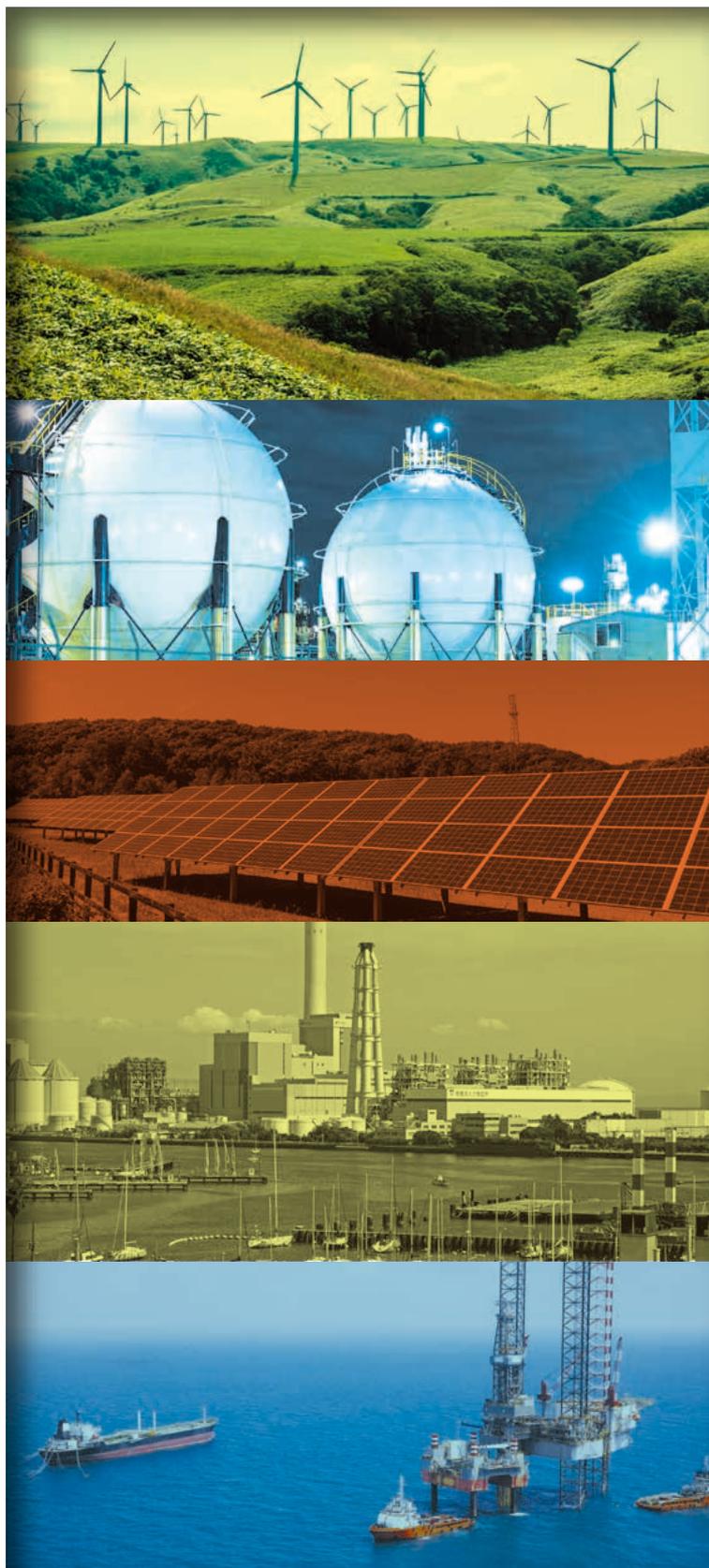


Japan's Energy White Paper 2016



Ministry of Economy, Trade and Industry

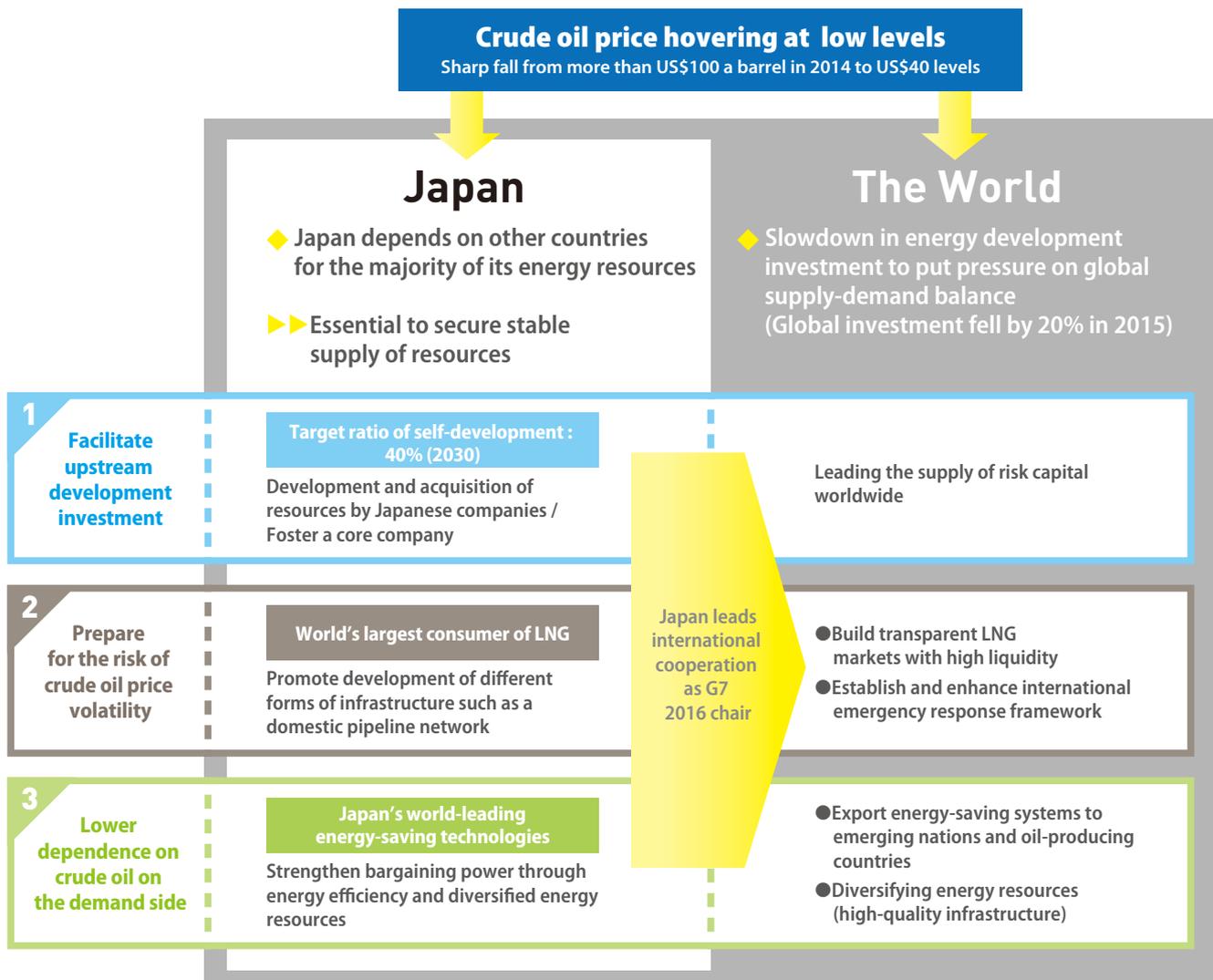
Long-term approach to energy security in an era of low crude oil prices

Japan's Ministry of Economy, Trade and Industry (METI) has compiled a report called the Long-term Energy Supply and Demand Outlook for FY2030 (the "Energy Mix"). This report outlines plans to achieve specific policy goals covering energy security, economic efficiency and the environment, with safety as the top priority. The Energy Mix also introduces forecasts and a vision for an optimal energy supply-demand structure.

Japan's goal is to reduce levels of dependence on fossil fuels and nuclear power by focusing on comprehensive energy-saving measures and maximizing opportunities to introduce renewable energy sources. Even with these efforts, Japan projects that in FY2030 fossil fuels will still account for 77% of its primary energy resources, and thermal power generation 56%. Consequently, it is essential for Japan to establish a system for procuring energy resources from other nations stably and at low cost.

