

Japan's Path for Carbon Neutrality and the Role of Energy Efficiency in Buildings

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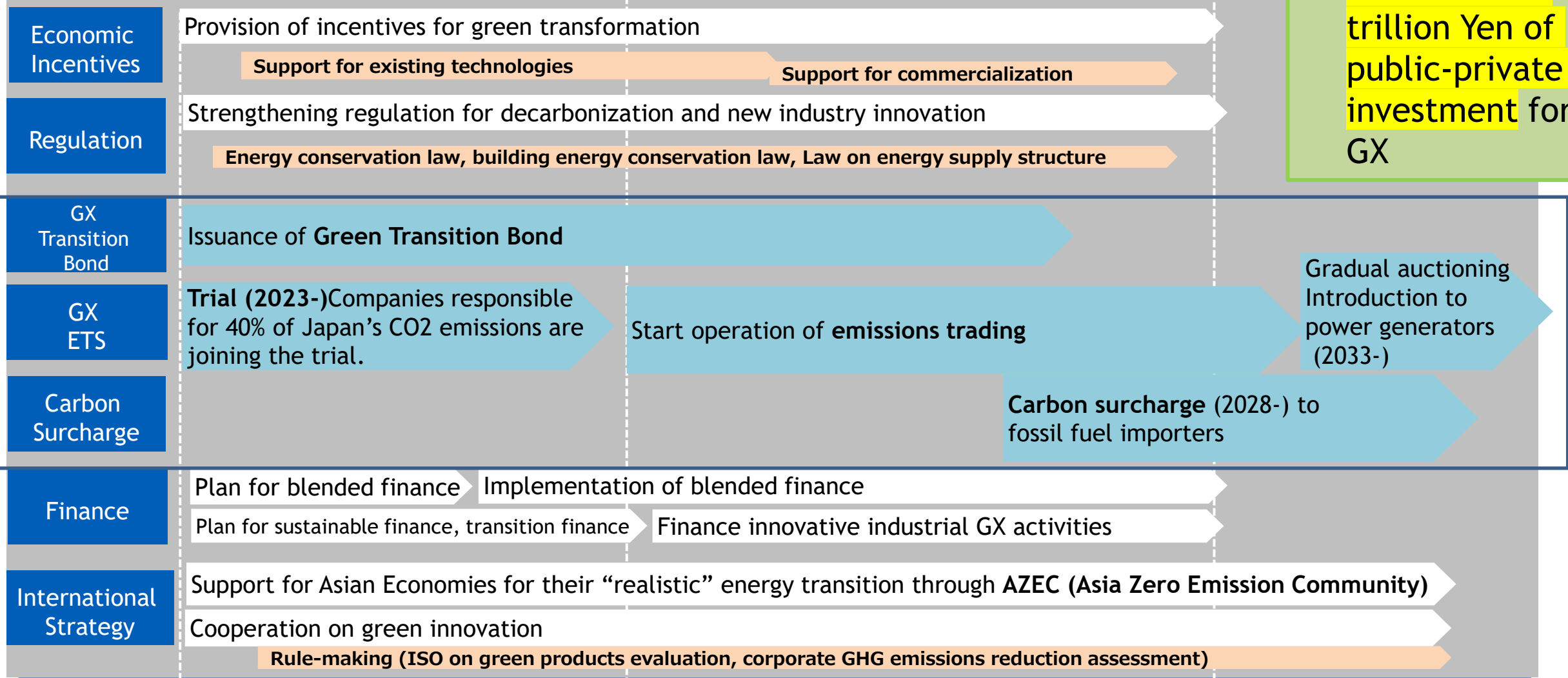
Naoko DOI

Japan's Progress of Policy Formulation at the Demand Side: Toward Carbon Neutrality

- In 2021, Japan announced the target to achieve carbon neutrality by 2050.
- April 2022, amendment of energy conservation law was made to include “non-fossil fuels” on top of fossil fuels for energy efficiency improvement. Demand Response is also included as the energy efficiency concept.
- Headed by Prime Minister Kishida, and participated by Ministers and representatives from industry, series of discussions are being held to plan for Green Transformation (GX).
- Roadmap for GX by technology/sector was announced in December 2022.
- For achieving the carbon neutrality, comprehensive approach covering the building sector is formulated.
- Promotion of introducing zero energy buildings, stock buildings energy efficiency renovation, and incessant efforts in operational energy efficiency improvement are the key in the building sector.

