

Policies for Building Energy Conservation of residential and non-residential buildings in Japan

9 November 2021

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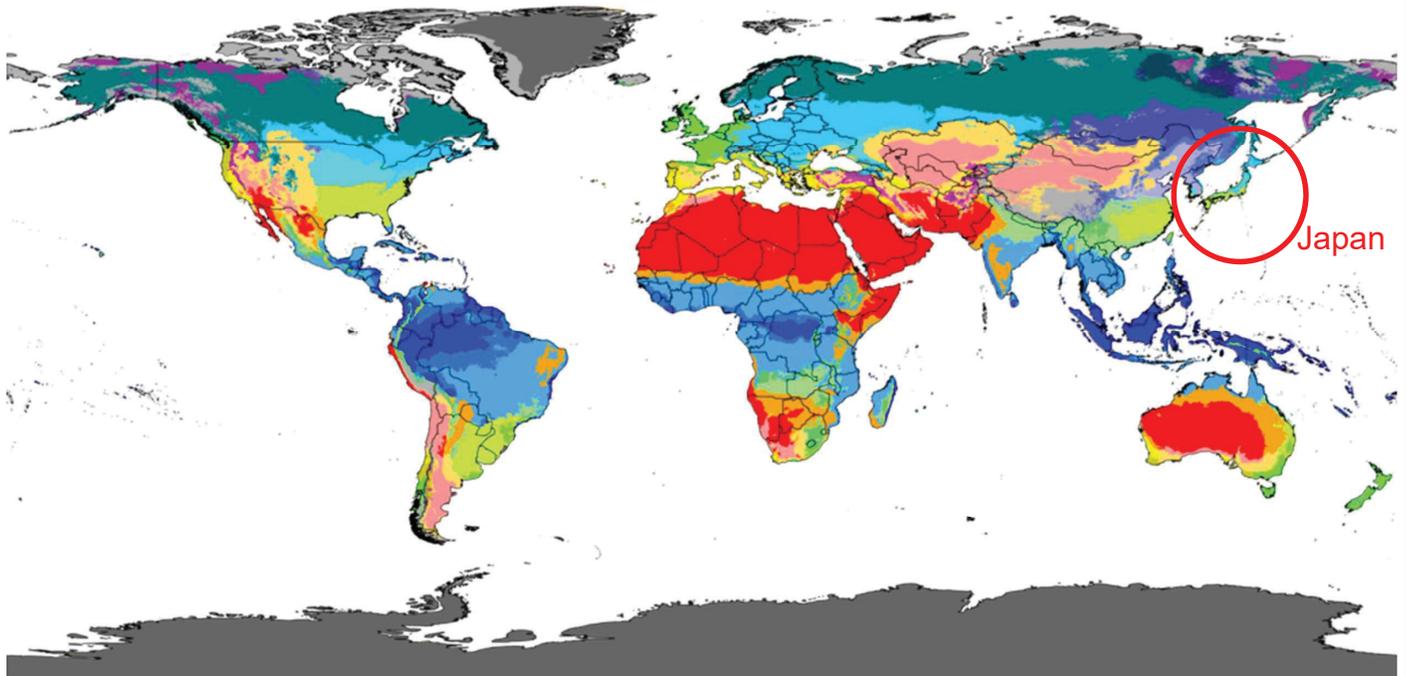
Ministry of Land, Infrastructure, Transport and Tourism

GHG emission reduction goals of countries



Country /Region	NDC (2030 goal)	Date of NDC submitted	Net zero by 2050
Japan	-46% (from 2013 level) Japan will continue efforts to meet the lofty goal of cutting its emission by 50%.	NDC submitted on 22 October 2021	Declared
U.S.	-50 to -52% (from 2005 level)	NDC submitted on 22 April 2021	Declared
Canada	-40 to -45% (from 2005 level)	NDC submitted on 12 July 2021	Declared
U.K.	-68% or more (from 1990 level)	NDC submitted on 12 December 2020	Declared
France, Germany, Italy, EU	-55% or more (from 1990 level)	NDC submitted on 18 December 2020	Declared
Australia	-26 to -28% (from 2005 level)	NDC submitted on 31 December 2020	-
Brazil	-43% (from 2005 level)	NDC submitted on 9 December 2020	Declared