To achieve this vision, Japan's Energy White Paper outlines a "Long-term approach to energy security in an era of low crude oil prices" based on three policy goals. They are:

- 1) facilitating global investment in upstream development,
- 2) establishing LNG markets in readiness for crude oil price volatility, and
- 3) exporting Japan's energy-saving technologies to reduce worldwide dependence on crude oil.



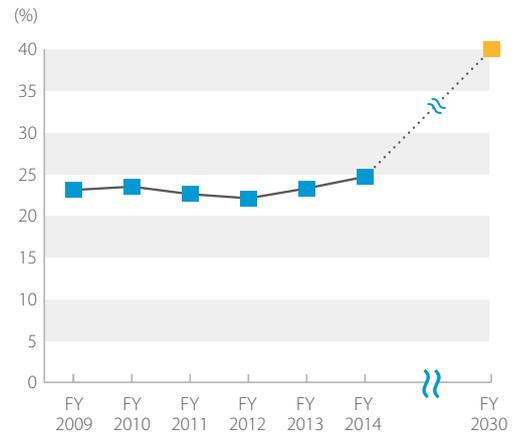
1 Facilitate upstream development investment

Promote upstream self-development of oil and natural gas

Japan's Basic Energy Plan, released in 2010, set a target to increase the ratio of self-development of oil and natural gas to 40%, or higher, by 2030. In FY2014, the rate reached nearly 24.7%, the highest-ever level. Contributing factors include additional supply from the Iraq Garraf Project and the start of imports from Papua New Guinea.

Moving forward, Japan must further develop and strengthen energy security by acquiring new interests and overseas assets and promoting the development of oil and natural gas domestically.

Current oil and natural gas self-development ratio and target



Public risk capital supply and establishment of a core company

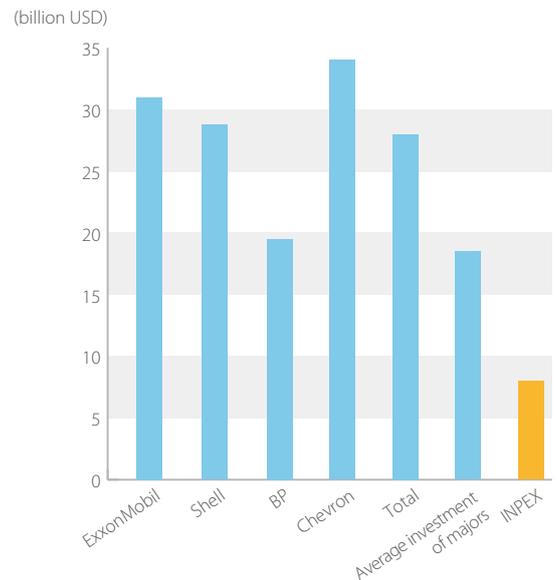
Japan's current systems for upstream development integrate three functions:

- 1) a strategic risk allocation fund from the Japan Oil, Gas and Metals National Corporation (JOGMEC),
- 2) establishment of a core company, and
- 3) proactive resource diplomacy.

Development companies in Japan face a weak financial base. Combined with increasingly volatile oil prices, Japan has strengthened the supply of risk capital to ensure stable exploration and asset purchases.

In an increasingly competitive resource market, Japan must ensure a stable supply of oil and natural gas through the efficient acquisition of overseas interests. This requires the establishment of a core company that can compete with major international companies overseas in terms of funds, technologies and human resources.

