Chapter 2

Background

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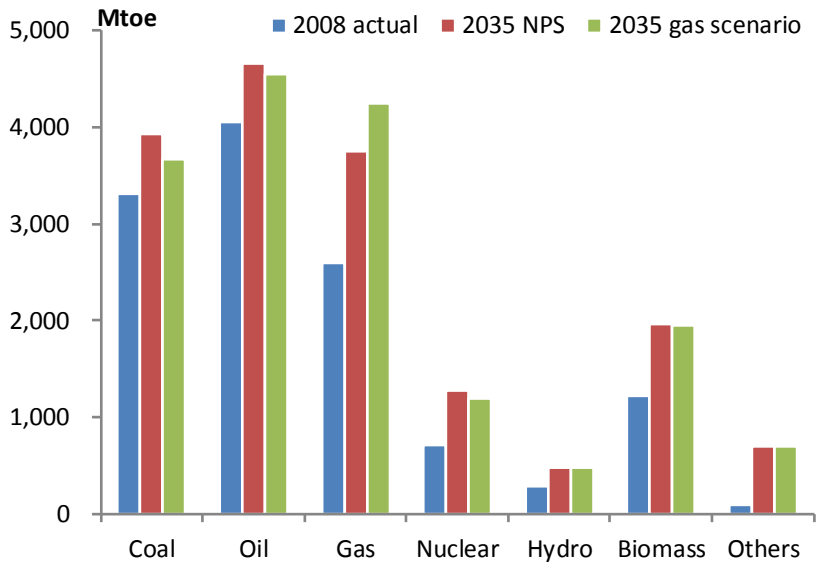
CHAPTER 2

Background

Five years ago, the advent of the Golden Age of Gas was suggested in the *World Energy Outlook 2011,* published by the International Energy Agency (Figure 2-1). It provided a scenario where an abundant natural gas supply at a reasonable price would expand the global natural gas market and simultaneously achieve stable energy supply and reduce carbon emissions by replacing coal consumption. However, such a rosy scenario has not unfolded, except in the United States of America where the significant growth in domestic production has increased the share of natural gas in its energy supply mix. Global gas demand, as a whole, has continued to grow in the last 5 years, but its growth rate has been rather lower than expected for many parts of the world. According to historical statistics, the increment of natural gas demand is smaller than that of coal in most years since 2000. In addition, after 2012, even the increase in renewable energy surpassed that of natural gas (Figure 2-2).

What happened in the global gas market? Why did the Golden Age not materialize?

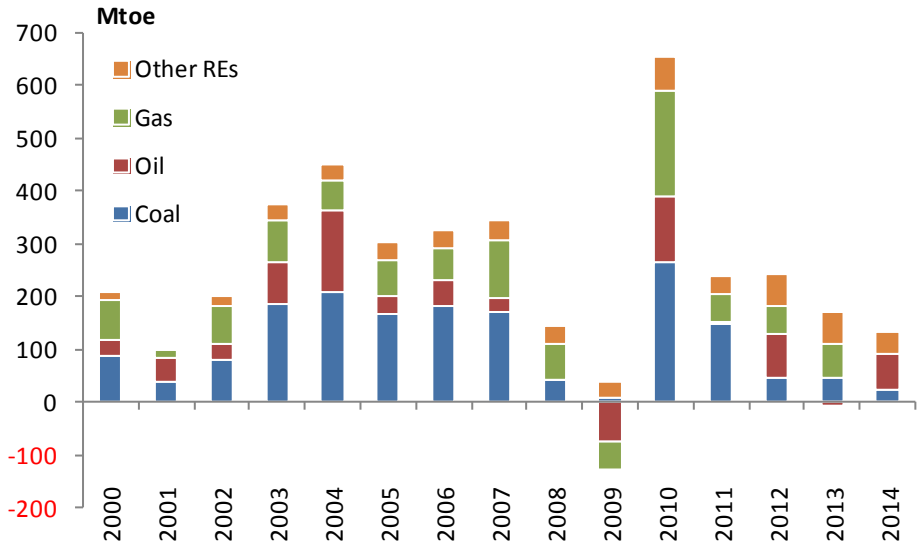
Figure 2-1. Outlook for a Golden Age of Gas



Mtoe = million tonnes of oil equivalent, NPS = New Policy Scenario.

Source: International Energy Agency (2011).