Roadmap for Japan's Green Transformation

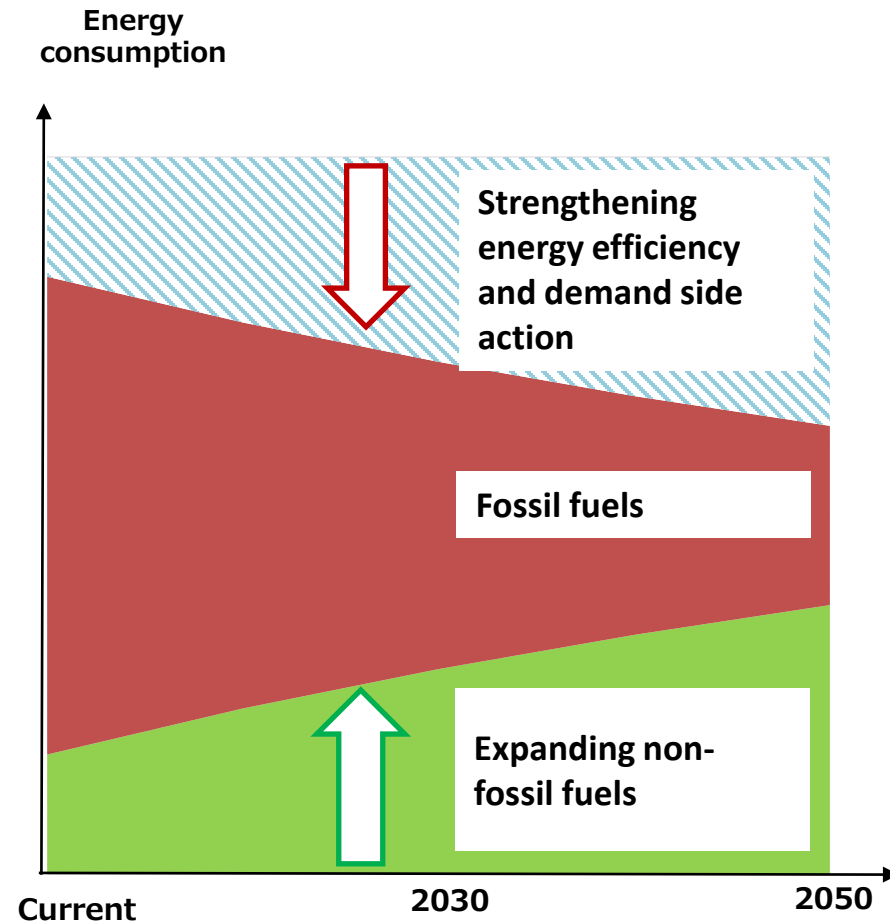
2023 2024 2025 2026 2027 2028 2029 2030



- Comprehensive approach to mobilize 150 trillion Yen of public-private investment for GX

Energy efficiency and demand-side actions are the key for Japan to achieve carbon neutrality by 2050.

Image of Achieving CN by 2050



Strengthening Energy Efficiency and Demand Side Actions

- **Industry:** Annual reporting system, benchmark system, technology innovation and financial support
- **Residential/Commercial**
 - Top-runner standard, ZEB/ZEH, Review for buildings standard
 - CN of water heaters, DR ready, and Electric/Gas Retailers' Energy Efficiency Pledge and Review
- **Transport:** Promotion of clean vehicles, fuel economy standard, rational use of energy by freight trucks, energy efficiency improvement in freight supply chain



Expanding non-fossil fuels

- Expansion of non-fossil fuels
- Encourage self-consumption : renewable energy and hydrogen
- Industry/commercial/ transport sector's increased use of non-fossil fuels
- Residential/commercial use of carbon neutral water heaters
- Optimal use of energy with the Demand Response
- Introduction of DR ready appliances

Source: Ministry of Economy, Trade and Industry

Directions for Further Deepening Japan's Energy Efficiency by 2030

Energy savings in each sector - to be accumulated to save energy consumption by 62 million kL in 2030

Estimated Energy Savings by Technology

(unit: Million kL, and % in total)

Residential
12 Mil kL

• New Energy-saving house	2.5 mil kL, 21%
• Renovation of existing house	0.9 mil kL, 8%
• Efficient water heaters	2.6 mil kL, 22%
• LED lights and OLE displays	1.9 mil kL, 16%
• EE Improvement through Top-runner Standard	1.7 mil kL, 14%
• Home energy management system	2.2 mil kL, 18%
• Promoting economy-wide campaign	0.2 mil kL, 1%

