

REHVA-SHASE workshop on NZEB and ZEB Ready concepts in Europe and Japan
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ZEB current activities in Japan

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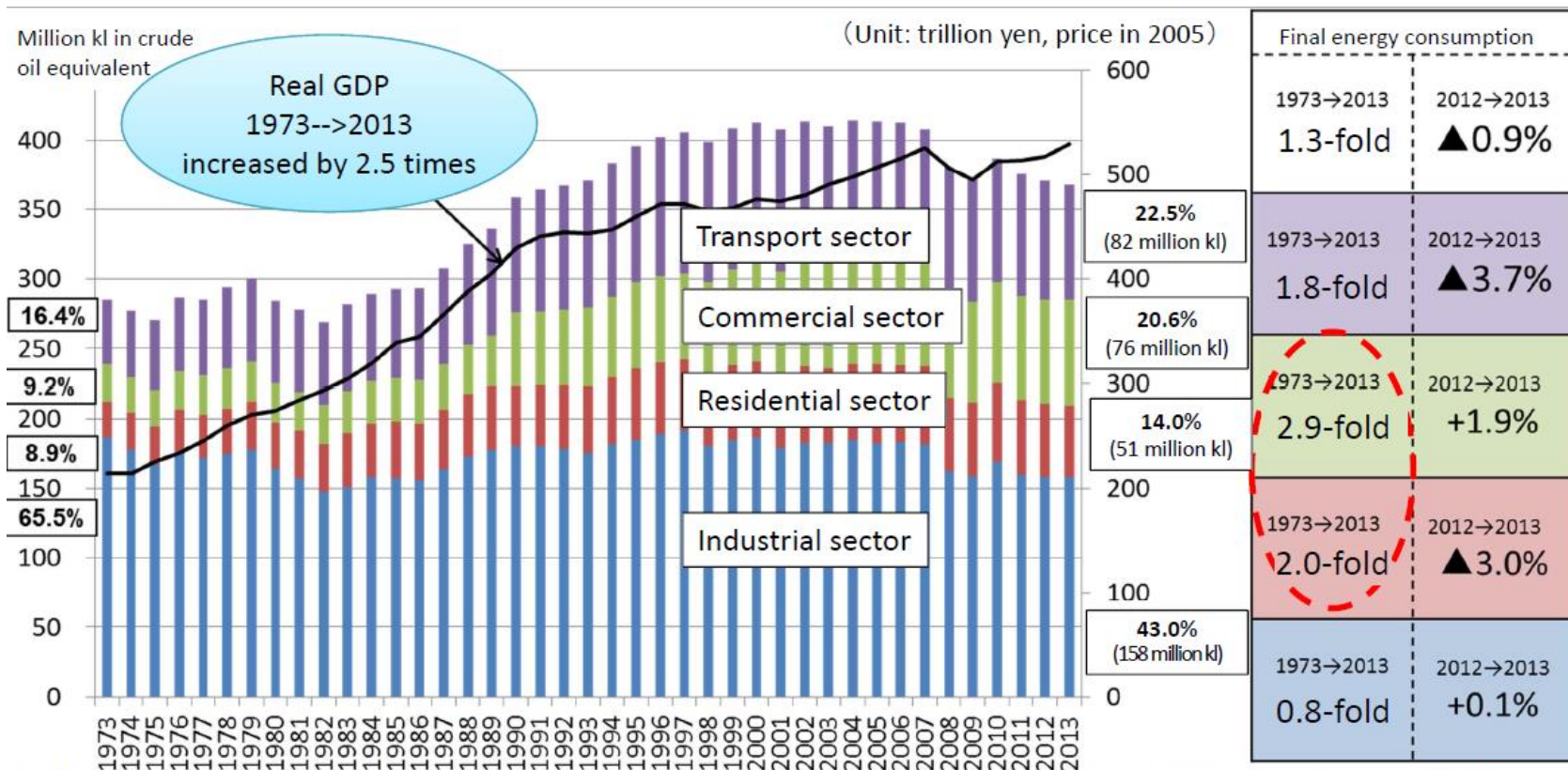


Background

- Final energy consumption in Building sector
- COP21
- Policy for promoting energy conservation of building

Final Energy Consumption by Sector in Japan

Industrial sector energy consumption has leveled off, but a significant increase in energy consumption has been observed in the commercial and residential subsectors (Building Sector).



Source: Comprehensive Energy Statistics and Annual Report on National Accounts

Intended Nationally Determined Contribution COP21



Country		The target of reduction		Compared to
	China	by 2030	CO2 emissions per GDP 60 - 65 %	2005
	EU	by 2030	40 %	1990
	India	by 2030	CO2 emissions per GDP 33 - 35 %	2005
	Japan	by 2030	26 %	2013
	Russia	by 2030	controlled to 70 - 75 %	1990
	U.S.A.	by 2025	26 - 28 %	2005

Breakdown of the Japanese reduction target

Industrial	7 %
Commercial	40 %
Residential	39 %
Transportation	28 %
Energy	28 %

Summary of Act on the Rational Use of Energy



Manufacturing plants & business locations

Obligation for business operators to make an effort and public disclosure of judgment standards

○ Specified business operators and specified chain business operators

(Energy consumption of 1,500kl per year)

- Obligation to appoint Energy Managers, etc.
- Obligation to periodically report on energy consumption status.
- Obligation to submit medium and long term plans.

Transportation

Obligation for business operators to make an effort and public disclosure of judgment standards

○ Specified carriers (freight and passengers)

(Fleet of vehicles: At least 200 trucks or at least 300 railway cars for railroads, etc.)

- Obligation to submit medium and long term plans.
- Obligation to periodically report energy consumption status.

○ Specified consigners

(Annual transport volume of at least 30 million ton-km.)

- Obligation to submit plans.
- Obligation to periodically report consumption of energy related to consigned transportation.

Residential buildings and structures

Obligation for construction clients and owners to make an effort and public disclosure of judgment standards

○ Specified buildings

(Total floor area of at least 300m².)

- Obligations relating to the submission of notifications pertaining to energy conserving measures implemented by construction clients in relation to large scale modifications and obligations relating to reporting the status of overall maintenance.