Figure 2-2. Year-on-Year Change of World Energy Demand by Fuel

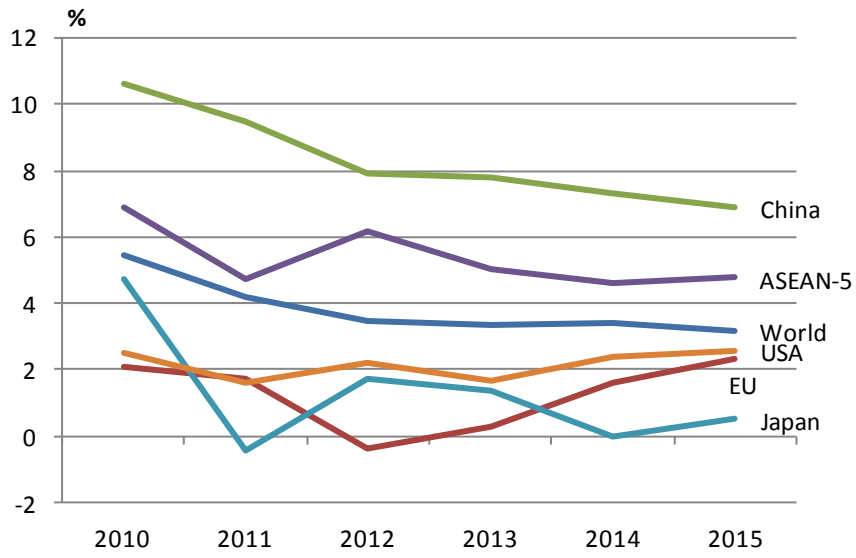


Mtoe = Million Tonnes of Oil Equivalent, RE = Renewable Energy.

Source: International Energy Agency (2016).

Market and policy factors are behind the disappointing rate of market expansion. The biggest market factor is macroeconomic stagnation in both developed and developing countries. In Europe, economic uncertainties triggered by the fiscal crises in several European Union member countries have dampened the region's economic performance, reduced total energy demand, and narrowed the room for growth in demand for natural gas. In emerging countries, most notably China, economic slowdown, if not downturn, resulted in much slower growth in total energy demand and restricted the potential growth of natural gas demand.

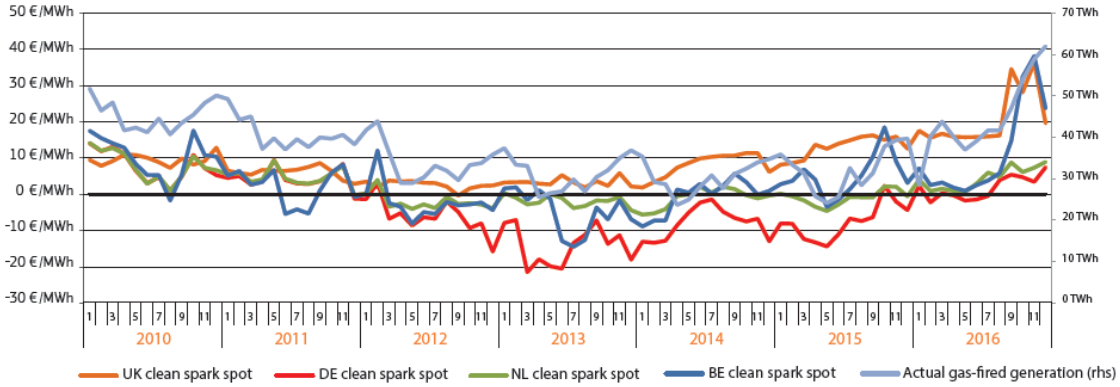
Figure 2-3. Growth Rate of Real GDP



ASEAN-5 = Indonesia, Malaysia, Philippines, Thailand, and Viet Nam, EU = European Union, GDP = gross domestic product, USA = United States of America.
Source: International Monetary Fund (2016)

A second market factor is the relative price competitiveness of coal against natural gas. In almost all major markets, natural gas prices are higher than coal prices. Natural gas is therefore not an economic option in the consumers' selection of energy sources. In Europe, the carbon price set in the European Union Emission Trading System was not high enough to encourage the use of the environment-friendly natural gas. In Asia, the liquefied natural gas (LNG) pricing formula linked to crude oil prices kept the prices of imported LNG at a high level, which kept consumers away from the use of natural gas versus more reasonably priced coal.

