

Energy Relationship Between Japan and Russia

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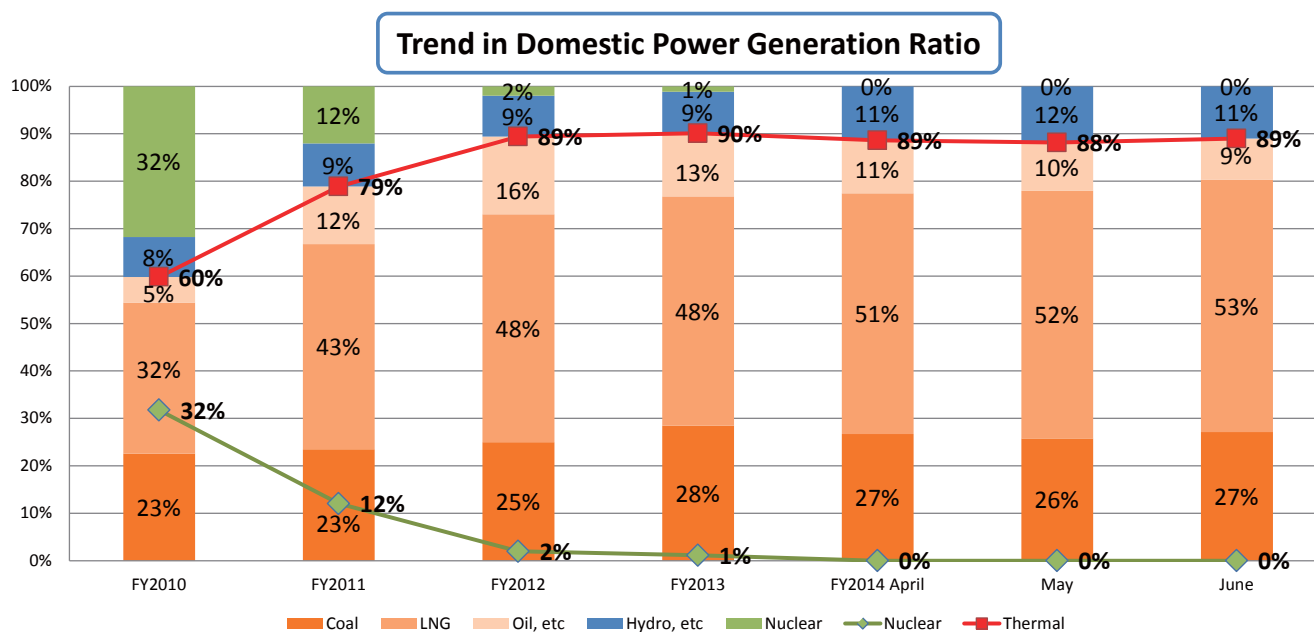
Agency for Natural Resources and Energy

Ministry of Economy, Trade and Industry (METI)

Japan

High Dependency On Fossil Fuels For Power Generation

- The nuclear power ratio in domestic power generation has decreased after the Great East Japan Earthquake due to the long-term shutdown of nuclear power plants .
- On the other hand, the thermal power ratio has increased to 90%. Currently, LNG thermal power alone accounts for nearly 50% of domestic power generation.