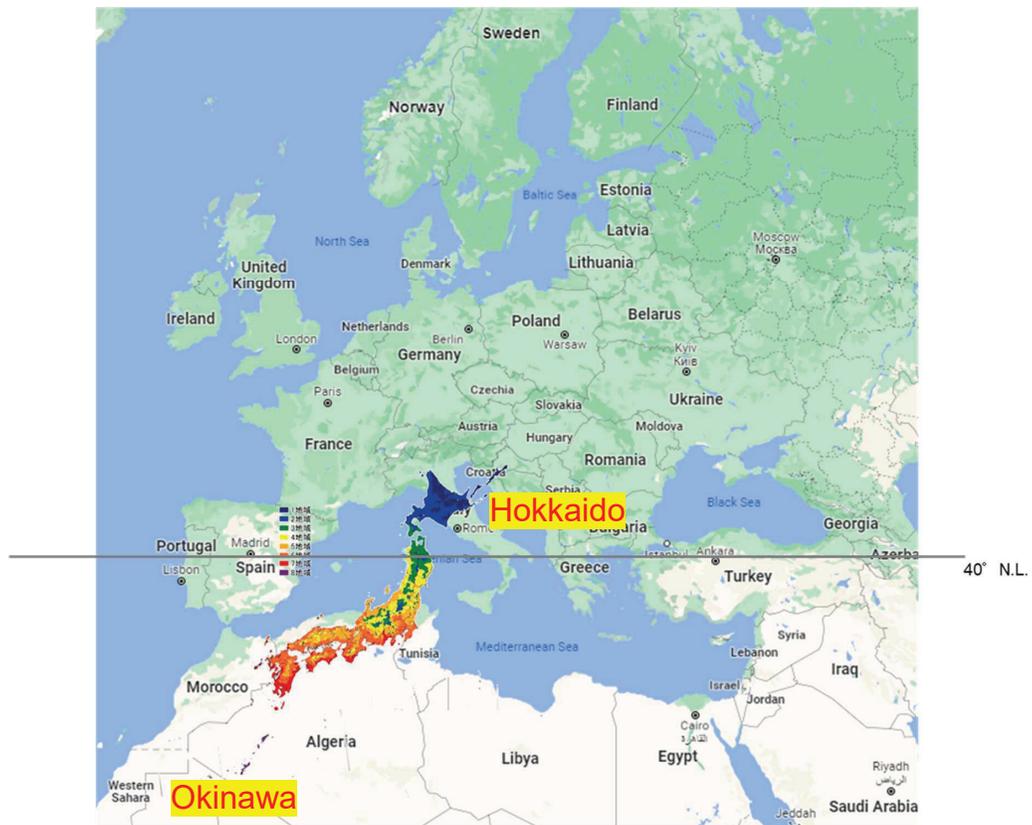
Köppen-Geiger climate classification map (1980-2016)



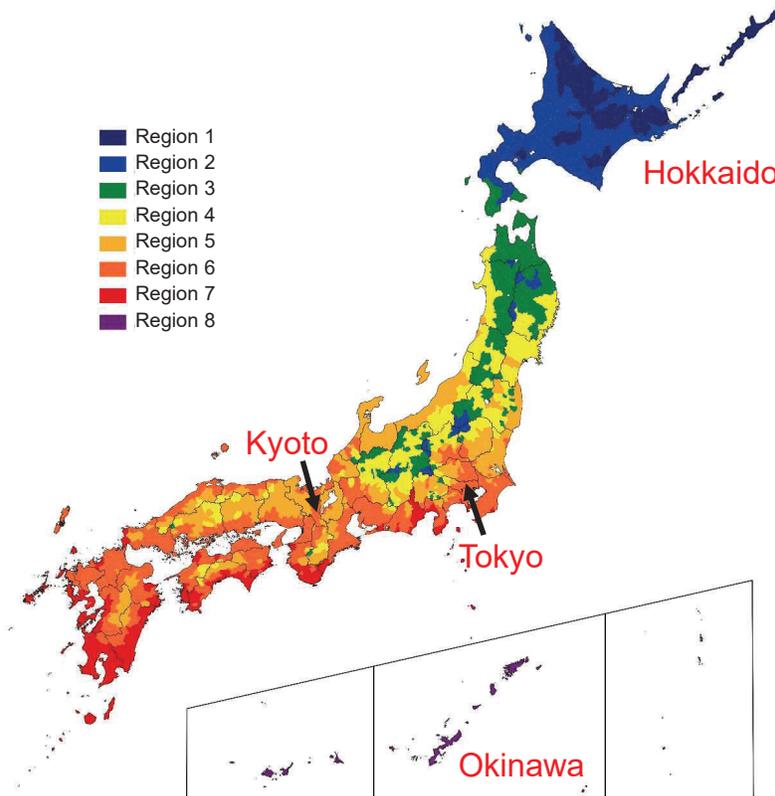
Source: Beck et al.: Present and future Köppen-Geiger climate classification maps at 1-km resolution, Scientific Data 5:180214, doi:10.1038/sdata.2018.214 (2018)