○ Housing providers

(Annual supply of at least 150 units.)

- Obligation to observe targets for improving energy conservation performance of supplied ready built residential housing.

Provisions relating to machinery and equipment

Obligation for manufacturers and import business operators of energy consuming equipment to make an effort

Top Runner Standards (23 units)

- Standards for energy conservation of passenger cars, air conditioners, television sets, etc. To exceed the performance of most superior products that have been commercialized at the present time is required of each type of unit.

Provision of information

Obligation to make effort in providing information to general consumers

- Provision of information on energy conservation (annual electric power consumption, fuel economy, etc.) that is easy to understand at storefronts of retailers who sell household electrical appliances, etc.
- Popularization of energy conserving equipment and the provision of information, etc., by electric power and gas companies.

Act on the Improvement of Energy Consumption Performance of Buildings (Building Energy Efficiency Act)

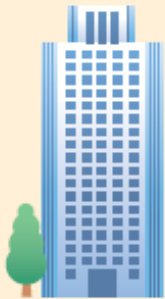


① Regulatory Measures (Mandatory)

Scheduled
for April
2017

■ Mandatory compliance with energy efficiency standards - Mandatory certification

Newly established



- Non-residential buildings over 2,000m² or more (planned)

Mandatory compliance/evaluation for compliance of newly-constructed building energy efficiency performance standards (energy efficiency standards)

■ Notifications

- Buildings 300m² or more (planned)

Mandatory notification to administrative agencies with jurisdiction of plan for new construction/extension/renovations



Residential

Non-residential

Instructions/orders issued when deemed necessary without compliance with standards.

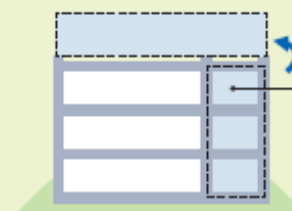
■ Housing Top-Runner Program

② Incentive Measures (voluntary)

April 1,
2016

■ Performance Improvement Planning Certification System / exception of floor-area ratio regulation

Newly established



Portion that exceeds normal building floor space for equipment necessary to improve energy efficiency performance

||

Not calculated

(Certificate by administrative agencies)

■ Labeling System for Energy Efficiency

Newly established



◎ Display of building energy efficiency performance based on Article 7 of Act



◎ Labeling of approval of compliance with energy efficiency standards (Verification by an administrative agencies)

established in July 8, 2015

1) regulatory measures for mandatory compliance with energy efficiency standards for large-scale non-residential buildings

2) incentive measures such as a labeling system displaying compliance with energy efficiency standards and exception of floor-area ratio regulation for certified building



Net Zero Energy Building(ZEB)

- History of Activity for Achieving ZEB in Japan
- Roadmap
- Definition
- Promotion of ZEB
- Mapping of state of ZEB in Japan

History of various activities to realize ZEB in Japan

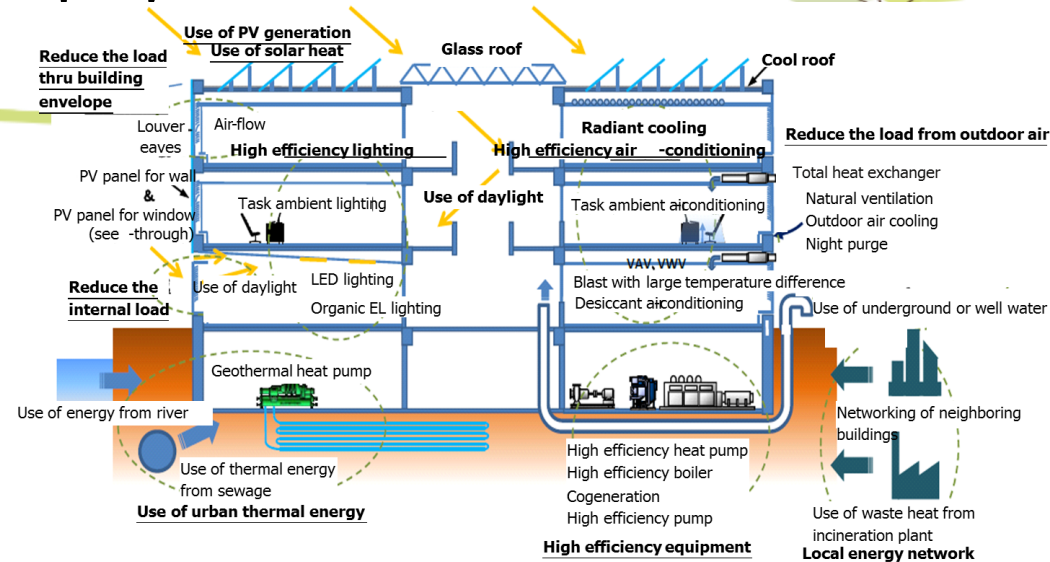


		SHASE	METI/ MILT/ MOE	
1979				Act on the Rational Use of Energy
2008	G8 Hokkaido Toyako Summit Report to the G8 Summit by IEA	SHASE: The Society of Heating, Air-Conditioning and Sanitary Engineers of Japan		
2009	L'Aquila 35th G8 Summit Recommendations to Japan by IEA		Workshop on realization and deployment of ZEB (METI)	
2010			Mid- and Long-Term Roadmap subcommittee, Global Environmental Committee, Central Environment Policy Council (MOE)	
			Meeting for Promotion of “Housing and Living Styles toward a Low-carbon Society” (METI, MILT, MOE)	
2012		A Vision of Air-conditioning and Sanitary Engineering for the 21st Century		
2013		Committee for Definition of ZEB		
2014				Strategic Energy Plan Japan
2015		Committee of Examination for ZEB feasibility	ZEB Roadmap Examination Committee (METI)	Act on the Improvement of Energy Consumption Performance of Buildings
2016			ZEB Roadmap Follow-up Committee (METI)	
2017		Committee for Examination of ZEB Design Guideline	METI: Ministry of Economy, Trade and Industry MLIT: Ministry of Land, Infrastructure, Transport and Tourism MOE: Ministry of the Environment	