Investment scale of Japanese companies vs. major international oil companies





2 Prepare for the risk of crude oil price volatility

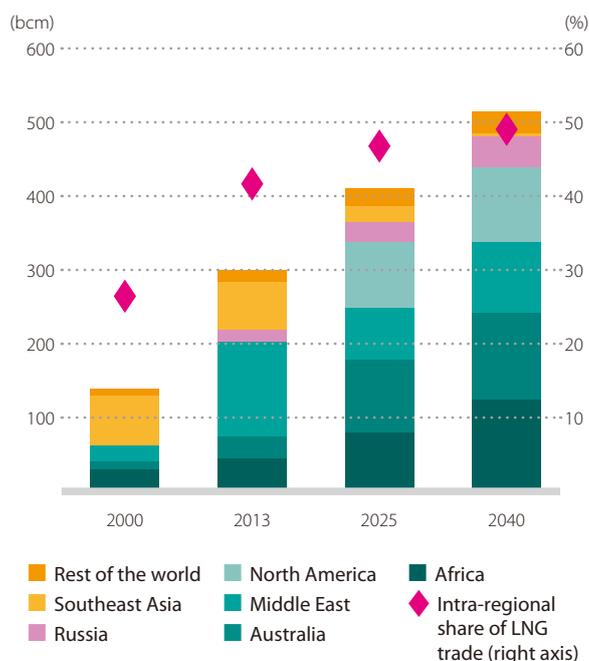
Global LNG markets

By 2020, global demand for LNG is expected to increase by approximately 45% over FY2014 levels, driven primarily by demand in Asian and European markets. More expensive to transport than crude oil, LNG is traditionally traded based on long-term sales contracts with destination clauses. The development of spot trading and the futures market seen in oil trading has developed much later in LNG markets. However, in recent years, the United States has begun supplying LNG without destination clauses and the market share of exporters outside the Middle East is forecast to grow through to 2040.

As the world's largest consumer of LNG, Japan views these changes in the global supply-demand environment as an opportunity to establish a mature LNG market by:

- 1) relaxing or abolishing destination clauses,
- 2) establishing LNG price discovery mechanisms, and
- 3) upgrading Japan's domestic gas infrastructure.

Projected increase in global LNG supply



G7 Energy Ministerial Meeting

METI hosted the G7 Kitakyushu Energy Ministerial Meeting in May 2016. The meeting, chaired by former Minister Hayashi, was titled "Energy Security for Global Growth."

G7 Ministers discussed three key issues:

- (1) energy investment for global growth,
- (2) energy security, and
- (3) energy sustainability.

3 Lower dependence on crude oil on the demand side

■ Diversification of energy sources

In many emerging countries, domestic resources have been sufficient to meet energy demands. However, economic development and population growth present challenges to meeting domestic demand by relying solely on domestic resources. For example, Malaysia’s oil self-sufficiency rate is currently 100%. However, this is projected to fall to 50% by 2035. In response to this trend, emerging Southeast Asian countries are increasingly taking measures to diversify their energy sources. A well-balanced energy mix makes it possible to maximize the benefits of each energy source and offset their respective disadvantages.



■ Japan’s energy-efficiency and conservation measures and technologies

METI launched its “Enevolution” initiative in May 2015 to improve the quality of life in emerging Asian countries by helping them diversify energy sources to secure stable supplies of energy. Japan can draw on a wealth of experience in formulating energy policy and offer advanced technologies in a wide range of areas to assist emerging Asian countries to formulate and implement energy strategies that best fit the market conditions in each country.

As the nation with the highest energy-efficiency levels in the world, Japan will export its energy conservation systems and promote the diffusion of energy-efficiency technologies adapted to the maturity of each country’s energy system, which in turn, will ease pressure on demand in international energy markets.



Snapshot of energy conservation policies in 10 ASEAN countries

		Indonesia	Thailand, Malaysia	Philippines	Vietnam	Singapore	Brunei, Cambodia, Laos, Myanmar
Energy-saving measures		○	○	○	○	○	—
Industrial	Energy management standards for business operators	○	—	—	—	—	—
	Certified energy manager system (factories)	○	○	—	○	○	—
Commercial / Building	Energy management standards for business operators (buildings)	—	○	—	—	○	—
	Certified energy manager system (buildings)	—	○	—	○	○	—
	Energy-efficiency standards and labeling system (e.g. air conditioners)	—	○	○	—	○	—
Transportation	Energy-efficiency standards and labeling system (e.g. fuel consumption)	—	○	○	—	○	—
Energy subsidy system		○	○	—	○	—	*Cambodia is the only ASEAN country that does not have this system.

