JAPAN-OECD HIGH-LEVEL POLICY SEMINAR

Zero Carbon Buildings : Global trends on life cycle CO2 reduction

< Presentation materials >

Thursday, February 20th 2025



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JAPAN-OECD HIGH-LEVEL POLICY SEMINAR Zero Carbon Buildings: Global trends on life cycle CO2 reduction



Panel I: The world's leading edge in WLC policies Multi-level Step-by-step WLC Approach in Japan

20 February 2025



Takashi IMAMURA Councillor /Deputy Director-General Cabinet Secretariat /Prime Minister's Office, Japan

Multi-level Step-by-step WLC Approach in Japan

- 1. Background
- 2. Operational Carbon
- 3. Embodied Carbon



Photo by Prof. Seiichi Fukao "Bosco Verticale"

G7 Climate, Energy and Environment Ministers' Communiqué (Sapporo, 16 April, 2023)



Energy and Envi



III. Climate and Energy

Decarbonizing Industry /Transport /Building Sector

82. Buildings: Noting the importance of decarbonizing buildings' lifecycles in combatting climate change, we recommit to advancing targets to reduce buildings' emissions across their whole lifecycle in line with keeping a limit of 1.5 ° C temperature rise within reach. We highlight the need for improved and climate-adapted building design, enhancing building energy efficiency, including through supporting measures, regulations and international collaboration so that new and renovated near-zero emission and climate resilient buildings are on the path to reach the 2050 net-zero goal. Actions will include improved energy efficiency; fuel switching, electrification and provision of heating and cooling services using renewable energy sources; sustainable consumer choices and the increased digitalization efforts to improve flexibility in buildings, ideally by 2030 or sooner. We aim to accelerate the phaseout of the installation of new fossil fuel heating systems and the transition to cleaner technology including heat pumps. We also recognize the importance of improved use of sustainable low-carbon materials including wood and end use equipment by using a whole lifecycle buildings, as well as decarbonizing the production of conventional materials.

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Classification of Whole Life Cycle Stages (Definition by WBCSD)



2

1. Background

- 2. Operational Carbon
- 3. Embodied Carbon



Photo by Prof. Seiichi Fukao "Bosco Verticale"

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Challenges and Solutions

Our **Challenges** for the implementation of mandatory energy efficiency standards:

> Minimize negative impact on economy

Not to cause any confusion from both technical and procedural aspects



Our *Solutions* for the implementation of mandatory energy efficiency standards:

> Step-by-step approach

Capacity building programs, etc.

Step-by-step Approach for Mandatory Energy Efficiency Standards in Japan

 \checkmark Make sure that all architects and construction companies master how to calculate and evaluate the energy efficiency performance of buildings. ✓ Enforcement of the compliance with the energy efficiency standards started with large-scale non-residential buildings, mostly designed and constructed by large companies which are supposed to have enough skills. The coverage will be enlarged "step-by-step" to include medium-scale, and then small-scale. Schedule to introduce and upgrade the standards to achieve the net zero level for new buildings Net Zero Level Near Net Zero Level Medium-scale non-Large-scale nonresidential buildings residential buildings (over 300m²) (over 2.000m²) Minimum Level (First Mandatory Standards) Small-scale non-residential buildings (under 300m²) All residential buildings **Before Mandatory Standards** 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 Year 6 Restricted Use - À usage restreint

Japan's Major Policy Measures on Energy Efficiency in Buildings

Capacity building programs

- ✓ Training for small and medium contractors
- ✓ Information sessions (both physical and online)
- ✓ Easy-to-access energy calculation tools
- ✓ Publications (manga, leaflet, etc.)
- ✓ Survey on health benefits of thermal renovation

Financial incentives

- ✓ Subsidies for energy-efficient pilot projects, deep renovation, etc.
- ✓ Tax cuts for energy-efficient houses, mortgage borrowers, etc.
- ✓ Low-interest loans for energy-efficient houses, deep renovation, etc. (JHF)

Certifications

- ✓ Building energy efficiency display system (BELS, etc.)
- ✓ CASBEE (Comprehensive Assessment System for Built Environment Efficiency)
- ✓ ZEH (net Zero Energy House), LCCM (Life Cycle Carbon Minus) house, etc.



1. Background

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Photo by Prof. Seiichi Fukao "Bosco Verticale"

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Energy Performance of Buildings Directive (European Commission)



Current Status of Regulations on Life-cycle GWP in Europe

9 European countries have introduced regulatory measures on life-cycle GWP

Regulations on Life-cycle GWP in Major European Countries

		Country	Mandatory Calculation	Limit value	Applicable building use	Target Process
		Netherlands	2013-	2018-	Offices, Residential	Embodied
<		Sweden	2022-	2027-	All building use over 100 m ^²	Upfront Embodied
		France	2022-	2022-	Offices, Residential, Educational	Whole life
<	ł	Denmark	2023-	2023-	All building use	Whole life
		Finland	2025-	2025-	All building use	Whole life
		London (UK)	2021-	N.A.	All building use over a certain floor area	Whole life

Note: In addition, Norway (2022), Estonia (2025) and Iceland (2025) have introduced regulatory measures.

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Example of Building Parts Employed for a Detached House



Multi-level Step-by-step WLC Approach in Japan

- Discussion on the life-cycle carbon assessment, counting on not only "operational" carbon but also "embodied" carbon, which is emitted during product & construction stages, in-use stage and the end-of-life stage, has been developed rapidly in the European countries.
- Cabinet Secretariat of Japan established the Inter-Ministerial Liaison Meeting in November 2024, in collaboration with the public-private partnership "Zero Carbon Buildings Promotion Council", in order to promote the WLC assessment of buildings by using a free carbon assessment tool (J-CAT, released in October 2024).



★Multi-level / Whole of Government Approach

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Vision of Society for which Japan should Aim (Relationship of Stakeholders)



Developing a Roadmap (Image of Step-by-step Approach)

- Despite the need for LCA of buildings, there are not so many architectural designers or construction companies that carry out LCA in Japan. There still exists some issues to solve, such as preparation of intensity data and standardization of calculation methods.
- > Therefore, a "step-by-step" approach is necessary, taking into account the stakeholders' efforts and their experience.