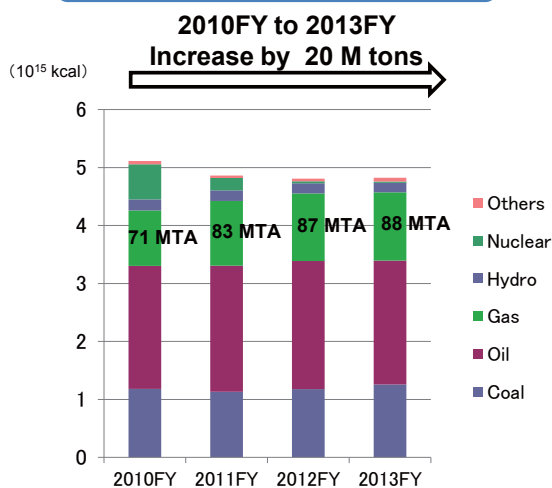


Source: Compiled by METI through power company hearing etc

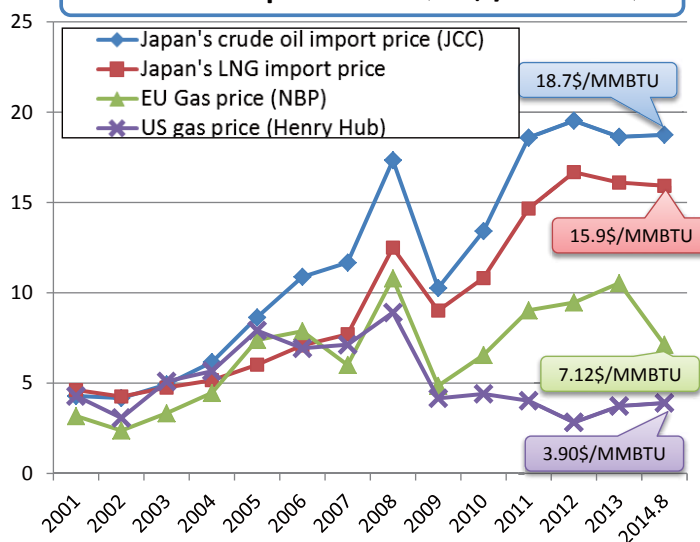
Increase in LNG Demand and LNG prices

- After the Great East Japan Earthquake, Japan's LNG demand increased by 24% due to the shutdown of nuclear power plants. (2010FY 71 MTA → 2013FY 88 MTA)
- In addition, Japan's LNG import price, linked to crude oil import price, has soared.
- As a result, Japan recorded a trade deficit for the first time in 31 years.

Japan's Energy Demand

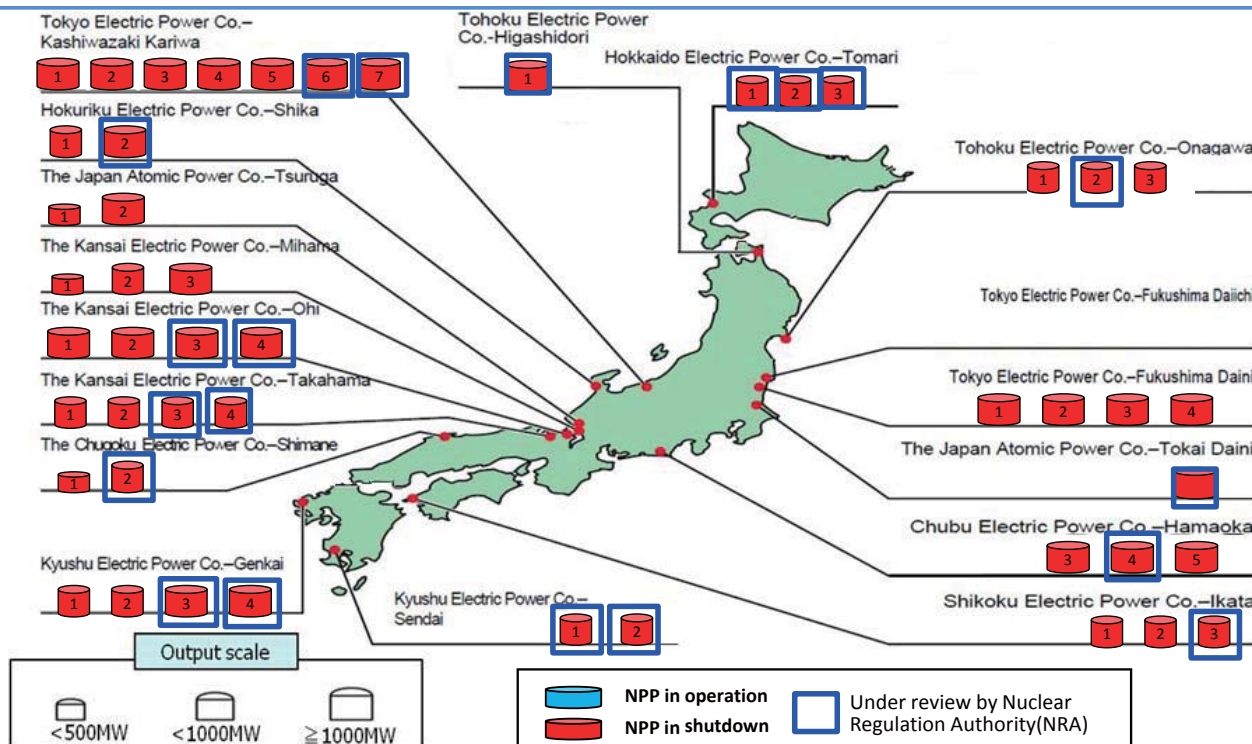


Natural Gas price trend (US\$ / MMBTU)



