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Energy Efficiency and Conservation Policy Outlook and Challenges for 2023

~Energy Savings Enhanced in a World Facing the Energy Crisis and Implications for Japan~

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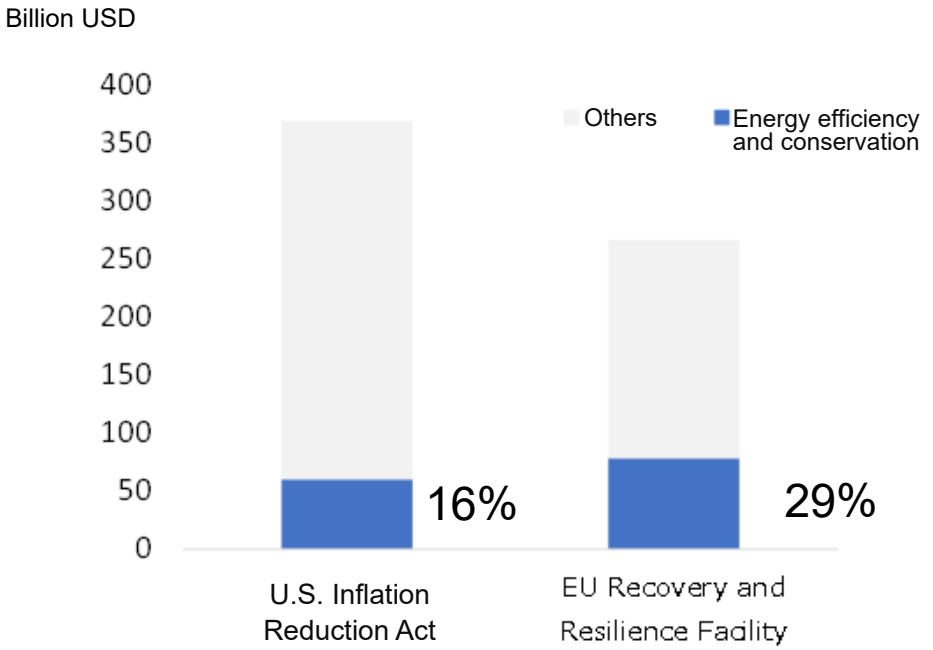
Key points of the report

- In the face of the energy crisis in 2022, the world enhanced energy efficiency and conservation measures that are available for producing immediate effects. In 2023, primarily winter gas- and electricity-saving measures will be promoted.
- Europe: Depending on temperatures this winter, Europe may be required to further reduce energy demand. A focus of attention in 2023 is whether the industry sector would take advantage of investment in energy efficient equipment to overcome the short-term crisis to get on a green growth path.
- U.S.: Under the Inflation Reduction Act, energy security and climate change investment totals $369 billion, of which 16% is earmarked for energy efficiency and conservation measures. In 2023, the United States will be required to diffuse control technologies and develop institutions to allow electric vehicle and heat pump diffusion and other electrification measures under the act to be used for optimizing demand in response to supply fluctuations.
- Asia: Asian countries will continuously enhance energy efficiency and conservation measures over the medium to long term. Thailand and other LNG importing countries strengthened electricity-saving measures in 2022. Depending on gas price levels, they will further strengthen these measures.
- Japan: From FY2023, non-fossil energy sources will be subject to regular reporting under the Act on Rationalizing Energy Use. In addition, upward and downward demand responses to optimize demand in response to supply fluctuations will be launched under the act. To achieve its FY2030 energy savings goal of 62 million kiloliters of oil equivalent (from FY2013), the government will provide manufacturers with some 160 billion yen in subsidies. If the subsidization pace is maintained, the government may provide some 500 billion yen in such subsidies over three years.

Energy efficiency and conservation enhanced as economic measures

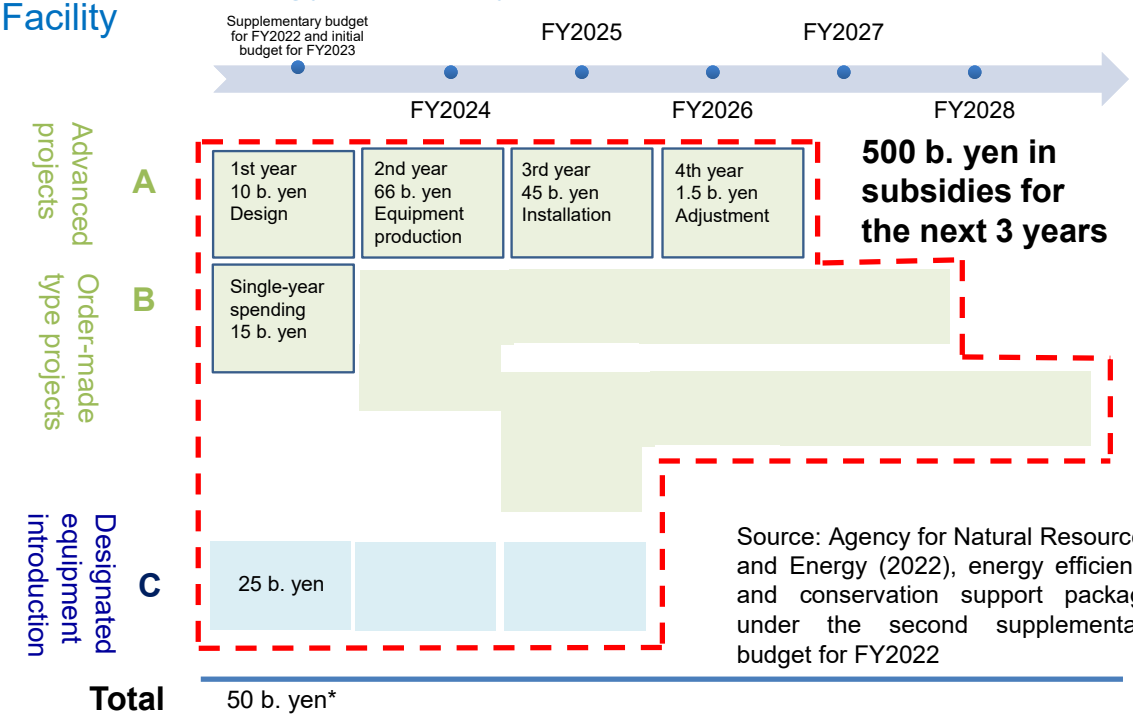
Energy efficiency and conservation spending under the U.S. Inflation Reduction Act and EU Recovery and Resilience Facility



