

The Global Evolution of Energy Efficiency Policy and its implications for Japan

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Overview



- Recent trends
 - Savings from energy efficiency
 - Policies
- Energy efficiency as a part of central energy policy
 - Climate policy
 - Energy security
 - Industrial competitiveness
 - Cost of living
- Future developments
 - New business models
 - Digitalisation

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Savings from energy efficiency in Japan





average

Energy Intensity in the G7 (TPES/GDP in PPP)

Savings from energy efficiency in G7

Final Energy consumption and savings in G7

Efficiency measures introduced since 2000 saved G7 countries 15% of their energy demand in 2015; Just as one example, tighter standards for household appliances saved 85 TWh of electricity

Savings from energy efficiency in G20

Final Energy consumption and savings in G20

Efficiency measures since 2000 saved G20 countries 13% of their energy demand in 2015; tighter standards for household appliances saved 200 TWh of electricity

The impact of efficiency savings on carbon emissions

In 2015, efficiency gains in IEA and China reduced their combined emissions by 15%; Efficiency policy in China has become one of the most important global actions to reduce emissions

Coverage of mandatory energy efficiency policies is increasing globally

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Mandatory energy efficiency regulations are a key policy driver

Energy use covered by mandatory efficiency regulations

Japan is one of the top 3 nations with highest share of energy consumption covered by standards, primarily due to the Top Runner Programme

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Savings from energy efficiency in Japan

Final Energy consumption and savings in Japan

Efficiency measures since 2000 saved Japan 19% of its energy demand in 2015; tighter standards for household appliances saved 15 TWh of electricity

Savings from energy efficiency in Japan

Breakdown of energy demand change in Japan between 2000-2015

Due to efficiency improvement Japanese TFC decreased by 27Mtoe, 10% since 2000

Energy efficient space cooling equipment

Performance standards for space cooling

Japan's space cooling standards are closest to best available technologies worldwide

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Passenger vehicle standards

Additional global savings potential from application of Japanese passenger vehicle standards

Japan's efficiency standards for passenger vehicles are best in class and if every major vehicle market adopted them, oil demand would be reduced by an additional 2.3 million barrels per day

The next phase for transport efficiency standards – Freight Trucks

Japan was the first country to implement truck standards in 2005 with full enforcement phased in from 2015. These standards aimed to improve truck efficiency by 12% over 2002 levels by 2020.

Global energy consumption in light, medium- and heavy-trucks covered by efficiency standards

Market Based Instruments (MBIs) for energy efficiency

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MBIs create a market for energy efficiency

Importance of policy design

- MBIs have worked successfully in many jurisdictions but the evidence on their relative effectiveness is not conclusive
- Freedom for private sector to innovate and discover best delivery routes
- Risk for policy maker that if designed or implemented badly – market participants will find ways to game the system

MBIs put a premium on good policy design, including strong monitoring, verification and evaluation

MBI design requires attention

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Considerable variation in cost among programmes

The market for energy efficiency services appears poised for growth

Global energy service company revenues by country/region, 2015

The global energy services market was USD 24 billion in 2015 and indicators point to future growth

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Energy efficiency's role in wider policy

New energy efficiency policies in other countries/regions

- European Union Energy Efficiency Directive
 - 30% reduction in energy use by 2030
- China 13th five year plan
 - 15% reduction in energy intensity by 2020
- Canada
 - Energy efficiency key focus of new climate policy framework
- Mexico
 - Energy transition law
- Other countries that are progressing energy efficiency policies:
 - Saudi Arabia, Brazil

Energy efficiency as part of mainstream energy policy

Improvements to energy efficiency in Japan represent 42% of greenhouse gas emissions reduction

Where do emissions savings come from?

GHG emission savings from energy efficiency, 2030 Savings by measure, 2030 **Renewables** Mt CO_{2-eq} investment -40 -30 -20 -50 -10 34% Japan 42% Heating and cooling Appliances and lighting Industrial motors Road transport 24% Energy Source: IEA, World Energy Outlook Analysis efficiency Reducing inefficient coal

In Japan, the majority of greenhouse gas emissions savings from energy efficiency are obtained from improvements to industrial motors and road transport

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Avoided imports for Japan from efficiency gains, 2015

Energy efficiency savings have reduced the amount of coal, oil and gas imports required by Japan

Energy efficiency and reduced energy import dependency

If energy savings from efficiency since 2000 are treated as a domestic resource, Japanese gas import dependency would be 13% less and oil import dependency would be 14% less in 2015

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Efficiency measures following Fukushima

2011

- Power outages (March)
- Large user limits (August)
- Numerical targets for electricity use

2012

• Numerical targets for required electricity saving

2013 – 2015

- Requirement for electricity savings (no numerical targets)
- Peak demand shift

2016

• Electricity savings measures came to an end

Energy efficiency contributing to emergency response

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Avoided electricity power plant from demand side

Energy efficiency and conservation avoided 21 GW_e of new electricity supply capacity since 2010, equivalent to nearly half of Japan's total nuclear power generation capacity

Sectoral electricity demand change since 2010

Mtoe 35 30

Electricity use between 2010 and 2014 decreased more in the industry and residential sectors than the service sector, although service sector energy use decreased more in 2011 than the other sectors

Sectoral electricity demand change

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Energy efficiency in Japanese industry

Comparison of industrial energy intensity

Industrial energy intensity in IEA member economies adjusted for industry structure, 2014

Energy efficiency contributing to industrial competitiveness

Despite rising energy prices, energy efficiency improvements have contributed to a reduction in the impact on gross value added and competitiveness

Japanese non-metallic minerals manufacturing

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Energy efficiency in Japanese cement manufacturing

Thermal energy intensity of clinker production in cement manufacturing, 2014

Source: IEA Energy Technology Perspectives (2017)

Energy efficiency in Japanese cement manufacturing

Thermal energy intensity of clinker production in cement manufacturing, 2014

Source: IEA Energy Technology Perspectives (2017)

Thermal energy intensity in Japan is lower than North American or European countries due in part to a higher percentage of kilns with waste heat recovery

Energy efficiency benefits for Japanese households

Indices of energy price, proportion of income spent on energy, and efficiency in residential buildings

limited the impact of rising energy prices on household expenditure on energy

Future developments for energy efficiency

- New models for delivering energy efficiency
 - Energy as a service
 - Integration with renewable energy
- Energy efficiency as a fuel
 - Demand side response
 - Capacity auctions
- Digitalisation
 - Advanced metering
 - Improved control and optimisation of industrial processes
 - Real time data collection and analysis

Increased electricity demand by connected devices

The energy use of connected/networked devices is growing rapidly, presenting new challenges for energy efficiency

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Integration of energy services – efficiency and renewables

- Shifting focus from providing energy to providing a service e.g. illumination, entertainment etc.
- Opportunity to increase combination of energy efficiency and renewable energy
- Example of BBOXX:
 - Energy efficient appliances together with the BBOXX home solar system enable customers to use the following appliances for up to 6 hours:
 - 4 LED lights;
 - 15.6" TV;
 - Radio;
 - Portable light;
 - Charge 2 mobile phones;

Energy efficiency and renewables will be the twin drivers of the transition

The New Policies Scenario including all the NDCs from the Paris agreement still leaves a significant amount of efficiency potential untapped.