Source: Wikipedia

Location of Japan on top of the European map

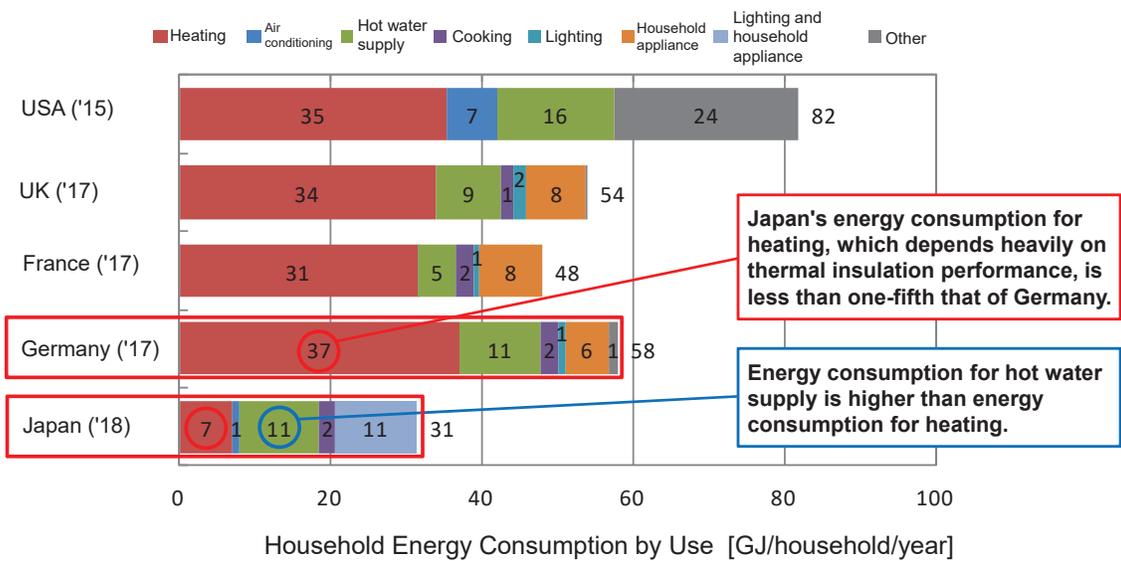


Map Data @2021 Google



➤ Consumption per household in Japan is about one-third of that in the U.S. and about half that in Germany and other European countries.

➤ Japan's energy consumption for "heating" is particularly low, while consumption of "hot water supply" is higher. While people in other countries heat/cool their homes for a long time, most Japanese way of living is "intermittent heating/cooling". Japanese people heat/cool their homes only when they are at home.



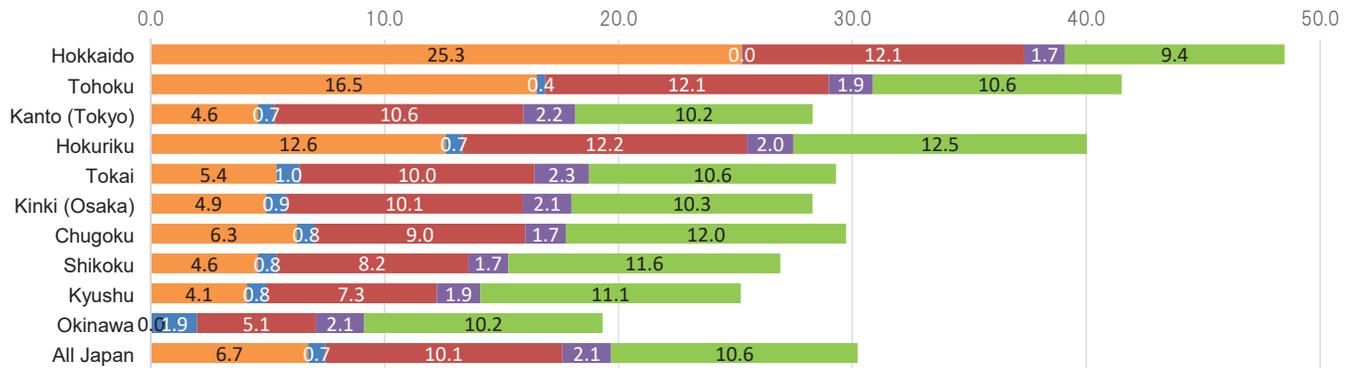
Japan's energy consumption for heating, which depends heavily on thermal insulation performance, is less than one-fifth that of Germany.

Energy consumption for hot water supply is higher than energy consumption for heating.

* USA.(Other) includes cooking, lighting, and household appliances.

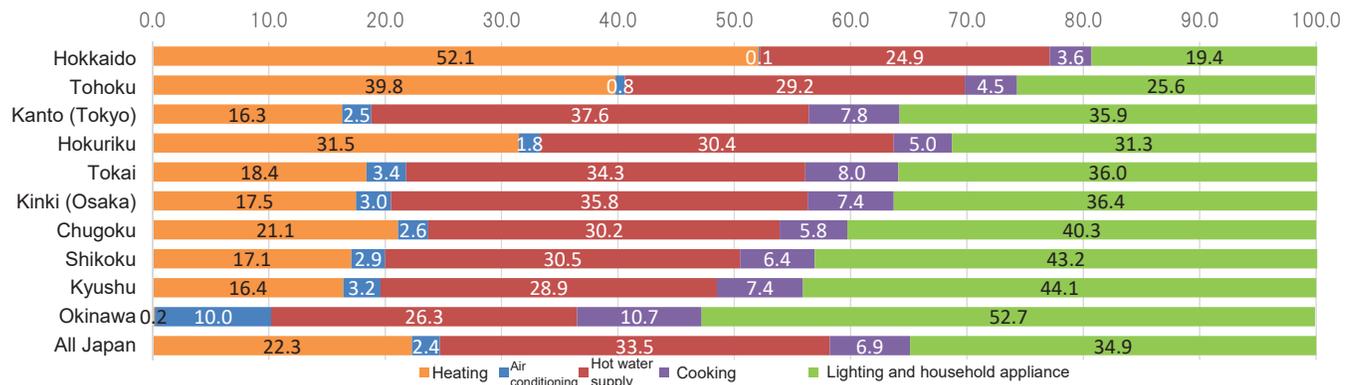
Annual Household Energy Consumption by Region

[GJ/household/year]



Annual Household Energy Consumption by Region (Ratio by Use)

[%]