If you have any questions, please contact the following: takashi.imamura.n7n@cas.go.jp

Photo by Prof. Seiichi Fukao "Bosco Verticale"

Experiences from climate declaration of buildings in Sweden

Roger Eriksson Deputy director Division for Housing and Building

Government Offices of Sweden

Ministry of Rural Affairs and infrastructure

Background



Initial steps

- 2014-2018, LCA case studies (academia, industry & state)
- 2014-2018, **Mapping state of knowledge** and pre-study (Boverket)
- 2018, Indicators of buildings sectors environmental impact from a life cycle perspective first published (Boverket)
- 2017-2020, Development of proposal of introducing climate declaration (Boverket)

Challenges

- Limited knowledge/experience of whole life cycle assessments
- High degree of SME
- Lack of data and limited digitalization
 Ministry of Rural Affairs and infrastructure

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Source: Boverket

Regulation from January 2022

Law on climate declarations for buildings

- Applies to new buildings.
- The developer is responsible to register a climate declaration at **Boverket** before final clearance from the municipality.
- Climate impact from all construction products in the building envelope, load-bearing structures and interior walls must be calculated.
- Climate impact from module A1-A5 in kg CO2e/m2 GFA is included.
- Generic and specific EPD-data may be used in the calculation.
- Boverket offers a publicly available database with generic climate data, declaration register (e-service), guidance manual, etc.



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Reasoning for limited scope (upfront carbon)

Main challenge: New regulation and calculation system

- A complete LCA for a building considered too complex and time consuming.
- Central that the majority of actors (including SME) have the opportunity to implement climate declarations.
- Starting point start calculating as a first step (learning process)
- Limited scope to parts that has the greatest climate impact
- Aim to increase knowledge and learning about climate impact of buildings and LCA in the construction sector.
- Make it easier, good quality calculations, the state is responsible updated generic climate database.
- Introducing regulation that can be further built on (Roadmap for complete LCA and limit values)



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Monitor/control of compliance

- **Municipality** check **registration** of climate declaration before a final clearance is issued.
- **Boverket** oversees that the climate declaration **complies** with the regulation.
- About 10% of registered declarations reviewed yearly.
- Boverket can request the **calculation basis** and **verifications**.
- Legislation contains possible **sanctions** if the rules are not followed.

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Declarations reported, so far



Climate declarations reported (aggregated)

Evaluation, 2023-2024



Experience

- Generally **positive reception** of a step-by-step approach within the industry.
- Big learning process for stakeholders, both authorities and the industry.
- Many climate declarations have surprisingly "low" declared values.
- Potential to streamline a lot within climate declarations.
- · Need for a mandatory calculation template.
- · Focus on compliance of the regulation.
- National register of declarations allows for supervision and close evaluation by Boverket (national authority).
- Climate database with generic data has been much used and appreciated
- Digital handbook for climate declaration and E-learning has also been much used

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Possible further development

Boverket has proposed introduction of limit values

 Applies to new buildings for module A1-A5 in kg CO2e/m2 GFA (green)

Boverket has also proposed an **extension of the climate declaration**

- Full life cycle, module A1-A5, B2, B4, B6, C1-C4 (green & orange)
- Climate declaration for certain **refurbishments** that require a building permit

The government has not taken any position on the proposals.

The **revised EPBD** includes requirements on declaring Global Warming Potential (art. 7)



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Building Life Cycle Information A 4–5 A 1–3 Product B 1–7 Use stage C 1–4 End of life stage Construction process stage stage demolitior Construction-installation use use - Raw material supply **Operational energy** C3 - Waste processing Operational water C1 - De-construction, B5 – Refurbishment A3 - Manufacturing B4 - Replacement 32 - Maintenance A2 - Transport Transport C2 – Transport C4 - Disposal B3 - Repair B1 – Use process A1 -B6 – B7 -A5 -

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Thank you!

Roger Eriksson Deputy director Division for Housing and Building

Government Offices of Sweden



Nordic Sustainable Construction – Nordic experiences with WLC

Our vision 2030

A green Nordic region

Together, we will promote a green transition of our societies and work towards carbon neutrality and a sustainable circular and bio-based economy.

A **competitive** Nordic region Together, we will promote green growth in the

Nordic region based on knowledge, innovation, mobility and digital integration.

Nordic Sustainable Construction

The Nordic region will become the most sustainable and integrated region in the world

A **socially sustainable** Nordic region

Together, we will promote an inclusive, equal and interconnected region with shared values and strengthened cultural exchange and welfare.



Helle Redder Momsen

20 02 2025

Nordic Ministerial Declaration, 2023

Nordic Ministers responsible for construction and housing

"We reaffirm our commitment to the ongoing work towards **low carbon solutions** and the integration of **circular principles** in the **Nordic construction and building sector**"

"... reaffirm our commitment to continue our collaboration on harmonising relevant regulations, methods, data, tools, and policies for carbon neutrality in the built environment, in accordance with the basic principles of a Roadmap, jointly developed within the Nordic Sustainable Construction network.

"Acknowledge the need to reduce the **emissions and waste** from the construction process, and **work towards emission free construction sites**"

"Recognise the potential in **preserving** and **developing existing building stock** as a contribution to reduced emissions"

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Our purpose

Nordic Sustainable Construction aims to support the ambition in the Nordic Vision 2030 of establishing the Nordics as a leading region in **sustainable** and **competitive** construction and housing – with minimised **environmental** and **climate** impact.