Update on Restart of Japan's Nuclear Power Plants

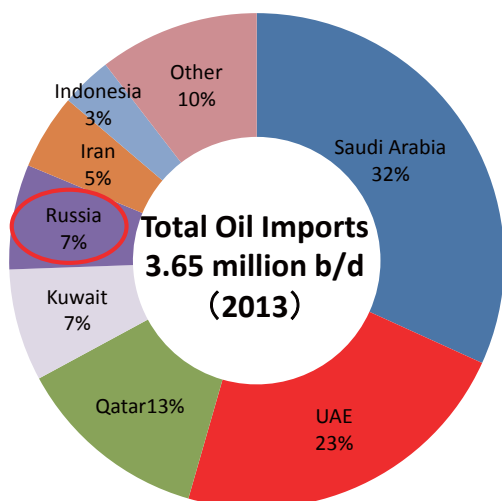
- 20 units (in blue squares) are under review for restart by the Nuclear Regulation Authority (NRA) in accordance with its new safety regulations.
- Two of the NPPs, Sendai 1st and 2nd units, have just got the first permission towards their restart.



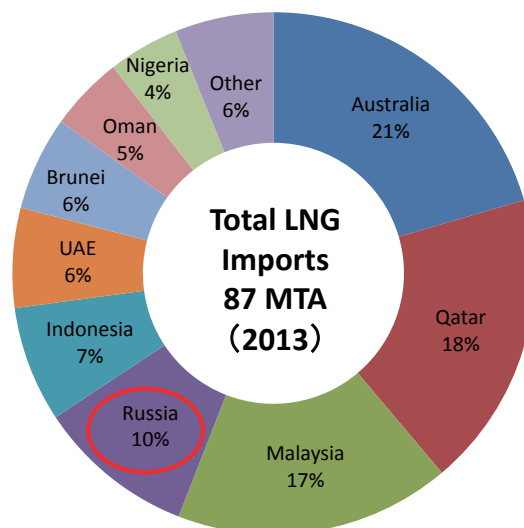
Importance of Russia to Japan

- Russia is one of the world’s top resource-rich countries for both oil and gas.
- Japan imports over 80% of its oil from the Middle East. In this regard, Russia is very important in our mission to reduce our dependency on the Middle East.
- The geological proximity to Japan also makes Russia an attractive source of supply.

Japan’s Oil Import (2013)



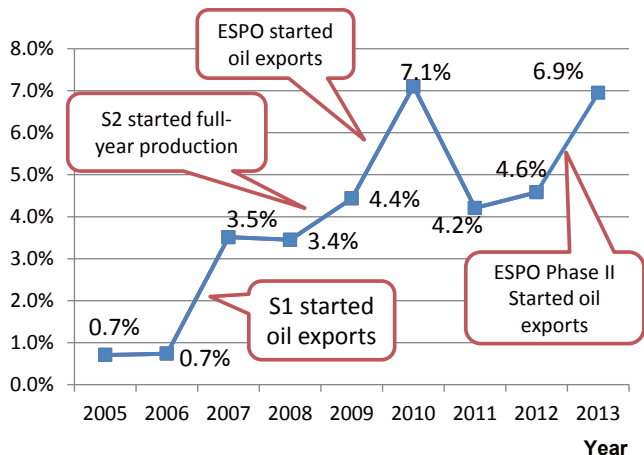
Japan’s LNG Import (2013)



Oil & LNG imports from Russia

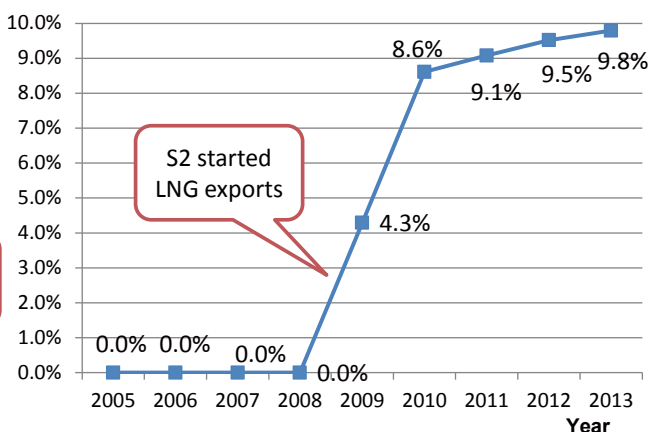
- In addition to oil exports from Sakhalin I (2005) and Sakhalin II (1999), the construction of ESPO (2009, 2012) has led to the increase of oil imports from Russia. Currently, Japan imports 7% of its oil from Russia.
- Japan imports 10% of its LNG from Sakhalin II, which started LNG exports to Japan from March 2009.