Sources: Congressional Budget Office (2022), European Commission (2022)

- Energy efficiency and conservation spending accounts for 16% of total clean energy spending under the U.S. Inflation Reduction Act and for 29% under the EU Recovery and Resilience Facility.

Energy efficiency and conservation subsidies



Source: Agency for Natural Resources and Energy (2022), energy efficiency and conservation support package under the second supplementary budget for FY2022

***Separately, 112.5 billion yen is earmarked under an action for bearing deficits in the Treasury.**

- In Japan, some 160 billion yen in energy efficiency and conservation subsidies were provided for manufacturers. If the subsidization pace is maintained, subsidies may total some 500 billion yen in three years. A roadmap was submitted to the Green Transformation Implementation Council, indicating some 8 trillion yen for manufacturers' energy conservation and fuel switching as well as some 14 trillion yen in the next 10 years for energy-saving renovation of housing and promotion of zero-emission buildings and housing. Each country seeks to promote energy efficiency and conservation over the medium to long term, develop markets and create jobs.

EU energy efficiency and conservation measures through 2030 and their position

August 5, 2022

- **Council Regulation on Coordinated Demand Reduction Measures for Gas**: Regulations were adopted to request all member countries to cut gas demand in emergency.

July 20, 2022

- **Save Gas for a Safe Winter**: A communication was issued for member countries to cut gas demand by 15% from this winter through the spring of 2023.

May 18, 2022

- **REPowerEU**: Member countries were urged to substantially reduce natural gas imports from Russia and phase them out before 2030. A goal was set to raise a primary energy demand cut (from the reference level) from 9% to 13% by 2030.

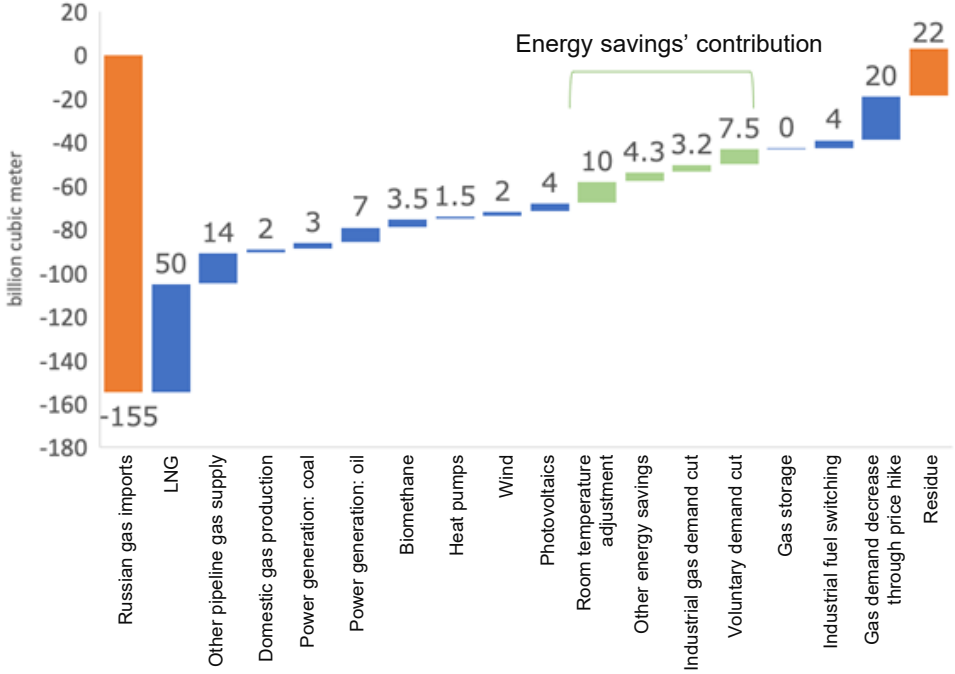
December 18, 2021

- **Energy Efficiency Directive for buildings**: Amendments were proposed.

July 21, 2021

- **Fit for 55**: The Fit for 55 policy package was proposed to achieve the goal of cutting greenhouse gas emissions by 55% from 1990 by 2030. One of key points of the package was the revision to the Energy Efficiency Directive for buildings. The proposal set out a goal of reducing primary energy demand by 9% from the reference case by 2030.