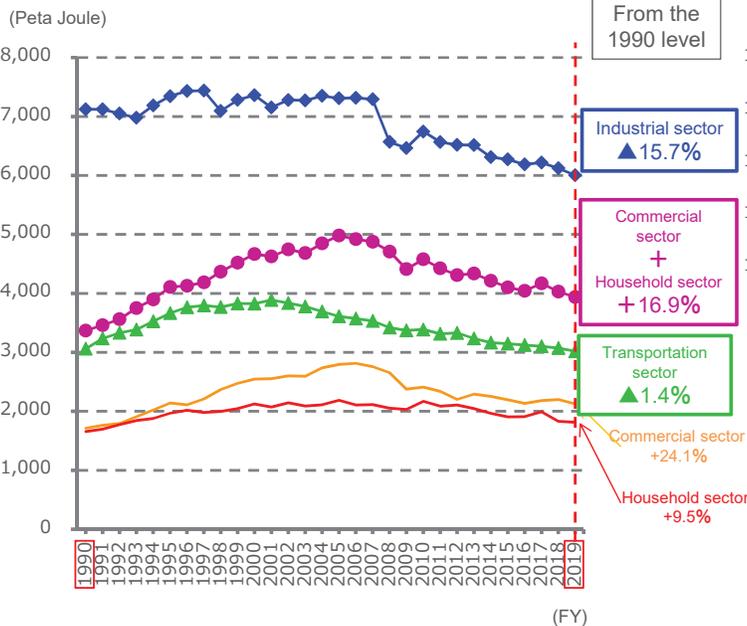


Source: Ministry of the Environment of Japan

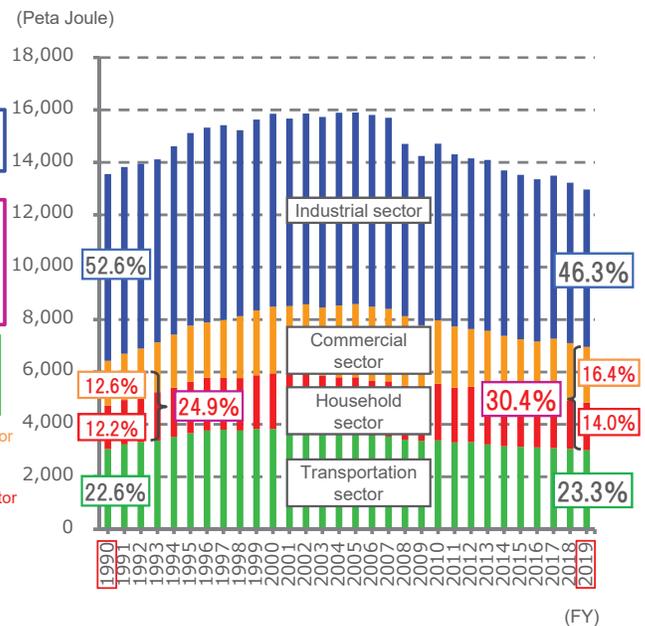
Trends in Japan's Energy Consumption by Sector

- While other sectors (industry and transportation) have decreased, **energy consumption in the commercial and household sectors have increased significantly (16.9% from the 1990 level (left Figure)).** They accounts for **about 30% of total energy consumption (right Figure).**
- **Drastic reinforcement of energy-saving measures on houses and buildings is essential.**

Trends in final energy consumption

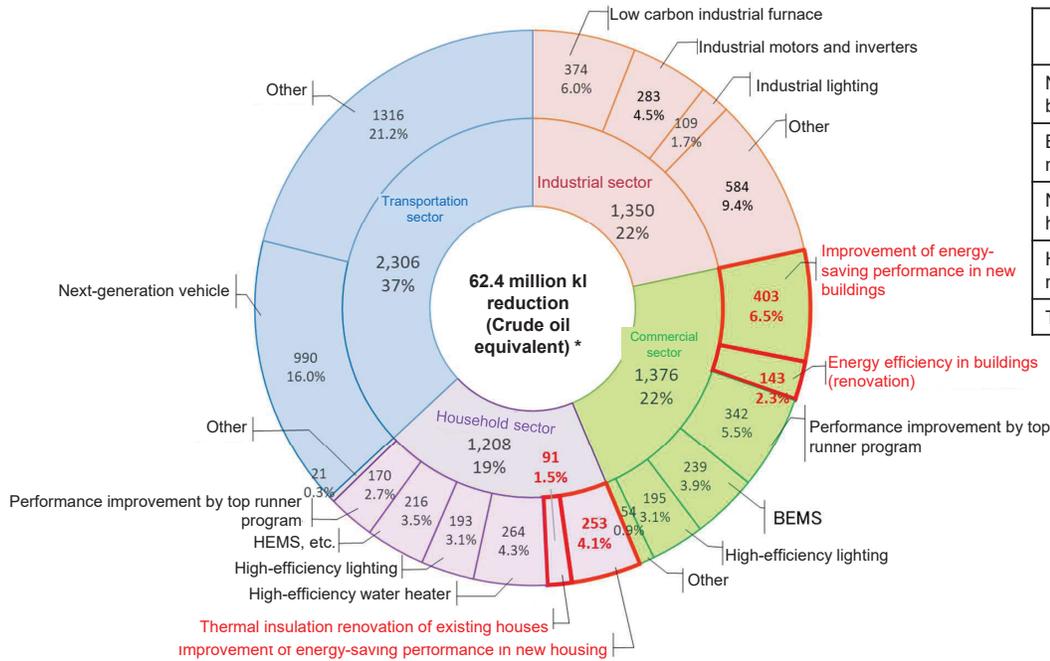


Trend of shares



Source: Comprehensive Energy Statistics (ANRE)

Reduction targets in the field of houses and buildings



	Amount of reduction
Newly constructed building	403
Building renovation	143
Newly constructed housing	253
Housing renovation	91
Total	889

* Total does not match due to rounding.

