経済産業省

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

December, 2015

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

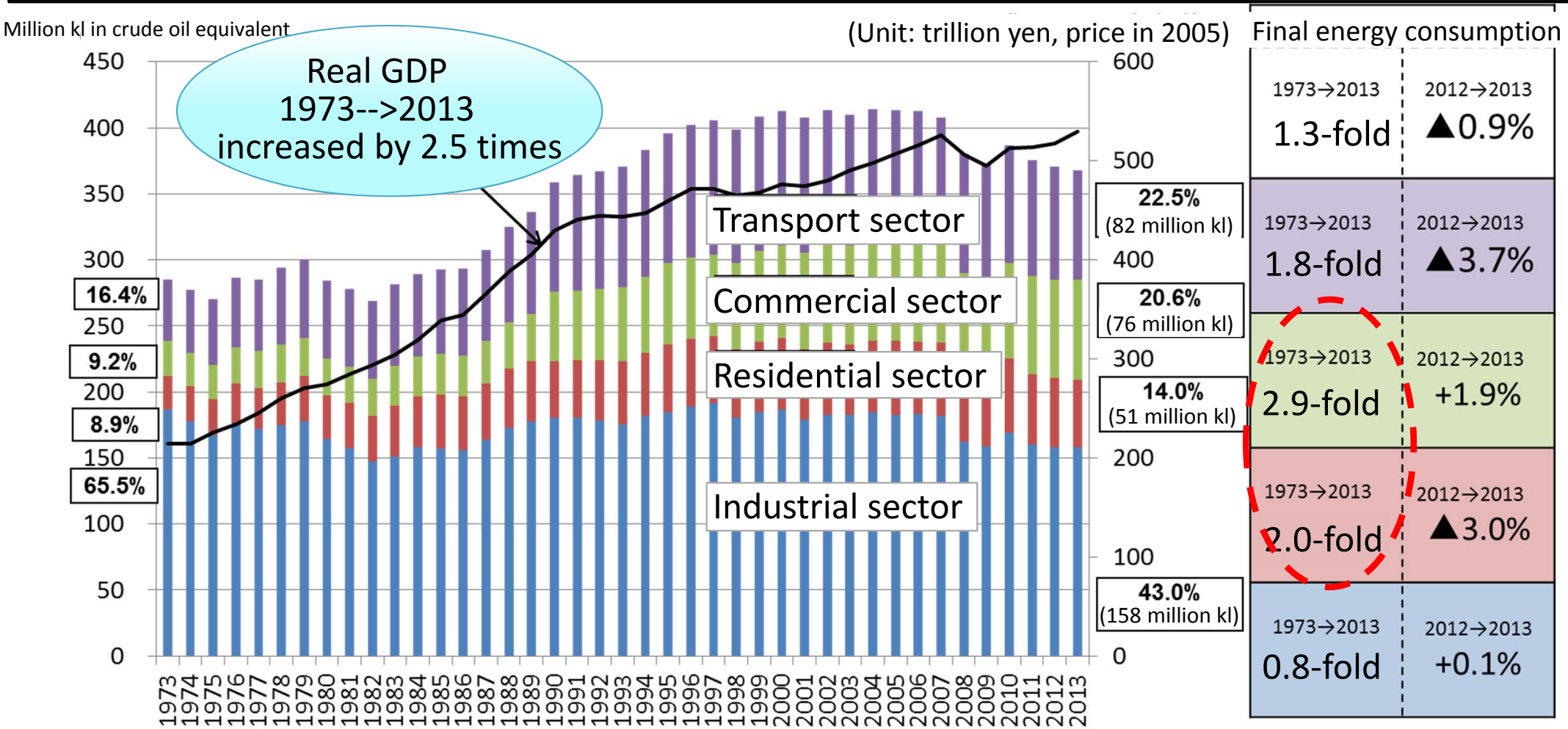
1. Status quo of energy in Japan

2. Definition of ZEH (net zero energy house) and future measures proposed by the ZEH Roadmap Examination Committee

(1) Introduction
(2) Definition and evaluation methods of ZEH
(3) Promotion methods of ZEHs

1. Status quo of energy in Japan (Status of energy consumption)

- Although Japan's GDP has increased 2.5-fold since the oil crisis, energy consumption by the industrial sector has dropped by nearly 20%. On the other hand, energy consumption by the civilian sector has increased considerably (2.9-fold for the commercial sector, 2.0-fold for the residential sector).
- To stabilize the energy demand and supply in Japan, it is essential to take measures to reduce energy consumption in the civilian sector.