Energy savings to substitute Russian gas



Source: Prepared from European Commission (2022), "Save gas for a safe winter"

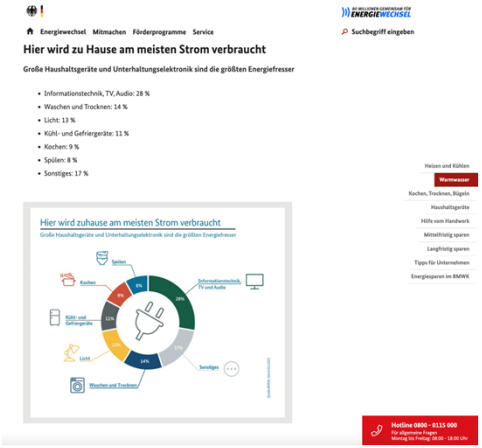
Note: Green portions indicate the effects of energy savings. Heat pumps are classified as renewable energy in the EU.

- LNG has the greatest potential to counter Russian gas supply cuts, accounting for 50 billion cubic meters. The second biggest potential is assumed for energy savings, amounting to 25 bcm.

Germany and Japan: Enhancing short-term measures

	Germany	Japan
Russia's share of gas imports	• 55% (2020)	• 9% (2020)
Goals, etc.	• Goal of cutting winter gas consumption by 20%	• No numerical goal.
Major measures	• A campaign called "80 million together for energy change" promoted gas and electricity savings. • The industry sector's fact-finding survey on gas consumption and introduction of gas safety platform auctions	• Providing information on electricity savings. • Developing region-by-region detailed databases and building on such databases to propose effective regional measures
Energy-saving and other economic measures	• Climate change fund: €177.5 billion (2023-26), including €16.9 billion (2.43 trillion yen) for improving insulation for housing and buildings and €3.4 billion (124.5 billion yen) for streamlining and modernizing industrial production processes	• A supplementary budget for FY2022 includes 50 billion yen (or about 160 billion yen including an amount for an action for bearing deficits in the Treasury) in subsidies for investment in energy-saving equipment, 250 billion yen for improving housing insulation performance, and 30 billion yen for introducing highly efficient water heaters. • 180 billion yen for energy-savings points
Energy price hike counter-measures	• Gas price credits for December 2022. • Gas brake (gas price cap) from 2023 to April 2024	• Mitigating drastic electricity/gas price changes • Mitigating drastic fuel price changes • Oil and gas distribution rationalization contributing to lowering retail prices

Web page for Germany's campaign called "80 million together for energy change"



Source: https://www.energiewechsel.de/KAENEF/Navigation/DE/Thema/energiespartipps.html

A one-stop service has been devised for consumers and business operators to browse (1) energy saving tips, (2) contacts for energy saving diagnosis services and (3) information on subsidies to understand energy-saving measures and take energy-saving actions.

Japan's energy/electricity-saving menu (Honshu, Shikoku and Kyushu versions. Hokkaido and Okinawa versions are also available)

Energy/electricity-saving menu

		Electricity-saving effect (consumption cut)
Heating	Layer and lower the room temperature. (The right electricity-saving effect is for a case where the room temperature is lowered from 22℃ to 20℃ when an air-conditioner is used.)	2.7%
	Clean a clogged filter. (The right electricity-saving effect is for an air-conditioner.)	0.8%
	Use heavier curtains for windows. (The right electricity-saving effect is for an air-conditioner.)	0.8%
	Use an electric fan or circulator to circulate upper warm air in a room.	-
Lighting	Lower brightness in living, bed and other rooms.	1.5%
	Switch off all unnecessary lighting.	4.5%
Refrigerator	Avoid excessive refrigeration (shift from "strong" to "medium"), reduce time for leaving the door open and refrain from cramming in too much food. * Take care about the spoiling of food.	1.5%
	Secure an appropriate space between the refrigerator and wall.	-
TV	Set the energy-saving mode to lower screen brightness. Switch off TV when it is not in use.	1.0%
Warm-water washing toilet seat	Use an energy-saving timer. If the timer is not available, lower preset temperatures for the seat and warm water, and close the seat cover.	0.2%
Washing machine	Do bulk washing by using 80% or more of capacity.	0.3%
Dryer	Use indoor drying to reduce dependence on clothes dryers (including those in washing machines) or bathroom dryers	0.5%
Kotatsu	Halve operating time.	1.0%
	Use quilts to keep warm air from being lost.	–
Heated carpet	Halve the heated area.	0.9%
	Place a heat insulation mat below a heated carpet.	–

* The electricity-saving effect is the ratio of an estimated electricity saving to daily home electricity consumption. The effect varies depending on regional and weather conditions.

Source: https://www.enecho.meti.go.jp/category/saving_and_new/saving/shoene_setsuden/

- Information is provided about measures and their effects based on detailed databases for residential and commercial sectors by region and season.

