Natural Gas Infrastructure Development in Japan

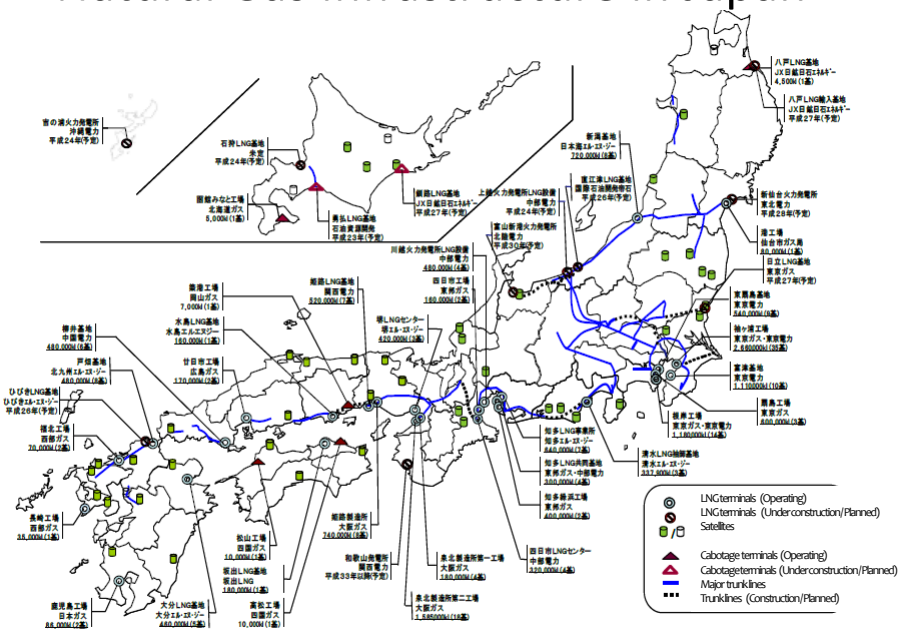
- This presentation has been prepared and translated by ERINA, using the materials published by the Agency of Natural Resources and Energy, METI, as a result of the Special Committee on the Establishment of Infrastructure for a Natural Gas Shift, under the Coordination Subcommittee of the Advisory Committee on Energy and Natural Resources. Please note that there might be distortions from the original materials in this presentation. For accurate understanding of the contents, please refer to the original documents (in Japanese) at the following web-site.

http://www.meti.go.jp/committee/sougouenergy/sougou/kiban_seibi/report_001.html

Background

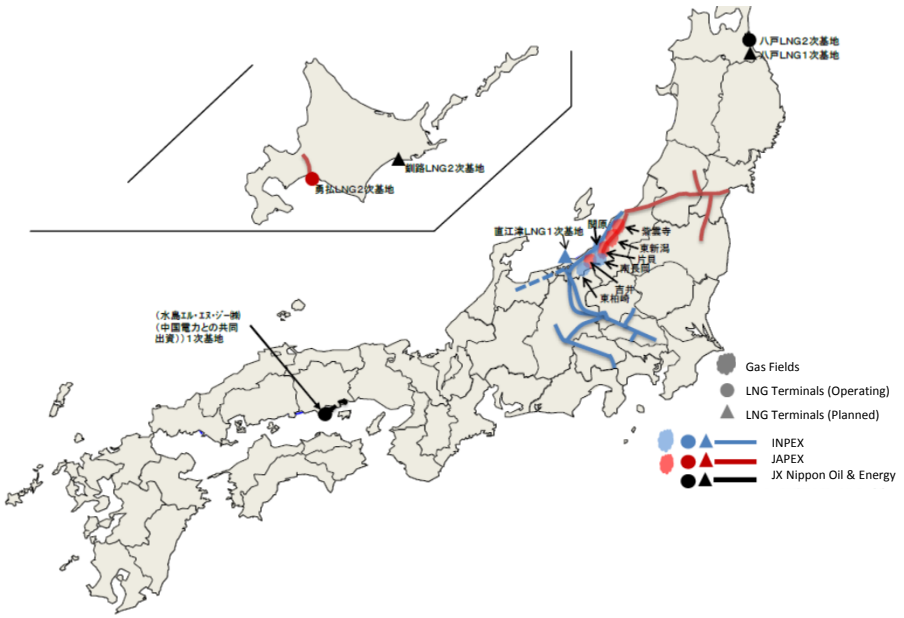
- "Effective utilization of fossil fuels (i.e., environmentally friendly use of fossil fuels), beginning with a shift to natural gas, while giving maximum consideration to environmental burden" ("Major discussion points toward the establishment of a new 'Basic Energy Plan for Japan' ", 20 December 2011, Fundamental Issues Subcommittee of the Advisory Committee on Energy and Natural Resources)
- A lesson from the Tohoku Great Earthquake is the importance of region-wide gas pipelines connecting cities and LNG terminals, which improve the security of the natural gas supply.
- The shift to natural gas has other significances such as the improvement of affordability and the reduction of the gas price.
- "The Special Committee on the Establishment of Infrastructure for a Natural Gas Shift" was established to carry out expert investigation on infrastructure development (regional pipelines, and underground storage, etc.) in January 2012. It published its final report in June 2012.

