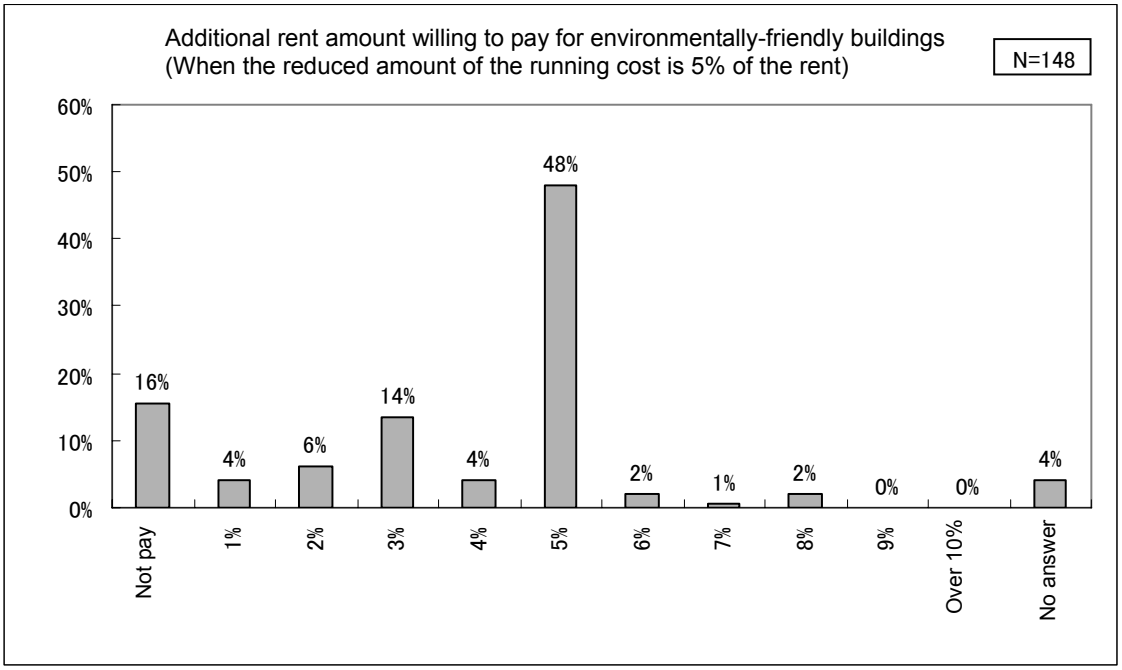


Fig. 1-3 Additional rent amount willing to pay for green buildings

(Source) "Opinion survey among companies on green buildings," STB Research Institute

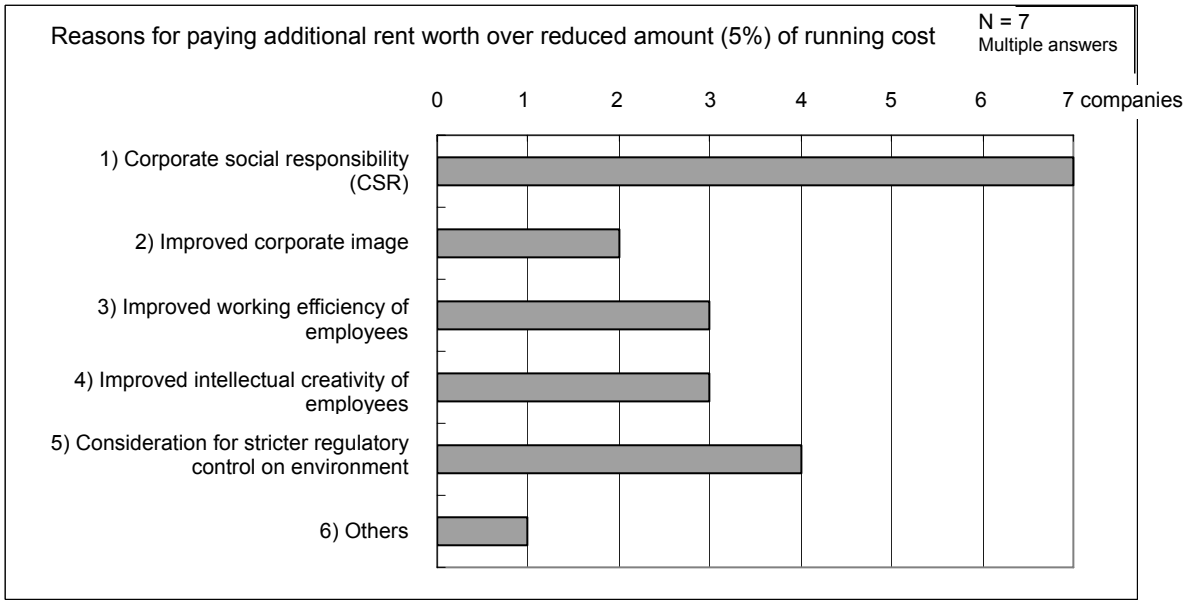


Fig. 1-4 Reasons for paying additional rent worth over reduced amount (5%) of running cost