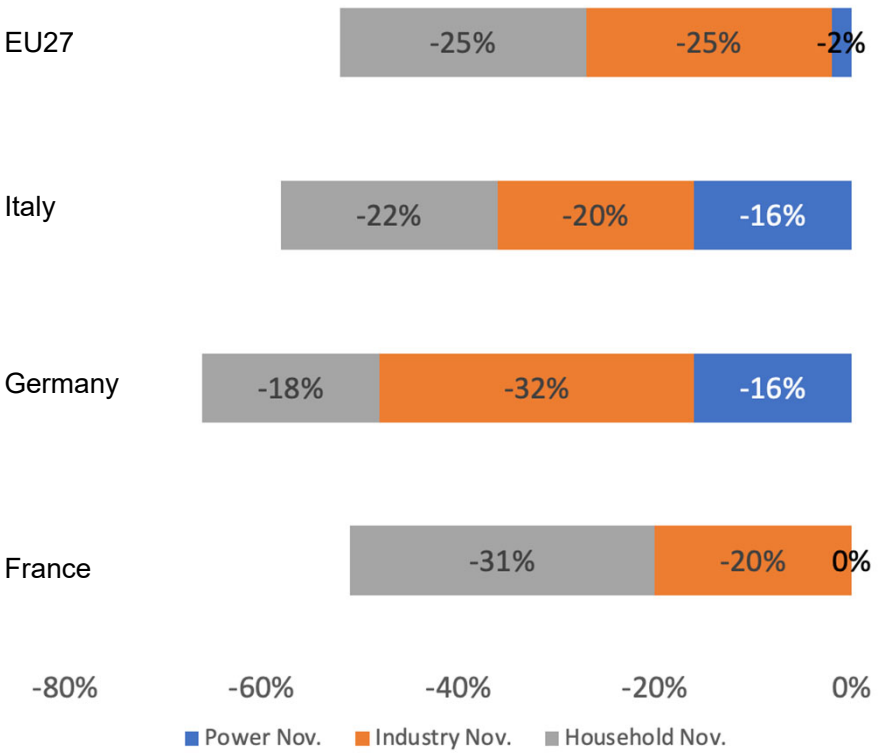
Reference:

Energy efficiency and conservation measures enhanced in Europe in response to energy price spikes

	Italy	France	Germany	U.K.
Goals, etc.	• Cutting gas demand by 7% by March 2023、reducing dependence on Russian gas imports substantially by 2025	• Cutting energy demand by 10% from 2019 by 2024	• Cutting winter gas consumption by 20% • (Cuts exceeded the goal in October-December. During the December 5-11 period, however, gas consumption was down 5% from the 2018-21 average for the period.)	• No energy-saving goals for the short term
Major measures	• Implementing a national plan to contain natural gas consumption • Providing information about limiting room temperatures to 19°C, reducing heating time, etc.	• Under the sobriété énergétique campaign, information is provided to consumers. An action plan was formulated. • The government formulated measures through talks with trade groups and other stakeholders. Working groups were launched on the following matters: Transportation, sports, digitalization and communications, local governments, housing, facilities opened to public and commercial areas, companies and job organizations.	• A campaign called "80 million together for energy change" promoted gas and electricity savings. • The industry sector's fact-finding survey on gas consumption and introduction of gas safety platform auctions	• National Grid's voluntary initiative to reduce electric load during peak demand hours to provide residential users with a £3/kWh incentive • Campaign to provide consumers with energy-saving information
Energy efficiency/conservation-related and other economic measures	• €5.5 billion in support (tax credits for energy-intensive companies seeing energy costs rising by 30% or more, support for renewable energy electricity sources, etc.) • Income tax credits in Super Bonus for investment in energy-saving hosing renovation (110% of investment). Ceilings are set by measure.	• Providing €2.5 billion in 2023 under the MaPrimeRenov' subsidy scheme • Subsidizing energy-saving renovation, supporting high-efficiency equipment. • Subsidizing industrial process decarbonization • €800 million in support for electricity/gas saving measures this winter	• Climate change fund: €177.5 billion (2023-26), including €56.2 billion for improving insulation, €3.4 billion for modernizing industrial production processes and €3.8 billion for decarbonization of heat supply	• Industry energy transition fund: £315 million in subsidies for decarbonization of energy-intensive industries • Regional energy saving diagnosis • ECO+ campaign to promote renovation for improving insulation (£6.6 billion plus £1.0 billion) • （Leaving fixed asset tax rates unchanged）
Energy price spike countermeasures	• Lump-sum payments to low to middle-income earners. • Excise tax adjustment to cut gasoline/diesel prices (25 euro cents per liter), gasoline purchase coupons for company employees (up to 200 euros per employee), installment payments of energy costs (up to 24 installment payments for May and June)	• Extending fuel price discounts until December 2022 (30 euro cents/L) • Providing €12 billion to cover 25% of electricity prices for companies and local governments • Reducing electricity/gas prices for households	• Gas price credits for December 2022 • Gas brake (gas price cap) from 2023 to April 2024	• Guaranteeing the electricity unit price at £34/kWh and the gas price at £10/kWh for the residential sector for six months from October 2022 • The government shoulders electricity and gas charge deviations (hikes) from baseline levels for industry and commercial sectors between December 2022 and April 2023.