Commercial
13.8 Mil kL

• New Energy-saving building	4.0 mil kL, 29%
• Renovation of existing building	1.4 mil kL, 10%
• Efficient boiler	0.5 mil kL, 4%
• Efficient lighting	2.0 mil kL, 14%
• Management of refrigerant technology	0.6 mil kL, 0%
• Top-runner standard	3.4 mil kL, 25%
• Building energy management system	2.4 mil kL, 17%
• Promoting economy-wide campaign	0.023 mil kL, 0.2%

Transport
23.0 Mil kL

Estimated Energy Savings by Technology

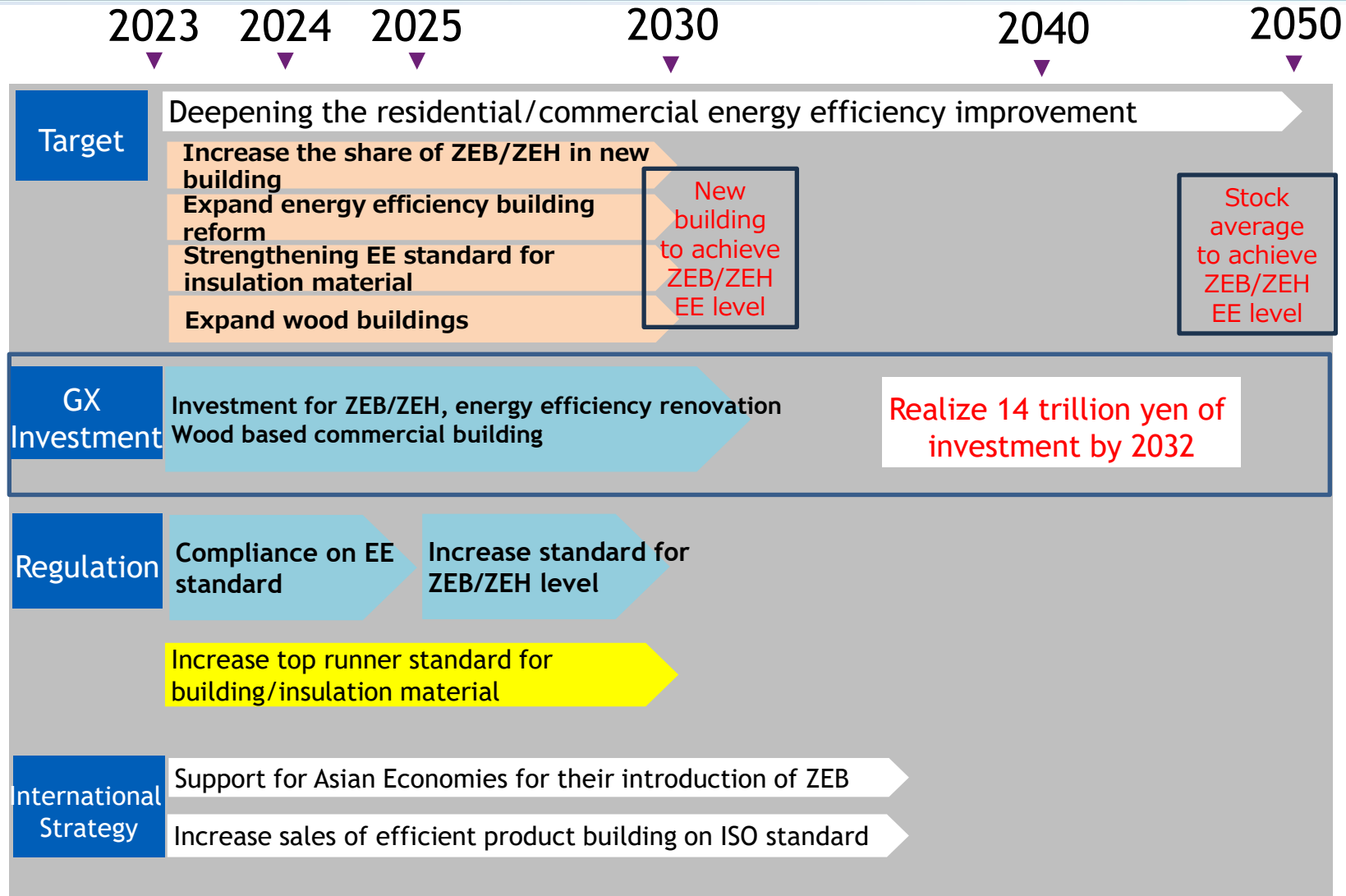
- Diffusing next-generation vehicles, improving fuel efficiency **9.9 mil kL, 43%**
⇒ One of every two vehicles would be a next-generation vehicle
- ⇒ Fuel cell vehicles: More than 100,000 units in maximum annual sales
- Other Measures **13.2 mil kL, 57%**
(Rail, Air, Marine and Urban Transport)