(Source) "Opinion survey among companies on green buildings," STB Research Institute

References

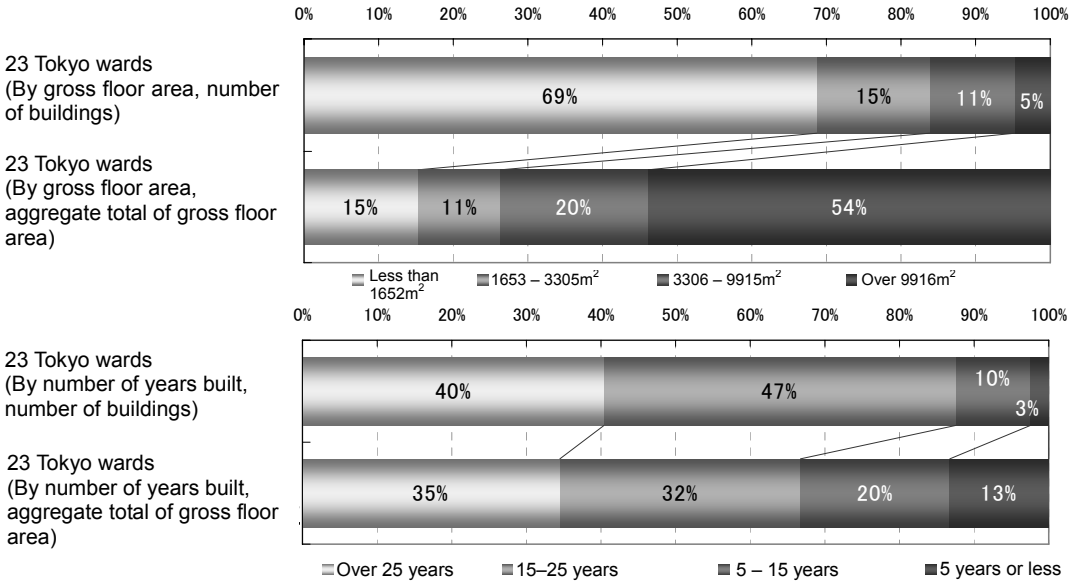
8 Result of survey among property investors (June 2009), Japan Real Estate Institute
9 General description of the result of the ”Opinion survey among companies on environmentally-friendly buildings” (July 2009), Sumitomo Trust & Banking

1.2. Impact of environmental performances on property rent

1.2.1. Japanese market trend

In considering the impact of environmental performances on the property appraisal, the breakdown of property by area shows the ratio of offices for rent is relatively small. The CO_2 emission by the business sector shows the biggest increase among all the sectors when compared against the base year of the Kyoto Protocol. In order to achieve the national goal of greenhouse gas reduction, the demand for energy-saving office buildings is expected to increase further.
This section describes the general description of the rental office market, followed by the current status of understanding and evaluating green property in the rental office market.
CB Richard Ellis, established in 1969, deals mainly in brokering of offices in Japan. It has one of the nation's biggest databases of office buildings for rent, covering 130,000 buildings and over 630,000 rooms across Japan. CB Richard Ellis Research Institute publishes the "Office Market Report" every quarter, which covers major office building districts in nine regions, 58 cities and 183 zones across Japan.