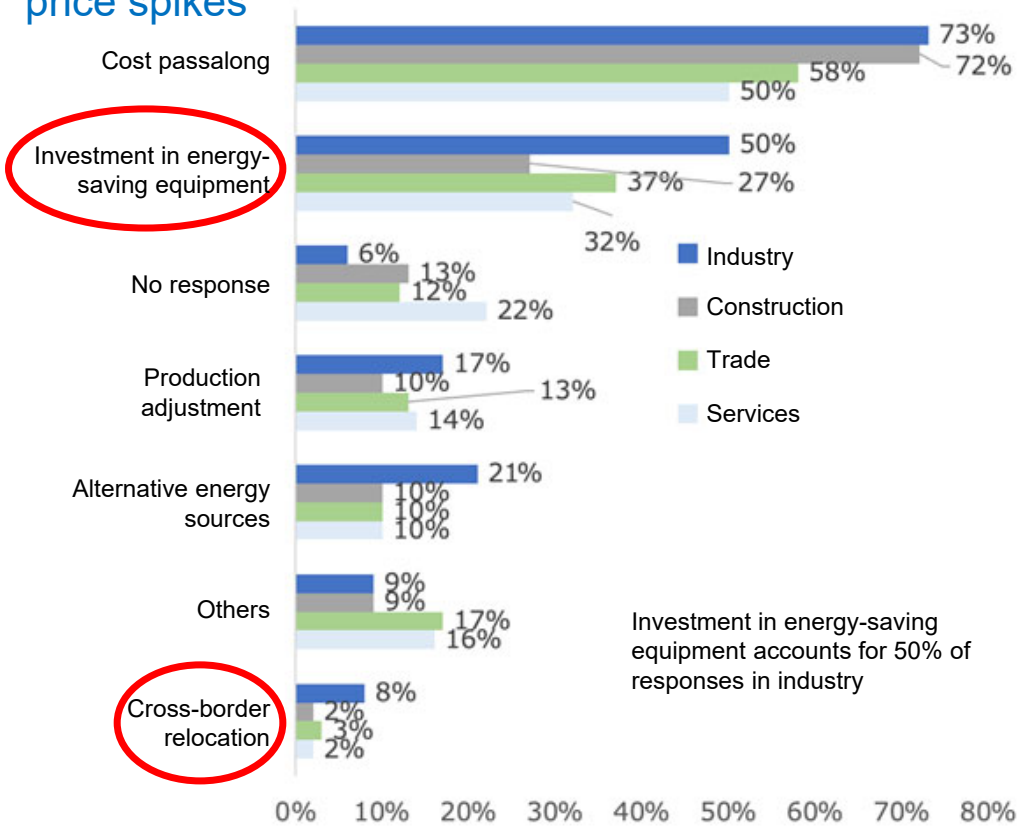
Europe forced to adjust production while taking maximum advantage of energy-saving measures
～Concern about cross-border plant relocation～

European gas demand changes in November 2022 (year on year)



Source: Bruegel (2022), “European Gas Demand Tracker”

German industry’s responses to electricity, gas and fuel price spikes



Investment in energy-saving equipment accounts for 50% of responses in industry

Source: Deutsche Industrie- und Handelskammer, DIHK

Asian countries enhancing energy efficiency and conservation measures

Country	Measures
China	• The energy intensity improved at an annual rate of 2.8% between 2015 and 2020 (the economy grew at an annual rate of 5.7%). • The “3060 goal” has been set to achieve an emission peak in 2030 and carbon neutrality in 2060. Heavy industries seek to improve the energy intensity by 13.5% by 2025. China pursues CO2 emission cuts under control. • Introduction of green building standards, introduction of new-energy vehicles, technological innovation, regulation and standard development, subsidization
Indonesia	• The energy intensity is expected to improve by 17% from the business-as-usual level in 2025. • Energy control. Implementing standards and labeling, and technology promotion. • To improve standards, the minimum energy performance standards (MEPS) have been introduced for air-conditioners, refrigerators, ventilation and rice cookers. More products are planned to become subject to the MEPS. An electric vehicle program will be accelerated.
Malaysia	• NEEP (National Energy Efficiency Action Plan) development, formulation of 2016-2025 initiatives, energy conservation for equipment, industrial energy diagnosis and control, energy diagnosis and control for buildings, MEPS for six products. • An energy efficiency and conservation law will be introduced for a more comprehensive approach.
Singapore	• Carbon tax revenue will be used for decarbonization investment. In April 2022, subsidies began to be provided for energy-efficient equipment. • The power generation sector will seek to promote demand-side management (DSM) and decarbonization towards the 2050 net-zero emission goal. The buildings sector will be given incentives for decarbonizing buildings.
Thailand	• **Over the short term, electricity-saving campaigns will be implemented in residential and commercial sectors. If LNG prices spike (to $50/MMBtu or more), industry and commercial sectors will be required to achieve target electricity-saving rates.** • A long-term goal calls for improving the energy intensity by 37% by 2037. Digital technologies are used for innovation. The 4D1E (digitalization, decentralization, decarbonization, deregulation, electrification) policy will promote digitalization and energy conservation.
Philippines	• **Over the short term, an electricity-saving campaign was implemented between May and July to reduce peak electric load in 2022. The government sector has set a 10% electricity-saving goal, promoting mainly LED lights and inverter air-conditioners** • The electricity supply-demand balance is expected to tighten between May and July. **Electricity-saving campaigns will continue to be enhanced.**

Sources: Prepared from various materials

Energy efficiency and conservation measures being enhanced continuously in 2023 and challenges