Industry
19.4 Mil kL

- Major industries (steel, chemicals, cement, paper-pulp, oil processing, food) **4.9 mil kL, 25%**
- Promoting plant energy management **0.74 mil kL, 4%**
- Cross-industry introduction of highly efficient equipment **13.8 mil kL, 71%**
⇒ Low-carbon industrial furnaces, high-performance boilers, etc.

Roadmap for Japan's Green Transformation : Buildings

Comprehensive Approach to Strengthen Energy Efficiency



Subsidy provision for the building sector (Supplementary Budget FY2023 (provided from April 2024))

- **Renovation for residential building** (e.g., double glazing window): 135 billion yen
- **Heat pump water heater, hybrid water heater, and residential fuel cell:** 58 billion yen
- **Condensing boiler for rented apartment:** 18.5 billion yen
- **Energy efficiency renovation, energy efficient residential facilities** (including bath): 210 billion yen

Government Support and the Private Sector Business Expansion

In the second supplementary budget for FY2023, for households, a total of 421.5 billion yen are being provided for the energy efficiency of residential sector.

	Subsidy for Owners
Heat Pump Water Heater	• 100,000 Yen/unit
Hybrid Water Heater	• 130,000 Yen/unit
Residential Fuel Cell	• 200,000 Yen/unit

Heat Pump Water Heater



Source: Panasonic

Hybrid Water Heater



Source: Rinnai

Residential Fuel Cell



Source: Aisin Corp.

Overseas HP Production and Investment for Plant Expansion

Daikin Corp.

- European market entry from 2006, and from 2019 maintain **the top share in pump-type heating (air conditioners)**.
- Invest more than 40 billion yen in 2022, and decided to establish a new plant for pump-type heaters in Poland

Panasonic

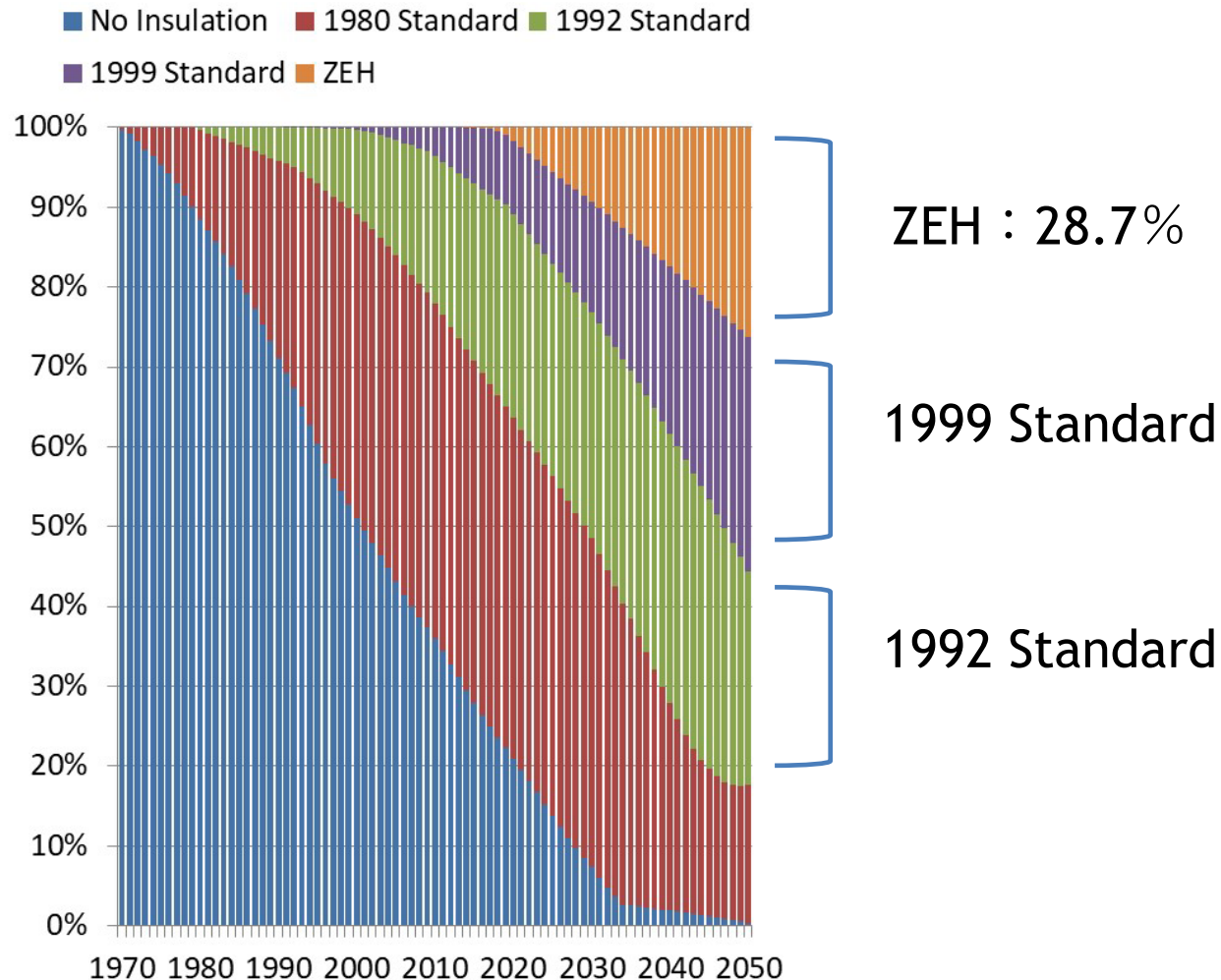
- Started production of Residential heat pumps for Europe in the Czech Republic from 2018
- The company announced plans to **more than triple its production capacity, Invest 45 billion yen by 2023 to 2025**