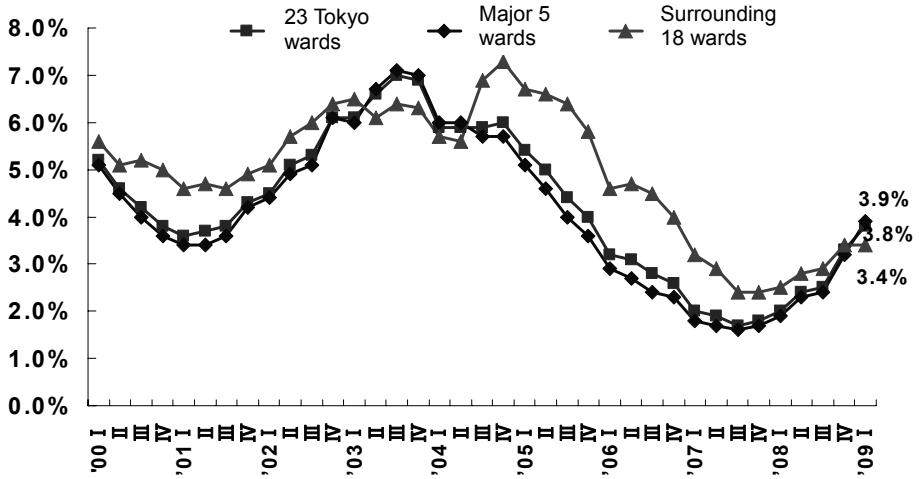
i. General description of the rental office market
As of the end of 2008, of the total rental room area of office buildings for rent in Japan (total areas for rent of rental office buildings) as understood by CB Richard Ellis, the 23 Tokyo wards account for about 60%, Osaka City about 16%, Nagoya City about 6% and the other major ordinance-designated cities account for the rest on a proportion almost commensurate with their economic sizes.
Take the 23 Tokyo wards, which have the biggest clusters of office buildings for rent in the nation, for example. A statistical report in Tokyo (Tokyo Land 2007) shows that the office area (including non-rental buildings) in the 23 Tokyo wards including that of banks as of January 1, 2007 is about 87.45 million m^2. If, for example, the availability of 70% is multiplied, the effective area will be about 61.21 million m^2. As the total rental room area of office buildings for rent in the 23 Tokyo wards as of the end of 2006 as understood by CB Richard Ellis is about 32.06 million m^2, the statistics covers about 50% of the total though it should be noted the availability is a rough estimate.
The rental office buildings in stock were broken down into the gross floor area and the number of years after being built. For the breakdown by the gross floor area, small buildings of less than 1652m^2 account for 69% in terms of the number of buildings. In terms of the gross floor area, however, mid- and large-size buildings of over 9,915m^2 account for almost half at 54%. For the breakdown by the number of years after being built, old buildings of over 25 years account for 40% in terms of the number of buildings and 35% in terms of the gross floor area while new buildings of less than five years account for 3% in terms of the number of buildings and 13% in terms of the gross floor area.



(Source: CB Richard Ellis Research Institute, as of April 2009)

Fig. 1-5 Composition of rental office buildings in stock in the 23 Tokyo wards

The room vacancy rate (= vacant room area / total area of rooms for rent) in the office market for the 23 Tokyo wards has turned upward since late 2007 due to a radical change in economic conditions. In the immediate 1st quarter of 2009, the rate stands at 3.8%. The demand by corporate tenants is affected heavily by economic conditions of the time and, generally, the rent for each building is determined through negotiations with tenants based on the building's comparative evaluation with its competing buildings of such characteristics as the location, size and functions, etc. The tenant rent, which is the source of income to be produced by the office building for rent, is determined through comparison under the market conditions of the time. If corporate tenants can understand the various benefits (Example: reduction in energy cost payment as a result of energy-saving effects, publicity of corporate attitudes in terms of CSR, etc.) of the energy-saving performance of the buildings while negotiating the rent, the environmental performances of the tenant buildings may be clearly recognized as a factor in determining the rent.



(Source: CB Richard Ellis Research Institute)

Fig. 1-6 Transition of average vacancy rate in Tokyo wards

The value called "rent" in the rental office market includes various concepts including "new rent" to be paid by new tenants, "continuous rent" to be paid by existing tenants, "offered rent" to be proposed by lessors in negotiations with tenants, "negotiated rent" to be presented during the negotiation process and "(new) agreed rent" to be presented at the final stages of negotiations, etc. And the levels of values also differ. Thus, special attention is required to the definition of the word "rent." As the "rent" varies according to various factors including locations, sizes, functions and market environment, etc., it is also necessary to make comparison by taking such pre-conditions fully into consideration when evaluating values of a property by considering factors for difference in rent.

ii. Opinion survey among tenants

CB Richard Ellis Research Institute conducted an opinion survey on offices among corporate tenants in the summer of 2008 (Tokyo: valid answers 403, Osaka: 279, Nagoya: 124). On the question of "Complaints about the current buildings," many respondents cited complaints about "facilities and equipment" and, specifically, they complained about elevators and segmentation of air-conditioning controls. On the question of "Items they wish to be improved even at additional cost," the largest number of respondents cited "earthquake resistance" as the most wanted item probably for their emphasis on the safety of their employees and the BCP. On the question of "motivations for future office relocation and new offices," many respondents cited such reasons as "expansion of floor space as a result of increased staff" and "reorganizing offices to reduce costs."