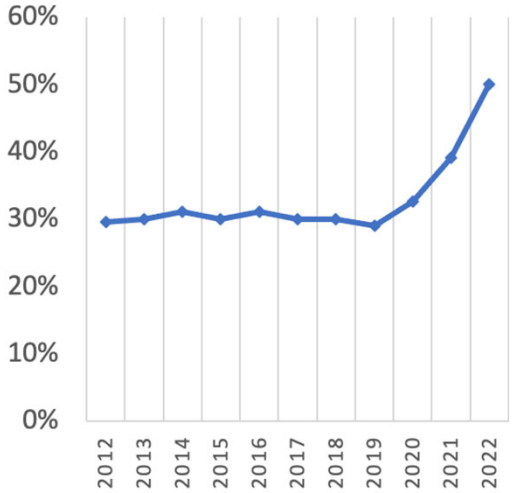
Energy efficiency regulations being enhanced in Europe and signs of their effects

Proposed amendments to EU Energy Efficiency Directive for buildings

	Proposed amendments to Energy Efficiency Directive for buildings
Enhancing energy efficiency of existing buildings	• Promoting energy-saving renovation of energy-inefficient buildings among existing residential and commercial buildings. Residential: Introducing the MEPS. Commercial: Lowering energy consumption below the level for the 15% most energy-inefficient buildings.
ZEB	• All new residential and commercial buildings shall be Zero Emission Buildings from 2030 (public buildings from 2028).
Life-cycle GWP	• The life-cycle global warming potential shall be calculated and labelled in energy performance certificates for 2,000-square-meter or larger new buildings from 2027 and for all new buildings from 2030.
Public buildings	• Energy-saving renovation shall be implemented for 3% of public buildings every year.
Fossil fuel boilers	• Abolishing subsidies for fossil fuel boilers. • Drafting policies to phase out fossil fuel consumption in buildings by 2040.
EV	• Installing charging infrastructure in residential and commercial buildings
Renewable energy use in buildings	• New buildings shall be solar ready. Solar PV introduction targets shall be set (for 250-square-meter or larger new buildings at the end of 2026, for 450-square-meter or larger renovated buildings at the end of 2027 and for new residential buildings at the end of 2029).

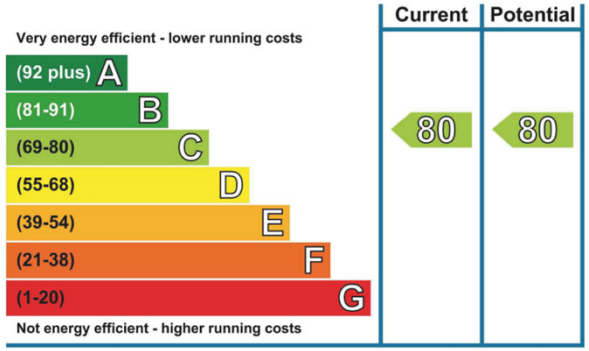
- Proposed amendments to the EU Energy Efficiency Directive may be approved by the summer of 2023. The amendments cover various regulation enhancement measures, while discord has arisen among EU members about energy efficiency improvement for existing buildings and other measures.

A-C grades' share of British rental property sales



Source: Prepared from Hamptons (2022).

Example of British Energy Performance Certificate

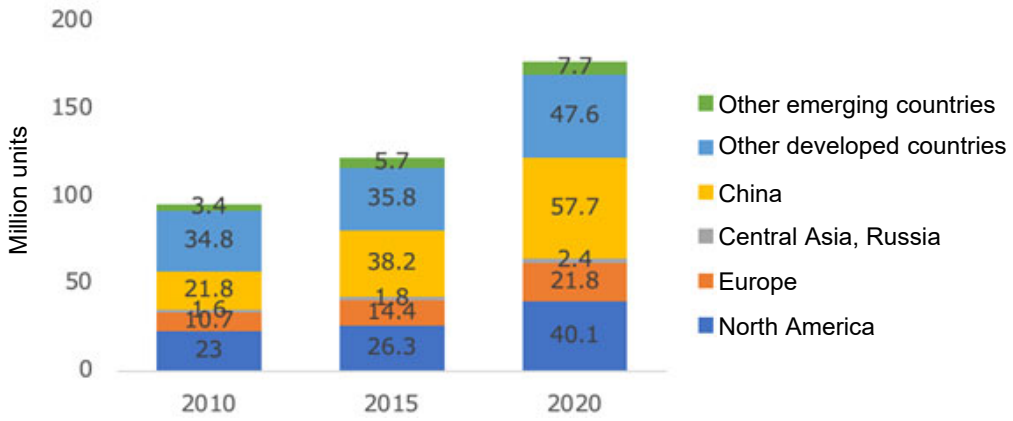


Source: assets.publishing.service.gov.uk

- The United Kingdom introduced a regulation in 2020 to bar Grade F and G properties with lower energy performance from being rented. The regulation targets owners of properties that are rental or planned to become rental, requiring insulation retrofit and other measures costing up to 3,500 pounds including VAT. A new regulation now under consideration would require grades to be raised to C for new rental properties from 2025 and for existing rental properties from 2028.
- In the United Kingdom, A-C grades' share of rental property sales increased from around 30% in and before 2020 to 50% in 2022.