Figure 2-4. Clean Spark Spreads of Selected European Markets



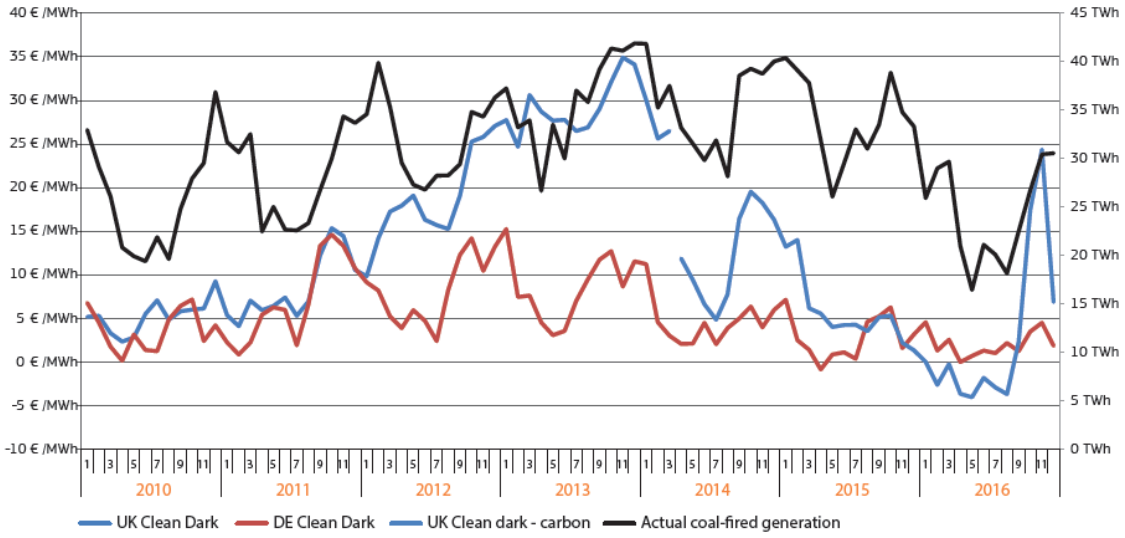
BE = Belgium, DE = Germany, NL = Netherland, UK = United Kingdom.

Notes: Clean-spark spreads is defined as the average difference between the cost of gas and emissions, and the equivalent price of electricity. If the level of spark spreads is above 0, gas power plant operators are competitive in the observed period.

€/MWh = euro per megawatt hour.

Source: European Commission (2016), *Quarterly Report on European Electricity Markets*, 4th Quarter.

Figure 2-5. Clean Dark Spreads of Selected European Markets



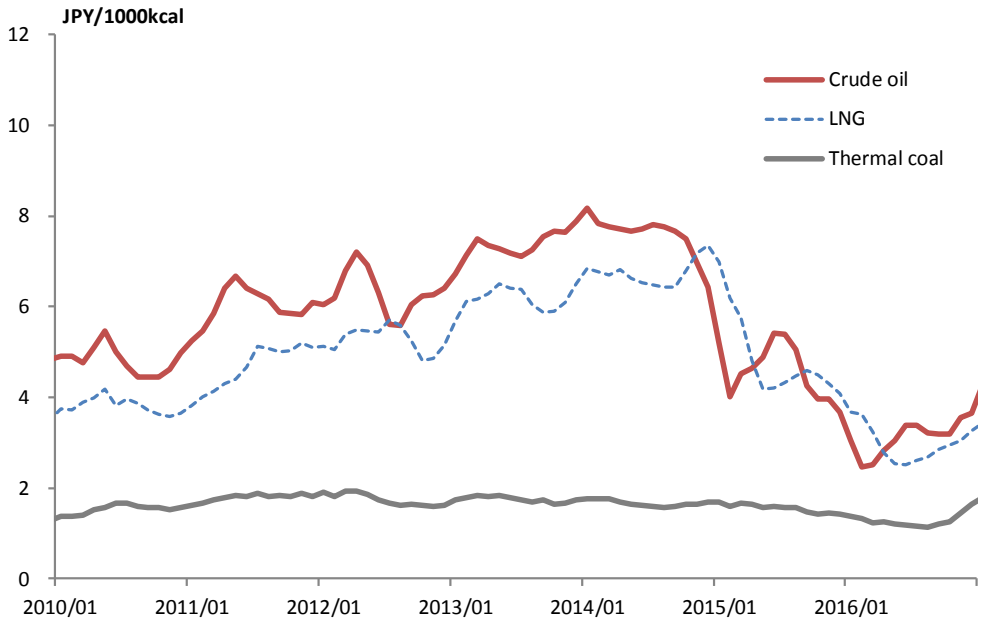
DE = Germany, UK = United Kingdom.