In view of increased awareness about the environment, the question "Wishing to move into buildings with less environmental loads" has been added to the survey since 2008, but very few people responded positively to this question. At around the time of the survey, it probably was difficult to quantify the benefits (such as the cost) and the environmental performances were rarely perceived to be a direct motive to relocate offices.

iii. Information on energy-saving performance of tenants' buildings in selecting relocated buildings

In selecting candidate buildings for relocation, corporate tenants generally obtain information such as building

specifications through brochures. However, such brochures only describe the method and control zones of air-conditioning for the air-conditioning specification, desk-top lighting for the lighting specification and power consumption per m^2 for the power specification. Thus, corporate tenants currently do not (or cannot) obtain such information as unit power consumption, hourly energy consumption and energy efficiency, etc. when selecting buildings for relocation.
Under such circumstances, it is difficult for tenants to select buildings through comparison of energy performance against the standard, as there is no explicit description of CASBEE or other assessment results. It is, therefore, necessary to improve such situations in order for the environmental performances to be perceived as the basic performance of office buildings for rent.

iv. Compatibility between items for selecting tenant buildings and items for CASBEE assessment (existing building)
The table below shows the association between assessment items for office buildings for rent and CASBEE (existing building) assessment items.
Assessment items for office buildings for rent and CASBEE (existing building) assessment items generally correspond to each other. However, in selecting office buildings, tenants generally tend to place importance on such basic items as proximity to nearby train stations, standard floor area, open hours of the building gates, earthquake resistance, etc. As the target, scope and purpose of assessment are different between CASBEE assessment and tenant building assessment, it is only natural that the assessment standard for each item and the depth and weights, etc. are different. And it will be necessary to take into consideration the relationship with the priority (weights) in the selection standard of offices while associating with CASBEE assessment.

Table 1-1 Compatibility between tenant building assessment items and CASBEE assessment items

Office building assessment items			Corresponding CASBEE items
Characteristics	Assessment target	Assessment items, standards, etc.	
Location	Transportation	Time required to major train stations, number of train lines used, etc.	
	Roads	Adjacency, width, etc.	
	Proximity to nearby train stations	Traffic line, ease, etc.	
	Cluster of businesses	Clustering status of office buildings, images of the vicinity, etc.	
	Facilities of convenience	Banks, post offices, drinking/dining, shops, etc.	
	Surrounding environment	Townscape, prosperity, etc.	(1)
Invariable	Standard floor area	Standard floor area, size of segmented areas	(2)
	Standard floor shape	Shaped/not-shaped, ease of layout planning, etc.	(3)
	Pillars and their locations	Number of pillars, location, etc.	
	Floor load	Standard value, heavy duty zone, etc.	(4)
	Ceiling height	Ceiling height, beams, etc.	(5)
	Design, appearance, size	Size, high-end atmosphere, etc.	(6)
	Entrance	Spatial area of lobby, ceiling height, high-end atmosphere, etc.	
	Years since built	Levels of facilities, cleaning, status of interior/exterior, etc.	(7)
	Quake resistance	Standards, seismic response, seismic isolation, etc.	(8)
	Building name	Names, images	
	Elevator	Location, spatial area, number of units, etc.	
	Parking lot	Number of cars to be parked, size, open hours, etc.	
	Scalability	Additional wiring, water supply systems, inner stairs, etc.	(9)
Variable	Entrance	Brightness, atmosphere, etc.	
	Air-conditioning	Available hours, zoning, etc.	(10)
	Electric outlet capacity	Electricity capacity per m^2, etc.	(11)
	OA cables	Type, (for free access) height, etc.	(12)
	Lighting	Lighting, zoning, anti-glare, etc.	(13)

	Security	Format, measures per zoning, etc.	
	Interior (floor, wall, ceiling)	Color and type of wall, ceiling, floor materials (in exclusive and common spaces)	(14)
	Toilets	Location, spatial area, number, functions (warmlet toilet seat, hot water), cleanness, etc.	
	Kettle room	Spatial area, number, heat source, ventilation status, cleanness, etc.	
	Common space	Spatial area, fittings, foliage plants, vending machines (soft drinks, cigarettes), cleanness, etc.	(15)
	Barrier-free	Toilet, stairs, etc.	(16)

(Source: CB Richard Ellis Research Institute)

Table 1-2 Relations between CASBEE (existing building) environmental items and office building assessment items

Score Sheet (Existing Building)