Phasing out fossil fuel boilers and emerging challenges regarding electrification

Number of heaters with heat pumps

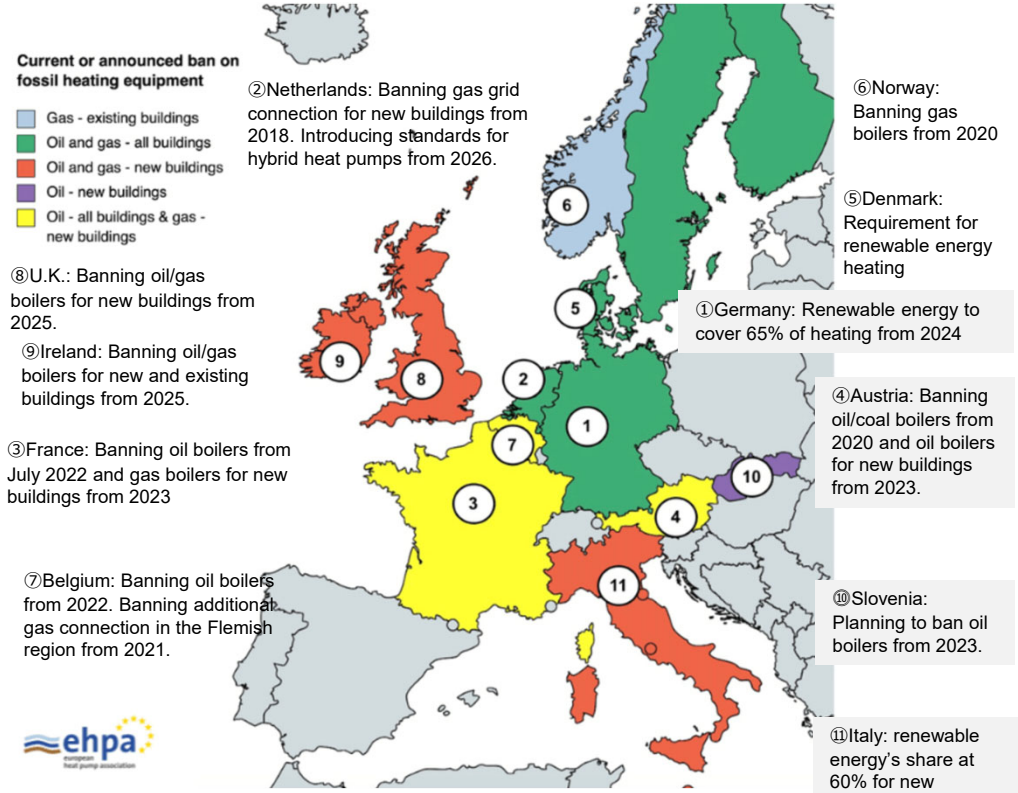


Source: Prepared from IEA (2022)

While heat pump sales are increasing, challenges are emerging

- While heat pump diffusion must be combined with the decarbonization of power sources, there are challenges regarding the enhancement of power transmission and distribution systems connected to wind power.
- There are challenges regarding consumers' initial investment burden and training of heat pump installers.
- Constraints on locations for heat storage and hot-water cylinders for existing buildings (including apartment buildings) (Europe, California).
- Concern about F-gas* regulation toward heat pump diffusion (Europe)

European policies on fossil fuel boilers

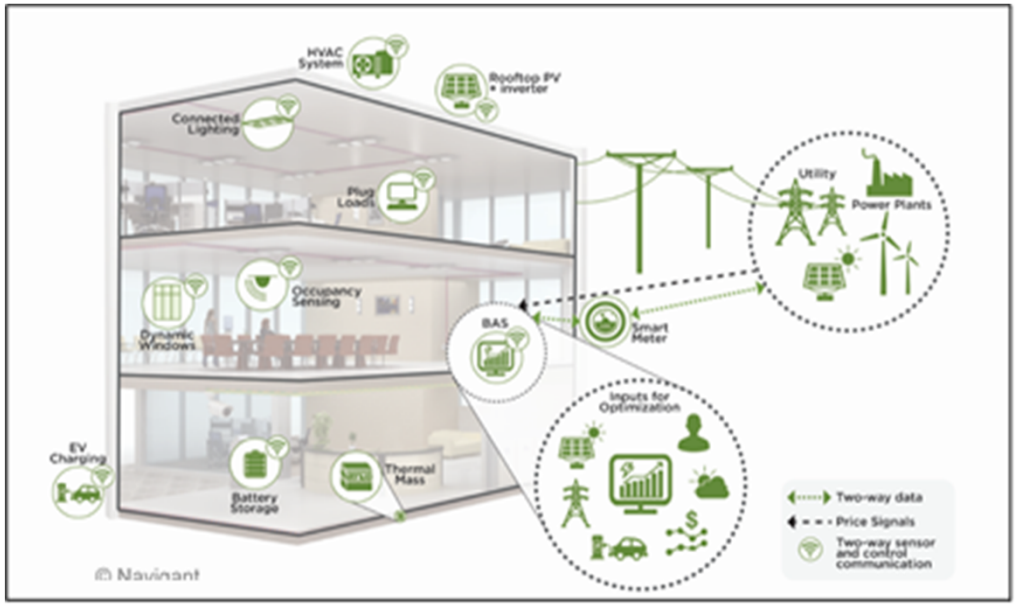


Source: Prepared from European Heat Pump Association (2022)

* F-gases: HFC (hydrofluorocarbon), PFC (perfluorocarbon), SF6 (sulfur hexafluoride) and other alternatives to chlorofluorocarbon

