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A new era in energy

Emerging global trends

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KPMG in Japan

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Japan's geopolitical risk brought into sharp relief

The Great East Japan Earthquake highlighted a latent risk that we are prone to forget: the geopolitical vulnerability in Japan's energy security. A rethink of Japan's energy policy became inevitable. On the 11th of April, 2014, the Basic Energy Plan incorporating the acceleration of renewable energy deployment and a reformulation of Japan's nuclear policy is set to be approved by the Cabinet. The world of energy is globally interrelated, interdependent and interlinked. Not possessing natural resources of its own, Japan's position is not strong. What to use as leverage and how to establish its position under such conditions to secure the future of the country, that is the essence of energy policy and these priorities will define the profile of Japan as a nation.

What is happening in the world of energy? Battles over energy are unfolding around the world. The trends in the energy industry are undergoing massive changes on a global scale.

Emerging economies such as China and India experienced rapid growth while Japan struggled with a protracted recession after the burst of the bubble in the 1990's. Middle East oil and gas producers broadened their export destinations to include emerging economies. The potential of shale gas and oil to address simultaneously security of supply and climate change challenges was heralded with much enthusiasm in the United States, while in the UK the debate focused on measures to ensure stable power supply.

The Great East Japan Earthquake hit in the midst of these dynamics. The *tsunami* that struck across eastern Japan destroyed the Fukushima Daiichi Nuclear Power Plant, one of the main sources of baseload power for the Kanto region. The area was forced to endure rolling blackouts. A fragmented power grid network hampered the supply of electricity from the Chubu and Kansai regions into Kanto. Following the nuclear accident in the Far East, Germany chose to phase out nuclear power generation. The UK in contrast introduced a new nuclear strategy, and the outlook for nuclear power generation in many emerging economies has not been greatly affected by the events in Japan.

All of Japan's 55 nuclear reactors are currently out of service including those set to be decommissioned. Japan is running its thermal power plants at full capacity to meet the demand. LNG used for gas-fired generation is almost 100% dependent on imports.

Japan's weak leverage in price negotiations due to geopolitical factors, in addition to growing LNG imports following the earthquake, has greatly increased the bill paid to the gas producers. Since the price of gas exported to Japan is contractually linked to the price of crude oil, Japan pays more than three times as much for gas as the United States and 1.7 times as much as Europe. Redressing this situation has become a national imperative for Japan in order to maintain the competitiveness of its industries.

In this booklet, experts at KPMG in Japan explain the new trends developing in the issues surrounding energy to provide various angles to watch at the energy market in Japan.

Redressing LNG price

A national imperative

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Trend of overseas investments

With the prolonged shutdown of the nuclear power plants, natural gas-fired power generation has become the main power source in Japan. However, LNG prices in Japan are expensive compared to international standards. Redressing this situation is arguably a national imperative if Japan is to maintain its industrial competitiveness.

To lower the price of LNG imports, Japan has embarked on the Ichthys LNG project in Australia as an 'all-Japan' team effort. For the first time in gas development, Japanese companies will be taking the lead over the entire process, from gas field development to operation, liquefaction and exporting.

Japanese companies are also participating in the construction of LNG export terminals in the United States with the aim of obtaining LNG at Henry Hub prices. Long-term supply contracts with Japanese customers were important requirements to enable the construction of the export terminals in Freeport, Texas and Cameron, Louisiana. Investments from Japanese companies and loans from Japanese banks are also essential elements.

The LNG export terminals in the US were originally built to receive LNG imports from the Middle East. Projects aim to convert for export facilities located at the Gulf of Mexico; exports to Japan will have to travel across the Pacific via the Panama Canal. The cost of transportation and liquefaction is estimated at approximately $6-7 per Million Btu. Assuming $4 for the Henry Hub price, Japan's purchase price will be approximately $10-11, lower than its current purchase price of $16-17 per Million Btu.

Canada is also considering exporting its LNG resources. Canada was originally exporting natural gas to the US, but the latter's need for imports decreased with the domestic production from shale gas. Hence Canada began to turn its attention to Asia. The western coast of Canada is a relatively short sea route to Japan and Asia with no bottlenecks in between. The drawback is that pipelines connecting inland gas fields with export terminals are still in construction; liquefaction facilities are also required. Thus, infrastructure investments are needed for Japan to be able to procure gas at lower prices and the Canadian partners are also expecting investment from Japanese stakeholders.

Seeking to expand its natural gas exports to Asia, Russia is proposing exporting gas to Japan via a pipeline; in turn it wants to obtain Japan's assistance in developing Siberia. Though many challenges exist—including economic feasibility—it is nonetheless an option for Japan in the future.

Meanwhile, having embarked on major investments in upstream interests as well as downstream supply chain, Japan is expected to have a surplus of LNG from the US from 2017 onward. In a historical first—with the exception of some trading companies ("Sogo Shosha") - Japanese companies will be in a position to hold surplus gas, and commodities trading and derivatives will become an important part of their business.

