

EXECUTIVE SUMMARY

Japan's energy policy is undergoing fundamental changes. The accident at TEPCO's Fukushima Daiichi nuclear power plant questions the future contribution of nuclear power in the national energy mix. Growing imports of fossil fuels to replace the lost nuclear capacity inflated energy prices and raise economic and energy security challenges. At the same time, the US shale gas and oil revolution is reshaping the global energy scene. These developments have driven the Government of Japan to review its energy policy from scratch and adopt a new Strategic Energy Plan. This new policy has far reaching implications for gas and coal development in Japan but also for the international markets as Japan is the world largest LNG importer and the second largest coal importer.

A systemic energy policy, supporting the goals of Abenomics

The Strategic Energy Plan, adopted by the Japanese Cabinet on 11 April 2014, is built around four basic principles. The first confirms the "3Es" (energy security, environment protection and economic efficiency) as the basis of Japan's energy policy, to which the Government has added Safety as a basic premise ("3E + S"). The second principle is the global approach of the policy, which aims at internationalizing domestic energy industries by facilitating their business overseas. The third principle is the contribution of energy policy measures to economic growth. To achieve this goal, Japan is carrying out reforms of the energy sector in order to enhance Japan's competitiveness as a business location. The fourth principle is to build a diversified, flexible, multi-layered supply-and-demand structure.

The new energy policy is systemic, waking in alignment with other policy strands and supporting industrial, economic and environmental goals of Abenomics. It affects the structure of the economy as a whole, not only the energy sector.

Key decisions on nuclear power and clean coal technologies

The major decision taken by the Government is the confirmation of nuclear power as an important base-load power source, on the major premise of ensuring its safety. Another key point is the importance given to advanced high-efficient coal technologies. The energy situation in Japan and Asia has pushed the Government to re-evaluate the role of coal in the power mix. The Government promotes the building of advanced high-efficient coal power plants in Japan, and abroad, as a pillar of its export policy. Natural gas, the main energy source for mid-load power generation, is expected to expand its role in new sectors of consumption, such as the industrial and transportation sectors. The Government expects that the price of imported gas will be determined by market forces. The development of renewable energy sources has been accelerated through the adoption of generous feed-in-tariffs. Their share in the electricity mix is expected to be higher than foreseen by the previous administration. However, this development adds a high cost on the economy and consumers' bill. The Government is addressing this issue with the aim of balancing both promotion of maximum use of renewable energy and mitigating people's burden.

The pace and scale of nuclear restart is still uncertain

Japan's nuclear reactors remain idle in the wake of the 2011 Fukushima Daiichi meltdown and it is unlikely that any reactors will be restarted before 2015. While utilities have applied to restart 20 nuclear reactors, only two have cleared the approval process in September 2014 but they still have to get local approval and clear other safety tests before restarting. This points to strong LNG and coal demand for some time to come as the country continues to rely on high levels of thermal generation. Nuclear power accounted for 30% of total generation before the tsunami. Now thermal power

generation ensures 90% of power generation. As Japan has little fossil fuel reserves, almost all its oil, gas and coal is imported.

Japan is rapidly advancing its strategy to lower LNG procurement costs and move away from oil-indexation

Since the Fukushima accident, import fuels costs turned the trade balance into deficit in 2011 and the deficit has risen substantially in 2013 with the devaluation of the yen. The priority challenge is to lower energy costs and procure stable and competitive supply. The soaring price of LNG has substantially inflated LNG procurement costs, from JPY 3.5 trillion in FY2010 to 7.1 trillion in FY2013. Due to the heavy burden for the Japanese economy, citizens and businesses, the Government is now treating the issue as one of national economic security. The Japanese Government has developed a wide strategy to reduce its LNG procurement costs, which encompasses the full LNG value chain, from upstream overseas investment to a move away from oil indexation, elimination of destination clauses, diversification of supplies and strategic comprehensive alliances.

Natural gas supply is expected to increase globally thanks to progress in unconventional natural gas development in the U.S. and other countries. Japan expects to take advantage of the trend to eliminate the "Asian premium" on natural gas prices and expand cheaper natural gas consumption. The active participation of Japanese companies in the development of shale gas and LNG projects in the U.S. is the key strategy to achieve this objective, through diversification of supplies and indexation on gas benchmark. Japanese companies are actively participating in three US LNG projects that have all been approved for exports to non-Free Trade Agreement countries, thanks to the pro-active role of the Japanese Government. Japan is also financing US shale gas and LNG projects to accelerate this development. In August 2014, a group of Japanese banks provided USD10 billion loans to US Cameron's LNG project, which is now expected to start deliveries to Japan by 2017. Another USD10 billion will be invested in 90 LNG tankers by 2020. Japan is also raising its negotiating power *vis-à-vis* LNG suppliers to reduce fuel costs. The recent alliance between TEPCO and Chubu Electric, announced in October 2014, will create one of the world's biggest importer and consumer of LNG. Tokyo Gas has recently partnered with South Korean KOGAS on joint LNG purchases and investment in gas fields. Japan is also seeking to create an Asian gas benchmark. The launch of Japan's first LNG derivatives trading platform on 12 September 2014 is a first step in this direction.