Nordic Council of Ministers

Nordic commitment to low carbon construction and circular principles in the construction sector – common effort and common gain

The building and construction sector plays a significant part in the shift towards a greener and more dimate-friendly built environment. The global climate change and orgoing energy crisis in Europe underline the importance of a plan Nordice (front to cope with the challenges that we are facing Adapted: 7.202.2023 Loadkin: Reykjank: Organisation: Nordice Council of Ministers:

We, the Nordic ministers responsible for construction and housing:
Affirm our commitment to fight climate change by facilitating reductions in emissions from the built environment. Further, we state our commitment to work towards making the Nordic construction sector the most sustainable in the world.
Recognise that the construction sector has a significant environmental impact, and that buildings affect the climate throughout their lifespan. At the same time, we recognise the construction sector's potential to play a major part in the transition to a sustainable future.
Coll for collaboration in the search for low carbon solutions in the Nordic construction sector, through Nordic co-operation and harmonisation where possible.
Acknowledge the need to reduce the emissions and waste from the construction process, and work towards emission free construction sites.
Will work towards reducing greenhouse gas emissions from building materials.
Recognise the potential in preserving and developing existing building stock as a contribution to reduced emissions
Reoffirm our commitment to continue our collaboration on harmonising relevant regulations, methods, data, tools, and policies for carbon neutrality in the built environment, in accordance with the basic principles of a Roadmap, jointly developed within the Nordic Sustainable Construction network.
Call for continued collaboration on establishing a common framework for calculating greenhouse gas emissions in building projects.
Recognise that using and enhancing EU initiatives, can contribute to making the Nordic countries the most sustainable region in the world.
Call for continued Nordic collaboration on developing a framework for facilitating the circular economy in the building sector.
An end of the second





www.nordicsustainableconstruction.com/work-packages/nordic-harmonisation-of-life-cycle-assessment Restricted Use - À usage restreint 5

Timeline of carbon declaration and limit values integration

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What to consider in the regulation?

- What buildings to include in the regulation?
- What area and building parts to regulate?
- What scope to include in the limit value calculation?
- When in the building process to declare?
- How to report the LCA data?
- Energy scenarios and etc....



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Creating regulation: 8 key steps to consider

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1	B	uild up competence	Acad Indus
	•	Learning resources adapted to national contexts Certification schemes to foster competition	
2	Se	cure stakeholder involvement	
	•	Balance current readiness with future requirements Monitoring and revisiting regulation	
3		sure access to generic data and standard values	
	•	Phasing out of the conservativity factor in generic data Use of standard component values for as-built reporting Alignment of structure and content of databases	
4		prove availability and digitalization of EPDs	
	•	Subsidies or automated tools designed to generate EPDs	
		Nordic Sustainable Construction	



1	Build up competence	Academia Industry
	 Learning resources adapted to national contexts Certification schemes to foster competition 	
2	Secure stakeholder involvement	Authorities Policymakers Industry
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	Nordic Sustainable Construction	usage restraint



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		Nordic Sustainable Construction	



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	 Phasing out of the conservativity factor in generic data Use of standard component values for as-built reporting Alignment of structure and content of databases 	
4	Improve availability and digitalization of EPDs	Authorities EPD Operators
	• Subsidies or automated tools designed to generate EPDs	
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Creating regulation: Key steps to consider

5) Create a case basis and structure for the limit values Academia Authorities • Real cases sample for feasible limit values (archetypes for potentials) Need for differentiation of limit values • Start with a limited scope (size and type, modules, building model) • Need to highlight upfront carbon reduction (several options) Incremental implementation of methods and limit value levels • Impact assessments to support gradual expansion (scope/ projects) • Avoid creating burdens for renovations with environ. benefits • Develop a harmonised approach (start with deep renovations) ЩL.

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5	Create a case basis and structure for the limit values	Academia Authorities
	 Real cases sample for feasible limit values (archetypes for potentials) Need for differentiation of limit values 	
6	Determine the initial scope and method	Policymake Authorities Academia
	 Start with a limited scope (size and type, modules, building model) Need to highlight upfront carbon reduction (several options) 	
0	Establish a suggested limit value pathway	Authorities Policymake Industry
	 Incremental implementation of methods and limit value levels (long-term roadmap) Impact assessments to support gradual expansion (scope/ projects) 	
8	Consider how to calculate renovations	Authorities Academia Industry
	 Avoid creating burdens for renovations with environ. benefits Develop a harmonised approach (start with deep renovations) 	
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Creating regulation: Key steps to consider

Create a case basis and structure for the limit values Academia

Real cases sample for feasible limit values (archetypes for potentials)
Need for differentiation of limit values

Determine the initial scope and method

6)

Щ

- Start with a limited scope (size and type, modules, building model)
- Need to highlight upfront carbon reduction (several options)

Establish a suggested limit value pathway

- Incremental implementation of methods and limit value levels
 (long-term roadmap)
- Impact assessments to support gradual expansion (scope/ projects)
- Consider how to calculate renovations
- Avoid creating burdens for renovations with environ. benefits
- Develop a harmonised approach (start with deep renovations)

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Policymakers

Authorities Academia

Authorities

Policymakers Industry

				+
		2022		All new buildings A1-A5
1/10 buildings to perform better New buildings 1,000 m ² 12 kgC0 ₂ m ⁽⁷⁰) A1-A3, B4, B6, C3-C4 All new buildings A1-A3, B4, B6, C3-C4 + D	ø	2023		
		2024		
17/20 buildings to perform better New buildings/Extensions > 50 m ² Extensions for small houses > 25 m ² 4-8 kpcOp2/(m ² yr.), building type dependent 1 kpcOp2/(m ² yr.) A+A3, B4, A6, Ca-C4. Construction process: 1.5 kgCOp2/(m ² Yr) A6, A5	@ •	2025	@ 	1/2 buildings to perform better New buildings 100 m ² 180 kgC0_s/m ² , tor 2-family houses, AT-AS, -34, goco_s/m ² /m ² , tor 20 years FSP 330-460 kgC0_s/m ² , building type dependent, A1-AS, -4.6.+9.2 kgC0_s/m ² yc)
		2026		
- 10%↓ - Likely inclusion of outdoor areas** Potential extension to further life cycle modulas (BJ, B2, CJ, C2) following European developments**	@ 	2027	•	New buildings and deep renovations A1-A5, B2, B4, B6, C1-C4
		2028		
~ 10% ↓	@ ••	2029		
		2030	ø 	15% ↓ 1-or 2-family houses 25% ↓ other building types
limit value 🖹 carbon declaration			* Initial perform **still op	y planned tightening to "1/3 buildings to better" sen to political negotiations
				14



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Find details in Nordic knowledge centre

Life Cycle Assessments

Dive into life cycle assessments: current and upcoming regulations on emissions from buildings

Competences for Reuse in Construction

Discover mapping of educatioal material to reuse construction materials and an overview of policies enabling reuse.