* Reduction target of the previous Plan for Global Warming Countermeasures (May 2016): about 50.3 million kl

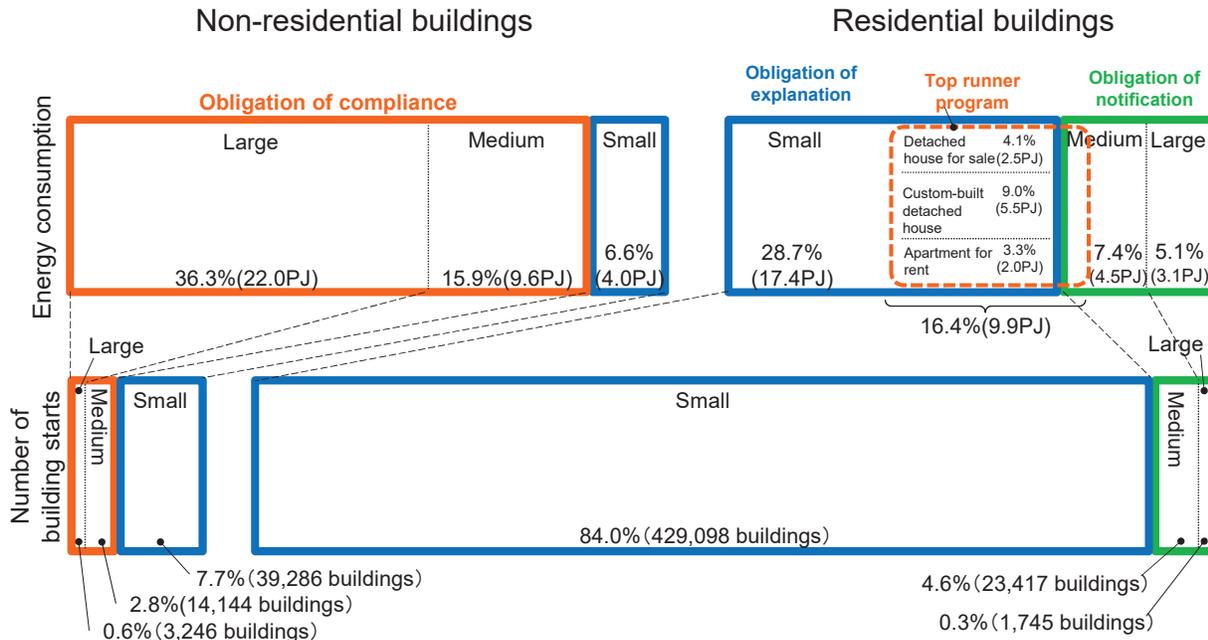
Source: Energy Demand and Supply Outlook for FY2030 (Sep. 2021) (Agency for Natural Resources and Energy)

Regulatory Measures under the Building Energy Efficiency Act of Japan

	Upon establishment of the Act (promulgated on July 2015)		After revision (promulgated on May 2019)	
	Non-residential	Residential	Non-residential	Residential
Large (2,000 m ² or more)	Specific building Obligation of compliance [Linked to the building certification procedure]	Obligation of notification [Instruction, order, etc. to be issued when the standard is not met and issuance is deemed necessary]	Specific building Obligation of compliance [Linked to the building certification procedure]	Obligation of notification [Instruction, order, etc. to be issued when the standard is not met and issuance is deemed necessary] <u>Streamlining the examination procedures in the competent administrative agency</u> ⇒ Focus on implementation of supervision (instruction, order, etc.)
Medium (300 m ² or more but less than 2,000 m ²)	Obligation of notification [Instruction, order, etc. to be issued when the standard is not met and issuance is deemed necessary]		<u>Obligation of compliance</u> [Linked to the building certification procedure]	
Small (less than 300 m ²)	Effort obligation [Improvement of energy-saving performance]	Effort obligation [Improvement of energy-saving performance]	Effort obligation <u>[Compliance with the energy efficiency standards]</u> + <u>Obligation of the architect to explain to the building owner</u>	Effort obligation <u>[Compliance with the energy efficiency standards]</u> + <u>Obligation of the architect to explain to the building owner</u> <u>Expansion of the target</u> Target housing Owner-occupied house, Detached house for sale, House for rent, Custom-built detached house, Apartment for rent