Russian shares in Japan’s total oil imports



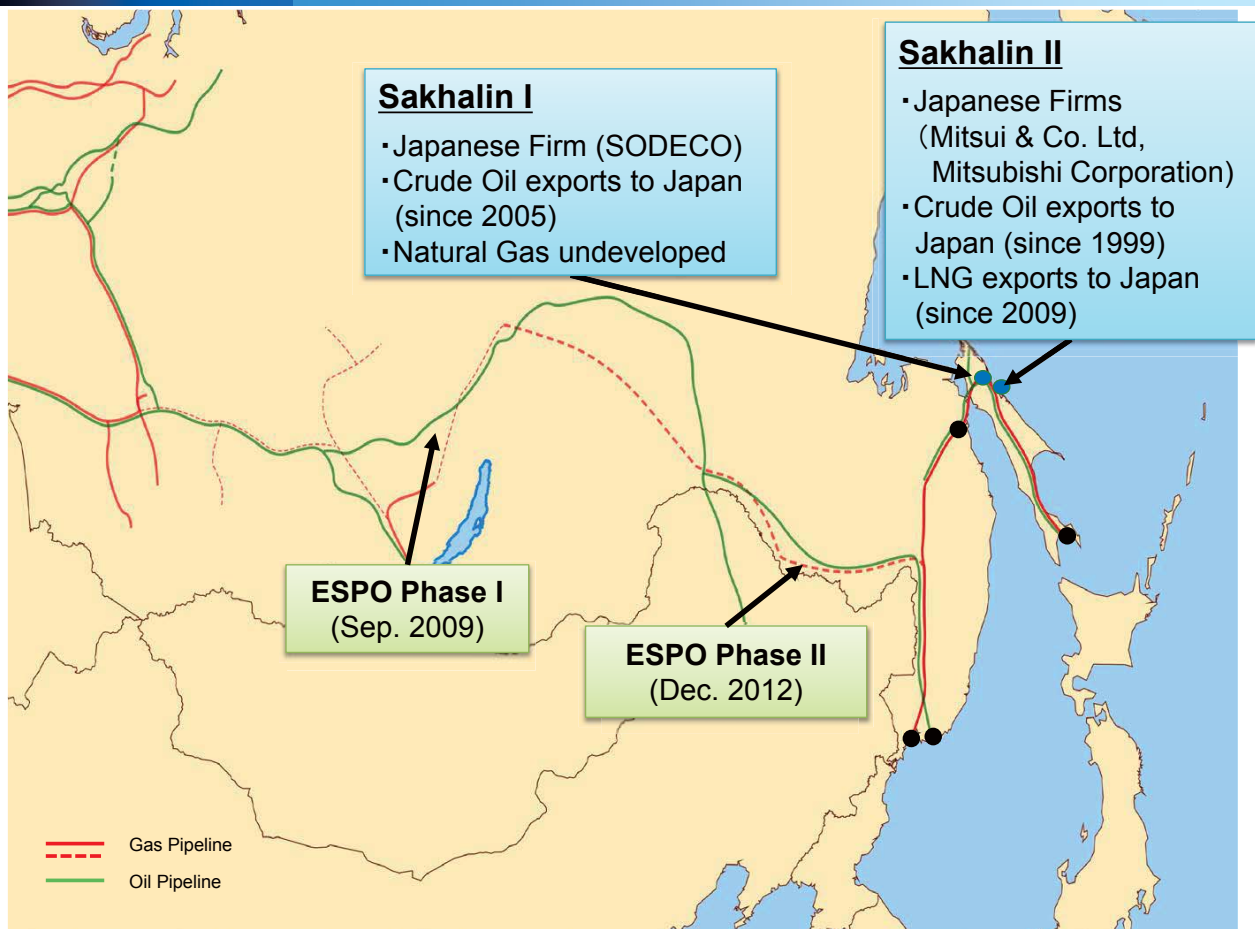
Source : Natural Resources and Energy Statistics