<u>Circular Economy in</u> Construction

Tools and materials on circular economy and circular bussiness models in construction companies.

Emission-free Construction

What's new in the road towards emission-free construction sites?

Read reports, watch videos and increase your knowledge.

Debates and Articles on Sustainable Construction Materials and Architecture

See debates, read articles and gather knowledge

→ www.nordicsustainableconstruction.com/knowledge-centre

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Experiences from Denmark

Helle Redder Momsen

Viden til gavn



National strategi for bæredygtigt byggeri



National Strategy for Sustainable Construction



Based on broad political agreement to reduce the WLC footprint of buildings

Original political agreement from March 2021

- o WLC requirements and CO2e limit values from 1st januar 2023
- A limit value of 12 kg CO2e/m2/year for buildings >1000 m2
- App. 10 pct. of new buildings were required to perform better
- Introducing a national roadmap detailing new limit values following a progressive downward trend.
- $\circ~$ The limit values were to be revisited in the years: 2025, 2027, 2029

The strategy included 21 initiatives to stimulate a green transition of the building sector

• As part of the strategy a committee with members of the Danish construction sector were established.

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New political supplementary agreement 2024

To accelerate the green transition in construction, the following additional measures to limit the climate impact and resource consumption of construction were adopted:





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The CO₂e-limit value is tightened

- Average limit value at 7,1 kg CO₂e/m²/year.
- Approx. 85 pct. of the new construction included in the agreement needs to perform better compared to 2021 – the previous agreement was 33 pct.
- The limit value will be differentiated
- The voluntary CO₂e-class (lavemissionsklassen) is adjusted so it aligns with the gradual tightening of the limit values.



Danish Authority of Social Services and Housing

Kg CO ₂ e/m ² /year	2025	2027	2029
Limit value General Buildings	7.1	6.4	5.8
Holiday homes under 150 m²	4.0	3.6	3.2
Single-family houses, row houses, tiny houses, and holiday homes at least 150 $\mbox{m}^{2\star}$	6.7	6.0	5.4
Apartment buildings	7.5	6.8	6.1
Office buildings	7.5	6.8	6.1
Institutions (e.g., schools)	8.0	7.2	6.4
Other new constructions	8.0	7.2	6.4
Independent limit value for the construction process	1.5	1.3	1.1
Total limit including construction process	8.6	7.7	6.9

*The 150 m2 limit only accounts for holiday homes



NEW STRATEGY! Simplification of rules -The Building act must support the green transition

The main focus in the strategy are:

- The regulation have to make it possible to limit the construction's climate impact AND limit the price
- To map out the regulation rules do we have conflicting regulation?
- Create balanced, coherence and comprehensive rules
- Develop the regulation in a way so new building materials can be a part of the solution
- Promote renovation of buildings

Time schedule:

2025-2028 - phased implementation of new rules

The full strategy: <u>Helhedsorienteret bygningsreglement |</u> <u>Social- og Boligstyrelsen (sbst.dk)</u>



Extra

Nordic Sustainable Construction

Building uses and sizes covered

carbon declaration limit value

included in limit value(s) J= included in declaratio

đ

O = suggested or planned inclusion in future limit value(s) O = suggested or planned inclusion in future declaration

Sweden provides detailed requirements on which buildings are exempted from declarations and are independent of the building type, such as temporary building constructions, building built by private.
 It can be assumed that the same building types included in the 2022 climate declaration will also be subject to the limit values proposed for

2.1 Can be accurate will also be subject to the limit values proposed for July 2025.
 3 when a building permit is needed according to a building regulation definition (and according to further exemption rules in Sweden) 4. Included when they are in blocks.
 5. called "Bisure homes" in Norway.
 6. Member states may decide on to set or apply the requirements to buildings owned by the armed forces or related government buildings, as well as temporary and agricultural building.
 7. Socially critical buildings are exempted from the 2025 limit value, but not from the carbon declaration requirements.
 8. Some public automities are exempted 0.1 can be assumed that the same building types included in the 2025 carbon declaration will also be subject to the limit values proposed to be introduced by 2028



Building TYPE	Denmark	Estonia	Finland	Iceland ⁹	Norway	Sweden	Europe (EPBD
	@ 🖹		ø 🗈	® =		® =	
Single-family homes	~			~		√ 1,2	~
Other residential buildings	~	0	0	~	~	√ 1,2	~
Office	~	0	0	~	~	√1,2	~
Retail and restaurant	~	0	0	~	~	√1,2	~
School and daycare	~	0	0	~	~	√ 1,2	~
Laboratory	~	0	0	~	~	√ 1,2	~
Hospital and health	~	0	0	~	~	√ 1,2	~
Sports facilities	~	0	0	~	~	√ 1,2	~
Cultural and other public buildings	~	0	0	~	~	√ 1,2,8	√ ⁶
Religious	~			~	~	√1,2	
Industrial	~			~	~		√ ⁶
Holiday cottages ⁵	from 2025				√ ⁴	√ 1,2	~
Other	√7	0		~	~	√ 1,2	√6
Renovation projects				~	~	0 ³	
Size of buildings	2023-2025: > 1,000 m ² From 2025: > 50 m ² for unheated buildings: > 250 m ² for extensions of single family, terraced and holiday houses	unspecified	no size requirement, except for warehouses, transport and communications buildings, indoor swimming pools and indoor ice rinks (> 1,000 m ²)	unspecified, buildings under scope classes 2 and 3 in Building Regulation	no size requirement, just building type	> 100 m ²	2028: > 1,000 m ² From 2030: > 50 m ²

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Process for implementation of LCA requirements and limit values in the Danish building code



Danish Authority of Social Services and Housing

More new construction covered by LCA-requirement

The scope is expanded from 57 pct. to 68 pct. of the new construction by:

- Including holiday homes
- Including unheated building over 50 m².
 e.g. parking garages and storage buildings.
- Including extensions to apartment buildings, office buildings, institutions and other construction (limit value as building type)
- For single-family houses, terraced houses, tiny houses and holiday homes, however, only extensions over 250 m² are included in the limit value

New exemptions from the limit value (must document climate impact):

• Special critical buildings such as water works, prisons, the Armed Forces' operational buildings and hospitals.