Enhancing measures to optimize demand in response to supply fluctuations

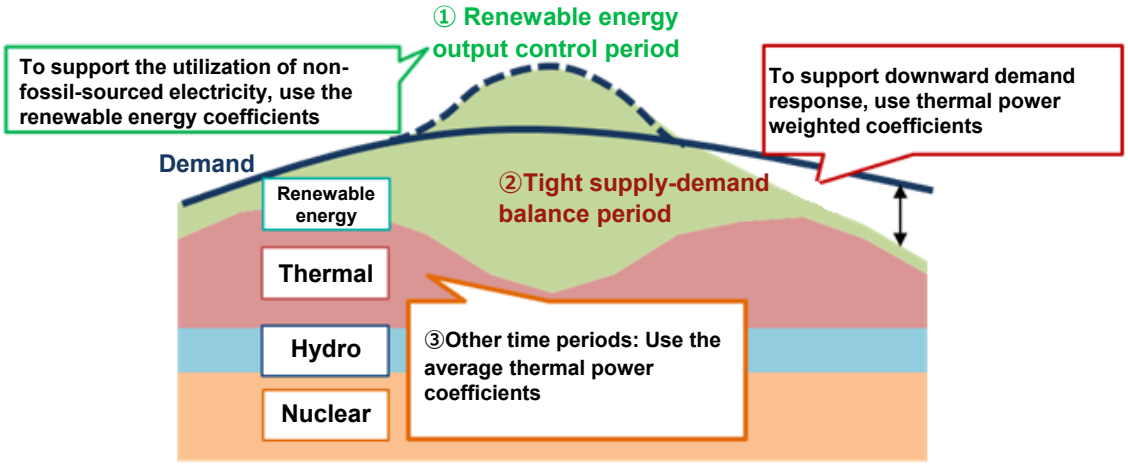
Grid-interactive Efficient Buildings (and Industry)



Source: https://www.energy.gov/eere/buildings/grid-interactive-efficient-buildings

- The U.S. Inflation Reduction Act provides for incentives for diffusing electric vehicles, heat pumps and renewable energy. Measures are required to resolve the duck curve issue. It is pointed out that subsidies should be expanded for grid-interactive efficient buildings as proposed by the U.S. government.

Upward/downward demand response under the Act on Rationalizing Energy Use (Japan)



Source: Ministry of Economy, Trade and Industry (2021). Secretariat document for the 35th meeting of the Energy Efficiency and Conservation Subcommittee

- To encourage a shift of demand to time periods where renewable energy electricity is in surplus, the primary energy-to-electricity conversion factor is changed according to the electricity supply-demand balance in each region and month.
- To raise users' awareness of demand response, a plan is considered for requesting electric utilities to report demand response results, including the counted frequency of demand response.

Subjecting non-fossil energy to streamlining (Japan)

Direction of quantitative goals for transition to non-fossil energy

Option 1 Non-fossil energy's share of total energy consumption	Option 2 Non-fossil electricity share	Option 3 Non-fossil energy's share of non-electricity energy consumption
Setting a goal for non-fossil energy's share of total fuel, heat and electricity consumption in terms of primary energy in FY2030 For instance, a goal of raising non-fossil energy's share of total energy consumption in FY2030 at x% may be set.	Setting a goal for non-fossil electricity's share of externally procured electricity in FY2030 For instance, a goal of raising non-fossil electricity's share of externally procured electricity in FY2030 at x% may be set. Privately generated electricity may be included.	Setting goals for key energy sources in FY2030 For instance, a goal of raising the share of non-fossil energy consumption for the hydrogen reduction steelmaking process in total steelmaking energy consumption at blast furnaces to x% in FY 2030 may be set. A goal of cutting coal's share of total energy consumption in FY2030 for the chemical industry by x% points may be set.

Source: Ministry of Economy, Trade and Industry (2021), "Future energy efficiency and conservation policy" for the 37th meeting of the Energy Efficiency and Conservation Subcommittee

- From FY2023, non-fossil energy will be subject to streamlining under the Act on Rationalizing Energy Use.
- Based on industries' various approaches to the transition to non-fossil energy, quantitative goals are under consideration for not only non-fossil energy's share of total energy consumption but also the non-fossil share of electricity consumption and that of non-electricity energy consumption.

Foreign cases' implications for Japan

Implications for Japan

- ✓ Foreign cases have the following implications for Japan's promotion of energy efficiency and conservation.
  - ✓ Over the short term, Japan has room to improve the provision of information on energy conservation promotion to consumers to help encourage their behavioral transformation. A list of information on energy savings by measure, energy savings diagnosis and subsidization measures needs to be provided.
  - ✓ Foreign countries have enhanced economic measures for energy efficient equipment investment promotion for long-term green growth. The government is required to make a commitment to providing medium to long-term support for private sector investment in energy savings and green transformation to enhance Japanese manufacturers' international competitiveness.
  - ✓ Given the long service life of housing buildings, Japan is urgently required to take measures for the existing housing building stock to achieve carbon neutrality for housing buildings by 2050. A comprehensive approach is indispensable, covering energy efficiency labeling implemented in the United Kingdom and the European Union, the renovation of existing stock with low energy efficiency and robust subsidization.
  - ✓ In 2023, Japan will be required more than ever to provide Asia and other emerging countries with financial support for investment in energy-saving equipment, energy management know-how and cooperation in developing energy efficiency and conservation policies.

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