Concerned categories			Corresponding items for building assessment by tenants
Q Environmental Quality of the building			
Q1 Indoor Environment			
1 Noise & Acoustics			
1.1 Noise			
	1	Background noise level	(10)
	2	Equivalent noise level	
1.2 Sound Insulation			
	1	Sound Insulation of Openings	
	2	Sound Insulation of Partition Walls	
	3	Sound Insulation Performance of Floor Slabs (light-weight impact source)	
	4	Sound Insulation Performance of Floor Slabs (heavy-weight impact source)	
1.3 Sound Absorption			
2 Thermal Comfort			
2.1 Room Temperature Control			
	1	Room Temperature	
	2	Variable Loads and Following-up Control	
	3	Perimeter Performance	
	4	Zoned Control	
	5	Temperature and Humidity Control	
	6	Individual Control	
	7	Non-regular Hour Air-conditioning	
	8	Monitoring Systems	
2.2 Humidity Control			
2.3 Type of Air Conditioning System			
	1	Difference in high and low temperature	
	2	Average airflow speed	
3 Lighting & Illumination			
3.1 Daylighting			
	1	Daylight Factor	
	2	Openings by Orientation	
	3	Daylight Devices	
3.2 Anti-glare Measures			
	1	Glare from Light Fixtures	
	2	Daylight Control	
3.3 Illuminance Level			
	1	Illuminance	
	2	Uniformity of Illuminance	
3.4 Lighting Controllability			
4 Air Quality			
4.1 Source Control			
	1	Chemical Pollutants	
	2	Asbestos	
	3	Mites, Mold etc	
	4	Legionella	
4.2 Ventilation			
	1	Ventilation Rate	
	2	Natural Ventilation Performance	
	3	Consideration for Outside Air Intake	
	4	Air Supply Planning	
4.3 Operation Plan			
	1	CO_2 Monitoring	
	2	Control of Smoking	

Concerned categories			Corresponding items for building assessment by tenants
Q Environmental Quality of the building			
Q2 Quality of Service			
1 Service Ability			
1.1 Functionality & Usability			
	1	Provision of Space & S	(2)
	2	Use of Advanced Inforn	(11),(12)
	3	Barrier-free Planning	(16)
1.2 Amenity			
	1	Perceived Spaciousnes	(3),(5)
	2	Space for Refreshment	(15)
	3	Décor Planning	(14)
1.3 Maintenance Management			
	1	Comprehensive effort	(7),(15)
	2	Cleaning	
	3	Sanitation control	
2 Durability & Reliability			
2.1 Earthquake Resistance			
	1	Earthquake-resistance	(9)
	2	Seismic Isolation & Vibration Damping Systems	
2.2 Service Life of Components			
	1	Service Life of Structural Frame Materials	
	2	Necessary Refurbishment Interval for Exterior Finishes	
	3	Necessary Renewal Interval for Main Interior Finishes	
	4	Necessary Replacement Interval for Air Conditioning and Ventilation Ducts	
	5	Necessary Renewal Interval for HVAC and Water Supply and Drainage Pipes	
	6	Necessary Renewal Interval for Major Equipment and Services	
2.3 Appropriate renewal			(7),(14)
	1	Updating finishing materials for roofs/external walls	
	2	Updating pipes/wiring materials	
	3	Updating major facilities/equipment	
2.4 Reliability			
	1	HVAC System	
	2	Water Supply & Drainage	
	3	Electrical Equipment	
	4	Support Method of Machines & Ducts	
	5	Communications & IT Equipment	
3 Flexibility & Adaptability			
3.1 Spatial Margin			
	1	Allowance for Floor-to-floor Height	(5)
	2	Adaptability of Floor Layout	(3)
3.2 Floor Load Margin			(4)
3.3 Adaptability of Facilities			
	1	Ease of Air Conditioning Duct Renewal	
	2	Ease of Water Supply and Drain Pipe Renewal	
	3	Ease of Electrical Wiring Renewal	(9)
	4	Ease of Communications Cable Renewal	
	5	Ease of Equipment Renewal	
	6	Securing backup space	
Q3 Outdoor Environment on Site			
1 Preservation of Biotope			
2 Townscape & Landscape			
3 Local Characteristics & Outdoor Amenity			(1),(6),(15)
3.1 Attention to Local Character & Improvement of Comfort			
3.2 Improvement of the Thermal Environment on Site			

(Source: CB Richard Ellis Research Institute based on “CASBEE for Existing Building” 2008 Edition Appraisal Manual (Issued by Institute for Building Environment and Energy Conservation))

1.2.2. Analyzing relations between CASBEE and rent

Companies in the United States and Europe are increasingly seeking green office buildings for their self-owned office buildings or office buildings for rent for CSR purposes. While building green office buildings requires additional costs, awareness is increasing about the economic benefits of improved property values that can be realized by, for example, increasing tenant satisfaction through improved indoor environments or reduced maintenance and management fees and responsiveness to environmental risks such as future enhancement of regulations, etc.