Notes: Clean dark spreads = Defined as the average difference between the price of coal and carbon emissions, and the equivalent price of electricity. If the level of dark spreads is above 0, coal power plant operators are competitive in the observed period.

€/MWh = euro per megawatt hour.

Source: European Commission (2016).

Figure 2-6. Japan's Fossil Fuel Import Price per Unit Heat Content



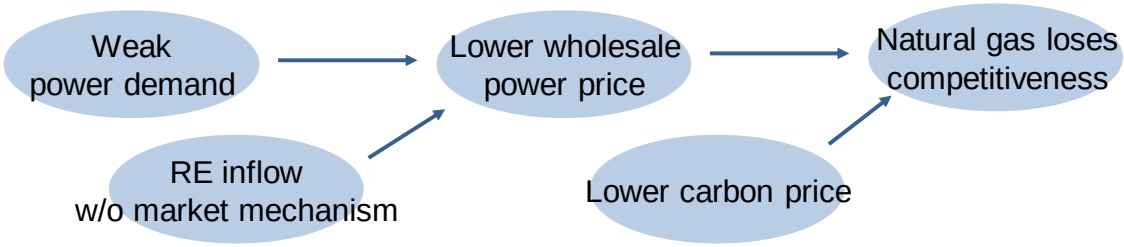
LNG = liquefied natural gas.
Note: JPY/Kcal = Japanese yen per kilocalories.
Source: The Institute of Energy Economics, Japan, EDMC Databank.

Policy factors also worked unfavourably for natural gas. Generous government support made renewable energy a more attractive energy option for consumers. Without any distortion by policies, natural gas is still more cost competitive over other renewable energy as a fuel source for power generation. However, it was disadvantaged by strong government/policy support for renewable energy, either by subsidies or taxation, such as the Feed-in-Tariff scheme.

The mechanism to squeeze out natural gas from power generation market can be explained like this. The fundamental (supply-demand balance) of power market is weak because of a stagnated economy. Although the power market is oversupplied, subsidized renewable electricity increasingly flows into the market and consequently lowers wholesale power price. Under such condition, the coal-fired power plant is the only choice for power generators to profit. In addition, a low carbon price further strengthens the price competitiveness of coal. As such, natural gas-fired power plants lose their ground in the power market.

This phenomenon is present not only in Europe, where renewable energy has traditionally received consistent government support, but also in emerging countries such as China and India where renewable energy is highly valued as an indigenous energy source from an energy security standpoint.

Figure 2-7. Mechanism to Squeeze out Natural Gas from the Market



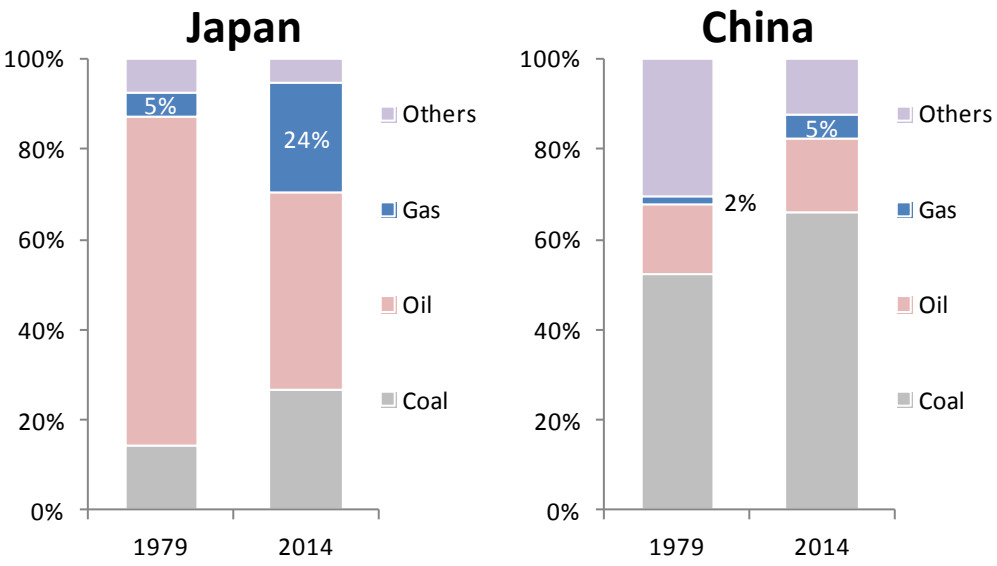
RE = renewable energy, w/o = without.