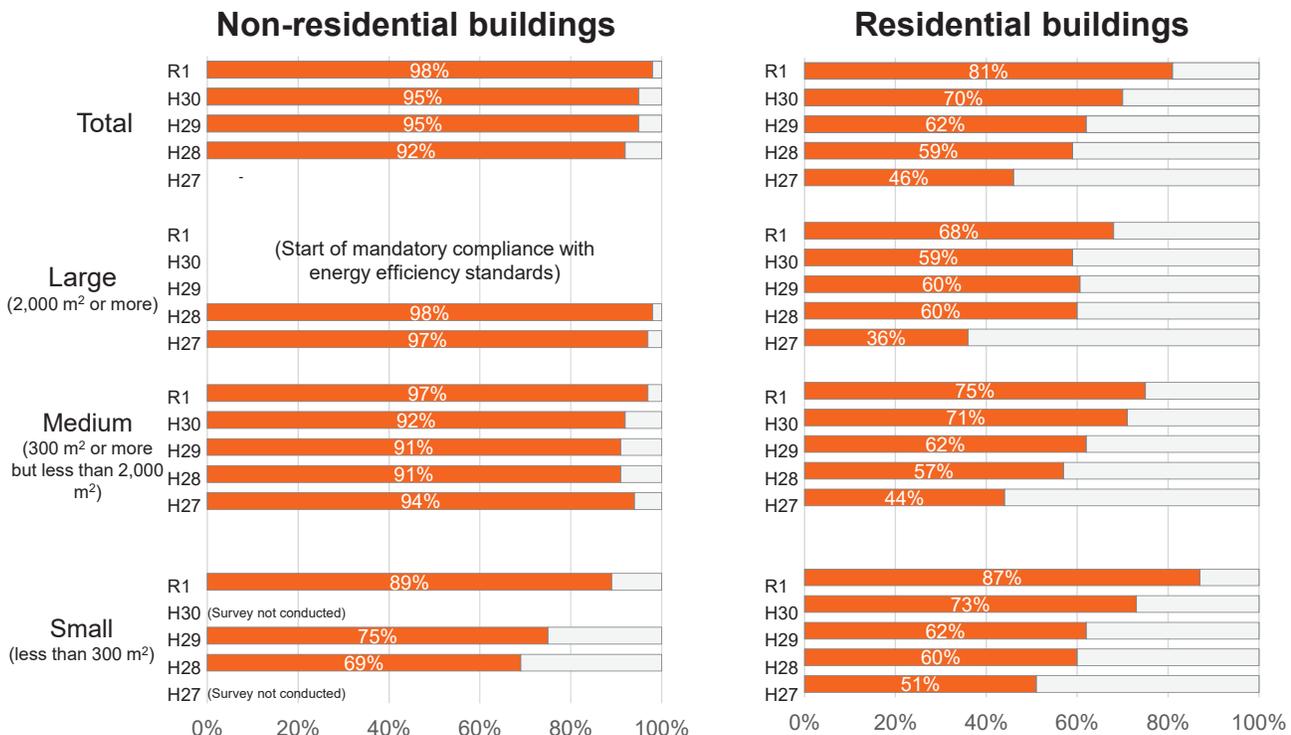
* If it is deemed necessary to improve the energy-saving performance of a major housing developer to a considerable extent, such as insufficient compliance with the top runner standards, the developer will be subject to the recommendation, order, etc. by the Minister of MLIT.

➤ The number of buildings subject to the obligation of compliance accounts for 3.4% of the total number of building starts (0.6% for large buildings and 2.8% for medium buildings), but their energy consumption accounts for 52.2% of the total energy consumption (36.3% for large buildings and 15.9% for medium buildings).



* Estimated by assuming that the average energy intensity of buildings is 878 MJ/m²/year, and average energy intensity of houses is 344MJ/m²/year, based on the 2017 Energy and Economy Statistical Abstract and the 2017 Statistics on Building Starts.

➤ The rate of compliance with energy efficiency standards for newly constructed housing has been rising year by year, and the rate of compliance in total housing exceeded 80% in FY2019.



* Calculated in the same manner as the FY2015 standard compliance rate in the Summary of the workshop on the actual state of energy consumption performance in housing and buildings (March 30, 2018).

➤ The Japanese energy efficiency standards for buildings are the standards that are necessary to ensure the energy-saving performance required for buildings as well as building equipment. They consist of two standards: “primary energy consumption” standards and “envelope insulation” standards.

Primary energy consumption standards (Apply to both residential and non-residential buildings)

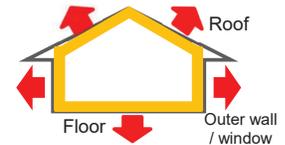
Primary energy consumption shall be equal to or less than the standard value.

- * "Primary energy consumption"
 - = Air conditioning energy consumption + Ventilation energy consumption
 - + Lighting energy consumption + Hot water supply energy consumption
 - + Elevator energy consumption
 - + Other energy consumption (OA equipment, etc.)
 - Energy creation by solar power generation equipment, etc. (limited to self-consumption)

Envelope insulation standards (apply only to residential buildings)

Heat loss per surface area of the “envelope” (outer wall, window, etc.), or envelope average heat transmission coefficient, etc. shall be equal to or less than the standard value.

<Image of heat loss through “envelope”>



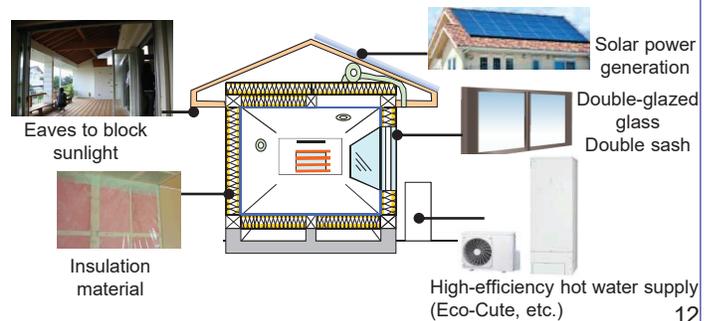
- * Envelope average heat transmission coefficient
- = Total heat loss / Envelope surface area