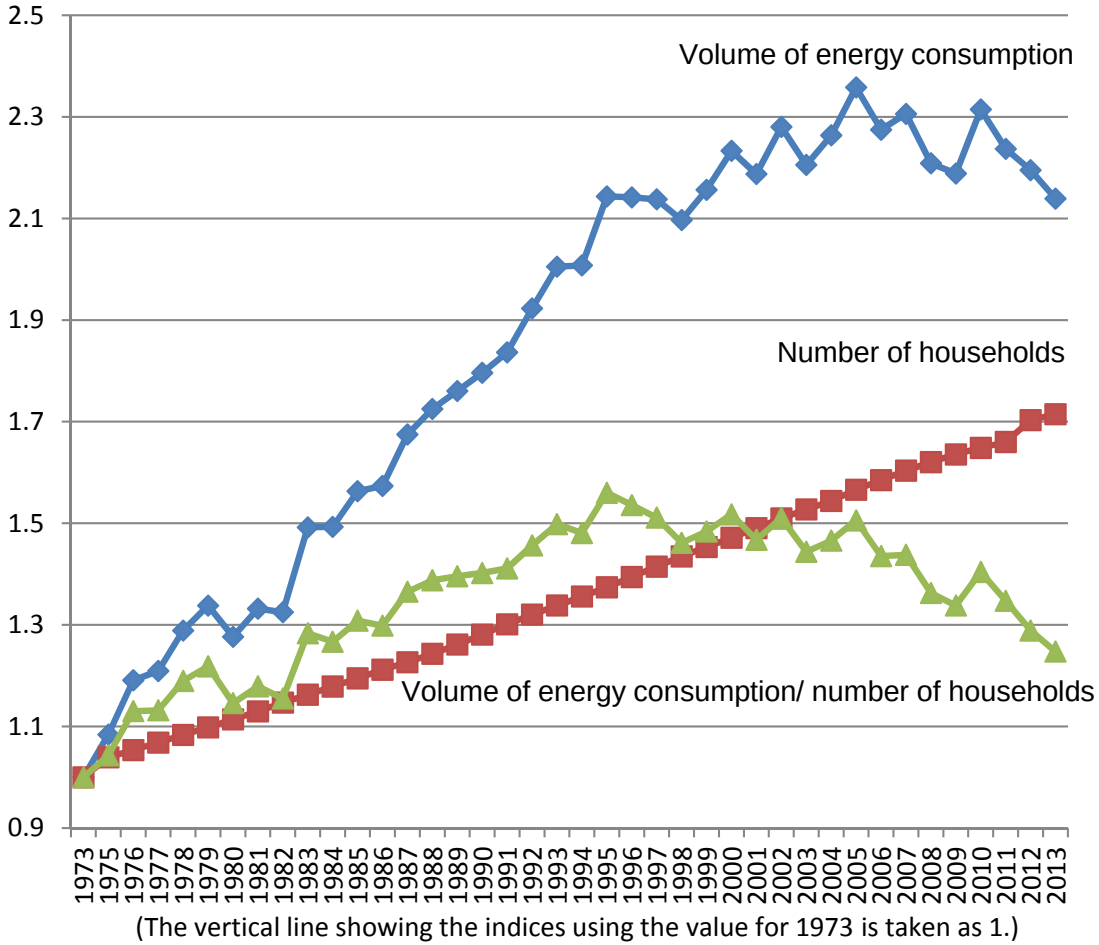
(Note) As for the final energy consumption by sector, the values estimated from sources such as the Input Output Table (the last version was published for the year 2005) and the System of National Accounts are used for the business and industrial sectors (non-manufacturing industry, food-manufacturing industry, small and medium manufacturing industry in other fields). Due to technical factors of the statistics, the short-term decrease in consumption after the Great Eastern Japan Earthquake in the commercial sector has not been sufficiently taken into consideration.

[Sources] *Comprehensive Energy Statistics*, *Annual Report on National Accounts*, *EDMC Handbook of Japan's & World Energy & Economic Statistics*

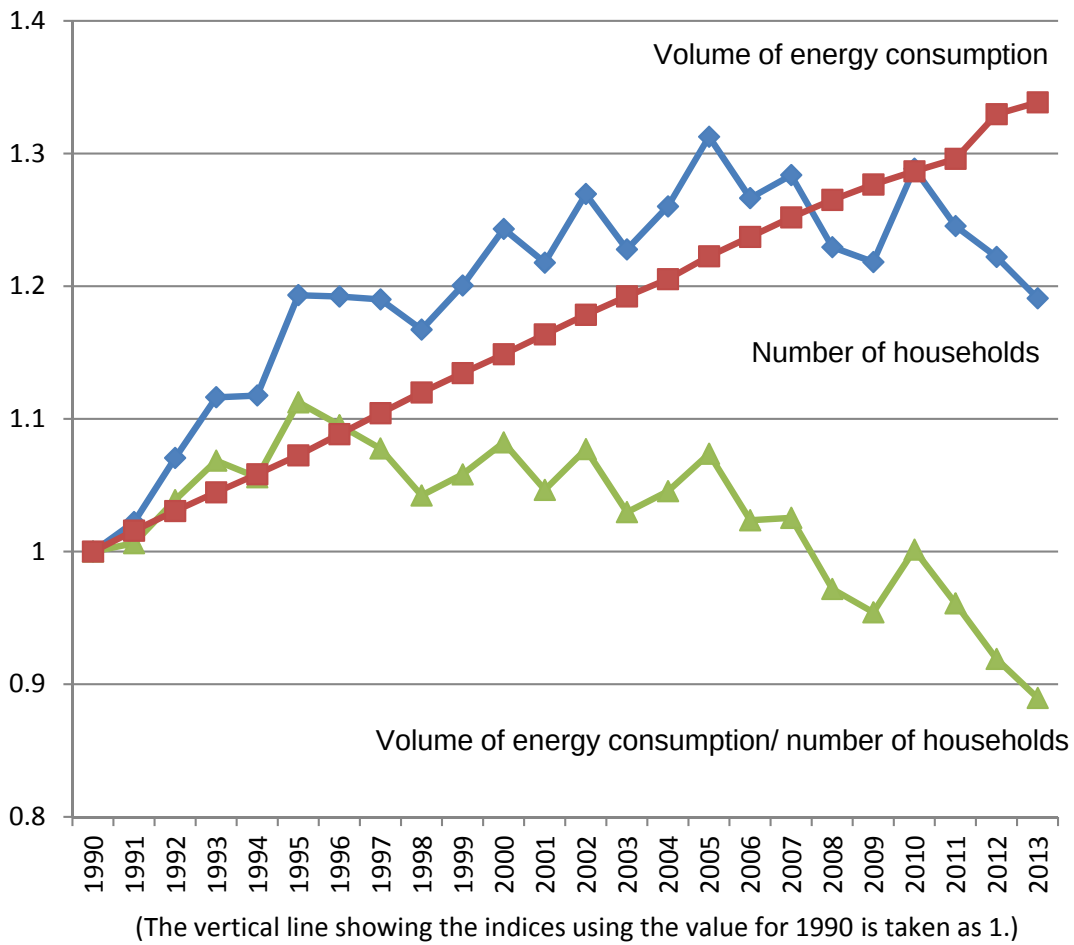
1. Status quo of energy in Japan
(Current status of energy consumption in the residential sector, part 1)

- The residential sector has seen a considerable rise in the overall energy consumption, but the energy consumption per household has leveled off or even improved in recent years.
- Although the number of households has consistently increased, the energy consumption has been relatively stable in recent years.