With a growing demand for gas in Asia, there are moves to create an LNG trading market to increase leverage vis-à-vis the Middle East in price negotiations. In November 2013, the Tokyo Commodity Exchange announced plans to create an LNG future trading market. However, competition from Singapore is stiff as the city-state already hosts a thriving oil trading market and possesses the infrastructure to potentially create a gas trading market. Singapore's ability to transport gas via pipelines to China and other final destinations in Asia is also an advantage. While Singapore is very likely to become the LNG hub of Asia, there is no doubt that Japan will still be the main player (both in terms of consumption and gas holdings) in Asia's LNG trading market.

An opportunity for innovation and transformation

Reform of the electricity system

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The reform of electricity markets that began in western Countries in the 1990's continues to drive innovation both in terms of business and technology. Transforming the electricity sector into a market-driven one where the customers have choices is the common goal of both industry and government.

What is the picture in Japan? The electricity system in Japan has been built primarily around large-scale thermal and nuclear power generation against the backdrop of an external dependence for fuel and constraints in plant-siting. The deregulation of high voltage segments to date has failed to activate competition fettered by a static wheeling rate regime and asymmetries in grid information, resulting in an electricity market still dominated by traditional business models. Following the Great East Japan Earthquake in 2011, the need to reform the electricity system into a more robust one capable of withstanding abrupt changes in the external environment became evident.

In this article, I would like to provide an overview of the impact that the forthcoming electricity system reform will have on generation, distribution and retail sectors, as well as the required actions. The immediate challenge in the area of power generation is the increased fuel cost to compensate the shutdown of nuclear power plants. To ensure energy security over the medium and long term, we need to develop a new energy mix that is low in carbon. Japan is an energy-efficient society - while Japan's total power production is the third largest in the world, its primary energy consumption relative to gross domestic product is comparable to that of EU member states—and its future demand growth is expected to be very small. For this reason, what we need is aggressive innovation in business processes and technology, such as developing a wide range of distributed power sources, achieving high levels of efficiency in facilities, introducing best practices in asset management and undertaking mergers and business integration to achieve economies of scale in asset management.

Western countries have pioneered the transformation of power distribution/transmission businesses. They established laws, licensing rules and codes of conduct to govern it as a regulated business and provided incentive mechanisms for network operators to expand and improve their facilities. At the same time, they required network operators to establish fair, independent governance and have been making efforts to eliminate asymmetry of information and conflicts of interest arising from shareholding relationships.

In Japan, a new body, the organization for cross-regional coordination of power transmission is going to be established in 2015, and legal unbundling of distribution/transmission operators is scheduled starting in 2018. Considering the time and cost requirements that this transition will impose on existing power companies, the rules on which the new system will be based need to be established early. Since the method of assessing the wheeling rates will also be reviewed, continued cost reduction is a must.

In recent years, the expression "affordable electricity rates" is heard often in the UK. It expresses the industry's commitment to providing electricity prices that customers find acceptable, notwithstanding the many factors that cause costs to rise.

In Japan, the retail market will be fully deregulated in 2016. It is possible that new entrants leveraging cross-selling with their core products will gain a competitive advantage. The core asset of incumbent power companies will be the customer base that they have nurtured over the years. They will also need to differentiate their marketing strategies by pursuing alliance strategies with businesses in other sectors, introducing new tariff menus including, for example, fixed rates and discounts for long-term contracts, and enhancing customer interface by leveraging information collected through smart meters.

The reform of the electricity system will have a big impact on society. For this reason, it should be regarded as an opportunity for innovation and transformation and be treated as an opportune time to endeavor to advance to the next-generation in electricity systems.

The hydrogen business

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A call for unwavering values based on long-term perspective

With the commercial introduction of fuel cell electric vehicles expected in 2015 and the Olympic Games in Tokyo in 2020, the development of an environmentally friendly hydrogen infrastructure is in the spotlight. Nevertheless, the efforts to date have been to a large extent no more than R&D or business development in anticipation of future growth. From what I hear, companies selected during the Ministry of Economy, Trade and Industry's public invitation to construct 100 hydrogen refueling stations (fiscal years 2013-2015), have been struggling to formulate their business models.

Meanwhile, if we look abroad, hydrogen businesses are being established based on values that are quite different from those of Japan. An overview of the global landscape to identify the underlying drivers reveals that the driver in Europe has been green hydrogen. Green hydrogen has been driven by the large volume of intermittent (i.e., weather-dependent) generation from renewable energy that has the potential to affect the stability of power supply, particularly in Spain and Germany, where FITs (the system of purchasing renewable energy at fixed prices) have been introduced. This has given rise to the need (and the business) to turn the electrolytic hydrogen derived from surplus power into a means of storing energy, as represented by the "Power to Gas." technology.