A wave of thermal power investment amid power market liberalization

The prolonged shutdown of Japan's nuclear power plants and a rising prospect that several units may not come back online have prompted utilities to invest in new thermal capacities. This trend is reinforced by the need to replace aging fleet. For instance, TEPCO owns a thermal power fleet of 43 GW, a third of national thermal capacity, but almost half of its power plants are over 35 years old. Electricity market reforms are also a strong incentive to expand capacity. The power market reforms aim at fully liberalizing the retail market (one-third of total demand) by 2016, fully liberalizing power generation, and ensuring neutrality of power transmission and distribution sectors through legal unbundling from 2018 to 2020. The first step of the reform, the creation of a national transmission operator (Organization for Cross-regional Nationwide Coordination of Transmission Operators, OCCTO) was formally authorized by the Government at end August 2014.

New power providers, such as gas utilities, trading houses, steel makers, renewable generators, can be expected to enter the market, promoting competition between players and between fuel sources and

lowering prices. This new competition provides additional incentives for electricity companies to reduce costs, and above all their LNG procurement costs.

More than 40 GW of new gas and coal power capacity is at various stages of development in Japan. Several power plants are built by companies looking to enter market competition, mostly around Tokyo. The Great Tokyo metropolitan area is highly coveted. The region accounts for 30% of Japanese electricity demand. And while Japan's power market continues to shrink, a rise in energy demand is expected in the capital and its surrounding areas in the lead-up to the 2020 Tokyo Olympics. Most of the thermal plants built before FY2019 are gas-fired power plants, which can be built quicker, in a modular way and are more efficient and less-capital intensive than coal-fired power plants. However, small coal power plants (100 MW), expected to start operations by 2016/17, are built by companies looking to enter market competition, mostly around Tokyo.

Gas and coal competition is heating up

Gas-fired power capacity is expanded at a high pace and speed. In 2013, power utilities commissioned almost 3 GW of new capacity and are expected to bring on 14 new gas-fired power plants between April 2014 and October 2015, adding 6 GW of new installed capacity. There is an additional 6.5 GW of capacity coming on line before FY2019 and 9 GW planned after that date.

Thermal power plants planned to start after FY2019 have to go through a public tender process. Four tenders are currently held for a combined capacity of 11 GW and show that competition between coal and natural gas is heating up in Japan. As Japan tries to reduce its energy bill, coal has become a new competitor for gas in the power sector as its import price is five times less than LNG on a Btu basis. Currently, there are thirteen coal-fired power plants, with a combined capacity of more than 9 GW, at various stages of development and expected to start after FY2019. Several coal-fired power plants are planned to demonstrate new high-efficient technologies, such as integrated gasification combined cycle, which use is promoted by the Government, in Japan and globally, to reduce GHG emissions significantly compared with current coal-burning technologies. This trend is also in line with the new energy policy which considers that over-reliance on one energy source has to be avoided.

In search for stable and competitive energy supply

The Strategic Energy Plan does not quantify the role devoted to each energy source. The future energy mix is still uncertain although it is quite clear that competitiveness and safety will drive future decisions.

At short term, the increase in coal power capacity in FY2013 has allowed a softening of LNG demand growth. Due to the low cost of coal, nuclear restarts will have a limited effect on coal consumption. This is not the case for LNG, whose imports are reduced in a scenario with nuclear restart.

In the mid-term, Japan is adding coal and natural gas generation, diversifying its LNG supplies, adding more flexible LNG contracts, and adding renewables with long-term feed-in-tariff contracts. If the nuclear restart is delayed and/or limited, the power sector will be ready for a long-term shift to thermal and renewable generation. If the scale of nuclear restart is high enough, the additional power capacity will make the system more reliable and allow competition between players and energy sources to increase. It is very difficult to assess how many coal-fired power plants may displace gas-fired power plants. Most of the coal stations are foreseen for the next decade, some even for FY2028. In the meantime, efforts to reduce LNG supply costs will be a key determining factor. The success of renewable feed-in tariffs and the outcome of the climate discussions next year in Paris will also play a key decisive role.