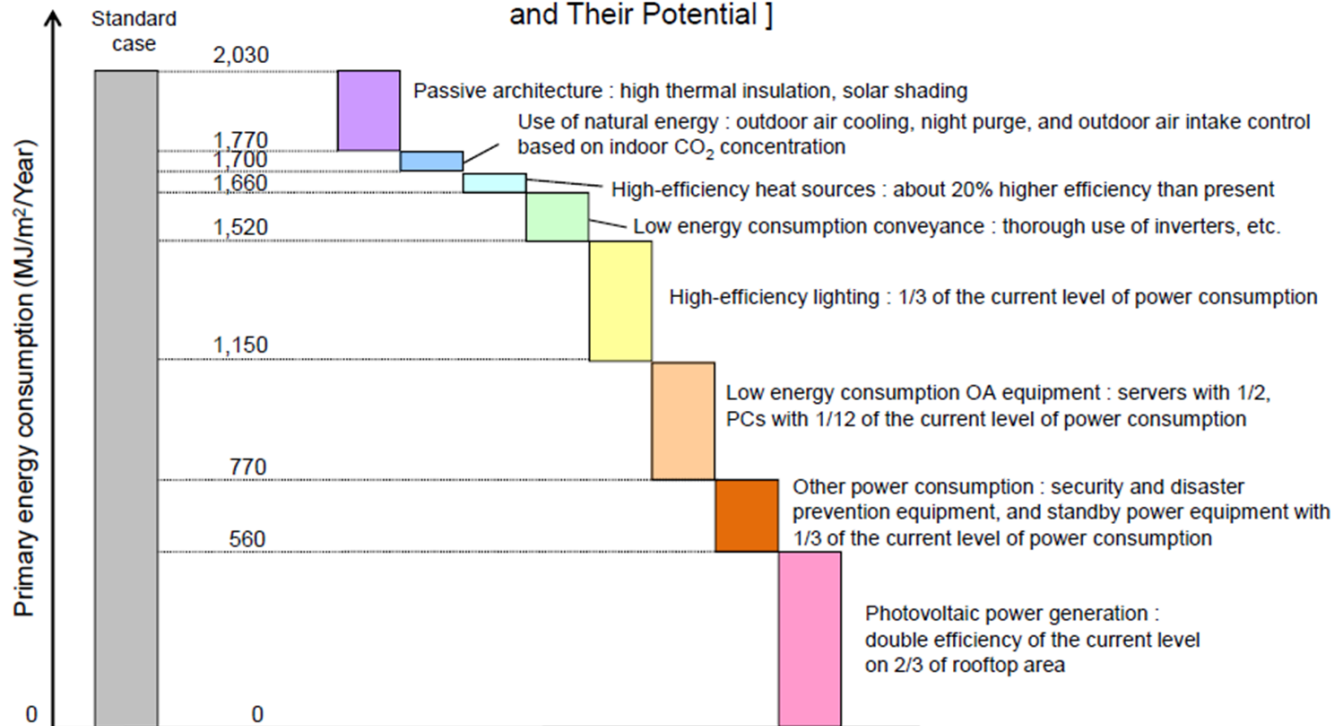
Workshop on realization and deployment of ZEB 2009

Vision for realizing ZEB

Realize ZEB for all newly built buildings by 2030



[Various Energy Efficiency Technologies for ZEB and Their Potential]



Proposal as a task and its countermeasure

- Strict enforcement of energy conservation standards
- Drastic reinforcement of tax incentives
- Drastic enhancement of support on budget
- Development of labeling system for energy conservation

Roadmap to ZEB Strategic Energy Plan Japan

April 2014



- GOJ has supported for around 4,000 projects across the nation as measures to achieve net zero energy by introducing energy efficient technologies such as high performance thermal insulation/air sealing, high-efficiency air conditioners, heat exchangers, LEDs with motion detectors and so on in public buildings, houses, office buildings and hospitals.
- GOJ aims to achieve net zero energy with regard to a newly constructed public building by 2020 and with regard to all newly constructed buildings on average by 2030.
- With regard to houses, GOJ aims to achieve net zero energy for standard newly constructed houses by 2020 and for all newly constructed houses on average by 2030.
- While improving the environment for improvements of energy efficiency performances for buildings and houses such as the above, GOJ will phase in the obligation for newly constructed houses and buildings to meet the energy efficiency standard by 2020, with due consideration given to the need for and degree of the regulation, etc.
- In addition, GOJ continues to disseminate lifestyles that lead to improvements of the quality of life and energy efficiency at the same time.

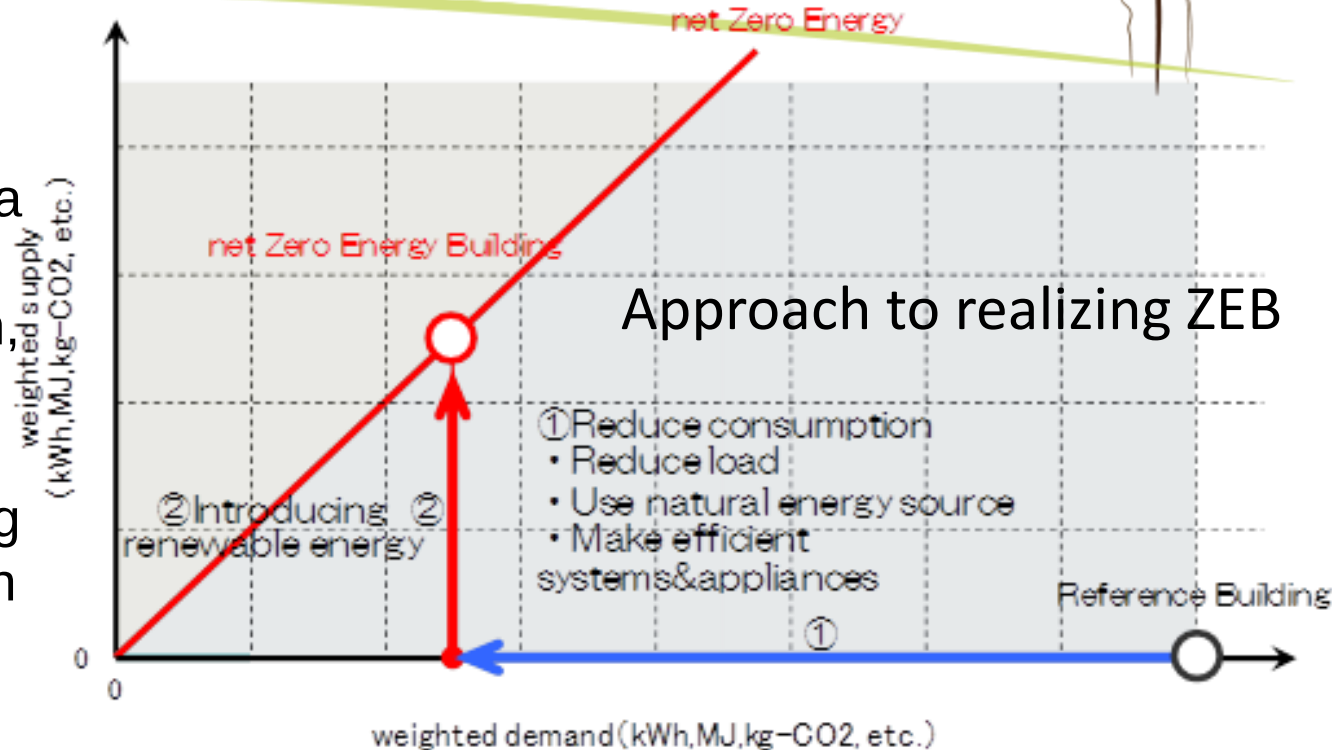
Definitions and Evaluation Method of ZEB