Source: Japan’s Agency for Natural Resources and Energy

“FY2016 Report on Projects for Streamlining the Use of Energy Internationally (Project for Developing Human Resources Energy Efficiency and Conservation)”

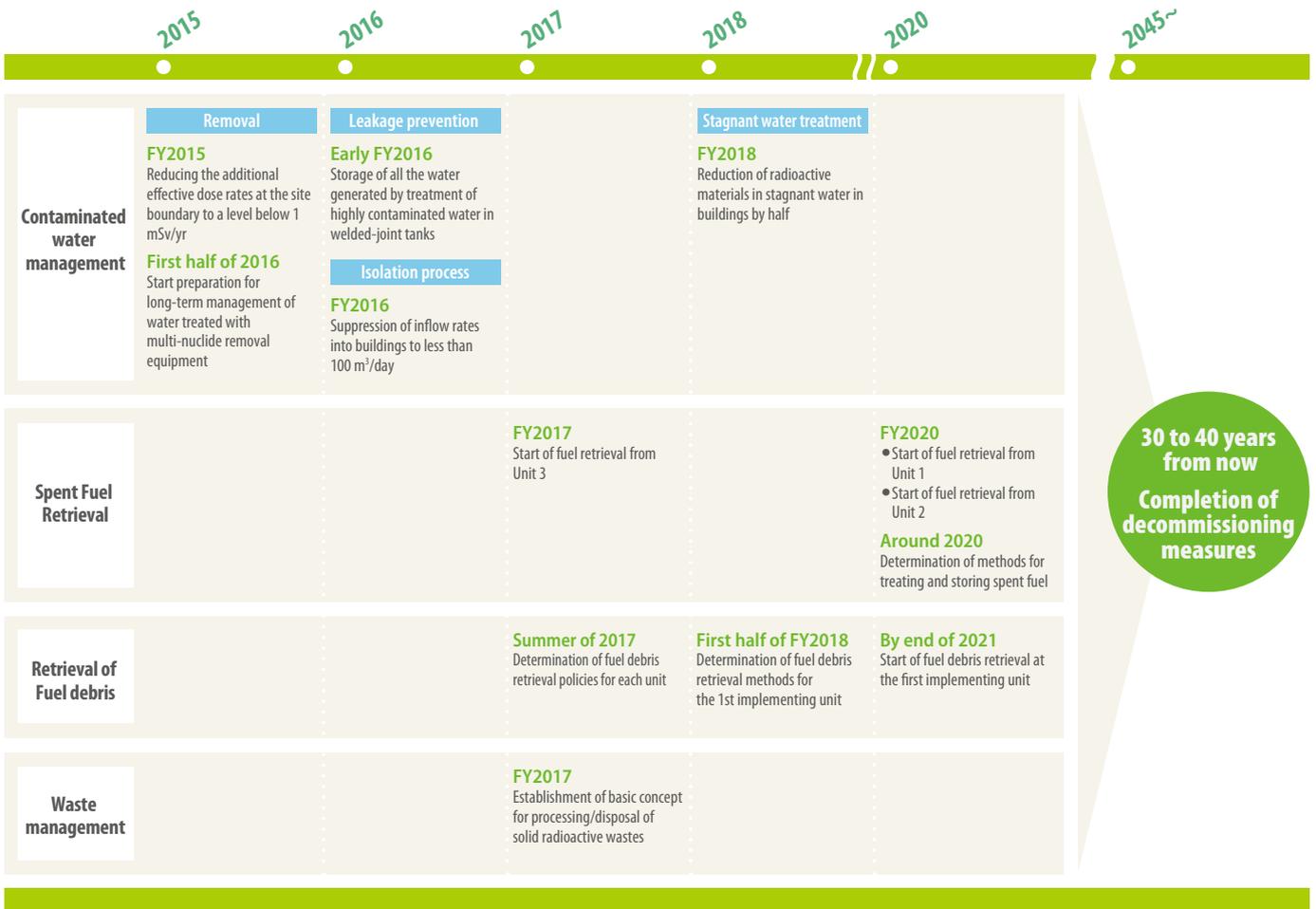
Part 2

Japan's approach to nuclear power based on lessons learned from the Great East Japan Earthquake

■ Response to the Fukushima Daiichi nuclear power station accident

Following the decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station and water contamination at the station, the Mid-and-Long-Term Roadmap toward the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station was established by Japan's Inter-Ministerial Council.

The Mid-and-Long-Term Roadmap is to be continually reviewed based on factors such as the situation at TEPCO's Fukushima Daiichi Nuclear Power Station and achievements in research and development related to decommissioning. The plan has been continually revised since its inception on December 21, 2011.