Demand for green office buildings is increasing also in Japan amid increasing social awareness about the environment. There are generally three conditions for good office buildings from the viewpoint of corporate tenants and investors – “Proximity (good location),” “Big (big in size)” and “New (soon after being built).” It is highly probable that the “environmental consideration (high environmental performances)” will be added to them in the future.

The rent for 21 tenant buildings that underwent CASBEE assessment were surveyed in order to understand the impact of environmental performances on the current rent of tenant buildings and the relationship between CASBEE scores and the rent was analyzed. The survey was conducted in Nagoya City where reporting CASBEE results for buildings of over a certain size was made obligatory for the first time in the country and targeted tenant buildings whose information about rent are available and that publicly released CASBEE assessment results.

Fig. 1-7 shows the relationship between BEE values of CASBEE and rent. However, as mentioned earlier, as the rent is heavily affected by the location, size and the number of years after being built, it was necessary to remove such impacts. The office buildings surveyed are relatively similar in the location condition (located in the office building district in Nagoya City) and are relatively new at 1-3 years old. For these reasons, only the gross floor areas were adjusted. The gross floor area was classified into four criteria depending on the size – “super large,” “large,” “middle” and “small.” The values are based on the comparison with the average rent of each size. Fig. 1-7 indicates that the rent tends to increase as the BEE value goes up. While the coefficient of determination “R^{2}” is low at about 0.48, the significant relationship was found at 0.01 level.

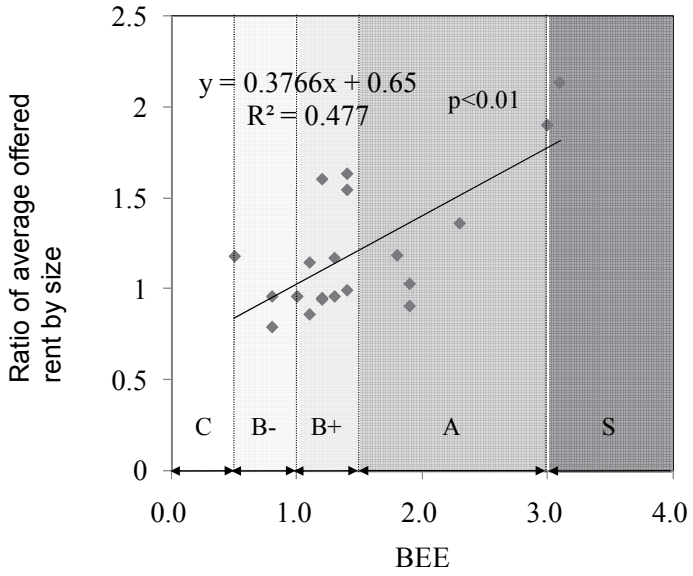


Fig. 1-7 Relationship between BEE values and rent

The multiple regression analysis was performed by using the CASBEE major items as explanatory variables and the rent as a dependent variable in order to find CASBEE assessment items that significantly contribute to rent increases. Fig. 1-8 shows the results. The analysis could not find significant results in three items – “Q3: Outdoor environment on site,” “LR1: Energy” and “LR2: Resources & Materials” while significant impacts on the rent were observed in three items – “Q1: Indoor environment,” “Q2: Quality of service” and “LR3: Off-site environment.” Standard partial regression coefficient in the longitudinal axis of the graph represents the impact of each explanatory variable on the rent, and the impact level increases as the absolute value nears 1.

Therefore, better assessment results in “Q1: Indoor environment” and “Q2: Quality of service” could lead to higher rent while a better result in “LR3: Off-site environment” could lead to lower rent. These findings show that consideration for “Q (environmental quality),” which helps increase comfortableness and intellectual productivity of corporate tenants, is perceived as an added value to office buildings and is reflected in the increased rent while consideration for “LR(environmental load reduction)” is yet to be perceived as such.

<Regression formula>

$y = -1.574 + 0.662 \times Q1 + 0.466 \times Q2 - 0.349 \times LR3$

y: Ratio of average offered rent by size

$R^2 = 0.53 \quad p < 0.01$

Q **Environmental quality**	Q1	Indoor environment
	Q2	Quality of service
	Q3	Outdoor environment on site *
LR **Environmental load**	LR1	Energy *
	LR2	Resources & Materials*
	LR3	Off-site environment

* No statistical significance was found when it comes to the impact of Q3, LR1 and LR2 items on the rent.