Examples of initiatives to improve energy-saving performance

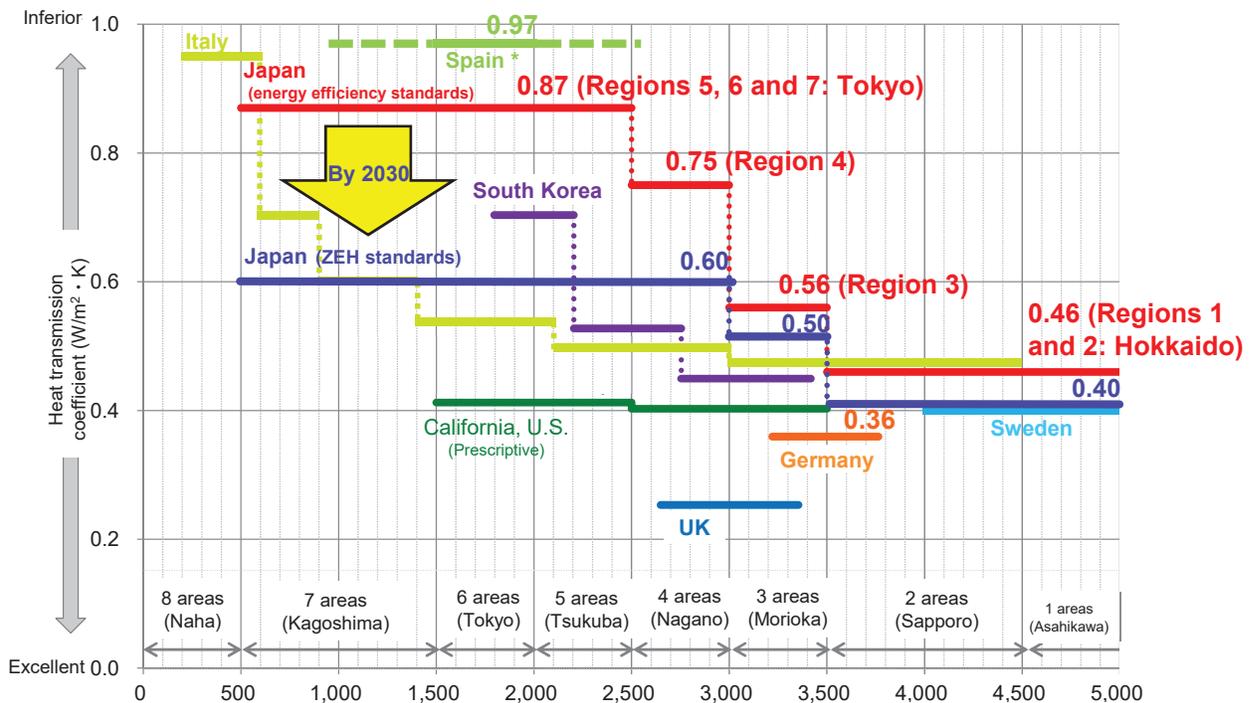
[Non-residential buildings]



[Residential buildings]



International Comparison of the Envelope Average Heat Transmission Coefficient Standards (UA Value) for Residential Buildings



Source: FY2014 Commissioned research by the MLIT

*Commissioned research on energy efficiency regulations, standards, etc. in overseas housing and buildings.

* Compiled by Nomura Research Institute based on the energy efficiency standards for homes in various countries.

* The MLIT made addition to the standards for Spain and Sweden.

* Created in consideration of heating degree days (degree day) in Madrid.

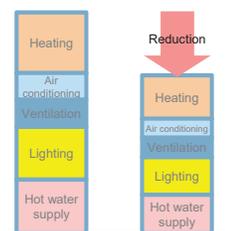
Definition of ZEH (Net Zero Energy House)

➤ **"ZEH" is defined as "a house in which energy consumed per year is approximately zero or less on a net basis by striving to save as much energy as possible through high envelope insulation and high efficiency equipment in the house while maintaining a comfortable indoor environment, and by creating energy through solar power generation and other means."**

(1) High envelope insulation



(2) High efficiency improvement of equipment, etc.



(3) Energy creation



Envelope insulation standards	Primary energy consumption standards																
	High efficiency improvement of equipment, etc.	(Energy creation)															
<p>High envelope insulation standards that are stricter than the energy efficiency standards</p> <p>(Standards for the envelope average heat transmission coefficient)</p> <table border="1"> <thead> <tr> <th>Regional classification</th> <th>Regions 1 and 2 (Sapporo, etc.)</th> <th>Region 3 (Morioka, etc.)</th> <th>Regions 4 (Nagano, etc.)</th> <th>Regions 5, 6 and 7 (Tokyo, etc.)</th> </tr> </thead> <tbody> <tr> <td>ZEH standards</td> <td>0.4</td> <td>0.5</td> <td>0.6</td> <td>0.6</td> </tr> <tr> <td>Energy efficiency standards</td> <td>0.46</td> <td>0.56</td> <td>0.75</td> <td>0.87</td> </tr> </tbody> </table>	Regional classification	Regions 1 and 2 (Sapporo, etc.)	Region 3 (Morioka, etc.)	Regions 4 (Nagano, etc.)	Regions 5, 6 and 7 (Tokyo, etc.)	ZEH standards	0.4	0.5	0.6	0.6	Energy efficiency standards	0.46	0.56	0.75	0.87	<p>20% reduction from the energy efficiency standards</p> <p>Without considering the energy creation by solar power generation, etc.</p>	<p>Reduce primary energy consumption to net zero or less</p> <p>Taking into account the energy created by solar power generation, etc., including the surplus electricity sold,</p>
Regional classification	Regions 1 and 2 (Sapporo, etc.)	Region 3 (Morioka, etc.)	Regions 4 (Nagano, etc.)	Regions 5, 6 and 7 (Tokyo, etc.)													
ZEH standards	0.4	0.5	0.6	0.6													
Energy efficiency standards	0.46	0.56	0.75	0.87													

Source: "ZEH Roadmap" compiled by the ZEH Roadmap Review Committee of the Ministry of Economy, Trade and Industry (METI) on December 17, 2015.