Mitsubishi Electric.

- In 2016, as a production base for Europe and Turkey, Established a factory in West Turkey.
- **Announcement of Total investment of 15 billion yen in 2021 and 2022 (including new factory construction)**

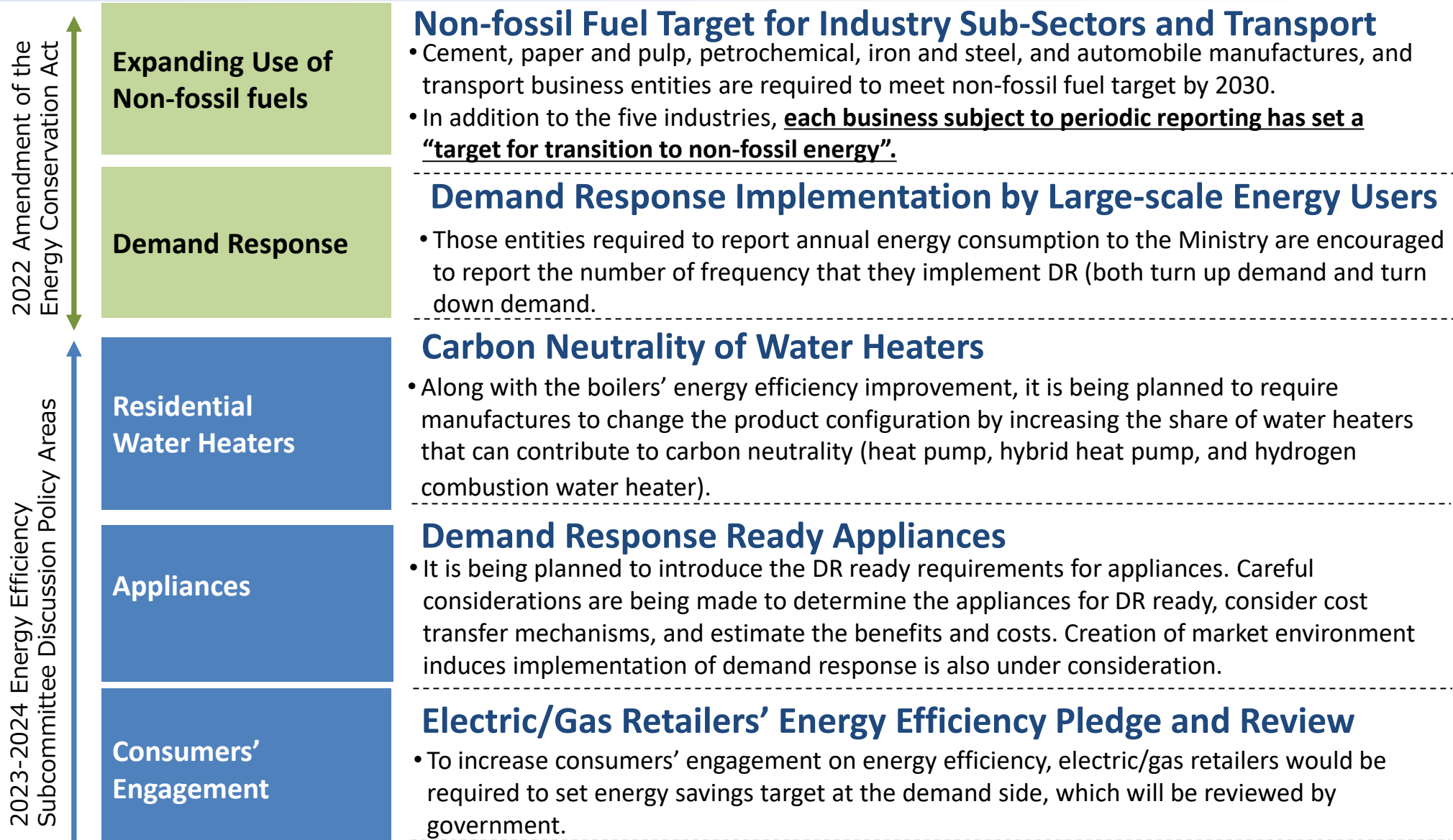
Estimated Distribution of Stock: Residential Buildings in Japan