Committee for Definition of ZEB, SHASEJ 2015



■ Qualitative definition

A net zero-energy building is a building that has high energy saving through load reduction, natural energy use and high efficient systems and appliances without decreasing the environmental quality both indoors and outdoors.



With the introduction of on-site renewable energies, *the on-site energy generated will be equal to or greater than the actual energy consumed within the building in the course of a year.*

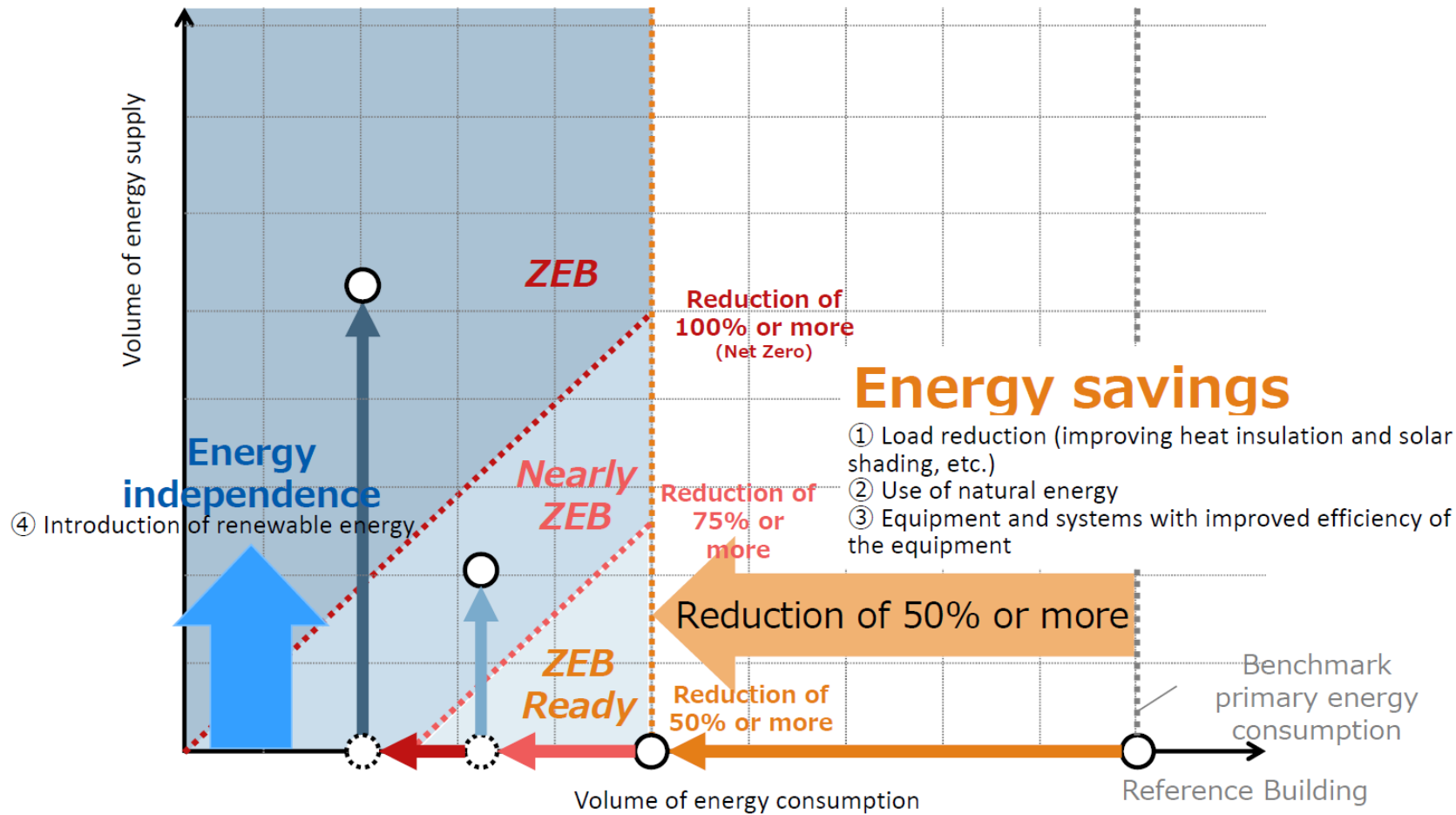
Committee for Definition of ZEB

Society of Heating, Air-conditioning and Sanitary Engineers, Japan Jun.2015

Definitions and Evaluation Method of ZEB (net Zero Energy Building)