Russian shares in Japan’s total LNG imports

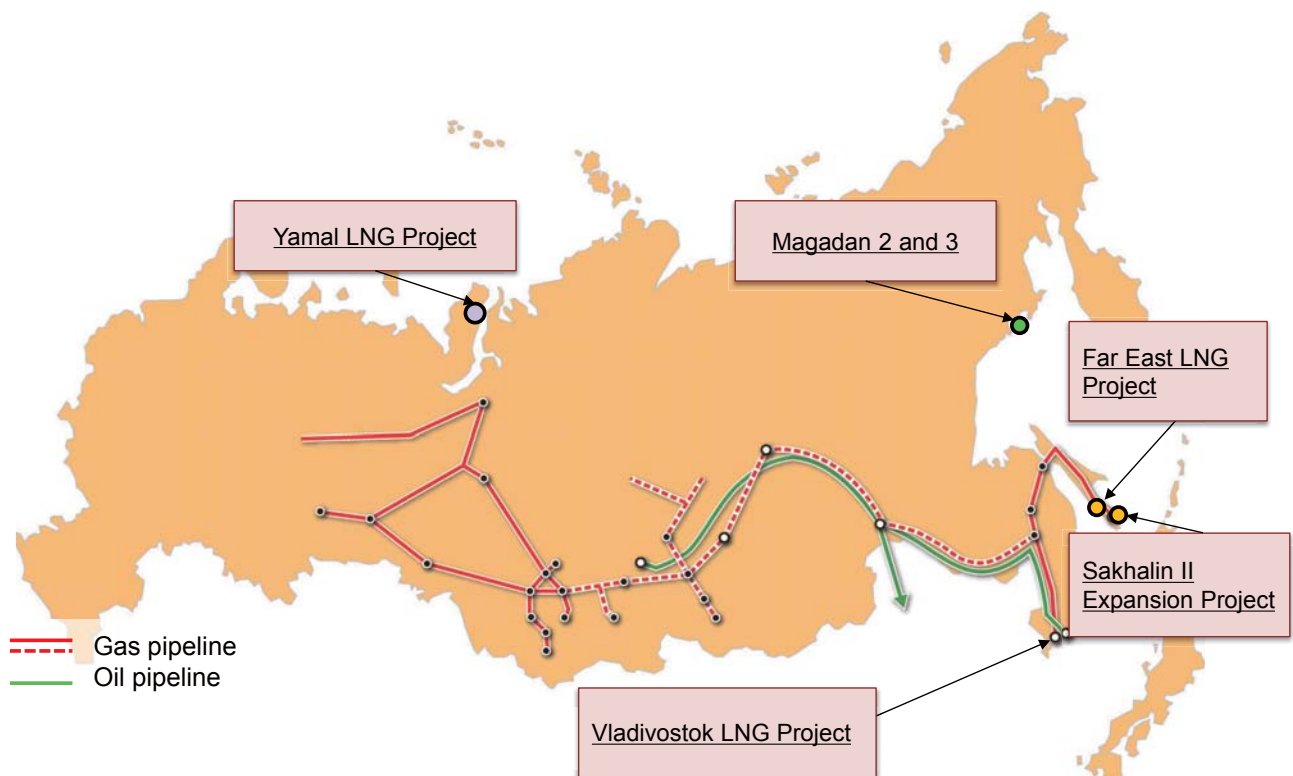


Source : MOF Trade Statistics

Oil and Gas Existing Projects in Russia



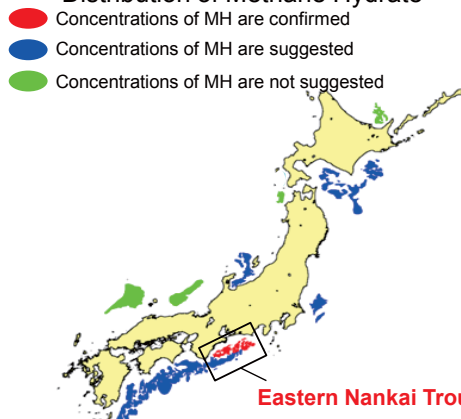
Russian Oil and Gas Future Projects in Russia



Deep Methane Hydrate

- In 2001, deep methane hydrate deposit surveys and R&D were launched as a national project. In 2006, detailed survey to identify the amount of deposits was completed. In 2008, onshore gas production test in Canada was conducted.
- In March 2013, the world's first experiment of methane hydrate gas production at sea was conducted using the depressurization method.
- Based on the results of the production experiment, the Japanese government established a policy target in which the technology for commercialized gas production will be prepared by FY 2018. Technological development will be promoted so that a project for commercialization led by private businesses can be started between 2023 and 2027.