Evolution of energy consumption in the residential sector and the number of households



(The vertical line showing the indices using the value for 1973 is taken as 1.)



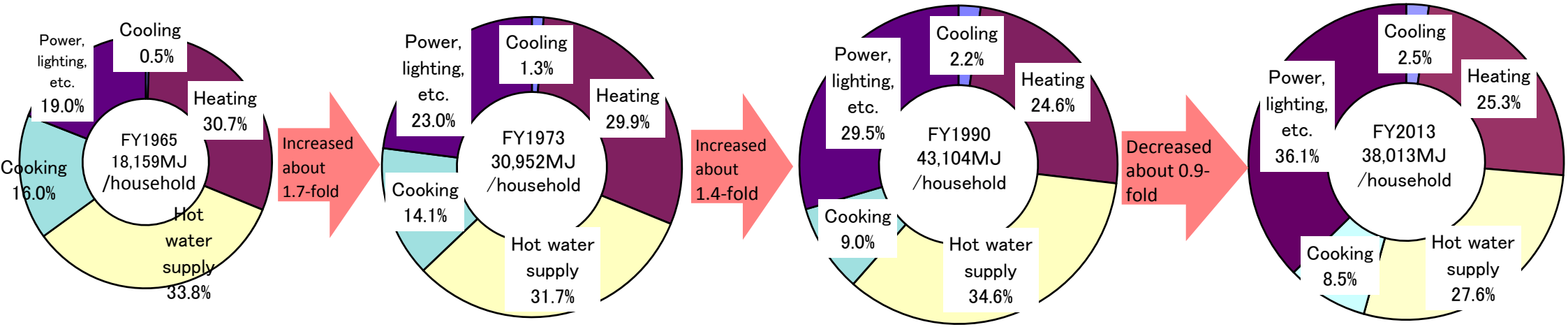
(The vertical line showing the indices using the value for 1990 is taken as 1.)

(Sources) Prepared on the basis of *the Handbook of Japan's & World Energy & Economic Statistics* issued by the Institute of Energy Economics, Japan.

1. Status quo of energy in Japan
(Current status of energy consumption in the residential sector, part 2)

- Energy consumption in the residential sector can be classified into five categories: Cooling, Heating, Hot water supply, Cooking, Power and lighting (e.g., house electric appliances)
- In FY 2013, the proportion of each category was: Power and lighting (36.1%), Hot water supply (27.6%), Heating (25.3%), Cooking (8.5%), and Cooling (2.5%).

Evolution of energy consumption per unit and energy consumption per household



(Note)

(Sources) Prepared on the basis of *the Handbook of Japan's & World Energy & Economic Statistics* issued by the Institute of Energy Economics, Japan.

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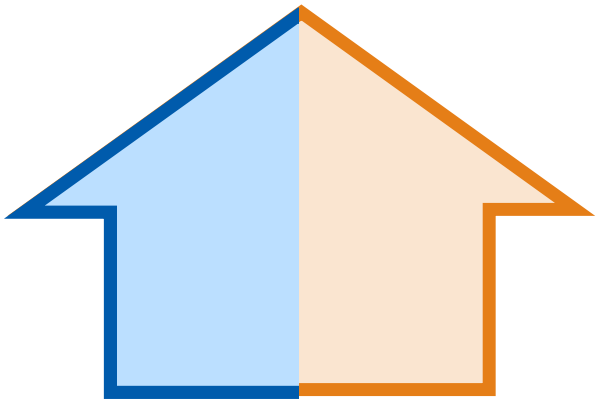
2.（1） Introduction (What is a ZEH?)

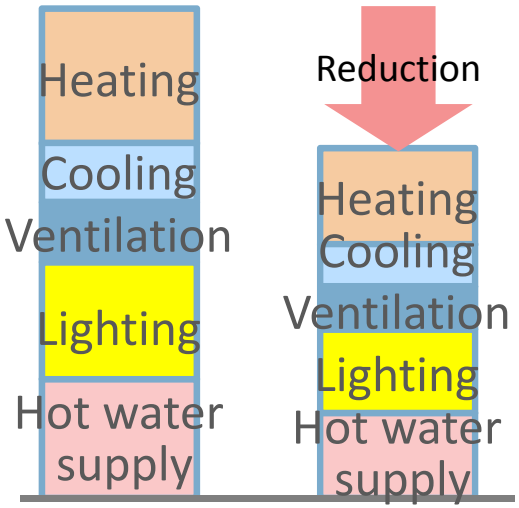
- A ZEH is a house with an annual net energy consumption around zero (or less) by saving as much energy as possible while maintaining comfortable living environment. This can be achieved through better heat insulation, high-efficiency equipment, and creating energy with photovoltaic power generation.