Continuation of exemptions from limit value and documentation:

• Unheated buildings under 50 m² and agricultural buildings

Danish Authority of Social Services and Housing

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Including the construction process in the limit value

- A requirement expansion with the climate impacts from the construction process (module A4 and A5)
- The limit value for the construction process is set corresponding to a level, so approx. half of all construction sites must perform better compared to 2021.
- An <u>independent</u> limit value for the construction process corresponding to 1.5 kg CO₂e/m²/year.
- Other measures: In mid-2026, a study of the possibility of including outdoor areas on the building site will be submitted to the political parties behind the agreement

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Changes in the way of building

- There will probably be changes in the construction practices
- Our way of categorize
 - Under the limit value without changes
 - Small optimizations a reduction of 0 to 2 kg CO₂e/m²/year.
 - Partly changed practices a reduction of 2-4 kg CO₂e/m²/year.
 - Totally changed practices a reduction of more than 4 kg CO₂e/m²/year.



Danish Authority of Social Services and Housing

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Lessons from Denmark

- The standard is very good but not written to be national requirements
- Need for many clarifications
 - Which stages and modules to include?
 - Simplification to certain modules
 - How to address floor area?
 - · Introduction of a generic database for construction materials
 - Building model
 - Life time of products and constructions
 - How to address the changing energy system



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Setting of limit values

- How to set limit values
 - Data for setting limit values representativity and data collection
 - CO2e/m2
 - Differentiation between building types
 - Mixed use buildings
 - How to address special buildings with demand for certain CO2e-emitting solutions to fulfill their purpose



Danish Authority of Social Services and Housing

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Side 33

20 February 2025 Japan-OECD High-Level Policy Seminar Panel session 1: The World's leading edge in WLC policies

ZERO-CARBON BUILDINGS IN CITIES : A WHOLE LIFE-CYCLE APPROACH

Takeshi Miyamori

Senior Manager, Sustainable Buildings Unit Cities, Urban Policies and Sustainable Development Division (CITY), Centre for Entrepreneurship, SMEs, Regions and Cities (CFE), OECD

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DECTER POLICIES FOR BETTER LIVES

OECD Survey on Whole Life Carbon of Buildings

Vancouver (Canada)

Respondents:

		11 COUNT	RIES	
•	Brazil	•	Israel	
٠	Costa Rica	•	Japan	
٠	Denmark	•	Netherlands	
٠	Finland	•	Singapore	
٠	France	•	Sweden	
٠	Germany			
		7 CITIE	S	
•	Espoo (Finland)	•	Oslo (Norway)	
•	Helsinki (Finland)	•	Tokyo (Japan)	

- Greater London (UK) •
- Malmö (Sweden)



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Countries & cities are developing policies step-by step with a roadmap Regulatory phase Draft methodology Preparation phase ♦ Introduction of regulatory measures ▲ Regulatory tightening ☆ Voluntary certification label Earlier 2022 2024 2025 2018 2019 2020 2021 2023 2026 2027 2028 2029 2030 EU Draft methodology EU taxonomy - Mandatory assessment for Mandatory assessment for >1000m² >5.000m² Denmark Limit values Draft methodology Voluntary certification label (2016) France Draft methodology Limit values Sweden* Draft methodology Mandatory reporting Limit values Helsinki (Finland) Draft methodology Limit value for apartment buildings Vancouver (Canada) Draft methodology Limit values

*Sweden's timeline is based on Boverket's proposal

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1. Step-by-step approach

3

Countries & cities are taking actions through tailored strategies



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1. Step-by-step approach

4

Challenges (Policy Development) Setting limit values, developing database & deciding on the scope of assessment

Figure. Main challenges at the policy development stage



Challenges (Policy implementation) Workload for calculating WLC & data collection

Figure. Main challenges at the policy implementation stage



3. City-led initiatives

Opportunity: Cities are leveraging local advantages to drive whole life carbon initiatives

Cities can take	2 Major enabling factors of city-led initiatives					
Earlier action to introduce limit values Helsinki (Finland) in 2023 & Vancouver (Canada) in 2022		Cities own public buildings / land	Cities are responsible for local regulations	Strong PPP & highly motivated local industry		
More ambitious action: assessment at both	Helsinki (Finland)	~	√			
Duilding permit stage and after completion Helsinki (Finland) & Malmö (Sweden)	Greater London (United Kingdom)		\checkmark			
	Malmo (Sweden)	~		✓		
A unique approach: setting carbon footprint	Oslo (Norway)	\checkmark		✓		
Tampere (Finland)	Vancouver (Canada)		1	1		

Source: OECD Global Survey on Whole Life Carbon of Buildings (2024)

Challenges: Collaboration across levels of governments are lacking



Only 4 out of 11 surveyed national governments have platforms to coordinate with subnational governments.



Only 2 out of 7 city respondents receive support for capacity building and technical assistance from the national government.

Disparities in WLC policies and methodologies hamper local implementation.

- Inflexible national policies may discourage cities from pursuing ambitious policies.
- Varying assessment methods within a country may complicate life-cycle assessment application process.

Source: OECD Global Survey on Whole Life Carbon of Buildings (2024)

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Thank you!