Natural Gas Infrastructure in Japan



（出所）第１回天然ガスシフト基盤整備専門委員会資料

Natural Gas Pipelines Constructed by Domestic Gas Producers, etc.



（出所）資源エネルギー庁作成

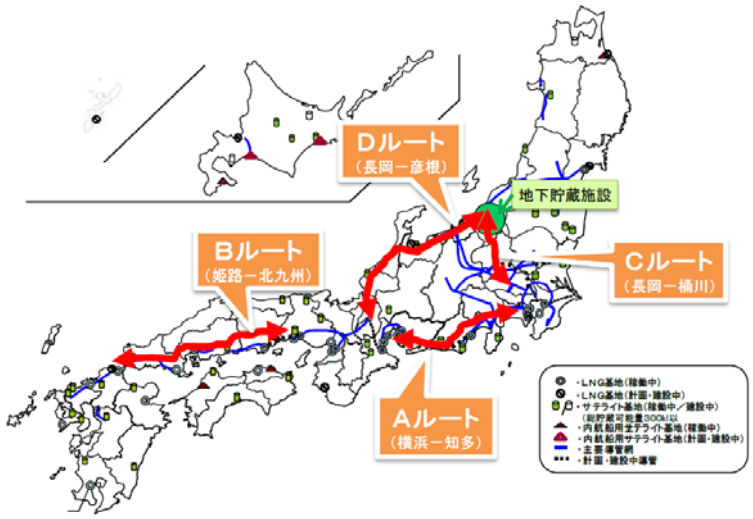
Estimates of the Costs and Effects of the Pipelines

- Mitsubishi Research Institute, Inc., carried out its estimation by way of the commissioning of the secretariat of the Special Committee on the Establishment of infrastructure for a Natural Gas Shift.

Assumptions for the Estimate

- For these estimates they set hypothetical routes regarding the natural gas pipelines for the wider region and the large-scale natural gas underground storage facilities which are looked to as the basis for the shift to natural gas, and attempted to ascertain the construction costs and expected effects thereof (these are not proposals for specific routes to put in place).
- When setting the hypothetical routes, it was taken that, in conjunction with connecting up the Kanto, Chubu, Kinki and Kyushu areas, which account for approximately 90% of the volume of Japan's LNG imports and approximately 70% of the town gas supply volume, there would be the connecting up of Niigata—as the promising region for the place of installation of the large-scale natural gas underground storage facilities—with the Kanto, Chubu, and Kinki areas. (See the next slide.)

Hypothetical Routes Used for the Estimates



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Results of the Estimates

- Construction costs of the 4 hypothetical routes and the large-scale natural gas underground storage facilities are estimated as follows:
  - Approx. 1.69 trillion yen (750mm)
  - Approx. 1.96 trillion yen (900mm)
- The effect is estimated to be approx. 1.79 trillion yen, as a sum of the expected business revenues, as well as the calculated benefits of the price reduction effect, the assets investment averting effect and the CO_2 reduction effect.

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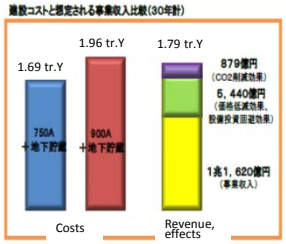

CO_2 reduction: 0.0879 trillion yen

Price reduction & assets investment averting : 0.544 trillion yen

Expected business revenues: 1.162 trillion yen

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Measures for Development of the Pipeline Network

1. A need for government policy ensuring totally optimized pipeline network development
2. A government coordination of interests among private enterprises
3. A definition of cost-sharing schemes, in terms of range of beneficiaries, methods, level and timing
4. A reduction of infrastructure development costs
5. Measures for stimulating demand in the areas along the pipelines in conjunction with their construction
6. An exploring of the possibilities for underground storage utilizing exhausted gas fields
7. An improvement of regulations in the areas of calorie adjustment and gas transportation service

Cost-Sharing Issues