Net annual energy consumption in the house is around zero or below

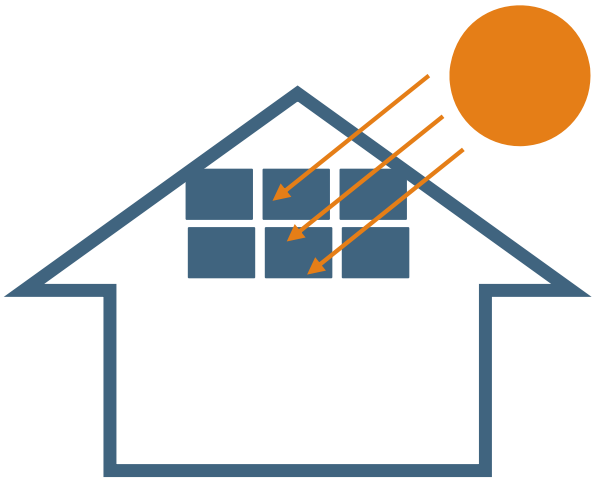
Require as little energy as possible
(Cool in summer and warm in winter)



More efficient use of energy



Create energy



2.（1） Introduction
(Goals of ZEHs and the establishment of the ZEH Roadmap Examination Committee)

- ZEHs are receiving a lot of attention as a residential building that can minimize energy consumption and operate independently in terms of energy even during a disaster.
- Japan's Strategic Energy Plan (adopted at the Cabinet Council in April 2014) sets the following goals to realize and promote ZEHs.
  - **Achieve zero emission in standard newly-constructed houses by 2020**
  - **Achieve average zero emission in newly-constructed houses by 2030**

- To achieve the above goals, the ZEH Roadmap Examination Committee, which is composed of university professors, house builders, and building contractors has been created to establish (1) the definition and evaluation method of ZEHs, and (2) measures to popularize ZEHs.

1．Status quo of energy in Japan

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2．(2) Definition and evaluation methods of ZEH (Problems)

- How to deepen consumers' understanding:
  - Since the definition and goals for ZEHs are unclear, house-builders and building contractors cannot highlight the benefits of ZEHs.
- Questions to consider to evaluate ZEHs:
  - Should ZEHs be evaluated at the design or management phase?
  - What kind of houses should be evaluated?
  - To what extent should walls and roofs be insulated?
  - Which equipment (cooling, heating, lighting, hot water supply, etc.) should be included in the evaluation?
  - Is it OK to install a lot of solar panels? How will the surplus power be evaluated?
- Questions to consider to evaluate ZEH goals:
  - In the phrase "Realizing ZEHs in standard newly-constructed houses by 2020", what constitutes a "standard newly-constructed house"?
  - What efforts should house-builders and building contractors make?

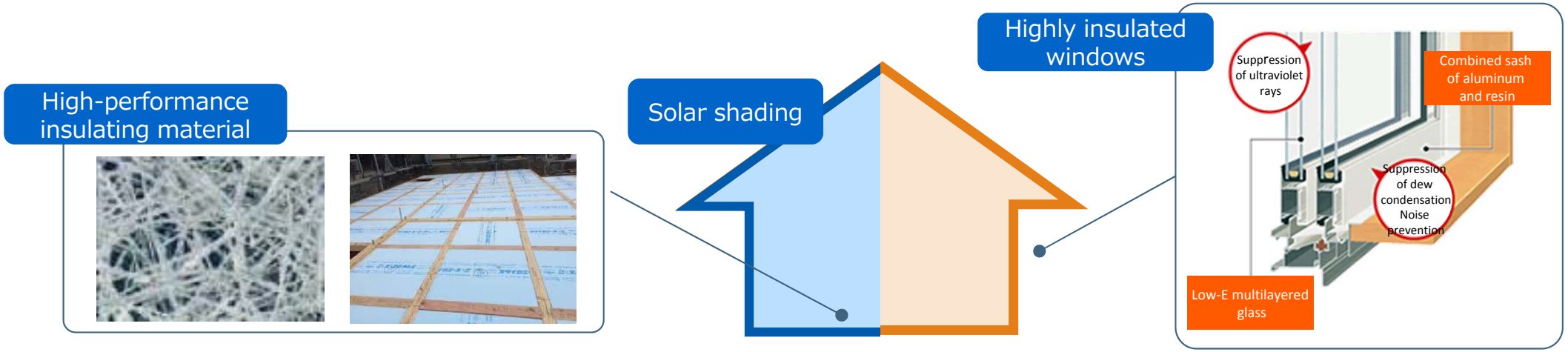
2．(2) Definition and evaluation methods of ZEH (Houses requiring a minimum volume of energy)

- To achieve energy savings in the housing sector for the next two to five decades and to create an excellent housing stock, it is important to improve the efficiency of the building envelope, which is difficult to fundamentally improve after completion.
- Therefore, the high insulation standard, which is the reinforced version of the Energy Saving Standard, is adopted as the ZEH standard.

※ It conforms to the Energy Saving Standard for the value ηA, airtightness, and dew-proofing performance.