Definition and Evaluation methods of ZEBs

ZEB Roadmap Examination Committee(METI) 2015



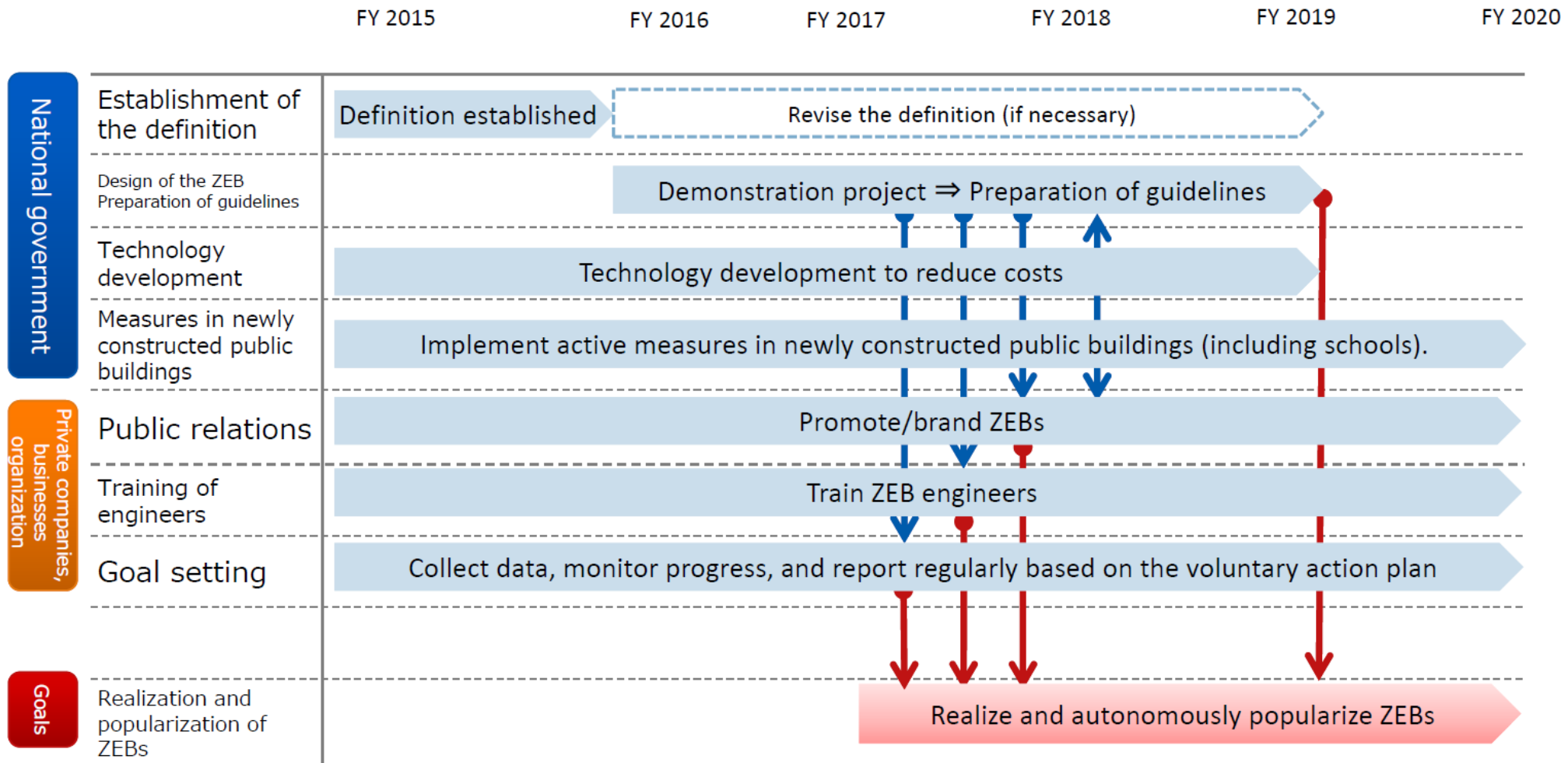
Energy Efficiency and Conservation Division Agency for Natural Resources and Energy
Ministry of Economy, Trade and Industry

Definition of ZEB and future measures proposed by the ZEB Roadmap Examination Committee

http://www.enecho.meti.go.jp/category/saving_and_new/saving/zeb_report/pdf/report_160212_en.pdf

Promotion measures of ZEBs (The ZEB roadmap)

ZEB Roadmap Examination Committee(METI) 2015



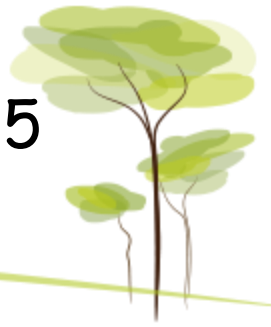
Energy Efficiency and Conservation Division Agency for Natural Resources and Energy
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Definition of ZEB and future measures proposed by the ZEB Roadmap Examination Committee

http://www.enecho.meti.go.jp/category/saving_and_new/saving/zeb_report/pdf/report_160212_en.pdf

Promotion methods of ZEBs

ZEB Roadmap Examination Committee(METI) 2015



- **Draft design guidelines through the ZEB demonstration project**
  - The techniques, methods, and costs for designing ZEBs should be clarified (ZEB designing guidelines) .
  - To execute the ZEB demonstration project, obtain feedback from those concerned through collection, analysis, and publication of real management data.
- **Support technology development aimed at higher performance and lower costs**
  - Support technology development necessary to realize ZEBs.
  - Implement active measures for newly-constructed public buildings (including schools) .
- **Promote and brand ZEBs**
  - Easy-to-understand PR activities (including comparisons with other indexes and the merits of ZEBs) should be conducted in cooperation with companies.