■ Efforts to restore social trust in nuclear power

The Nuclear Regulation Authority of Japan has developed new regulatory standards to prevent severe accidents. These new standards take learnings from the accident at TEPCO's Fukushima Daiichi Nuclear Power Station and feature more stringent regulatory requirements, including the enhancement of protective measures against extreme natural hazards, such as earthquakes and tsunamis, as well as improved resistance to fires, internal flooding, blackouts and other risks. Moving forward, Japan will continue to hold regular disaster prevention drills to improve the plan's effectiveness.



Energy policy changes following the Paris Agreement

Achieving the world's lowest levels of GHG emissions by energy mix policy

Japan believes that a fair and effective international framework in which all nations participate is essential to address global climate change issues. To achieve this goal, Japan, alongside other nations, committed to the adoption of the Paris Agreement at COP21.

All nations, including major emitters, are participating in the Paris Agreement. It includes a globally shared long-term target to hold the increase in average global temperature to well below 2°C above preindustrial levels (the 2°C goal). The Agreement stipulates that each country shall communicate or update emission reduction targets every five years. It also calls for stocktaking of the implementation of the Agreement to assess collective progress toward achieving the purpose of the Agreement every five years globally.

Prior to COP21, Japan submitted its Intended Nationally Determined Contribution (INDC) to the secretariat of the United Nations Framework Convention on Climate Change. It is an ambitious target that calls for Japan to reduce GHG emissions by 26.0% by FY2030 compared to FY2013 (a 25.4% reduction compared to FY2005). This means that Japan, whose GHG emissions per gross domestic product (GDP) are already the lowest among developed countries, will try to make further improvements by a measure of 40% (0.16 kg-CO₂/U.S. dollar).

Leading Economies	Compared to 1990 levels	Compared to 2005 levels	Compared to 2013 levels
Japan	-18.0% (FY2030)	-25.4% (FY2030)	-26.0% (FY2030)
United States	-14~16.0% (FY2025)	-26~28.0% (FY2025)	-18~21.0% (FY2025)
EU	-40.0% (FY2030)	-35.0% (FY2030)	-24.0% (FY2030)

*Source: Compiled by METI based on data from IEA 2015 and national statistics of the respective countries

Innovative energy strategy to balance environmental protection and economic growth

Tackling climate change issues requires finding a balance between mitigation measures and economic growth. To achieve this, Japan is committed to:

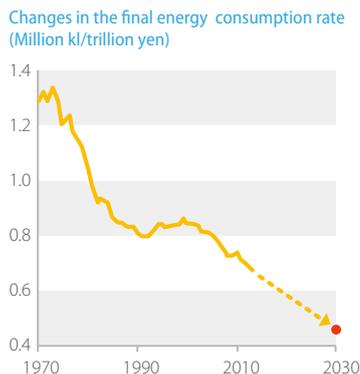
- 1) promoting energy-saving measures,
- 2) expanding the use of renewable energy sources, and
- 3) increasing investments aimed at establishing a new energy system to improve the efficiency of energy use.

To this end, METI compiled the Innovative Energy Strategy in April 2016.



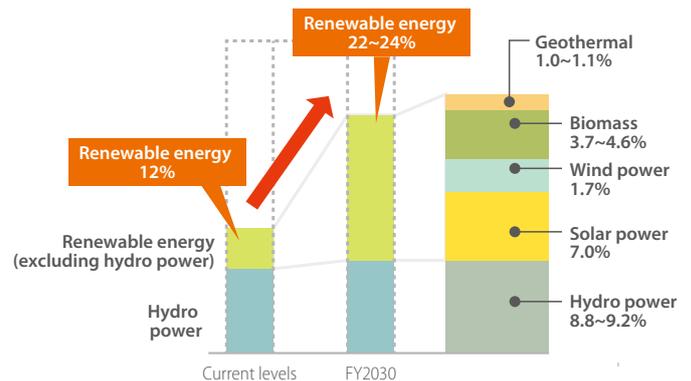
Energy conservation

Efficiency improvement equivalent to that achieved by Japan after the 70s oil crisis (35% improvement in energy efficiency)



Renewable energy

Two-fold increase from current levels (from 12% to 22-24%)





Ministry of Economy, Trade and Industry