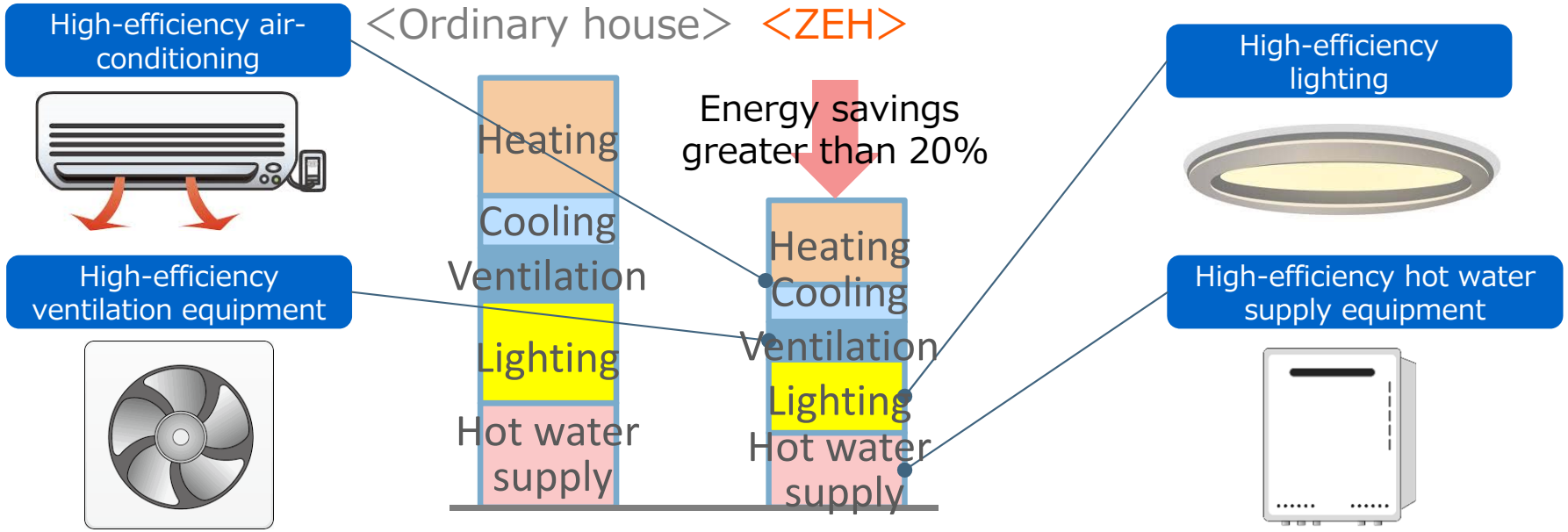
Region category	Region 1 (Asahikawa, etc.)	Region 2 (Sapporo, etc.)	Region 3 (Morioka, etc.)	Region 4 (Sendai, etc.)	Region 5 (Tsukuba, etc.)	Region 6 (Tokyo, etc.)	Region 7 (Kagoshima, etc.)	Region 8 (Naha, etc.)
ZEH Standard	0．4	0．4	0．5	0．6	0．6	0．6	0．6	–
Energy Saving Standard	0．46	0．46	0．56	0．75	0．87	0．87	0．87	–

Table: Standards for the average heat transmission coefficient of the envelope (UA value)



2．(2) Definition and evaluation methods of ZEH (Energy-efficient houses)

- It is important to improve the efficiency of air-conditioning, ventilation, lighting, and hot water supply equipment to effectively use energy while realizing the “high insulation standard” of the ZEH and maintaining comfortable living spaces.
- The ZEH standard requires energy savings of more than 20% higher than the Energy Saving Standard via better insulation of the building envelope and higher equipment performance.

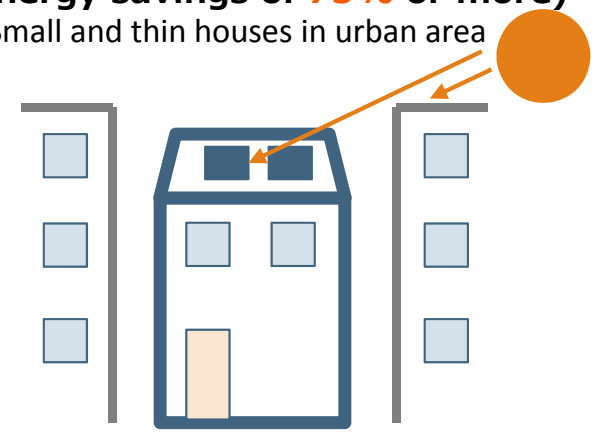


* The calculation method should be consistent with the Energy Saving Standard. However, the 20%-higher energy saving rule applies to air-conditioning, hot water supply, ventilation, and lighting equipment. Although the reduced volume with renewable energy should not be taken into consideration, the reduced volume with fuel cells should be considered if the effect due to the fuel cells (consumption) has been separately calculated.

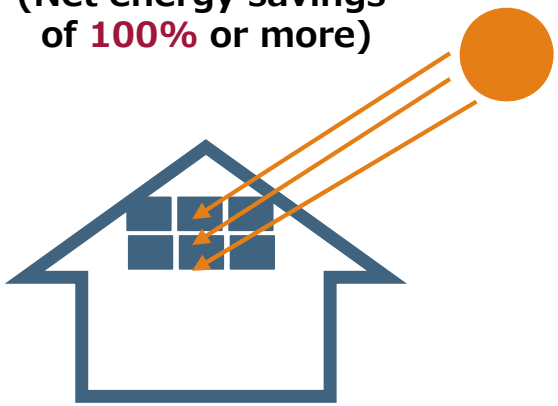
2．(2) Definition and evaluation methods of ZEH (Energy-creating houses)

- The goal is to achieve a net zero energy consumption by generating energy through photovoltaic power production while adopting “better insulation” and “higher equipment performance” set forth for ZEHs to achieve 20% energy savings.
- For evaluation purposes, houses with small roofs or poor sunshine should be considered in the evaluation even though the potential for energy production is limited.
- If energy savings of **75%** of the net value is achieved, the **Nearly ZEH status** is granted.
  If energy savings of **100%** or more is achieved, the **ZEH status** is granted.