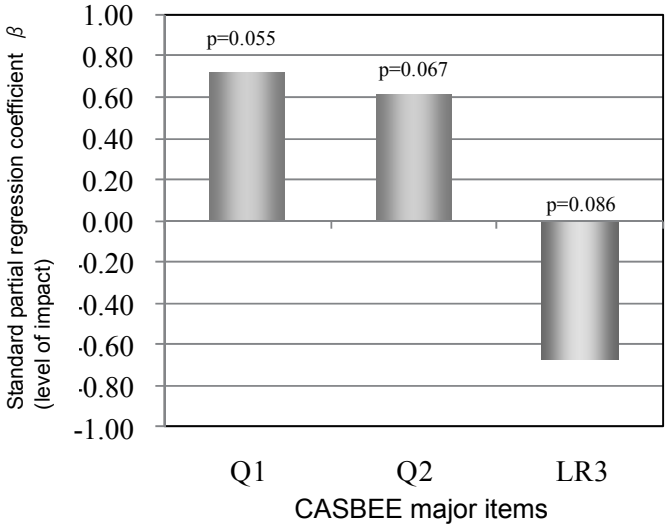


Fig. 1-8 Impact of CASBEE assessment (major) items on rent

However, the results of performing the multiple regression analysis by using the CASBEE middle items as explanatory variables suggest the possibility that consideration for “LR3.6: Off-site environment” in “LR3: Off-site environment” could lead to increased rent. Consideration for LR (environmental load reduction) could also be perceived as an added value of office buildings in the future as awareness about the environment and environmental risks such as future enhancement of regulations increases.
However, the above-mentioned analysis collected little information on rent (number of samples: 21) and, therefore, the results only show the general trend. Also for the rent values, as offered rent values (to be proposed by owners) publicly available in the market for offering to corporate tenants were used for the analysis, they may be significantly different from agreed rent values. The relationship found between the BEE value and the offered rent may derive from the tendency of owners to make additional investment to increase the environmental performances of office buildings that are likely to achieve increased rent. Analysis by using agreed rent may also be necessary to accurately understand how environmental performances are perceived as additional values of office buildings.

1.2.3. Case study (Comparing specifications in same district)

To understand the relationship in office buildings for rent among Q assessment (environmental quality of buildings) of CASBEE, facility specifications and rent, office buildings that underwent CASBEE assessment and buildings with significantly similar rent pricing factors (location, size, etc.) were selected in Tokyo. After assessing the latter buildings (those with significantly similar rent pricing factors) by the Q items of CASBEE assessment, they were compared with office buildings that underwent CASBEE assessment in terms of the facility levels, Q scores and rent levels.
The following considerations were given in making the comparison:

<Criteria to select buildings for comparison>
Considerations were given for differences in the rent accruing from differences in locations and sizes in selecting buildings for comparison. And office buildings for rent with similar size (standard floor area, gross floor area, etc.) in neighboring areas were selected. However, as some differences in rent were found even among samples selected based on such consideration, The impact of location, number of years after being built and size on differences in rent between buildings that underwent CASBEE assessment and buildings selected for

comparison were considered.

<Information disclosure>
Information on buildings was disclosed with the names remaining anonymous to maintain information confidentiality. The “ratio of gross floor area,” “ratio of standard floor area” and “ratio of estimated rent” in the table are represented by the percentage of buildings selected for comparison against the basis of 100.0 for buildings assessed by CASBEE.

<Definition of facility levels>
Spaces used for office purposes on the standard floor were used for comparison while spaces used for shops and underground spaces used for special purposes were excluded. The facility levels are based on those described in brochures or the results of the hearing conducted during the Q assessment, etc.

<Definition of rent levels>
The estimated rent level in this section is a rent per 3.3051m^2 (or 1 tsubo) including common area charges. The rent level is highly likely to be an agreed rent when vacant rooms are considered per floor as of June 2009. CB Richard Ellis Research Institute estimated the rent based on hearing among market experts.
As the absolute rent is determined according to such conditions as location, size and number of years after being built of each building under the underlying market conditions, it is important to note that the rent and differences in the rent of each building change as the market environment changes.