<Distribution of Methane Hydrate>



As for the Deep Methane Hydrate, it is estimated that in the eastern Nankai trough area, there are original gas in place as much as 10 years of the natural gas consumed in Japan.

<The First Offshore Gas Production Test>



Deep Sea Drilling Vessel "CHIKYU"



Flare from offshore production test

Gas production test was conducted off the coast of the Atsumi and Shima peninsulas for about 6 days. The total output was approximately 120,000 cubic meters, and the average daily output was approximately 20,000 cubic meters.

(Reference)

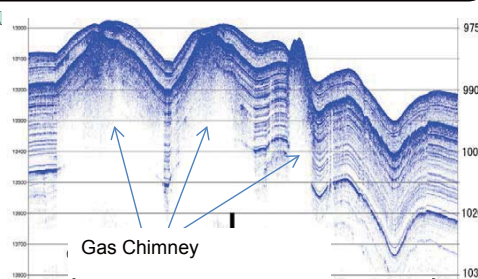
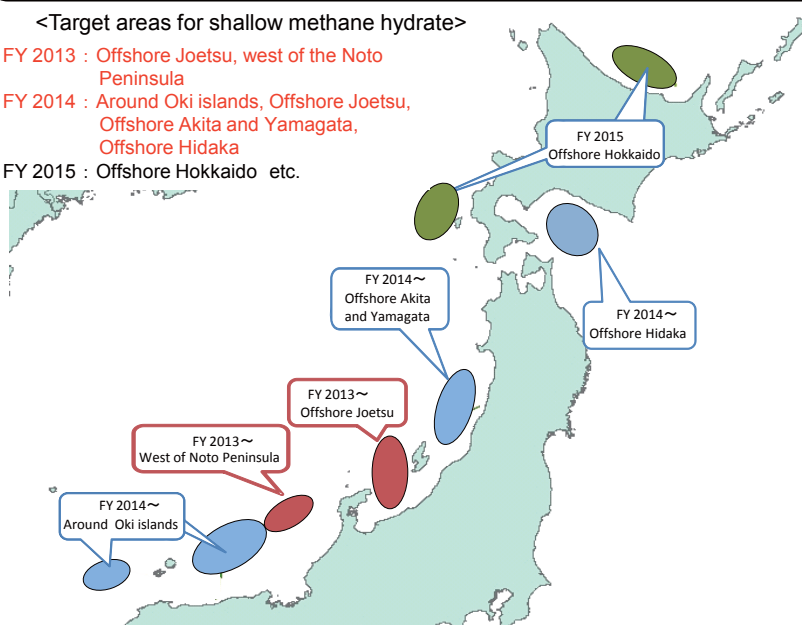
In 2008, onshore production test by using the depressurization method was conducted in Canada for 5.5 days. The total output was approximately 13,000 cubic meters, and the average daily output was approximately 2,400 cubic meters.

Shallow Methane Hydrate

- As for the shallow methane hydrate, deposit of which have been confirmed mainly in the Sea of Japan, a wide-area distribution survey will be conducted for 3 years from FY2013 to assess the amount of deposit. In FY2013, wide-area geological survey on the offshore Joetsu district and west of the Noto peninsula was conducted, and geological structure was confirmed.
- As a result of the analysis, "Gas Chimney structure", a potential area for methane hydrate bearing structure, was confirmed as 225 sites in survey area. In addition, they are observed to be significantly large, with diameters from about 200m to about 500m, occasionally reaching up to about 900m.
- It was also revealed for the first time that methane hydrate is densely distributed within gas chimney structure.
- In FY2014, a wide-area survey was continuously conducted along with geological sampling for methane hydrate evaluation.

<Target areas for shallow methane hydrate>

- FY 2013 : Offshore Joetsu, west of the Noto Peninsula
- FY 2014 : Around Oki islands, Offshore Joetsu, Offshore Akita and Yamagata, Offshore Hidaka
- FY 2015 : Offshore Hokkaido etc.



Example of cross-section diagram of the sea bed



Marine resource research vessel "Hakurei"