Distribution of Residential Building Stock by Energy Efficiency Standard



- An estimation is being made to consider the potential share of Zero Energy House in 2050.
- If all the newly built residential houses are ZEH from 2021, its share will reach 28.7% by 2050.
- This results show the needs for additional measures such as (1) operational energy efficiency improvement, (2) strengthening of energy efficiency renovation for existing stocks, and (3) promotion of ZEH in apartment buildings.

Japan's evolving energy efficiency policies areas



Non-fossil Fuel Target for Industry Sub-Sectors and Transport

- Cement, paper and pulp, petrochemical, iron and steel, and automobile manufactures, and transport business entities are required to meet non-fossil fuel target by 2030.
- In addition to the five industries, **each business subject to periodic reporting has set a “target for transition to non-fossil energy”**.

Demand Response Implementation by Large-scale Energy Users

- Those entities required to report annual energy consumption to the Ministry are encouraged to report the number of frequency that they implement DR (both turn up demand and turn down demand).

Carbon Neutrality of Water Heaters

- Along with the boilers' energy efficiency improvement, it is being planned to require manufactures to change the product configuration by increasing the share of water heaters that can contribute to carbon neutrality (heat pump, hybrid heat pump, and hydrogen combustion water heater).

Demand Response Ready Appliances

- It is being planned to introduce the DR ready requirements for appliances. Careful considerations are being made to determine the appliances for DR ready, consider cost transfer mechanisms, and estimate the benefits and costs. Creation of market environment induces implementation of demand response is also under consideration.

Electric/Gas Retailers' Energy Efficiency Pledge and Review

- To increase consumers' engagement on energy efficiency, electric/gas retailers would be required to set energy savings target at the demand side, which will be reviewed by government.

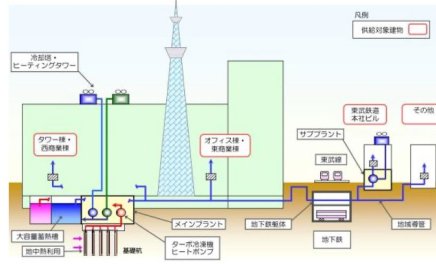
Source: Ministry of Economy, Trade and Industry (2023). "Energy Efficiency Subcommittee: Interim Report"
https://www.meti.go.jp/shingikai/enecho/shoene_shinene/sho_energy/pdf/20230726_2.pdf

Tokyo Cap-and-Trade Program : Top Level Certification System

Example of Top Level Certified Buildings



Sky tree



Tokyo midtown



Documentation to follow detailed check list for energy savings/CO2 emissions reduction

The Top-level Business Entity Certification System:

- Mechanism that reduces the reduction obligation rate of a business entity with excellent specified global warming countermeasure business entity

The emissions reduction obligation rate:

- Large-scale businesses in Tokyo is imposed GHG emissions reduction rate of 27% or 25% (fiscal years 2020-2024) .