Energy-Saving Performance Indication System

➤ In order to indicate excellent energy-saving performance in houses and buildings, the Building-housing Energy-efficiency Labeling System (BELS) is operated as a system that conforms to the guidelines based on Article 7 of the Act.

➤ Indicated in five levels according to energy-saving performance through evaluation by a third party.

BELS (Building-housing Energy-efficiency Labeling System)



Records of BELS

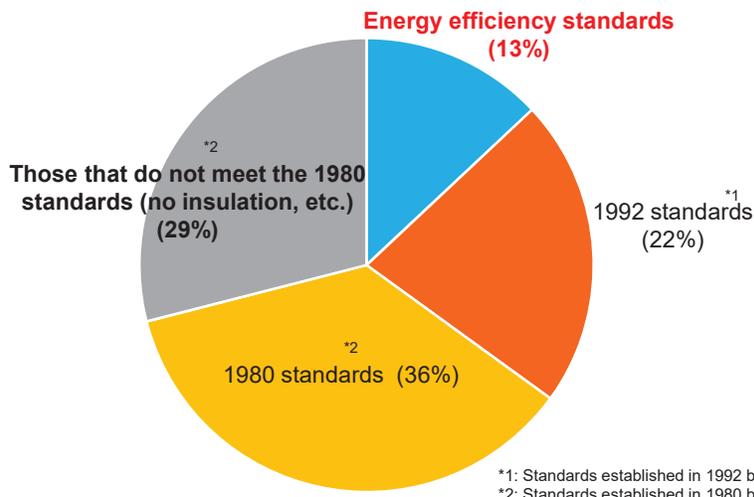
(as of the end of July 2021)

Building type	Number of type
Detached housing	130,577
Residential complex	31,440
Non-residential building	2,195
Total	164,212

Item	Overview
System management entity	Housing Performance Evaluation and Labeling Council (a General Incorporated Association (GIA))
Target buildings	Newly constructed and existing houses and buildings
Evaluation target	Energy-saving performance at time of design for entire building *Depending on the evaluation method, floor unit, etc. is also possible.
Evaluator	Third-party evaluation by evaluation organization Evaluator: First-Class Registered Architects, Building Service Engineers, etc. who have taken and completed training held by a third-party
Evaluation indices (Primary energy)	• Primary energy consumption and BEI (Building Energy Index) = Design primary energy / Standard primary energy

- As of FY2019, about 13% of the total housing stock (about 50 million units) complied with the energy efficiency standards, and about 29% of the total housing stock was uninsulated.
- According to the Housing and Land Survey (2018), the actual number of thermal insulation renovations for the housing stock in less than five years from January 2014 to October 2018 was about 720,000 units.

Thermal insulation performance of housing stock (about 50 million units)



Source: Calculated based on the distribution of housing stock by performance according to the MLIT survey, reflecting the number of renovations according to the Housing and Land Survey and the estimated number of newly constructed housing units by performance based on business operator's questionnaire, etc. (FY2019).

Future Policies for Building Energy Conservation in Japan

- For energy-saving measures on housing and buildings, **the Building Energy Efficiency Act was established in 2015 to achieve the reduction target based on the Paris Agreement. The Act was revised in 2019 and the measures to achieve the target had been sequentially strengthened.**
- **Since April this year, we have been considering the direction of strengthening energy-saving measures in the housing and building sectors. We have provided a roadmap for strengthening measures based on this consideration. The new "Plan for Global Warming Countermeasures" also includes the following:**

- **Strengthen the Building Energy Efficiency Act**
 - ✓ **Mandatory compliance with the energy efficiency standards for all the newly constructed buildings, including residential buildings, by FY2025.**
 - ✓ **Gradual upgrade of the energy efficiency standards to the level of ZEH/ZEB standards by FY2030 at the latest.**
 - ✓ **Strengthen the indication of the energy-saving performance of residential and non-residential buildings when they are sold or leased.**
 - ✓ **Other measures, including those for existing buildings?**
- **Promote introduction of renewable energy (by financial incentives, etc.)**
 - ✓ **Install solar power generation equipment for 60% of newly constructed detached houses by FY2030.** (The target is set by the new "Plan for Global Warming Countermeasures")

The image shows the interior of Nagato City Hall, featuring a high ceiling with exposed wooden beams and a floor made of light-colored wood. The space is well-lit, with recessed lighting in the ceiling and a long, low wooden bench in the foreground. The overall atmosphere is warm and modern.

ありがとうございました！
Thank you very much!
Merci beaucoup!
Muchas gracias!
Muito obrigado!

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Nagato City Hall