Nearly ZEH
(Net energy savings of 75% or more)
* Small and thin houses in urban area

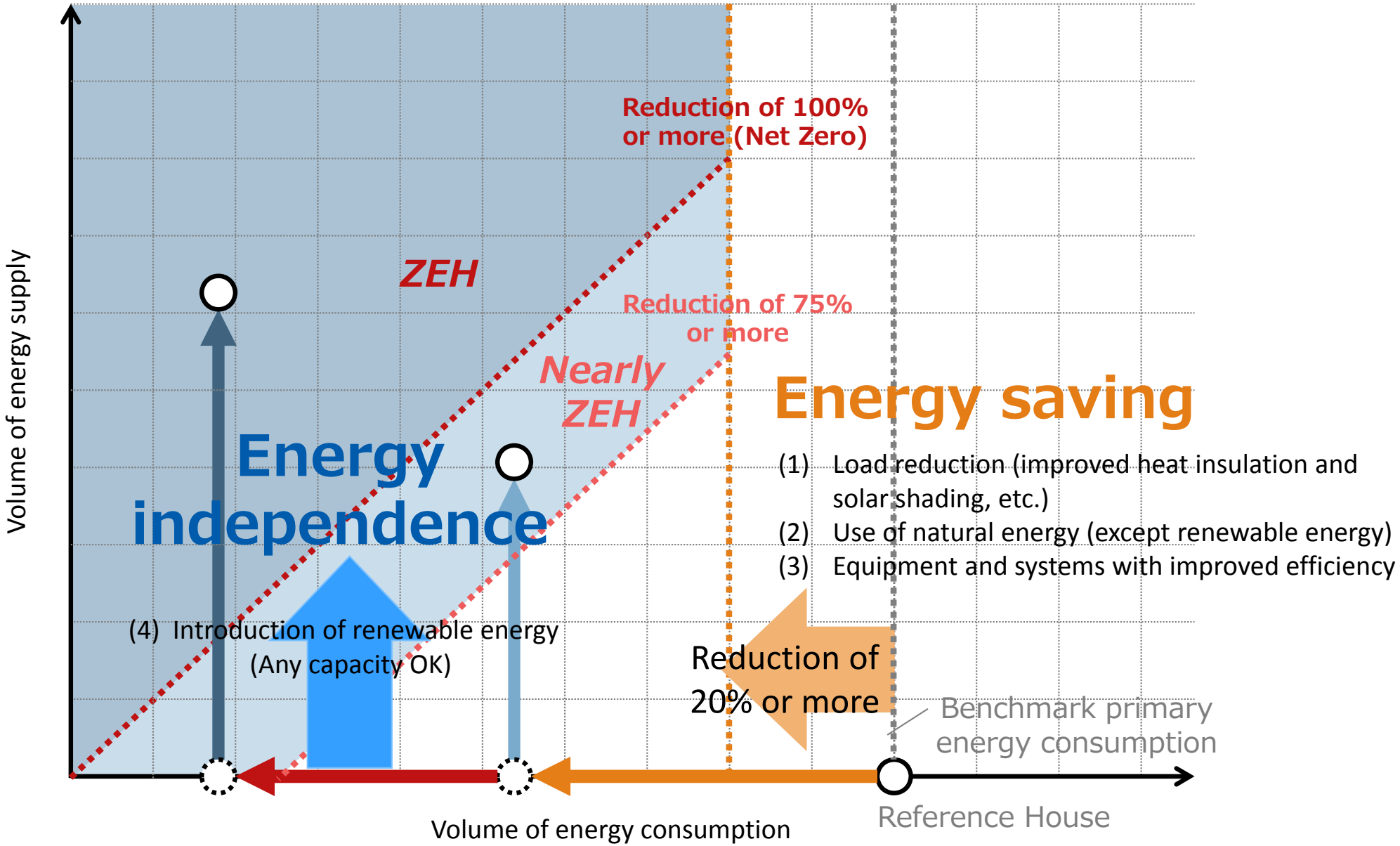


ZEH
(Net energy savings of 100% or more)



* The method to determine 75% or 100% energy savings should follow the Energy Saving Standard. This rule should apply to air-conditioning, hot water supply, ventilation, and lighting. In addition, while only the part of self-consumption is counted in the Energy Saving Standard, the electricity sale should also be taken into consideration. (However, this is limited to the sale of surplus power in the system of surplus electricity purchase.)

2．(2) Definition and evaluation methods of ZEH (Image of the ZEH definition)



2．(2) Definition and evaluation methods of ZEH (Goal of ZEHs)

- To ensure that “standard newly-constructed houses will be ZEH” by 2020, over half of newly-constructed houses by house-builders or building contractors must be ZEHs.

- Targets for “newly-constructed detached houses” include:
  - Evaluation during the “design phase”.
  - Although it is important to improve the energy saving performance of housing complexes (including apartments), achieving the ZEH status is more difficult due to the limited roof area compared to consumption. (This does not mean that we do not aim to promote ZEHs for housing complexes.)