As few samples are currently available for comparison, it is necessary to increase the number of samples in the future to improve the significance of the comparison study. However, the comparison study in this section can be concluded as follows: Buildings with high Q scores are generally new buildings in terms of the number of years after being built and tend to have relatively high rent.
In many cases, the facility adopted by newly-built buildings is generally adopted by taking into consideration the cost effectiveness of the time. Newer buildings supposedly adopt a higher facility based on changes in social needs for facilities of office buildings. Thus, newer buildings are evaluated highly in the rental office market, and, as a result, are likely to result in relatively high rents. It should be noted that the “newer buildings” seem to include the value of “relatively high facility” and such high facility materializes high environmental quality and could eventually lead to high Q scores.
On the other hand, even among existing older buildings, those with relatively high environmental quality and environmental efficiency as a result of facility renovations, etc. supposedly have potential added values (quantitative and qualitative values produced by high environmental efficiency) in addition to values recognized by the rental office market (a factor for reduced value according to the number of years after being built and a factor for increased value through facility renovations, etc.). Once a method of measuring such potential values of existing buildings is established for the rental office market, the environmental efficiency will clearly be recognized as a factor to increase not only the rent of office buildings for rent but also the asset values of the buildings.

Writers

Preface: Assessing environmental considerations for property based on CASBEE	Shuzo Murakami, Director, Building Research Institute
CASBEE Property Appraisal Manual	
1. Domestic trend on property appraisal	
1.1. Proliferation of CASBEE and diversified use	Junko Endo, NIKKEN SEKKEI Research Institute
1.2. Move toward considering environmental added values in the Japanese property appraisal industry	Masato Ito, Sumitomo Trust & Banking Co., Ltd.
2. Concept of manual	Hiroaki Takai, Takenaka Corporation
3. Relations with real estate appraisal, etc.	Masato Ito
4. Explanation of major items in this manual	Masato Ito, Junko Endo
5. Case studies based on this manual	Hiroaki Takai
6. Conclusion: Issues surrounding property appraisal in the low-carbon era	Hiroaki Takai, Masato Ito
Reference	
1.1. Results of opinion surveys on the environment among investors and tenants	Koichi Matsunaga, CB Richard Ellis Research Institute Masato Ito
1.2. Impact of environmental performance on property rent	
1.2.1 Japanese market trend	Koichi Matsunaga
1.2.2 Analyzing relations between CASBEE and rent	Kumi Okumura, Toshiharu Ikaga Laboratory, Keio University
1.2.3 Case study (Comparing specifications in same district)	Koichi Matsunaga

Acknowledgement

This manual is part of the outcomes of the activities of the “The Research Committee for CASBEE” under Japan Sustainable Building Consortium (Shuzo Murakami, Chairman) and Working Group for CASBEE and Property Appraisal. We extend our sincere gratitude to all the people concerned for their cooperation.

< Working Group for CASBEE and Property Appraisal >
Chairman: Shuzo Murakami (Building Research Institute)
Chief: Hiroaki Takai (Takenaka Corporation), Masato Ito (Sumitomo Trust & Banking Co., Ltd.)
Members: Toshiharu Ikaga (Keio University), Kazuo Iwamura (Tokyo City University), Teruaki Uchida (Japan Real Estate Institute), Hiroyuki Deguchi (Shimizu Corporation), Naoki Nakamura (Engineering & Risk Services Corporation), Shin Hayakawa (Nihon University), Hiroki Hiramatsu (CSR Design & Landscape), Koichi Matsunaga(CB Richard Ellis Research Institute)
Observers: Kumi Okumura, Nao Mizoguchi (Toshiharu Ikaga Laboratory, Keio University)
Secretariat: Junko Endo (NIKKEN SEKKEI Research Institute), Kiyohisa Oine, Nobufusa Yoshizawa (Japan Sustainable Building Consortium)

< Those who cooperated >
Shigeru Urashima, Tokyo Office, Intel Corporation
Seiichi Hayashida, etc., Davis Langdon & Seah Japan Limited
Yoshihiro Kawazoe, Kenji Moriyama, Japan Real Estate Institute

CASBEE Property Appraisal Manual (2009 Edition)

Not for sale

Issued on	December 31, 2009
Edited by	Japan Sustainable Building Consortium (JSBC)
	Zenkyoren Kojimachi Building, 3-5-1 Kojimachi, Chiyoda-Ward, Tokyo 102-0083 Japan
	TEL +81-3-3222-6391 FAX +81-3-3222-6696
	E-mail casbee-info@jsbc.or.jp
Published by	Institute for Building Environment and Energy Conservation (IBEC)
Printed by	Rengo Printing Center Co., LTD.

CASBEE®

Property Appraisal Manual (2009 Edition)

Edited by Japan Sustainable Building Consortium (JSBC)
Published by Institute for Building Environment and Energy Conservation (IBEC)