If you have further questions, please contact:

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CECD Urban Studies
Zero-Carbon Buildings in Cities
A Whole Life-Cycle Approach







Policy Highlights

Report &



Decarbonising Buildings in Cities and Regions

Promoting whole-life carbon assessment of buildings in Japan



Toshiharu Ikaga President, The Institute for Built Environment and Carbon Neutral for SDGs (IBECs), Deputy Chair, Zero Carbon Promotion Council / Professor Emeritus, Keio University



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WLC reduction Past efforts by industry, government and academia



Toshiharu Ikaga, Shuzo Murakami, Shinsuke Kato, and Yasuyuki Shiraishi: Prediction of Japan's Construction-Related CO₂ Emissions up to 2050, Journal of Architecture and Planning Architectural Institute of Japan, Vol. 65, No. 535 p. 53-58 (September 2000) <u>https://doi.org/10.3130/aija.65.53_5</u>



emissions from electricity

WLC reduction Past efforts by industry, government and academia



WLC reduction Recent efforts by Zero Carbon Building Promotion Council



J-CAT Japan Carbon Assessment Tool for Building Lifecycle



Case studies on Upfront Carbon

п	NC/RE	Main Llee	Structure	2102	Stories	2-2
2.2	New Construction		Structure		Stories	2 7-1 Logistics facilities
2-2	New Construction	Logistics facilities	5	E	a	9-4
/-1	New Construction	Logistics facilities	5	G	a	2-1
9-4	New Construction	Housing complex	RC	н	e	8-2 Direct temporary construction
2-1	New Construction	Housing complex	SRC	G	e	Housing complex
8-2	New Construction	Housing complex	RC	D	а	
2-4	New Construction	Housing complex	RC	E	b	5-1 Concrete
4-2	New Construction	Housing complex	RC	C	а	11-2 and High School Steel frame
5-1	New Construction	School*	W	С	а	11-1 Reinforced concrete
11-2	New Construction	School*	S	E	а	Hospital Wood
11-1	New Construction	Hospital	S	G	b	8-1 Deck plate
3-2	New Construction	Hospital and Clinic	S	E	b	6-2 新築平均
8-1	Renovation	Office	S	E	b	13-1 1,164kg
6-2	Renovation	Office	SRC	D	b	3-1 -CO ₂ /m ² Interior finish
13-1	New Construction	Office	S	E	С	9-2 Other construction works
3-1	New Construction	Office	S	D	b	4-1 Electrical work
9-2	New Construction	Office	S	D	С	9-1 Office Air conditioning work
4-1	New Construction	Office	S	D	С	2-3 Sanitary work
9-1	New Construction	Office	S	G	d	2-5
2-3	New Construction	Office	S	D	с	9-5
2-5	New Construction	Office	S	В	b	6-1 Offsite Construction
9-5	New Construction	Office	S	Н	d	1-1
6-1	New Construction	Office	S	D	а	9-3
1-1	New Construction	Office	RC	С	а	10-1 Hotel
9-3	New Construction	Office complex	S	Н	e	
10-1	New Construction	Hotel	S	E	с	
[Total a	rea classification]	A: Less than 300 m ² , B: 3	00 m ² or mo	re and le	ess than 2,	$\frac{1}{2}$,000 m ² , C: 2,000 m ² or more and less (kg-CO2/m2)
than 5 000 m ² D: 5 000 m ² or more and less than 10 000 m ² E: 10 000 m ² or more and less than 30 000 m ² E: 30 000 m ²						

or more and less than 50,000 m², G: 50,000 m² or more and less than 100,000 m², H: 100,000 m² or more [Floor Classification]

a: 5 floors or less, b: 6 to 10 floors , c: 11 to 20 floors , d : 21 to 30 floors , e: 31 floors or more

IBECs 住宅・建築 SDGs 推進センター tute for Built Envir ent and Carbon Neutral for SDGs

Case studies on whole life carbon per year (60 years)



than 5.000 m². D: 5.000 m² or more and less than 10.000 m². E: 10.000 m² or more and less than 30.000 m². E: 30.000 m² or more and less than 50,000 m², G: 50,000 m² or more and less than 100,000 m², H: 100,000 m² or more a: 5 floors or less, b: 6 to 10 floors , c: 11 to 20 floors , d : 21 to 30 floors , e: 31 floors or more Floor Classification]

IBECS 住宅・建築 SDGs 推進センター *: Elementary, Junior High, and High School Restricted Use - À usage restreint

Design guidelines for reducing WLC under consideration

Method 1: Reducing material usage

Method 2: Use of low carbon materials

Method 3: Construction Effort



The model building is a sample building used by the Real Estate Association (office , total floor area 10,000 m², SRC structure).

Panel Discussion 2: What should Japan do? Development and promotion of WLCA in Japan





Decarbonization Initiatives for Buildings in Tokyo

February 20, 2025

Koji Miyazawa

Deputy Director General, Bureau of Environment, Tokyo Metropolitan Government

Bureau of Environment, Tokyo Metropolitan Government Restricted Use - À usage restreint

HTTT^{***} TekgeTokyo Current Situation of Buildings and CO₂ Emissions in Tokyo

- The total area of buildings constructed in Tokyo each year accounting for more than 10% of construction starts nationwide.
- Buildings account for 70% of CO₂ emissions in Tokyo.
- •In addition to steadily promoting the existing decarbonization building system based on the Environmental Security Ordinance, the system has been strengthened and expanded in line with the changing times (revision).



Utline of the Tokyo Green Building Program

• Encourage building owners to take proactive measures for the environment from the building planning stage.

- Applicable entities: Building owners who construct buildings, including new constructions, renovations, or extensions, with a total floor area of 2,000 m² or more^{*} (approximately 800 buildings per year). (Plans for buildings with a total floor area of less than 2,000 m² may be submitted on a voluntary basis)
- Although buildings with a total floor area of 2,000 m² or more only make up about 2% of all building and house construction starts in any year, they account for about 50% on a total floor area basis.

Program overview

- Mandate building owners to submit a plan that describes the details and evaluation (on three levels) of their environmental efforts according to the guidelines of the Tokyo Metropolitan Government (TMG). TMG publicizes an overview on its website.
- Mandate compliance with the Energy Performance Standards (heat insulation/energy efficiency) of TMG and the consideration of the use of renewable energy (installation of renewable energy equipment/procurement of renewable power).
- <Residential buildings> Mandate the inclusion of Green Labeling for Condominiums to indicate environmental performance in advertisements for the sale etc. of condominiums.
- <Non-residential buildings> Require owners of those exceeding a certain total floor area to issue an Environment Performance Certificate, which includes an assessment of the buildings' environmental performance, to tenants and other relevant parties.