ZEB demonstration Project

discussed at ZEB Roadmap Follow-up Committee (2016~2017)



ZEB demonstration Projects (Subsidy)

Support a part of the expenses to business operators who agree to provide information on the introduction of high-performance building materials and equipment, which can be components of ZEB

→ develop the design guidelines for other building applications

ZEB demonstration project by MOE and METI (FY2018)

	MOE	METI
Private facilities for business use	○ Less than 2,000 m ²	○ 2000 m ² or more
Facilities of local government etc.	○ There are no restrictions about the area	

ZEB Pamphlet / ZEB Design Guideline

Can be downloaded at WEB site of Sustainable open Innovation Initiative
<https://sii.or.jp/>



Basic design • Detailed design
Design guideline

Planning
Pamphlet



☒ Design guideline



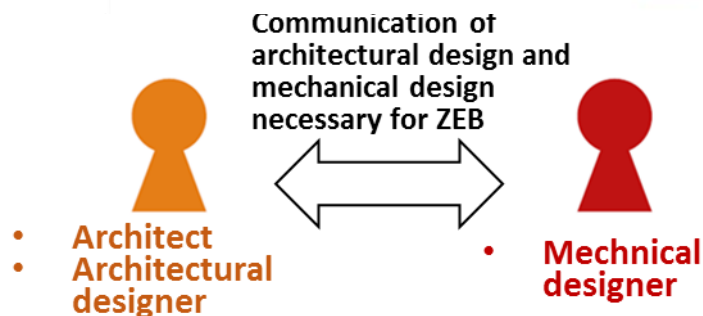
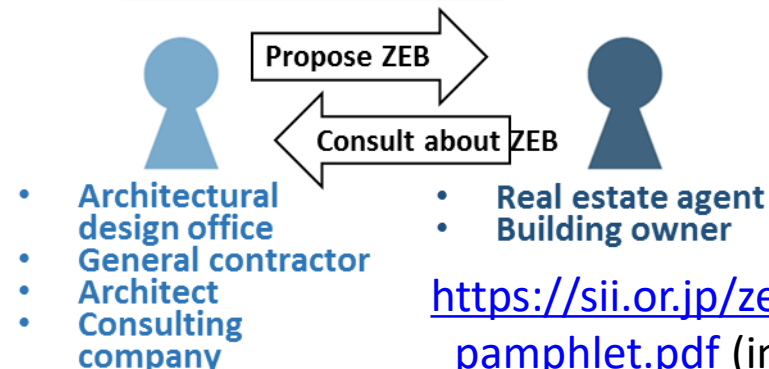
☒ WEB Program
Calculation Sheet*



☒ Pamphlet



* Act on the Improvement of
Energy Consumption
Performance of Buildings



https://sii.or.jp/zeb28/file/guideline_pamphlet.pdf (in Japanese)

ZEB planner / Zeb leading owner

discussed at ZEB Roadmap Follow-up Committee (2016～2017)

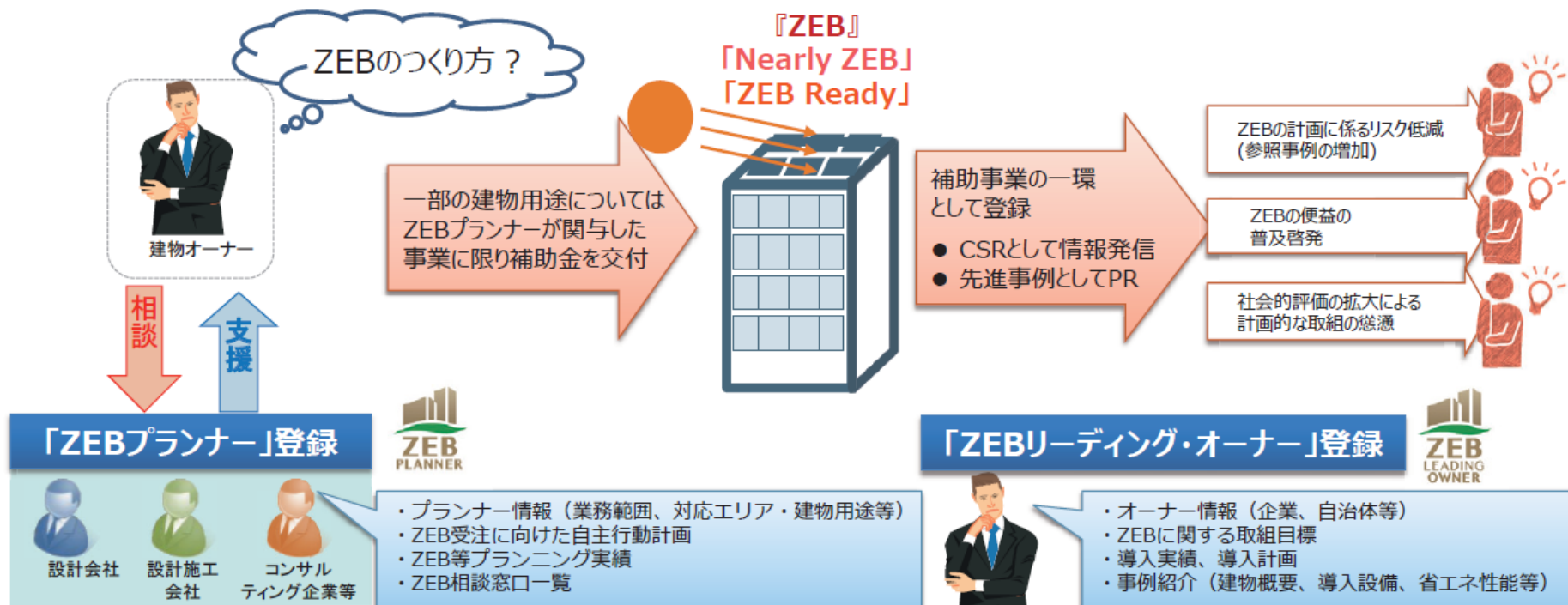


ZEB planner registration system

architectural design office, design and construction company, consulting companies, etc. who actively encourage owners to realize ZEB