<Targets of the ZEH goal>

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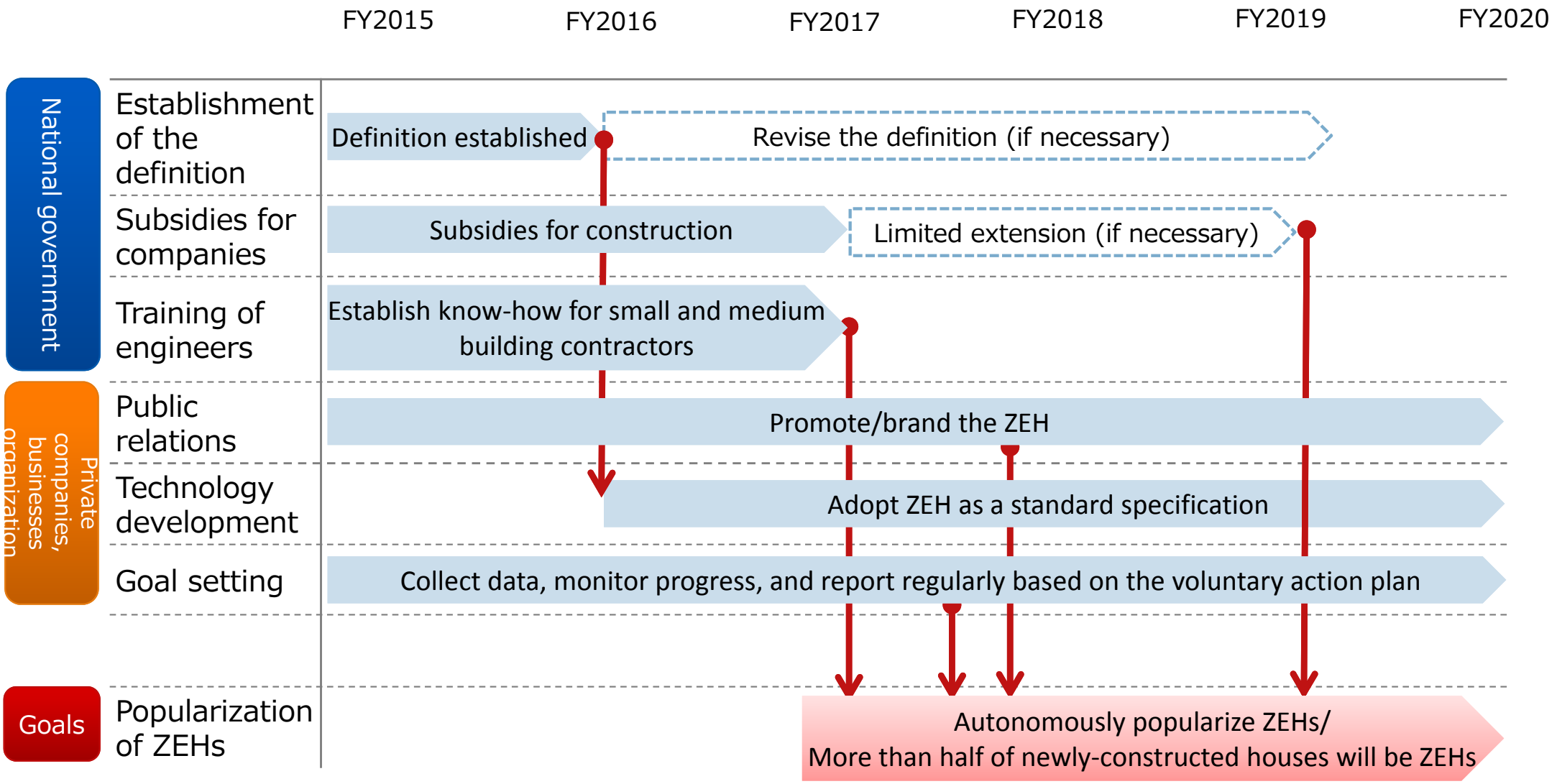
2. (3) Promotion methods of ZEHs (Challenges)

- Will ordinary customers recognize ZEHs?
  - What are the benefits of living in a ZEH?
    (Reduced electricity and heating expenses, better anti-disaster performance due to energy independence, improved comfort and healthiness, etc.)
  - How does a ZEH differ from similar indexes for houses?
    (Certified low-carbon houses, smart wellness houses, life cycle carbon minus houses, etc.)

- How does the cost of building/buying a ZEH compare to an ordinary houses?
  - Currently ZEHs are more expensive.
  - Therefore, it is important for house-builders and building contractors to set their own goals to promote ZEHs. The entire industry should make efforts toward mass production and cost reduction.
  - To support such efforts, time-limited subsidies by the national government are essential.

2. (3) Promotion methods of ZEHs (The ZEH roadmap)

- Based on the discussions in the Examination Committee, the following measures are proposed for ZEHs.