Fields	Environmental considerations
Rational Use of Energy	 O Placement of buildings, thermal insulation of outer walls and roofs, solar shielding and thermal insulation of windows, etc. O Use of renewable energy (natural lighting and ventilation, solar power generation, installation of solar heat collectors, etc.) O Energy efficiency systems (improvements in the efficiency of equipment systems)
Proper Use of Resources	 O Use of eco materials (recycled materials, wood, etc.) O Longevity etc. (measures against the deterioration of the building frame, ease of renovation, etc.)
Natural Environment Conservation	 O Drainage of rainwater O Ensuring the quantity and quality of greenery on sites and buildings (consideration for ecosystems etc.), creating good landscapes, etc.
Mitigation of Heat Island Effects	 O Measures against artificial exhaust heat from equipment embedded in buildings O Installation of EV/PHV chargers

Achievements of the Tokyo Green Building Program

• Since the start of the program, energy efficiency performance has gradually improved.

By integrating urban redevelopment procedures, the environmental performance of large has significantly improved through stricter compliance requirements for higher environmental performance.



HTT Total Outline of Strengthened/Expanded Tokyo Green Building Total Tokyo Program (Effective from FY 2025)

Strengthening and new establishment of Energy Performance Standards (mandatory action for thermal insulation and energy efficiency performance)

- Raise the standards for non-residential use (effective from FY 2024).
- Establish new standards for residential use.

Establishment of new renewable energy equipment installation standards (mandatory installation)

- Require the installation of renewable energy equipment, such as solar power generation equipment Installation standard capacity (kW) = Total floor area of building (m²) x Installation standard rate 5% x 0.15 (kW/m²)
- In addition to considering the space where equipment cannot be installed (exclusion area), set lower and upper limits of capacity (mitigation measures) according to the size of the building.

Establishment of new electric vehicle charger installation standards (mandatory installation)

• Require new buildings with at least a certain number of parking spaces to install chargers, piping, etc.

Enhancement and expansion of three-tier evaluation and display system

- To recognize the efforts of building owners striving for higher standards, **strengthen and expand the evaluation criteria by incorporating new perspectives**, such as adaptation measures and the procurement of low-carbon materials, into the three-tier evaluation system for environmental considerations.
- Strengthen and expand the display of environmental performance (Green Labeling for Condominiums and Environment Performance Certificate) by building owners. Additionally, enhance the information published by TMG to promote the selection of environmentally friendly buildings.

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HTT^{***} Introduction of Measures for Whole Life Carbon by ^{7/4y•Tokyo} the Tokyo Green Building Program

 Buildings are constructed with a large amount of input, and the impact of material procurement on CO₂ emissions in the supply chain is also significant. It is important to recognize and select materials with low CO₂ emissions during construction, and to actively promote the expansion of their use.

Extract of documents for the 6th engineering review meeting

Excerpts from the Report on the Revision of the Ordinance on Environmental Preservation to Secure the Health and Safety of Citizens of the Tokyo Metropolitan Area (August 2020)

The Shape of Effective Programs for the Realization of "Carbon Half"

Proper Use of Resources

Toward 2030, efforts should be made to reduce the environmental impact not only during the operation of the building, but also related to the construction of the building, and review it so that efforts to understand the impact of the environmental impact can be supported.

In addition to the efforts made so far, **initiatives that contribute to reducing embodied-carbon** (CO₂ emissions generated during construction, renovation, and life cycle of buildings) **should be promoted**. These include **the active use of low-carbon materials such as wood, the assessment of CO₂ emissions related to construction activities, and the recycling of construction waste**.



[Set new evaluation by Contents of strengthening and expansion of system] <u>Start evaluation of recognition/reduction of CO₂ emissions during the construction</u> <u>Use of sustainable low-carbon materials etc.</u> <u>Restricted Use-A usage restreint</u>

HTT^{***} ^{76kyeTokyo} Outline of evaluate the WLC initiatives for Tokyo Green building program

- Evaluate the recognition of CO₂ emissions from construction materials with significant impact during construction (upfront carbon) and the initiatives undertaken at construction sites. Provide guidance to promote efforts to reduce CO₂ emissions effectively.
- Promote the emission reductions during the UC by evaluation the use of low-carbon materials with low CO₂ emissions when manufactured.



*Prepared by TMG by adding some descriptions based on EN-15978 (2011) provided in Net-Zero buildings (World Business Council for Sustainable Development).

6

HTT *Tekge*Tokyo for the environment

Promote visualization of environmental performance so that people can choose buildings with excellent environmental performance when purchasing or renting new buildings.
 Published comprehensive their environmental performance level each building to easy to grasp them.

- 1 Measures for visualize building environmental performance OGreen Labeling for Condominiums Mandatory display of environmental performance labels when advertising the sale of condominiums.
- OEnvironment Performance Certificate Mandatory Issuance of a building environmental performance evaluation report to tenants at the time of contract.
- ⇒ <u>Strengthen and expand the display of environmental performance</u> <u>from Strengthened/Expanded Tokyo Green Building (FY2025~)</u>
- **2** Published comprehensive their environmental performance level each building (IMAGE) The status of each building's environmental initiatives is published in a list.

owner	Name of Building	Address	Building Use	Total floor		Ratio of point
□Co.	□□Building	A区1-2	Office	*,***m ²		75.3%
OCo.	OOBuilding	B⊠2-3	Office	*,***m ²		66.6%
riangleCo.	△△Building	C⊠3-4	Office	*,***m ²		61.7%
		4-5	Office	*,***m ²	Restricted Us	e - À usage restreint

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ニネルギー消費性能	* * * *	• 本計圖書
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圭持管理・劣化対策	* * *	延べ面
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C 0		 (国の省) 評価日

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					-
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環境性能評価書

長又は改築する建築物の環境性能に関する1







国十交诵省



Expectations for Carbon Neutrality in Building Sector

Significance of Efforts to Reduce WLC in Buildings

the 20th of February 2025 JAPAN-OECD HIGH-LEVEL POLICY SEMINAR

Shogo Yadomoto Deputy Director-General, Housing Bureau Ministry of Land, Infrastructure, Transport and Tourism

Japan's Goal for Carbon Neutrality in the Building Sector 🛛 🖳 国土交通省

From FY2025, A Require compliance with energy efficiency standards for all new buildings. By FY2030, A Require the level of <u>net zero energy for all new buildings</u>, by upgrading energy efficiency standards. By FY2050, A Secure the level of net zero energy for buildings <u>on stock average</u>.