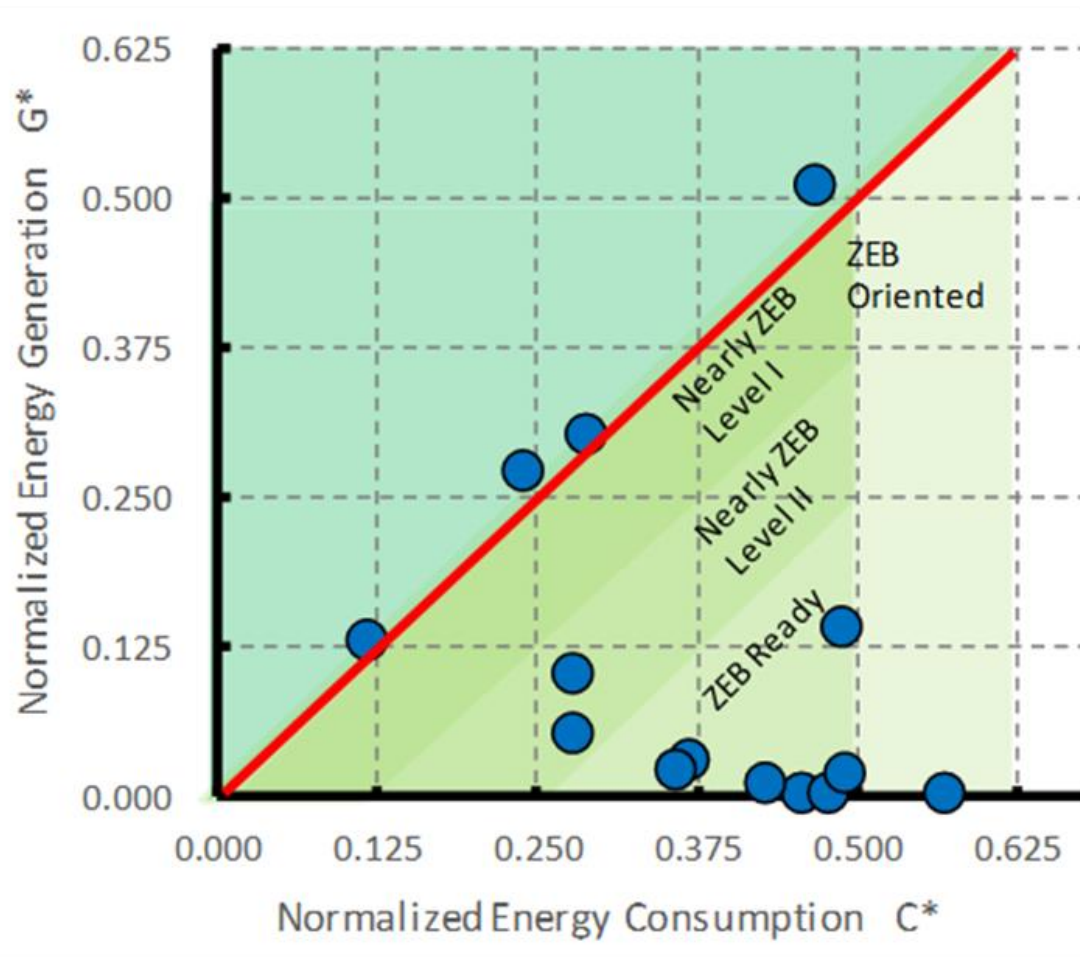
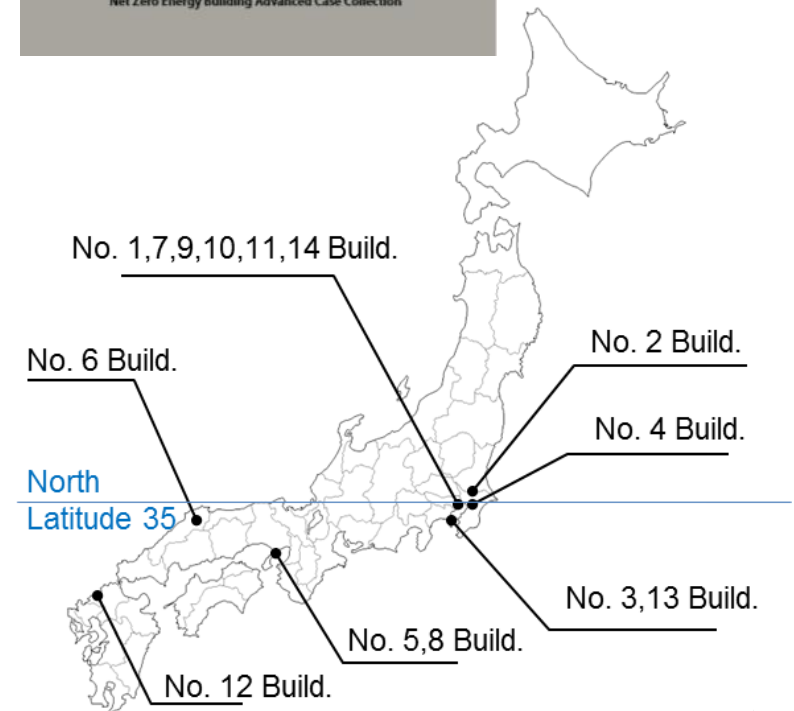
ZEB leading owner registration system

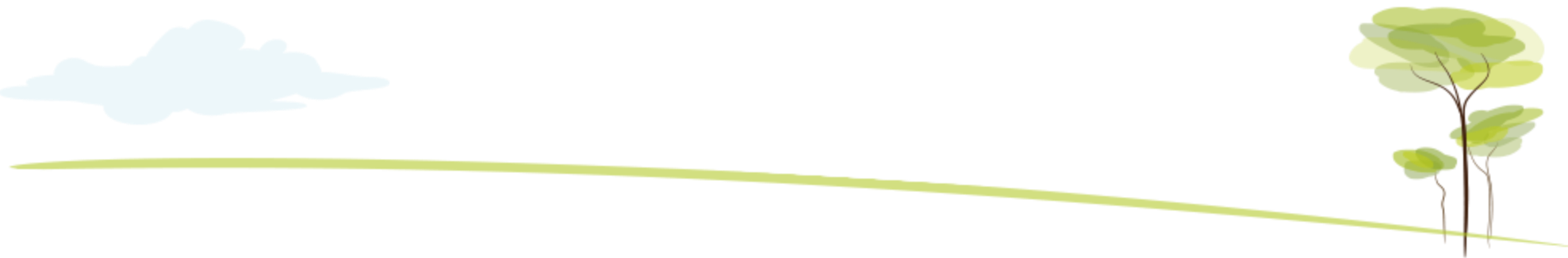
The building owner who possesses actual cases of ZEB or concrete plans on ZEB



Mapping of ZEB oriented Buildings

ZEB chart for 14 Best practices





SHASE•REHVA

Joint research on nZEB

- The process to beginning of joint research
- Contents of joint research

The process to beginning of joint research



2012

SHASE and REHVA concluded MOU

includes the implementation of joint research in both groups

2017

January

TOP Meeting of REHVA & SHASE at AHSRAE Winter Meeting (Las Vegas)

Implementation of joint research based on MOU was discussed.