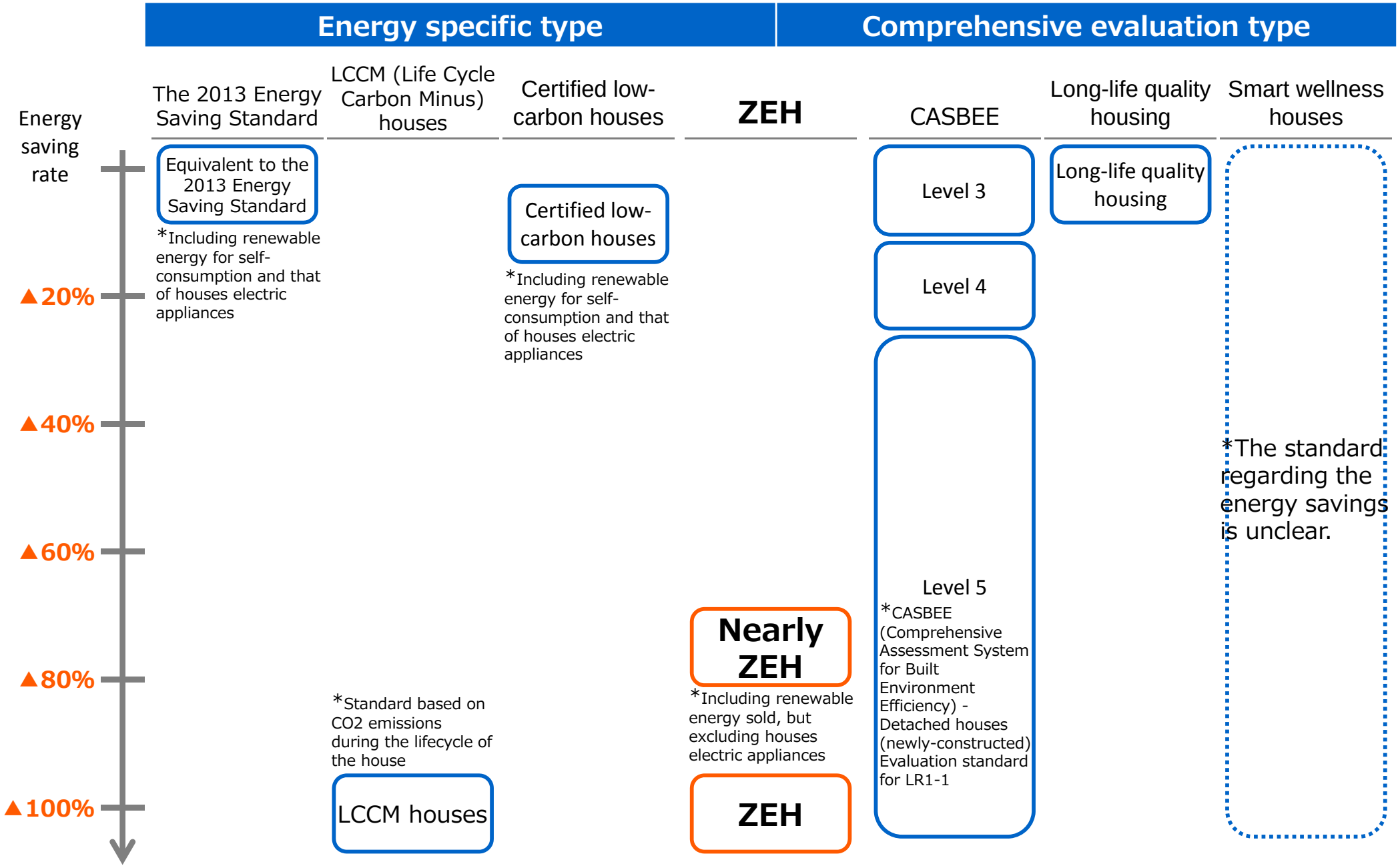


2. (3) Promotion methods of ZEHs (The ZEH roadmap)

<Measures that the national government should take in cooperation with businesses and private companies>

- Grant incentives for ZEH construction
  - Whether Nearly ZEHs (75% energy saving houses) should also be subsidized must be carefully evaluated.
  - In addition, time-limited support should be considered for companies that establish, publish, and work towards goals for ZEHs.
  - It is important to obtain feedback from those concerned through collection, analysis, and publication of actual data.
- Train engineers working in SMEs
  - Whether to support the construction of energy-saving houses by small and medium building contractors should be examined.
- Promote and brand ZEHs
  - Easy-to-understand PR activities (including comparisons with other indexes and the merits of ZEHs) should be conducted in cooperation with companies.

2. (3) Promotion methods of ZEHs
(Reference: comparisons with other indexes)



2. (3) Promotion methods of ZEHs (The ZEH roadmap)

<Measures that businesses and private companies should take in cooperation with the national government >

- Adopt ZEH as part of the standard specifications
  - House-builders and building contractors should add ZEHs and ZEH-related technology (adoption of the standard specifications) to their product lineup as well as promote mass production and cost reduction.
- Set goals and monitor progress of ZEHs
  - House-builders and building contractors should establish and publish goals related to the popularization and implementation of ZEHs.
- Promote and brand ZEHs
  - Easy-to-understand PR activities should be conducted in cooperation with the national government.

Energy Conservation and Renewable Energy Department
Agency for Natural Resources and Energy
Housing Industry, Ceramics and Construction Materials Division
Manufacturing Industries Bureau
Tel: 03-3501-9726 (Energy Conservation and Renewable Energy Department)

The Promotion Project for the Introduction of Innovative Energy Saving Technology for Houses and Office Buildings

Amount of draft budget for FY2016: 11 billion yen (760 million yen)

Project content

Project goal and summary

- 【Zero Energy House (ZEH) Support Project】
  To achieve the goal of ensuring that more than half of newly-constructed houses are ZEHs (*) by 2020, the project supports introducing ZEHs using a combination of high-performance building materials, equipment, and storage cells to reduce the costs of building ZEHs and speed up their popularization

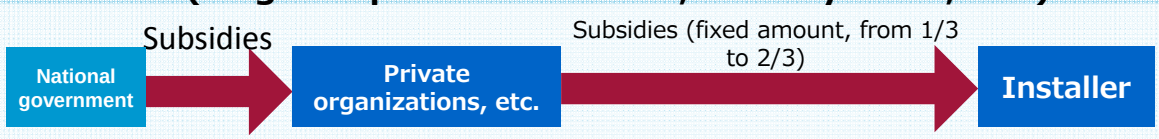
- 【Zero Energy Building (ZEB) Demonstration Project】
  To achieve the goal of the ZEB (*) by 2020 and to create guidelines, the project supports introducing necessary high-performance building materials and equipment as well as innovative activities that aim to realize top-level energy savings.

* ZEH/ZEB (Net Zero Energy House/Building)
Houses/buildings with a net zero annual primary energy consumption

Objective

- By promoting the popularization of houses and buildings with high energy saving performances to reduce energy costs, the project aims to ensure that more than half of the newly-constructed houses will be ZEHs and that buildings will turn into ZEBs by 2020.

Conditions (targeted persons and acts, subsidy rates, etc.)



Project image