Building Whole Life Carbon



일 国土交通省



Importance of Efforts to Reduce WLC in Buildings () Architectural Design Transition





Challenges and Potential Solutions

Challenges **Potential Solutions** Establish "generic" CO2 intensity ✓ Establish the "Inter-Ministerial Liaison Meeting" among national government and "EPD Promotion database Council" with industrial sectors \checkmark Provide capacity building programs and financial incentives for the development of CO2 intensity Formulate a legal system for WLC ✓ Adopt "Step by Step Approach" ✓ Develop roadmaps towards the legal system (By assessment next March) ✓ Provide financial incentives for LCA implementation Capacity building ✓ Development and provision of training programs for designers, builders, etc. ✓ International communication on the characteristics Balance seismic risks with of WLC in earthquake-prone countries environmental impact ✓ Focus on reductions from previous, rather than comparing the WLC itself

일 国土交通省

Councils/Meeting to Promote WLC Assessment

- > Japan has constructed the Public-Private-Academia partnership for the deployment of the WLCA approach
- The Zero Carbon Building Council, which examines LCA methods that are compatible with Japan's building conditions, the EPD (Environmental Product Declaration) Promotion Council, which promotes the development of CO2 intensity, and the Inter-Ministerial Liaison Meeting for Building Life-cycle Carbon Reduction, which examines institutionalization, have each established a system to closely collaborate in their respective studies.
- A roadmap for institutionalization is scheduled to be presented in March of this year at a meeting of the relevant ministries and agencies..





Sumitomo Forestry Decarbonization Initiatives

Toshiro Mitsuyoshi President Sumitomo Forestry Co., Ltd.

February 20, 2025





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	Sumitomo Standa	o Forestry's decarbonization initiative r dize carbon neutral design	<u>★と生きる</u> 業 ◆住友林美		
Sumitomo Forestry's major business related to LCA					
1	Widespread adoption of software application	Visualization of CO_2 emissions from construction sector	One Click		
2	② EPD acquisition support manufacturers				
《Features of One Click LCA》					

.... 4 00

① Precise calculation of CO₂ emissions	⇒Enables incorporation of companies' CO ₂ reduction efforts
② Efficient data calculation	⇒Supports labor reform and digital transformation (DX) in the construction industry
<u>③ High compatibility to international</u> <u>certifications</u>	⇒Addressing foreign real estate developers and global ESG capital

★と生きる # 描 住友林業

Presence of foreign investors in the domestic real estate market



Investment volume by investor type



Furthermore, there is a growing presence of:
 ① Global ESG capital
 ② Foreign real estate developers

出所:CBRE. "Japan Investment MarketView Q4 2024". CBRE Web site. 2025-02-03, https://mktgdocs.cbre.com/2299/d21f67e9-79fa-4d7b-bcca-bf86e589300d-13207463/Japan_Investment_MarketView_Q4.pdf, (参照 2025-02-12) .

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Challenges and strategies for promoting "Carbon neutral design, 全住友林業

[Challenges and Future Initiatives in Embodied Carbon Calculation]

① BIM Data Connection

⇒ BIM adoption is expanding to reduce design workload and address severe labor shortages. One Click LCA, which directly connects with major BIM software, enables efficient design and LCA calculations using BIM data.

② Widespread Adoption of EPD Labels

 \Rightarrow Encouraging widespread adoption of EPDs reflecting CO₂ reduction efforts for individual products, leading to overall CO₂ reduction and positive cycle across the entire supply chain.

Acquisition of EPD via EPD Acquisition Support Service 4 (本本)

[Asahi Woodtech/ Wood flooring]



[Nelson Pine / LVL·MDF]





[Kmew / Siding]



[Sumitomo Forestry Crest/ Wood flooring] [Tenri Shuseizai/ Glued laminated timber]

木と生きる参補

[JSP/ Extruded Polystyrene Foam (XPS)]



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木と生きる幸福



- ✓One Click LCA continues to evolve, addressing various challenges such as connecting with BIM to improve productivity in the construction industry and promoting the widespread adoption of EPDs.
- ✓We strive to promote the widespread adoption of EPD for decarbonization across the entire supply chain through collaboration between industry, government, and academia.





Developers' Efforts Towards a Zero-Carbon Society

Mitsui Fudosan Co., Ltd.

Representative Director and Chairman: Masanobu Komoda

February 20



Introduction



- Realising the corporate philosophy of " & mark"
- Cooperate throughout the supply chain towards decarbonised society
- Setting Decarbonisation Action Plan for GHG emissions reduction targets





Action Plan to achieve corporate targets



To further strengthen and accelerate decarbonisation measures,

"Group Action Plan towards Decarbonised Society" was launched in November 2021.



Our Group's GHG emissions (FY2019)

きま、町からホ来をかえよう 三井不動産 MITSUI FUDOSAN

Cooperate throughout the supply chain to reduce scope 3 emissions which accounts for 90% of total emissions. Of which, roughly half stems from construction of buildings.



Our Group's GHG emissions: 4.38 million tons - CO 2

Bottlenecks of GHG emissions calculations and solutions



Development of new assessment methodology helps:

Understanding the breakdowns of emissions and taking measures to reduce emissions



Continuous progress in addressing challenges

さき、町から本米をかえょう 三井不動産 MITSUI FUDOSAN

Expand our sole initiatives to involve other stakeholders – from a corporate-level



Comparison of calculation results



New methodology enables "visualisation" of reduction efforts by quantitative emision assessment by material.







Towards a decarbonised society, we strive to reduce emissions throughout the supply chain, and develop and propose new reduction measures



Given the importance of GHG emissions in urban development, we continue promoting "sustainable urban development".