Source: Author.

Natural gas has numerous security benefits. In Japan, for instance, LNG was introduced as an alternative energy to reduce its high dependence on oil after the two oil crises in the 1970s. LNG has in fact been a highly stable and reliable energy source for traditional LNG importers such as Japan, Korea, and Taiwan. In China and India, natural gas will likely play a very important role in diversifying their energy sources that heavily depend on coal today. In Asia, where energy demand will continue to grow, the security benefits of natural gas cannot be overemphasized. Among various natural gas supply sources, imported LNG will play a far greater role in Asia considering its significant potential for growth in supply[1] and supply flexibility.

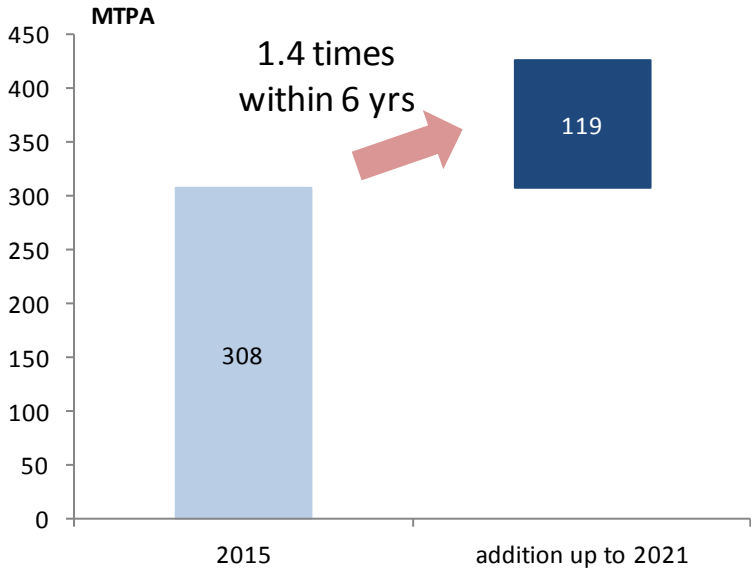
[1] The Energy Information Administration estimated the global technically recoverable amount of unconventional gas as 6,954 trillion cubic feet (approximately 195 trillion cubic metres) in their World Shale Resource Assessments in September 2015. If this resource becomes available, the world's natural gas reserves-to-production ratio will be doubled to around 109 years from 53 years in 2015 (BP (2016)).

Figure 2-8. Change in Total Primary Energy Supply Mix



Source: International Energy Agency (2016).

Figure 2-9. Planned Addition of LNG Liquefaction Capacity



LNG = liquefied natural gas, MTPA = metric tonnes per annum.
Sources: GIIGNL (2015) and International Energy Agency, Global Gas Security Review 2016.

Another important element that hinders the use of natural gas is the lack of natural gas/LNG supply infrastructure. Needless to say, a country needs to develop sufficient capacity for LNG receiving terminal, transmission, and distribution pipelines before it can import and consume. The problem is the relatively high capital expenditure on natural gas infrastructure. Because of this capital-intensive nature, the development of a natural gas/LNG supply infrastructure

requires a minimum/critical amount of concentrated demand to make it economically feasible. A certain amount of demand is also required as collateral to secure the necessary loan for financing a project.

In general, the development of gas infrastructure lags behind electricity, in particular, the low-pressure distribution system. In a developed country, for instance in Japan, gas was first utilized as fuel for street lighting. Hence, gas distribution pipelines were installed to provide public service to the city. However, at present, electricity is the more common source of essential energy service for the people and industry. As such, developing countries have been making strong efforts to achieve 100% electrification. With this shift from gas to electricity, a lot of people from cities in the Association of Southeast Asian Nations (ASEAN) are using electricity rather than gas for cooking, heating water, and lighting. Naturally, the creation of new natural gas demand and the development of new gas supply infrastructure have become more difficult than in the past.

What then needs to be done to realize the expanded use of LNG in Asia? This report recommends several actions by government and industry players to achieve this objective. Chapter 3 discusses this issue in depth.