March

The offer of starting nZEB working group from REHVA (President Stefano Corgnati)

Representative: Prof. Jarek Kurniski (REHVA) Prof. Gyuyoung Yoon (SHASE)

November

Discussion in Brussels

2018

January

TOP Meeting of REHVA & SHASE at AHSRAE Winter Meeting (Chicago)

Formal start of joint research

Establishment of the Special Committees in SHASE



- **Comparison of the energy performance of nZEB in different climates and countries**
- **Evaluation method of the biomass and the green energy**
- **The framework of social worth of nZEB**
- **Design methods and tools for realization and promotion of nZEB**
- **Elemental technology necessary for achieving nZEB of large scale buildings**
- **The policy and incentive for the spread of nZEB**
- **Road map of the spread of nZEB**

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Thank you for your attention

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A Vision of Air-conditioning and Sanitary Engineering for the 21st Century SHASE, Japan 2012



Growth strategy and ultra low-carbon solution of environment
and equipment technology that supports the 21st century



Three Proposals

A Reform of Industrial Structure

- A comprehensive environmental solution business
- A Comprehensive service which achieves a high level of safety, health and comfort
- Strategy for Asian Market and Internationalization
- Preparation for large-scale disasters

Significant Contribution to ZEB and the Low-Carbon Technology

Infrastructure for Highly Rationalized Industry

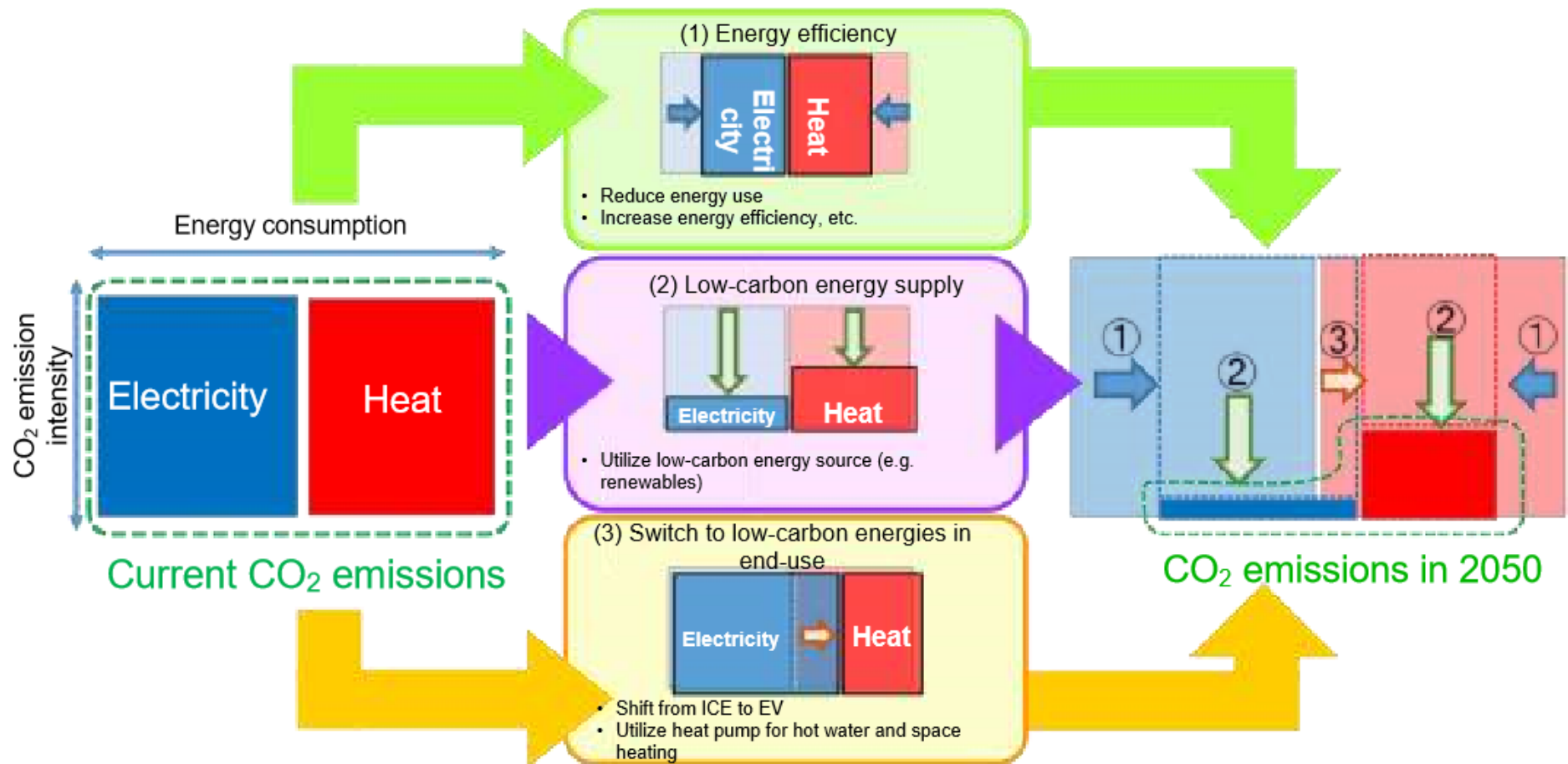
- BIM and Rationalization in facility design and construction phase
- Occupational ability and ethics required for engineers

SHASE as a Platform of Three Proposals

Academic Standards and Policy Proposals
Education and Internships for the Young Engineers
Public Relations on Academic Information

Directions to be Taken in Achieving an 80% Reduction by 2050

Long-term Low-carbon Vision [MOE] March 2017



Excerpted from the Long-term Climate Change Strategy Advisory Group