In Germany, Article 5 of the Renewable Energy Act ("EEG") sets a rule whereby power produced from renewable sources enjoy superiority grid connection at the power companies' (grid operators) expense. This is in contrast with the policy in Japan to establish a limit on the volume accepted under the principles of "the party causing the need (for grid connection, i.e., the power producer side) bears the expenses" and "minimum social cost." As exemplified by a comment I heard in Germany—"countries in Europe have had the bitter experience of letting people freezing when Russia shut down its natural gas pipelines"—securing home-grown energy is a policy that has priceless priority. With low energy conversion efficiency, green hydrogen is considered a costly form of energy, but Europe has definite reasons for promoting it nonetheless.

Hydrogen in the United States is very much a "mobility fuel that has commercial value added." This is because they can produce reformed hydrogen from natural gas cheaply thanks partly to the shale gas boom. Since reformed hydrogen derived from gas generates CO2 in the process of production, the environmental benefit is reduced. However, it is beginning to find uses as a mobility fuel in environments that are incompatible with exhaust gas, such as forklifts in large distribution warehouses, ports, and clean mobility in environmentally friendly cities.

What about Japan? There is an impressive array of ideas and technologies including imports of hydrogen derived from brown coal, mass transportation using toluene, massive consumption for power generation and hydrogen-adsorbing alloys, in addition to the examples seen in western Countries. While it is not bad to expand the potential of a technology through short-term policies centered on subsidies, I wonder if we could have determined long-term perspective to contribute for our better future, referring to the examples of the West for guidance. If that kind of energy policy finds resonance in the long-term investment strategies of businesses to develop technology, a path will open for Japan—a technology leader—to compete globally in this field also.

Japan's way out of the problems

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We have discussed on several occasions Japan's energy market reform with Mr. Alistair Buchanan (a KPMG UK partner since last October) who served as the CEO of the UK's Office of Gas and Electricity Markets ("Ofgem") for the last ten years. I had hoped to hear from him—somebody who was thoroughly familiar with global examples and headed the UK's regulator in the midst of the 20-plus year long market privatization and reform process—practical suggestions for Japan as it proceeded with its market reform. However, his first comment was: "What is the strategic intent of Japan's energy market reform? Depending on what the strategic intent is, the examples of good (and bad) practice in policy making are all out there in well-documented global precedents."

In the UK, the strategic intent is to ensure energy security, move to a low-carbon economy, and realize energy affordability (make energy prices more acceptable to consumers). To resolve this trilemma, the Electricity Market Reform ("EMR") is currently in progress.

Specific measures to implement reform include various mechanisms (e.g., CfD, capacity markets) to encourage investments into low-carbon power generation technologies that also help improve energy security, for example nuclear power. The UK is also pioneering RIIO, a new regulatory approach to set allowed revenues of transmission and distribution operators. This new approach aims to maintain fair energy prices while promoting innovation and adequate investments in assets over the long term, as well as a system for disclosure of management metrics to ensure operational transparency among business operators and promote competition. I believe that RIIO in particular serves as a very useful reference for designing the system to regulate wheeling rates in Japan.

Turning to Japan, I would like to consider—presumptuous as it may be—what the strategic intent could be in reforming its electricity system. With regard to nuclear power—which should not be forgotten in any discussion of Japan's energy system—I think we are at a juncture where we should discuss not only whether it is necessary or not but also its relationship to energy security—including our leverage in negotiating the purchase of other sources of energy—and the Nuclear Non-proliferation Treaty.

I would like to propose energy security (management of geopolitical risks) as part of the strategic intent. I also believe that we may adopt with confidence the perspective of expanding business opportunities for Japan as a country built on technological excellence, which has successfully developed and commercialized automated supply systems, compact fuel cells/heat pumps, and household appliances equipped with meticulous control features.

Expanding customer choices and promoting competition to make energy prices more affordable and stable against external factors—e.g., earthquakes and exporting countries policies— is another strategic goal, and, as a member of the international community, we should also not forget our commitment to realizing a low carbon society.

Lastly, I would like to propose mobility and utilization of highly skilled human resources. During the pre-3.11 earthquake period, as the regulator adopted a very favorable stance in order to promote "minimum social costs" policies in the energy sector, Japan's energy operators accumulated an overwhelming amount of information and developed unparalleled skills investment clout and political power. It is rare internationally to find a country with this much human talent concentrated in the energy industry.

At the same time, now that a regime change is called for, I believe that a review of roles and responsibilities of the operators, vendors, regulators, and professional service providers is in order. Considering this, introducing mobility to the pool of talented human resources and creating a business environment that accommodates that mobility requires expedite action. I strongly hope that Japan will overcome as soon as possible the current post-earthquake situation in which the power industry is forced to sit so to speak in the dock. I look forward to the emergence of an environment in which the government and the private sector work as one to drive the resolution of the challenges faced by Japan including the decommissioning of nuclear power plants, and to promote globally the solutions developed in to solve those challenges —for example, in the form of global deployment of technologies and human resources.

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