Remodeling Energy Cooperation Scheme in North East Asia
--Beyond the Fukushima Daiichi Nuclear Accident--

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The accident of Fukushima Daiichi Nuclear Power Station (NPS) occurred on March 11, 2011. Japan's Prime Minister Naoto Kan at that time has declared that Japan will revise its energy policy from scratch and reduce its dependence on nuclear power, aiming to create a society with less dependent on nuclear power. On August 23, the feed-in-tariff law for renewable energies was enacted at the Parliament, which should help Japan leap to the forefront of the solar, wind, geothermal, biofuel market in place. Although Japan has massively worked to regain control of damaged Fukushima Daiichi nuclear power plants, and also carried out large-scale humanitarian relief efforts in the affected areas, Japan faces enormous nuclear risks entailing to regional agenda which should be tackled in the scope of the mutual interests of nuclear safety, and energy development/infrastructure projects to seek cross-border electricity and natural gas grid including oil, coal and LNG supply chain in North East Asia (NEA).

1. Introduction

Before Fukushima Daiichi accident, the “Strategic Energy Plan of Japan” compiled by Agency of Natural Resources and Energy(ANRE)/Ministry of Economy, Trade and Industry (METI), focuses on the long term targets for 2030, including; the energy self-sufficiency ratio from current 38% to about 70% (including nuclear fuel cycle); raise the zero-emission power source ratio from current 34% to about 70%; half CO2 emissions from the residential sector. In the wake of Fukushima Daiichi accident, the “Strategic Energy Plan” has met deadlocked.

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On October 28 in 2011, the Japan’s government has published “The White Paper on Energy Policy for FY2010”, and the government regretted its past energy policy and it called for a reduction in the reliance on nuclear energy in light of the loss of national confidence on nuclear safety and vulnerability of the energy supply system. The White Paper highlighted the vulnerability of the nation's energy infrastructure, caused by the East Japan Earthquake, which damaged supply chain or lifeline of electricity, city gas and petroleum refinery. The massive magnitude of Fukushima Daiichi accident may impact on the structural change of energy supply chain including electricity and gas interconnection in the North East Asia (NEA).

In the wake of Fukushima Daiichi accident, regional cooperation scheme in NEA has been mobilized with view to assure nuclear safety and environmental monitoring, and to build-up electricity and natural gas pipeline, for securing availabilities of alternative energy. In NEA, there have been so far traditionally several energy-environmental cooperation scheme including nuclear safety, bilaterally and multilaterally including Asia Pacific Economic Council (APEC), ASEAN+3, APP (Asia-Pacific Partnership on Clean Development and Climate) and EAS (East Asian Summit), and a lot of NGOs .

2. Global Concerns over Nuclear Energy

On May 22, Japanese Prime Minister Naoto Kan, Chinese Premier Wen Jiabao, and Republic of Korea President Lee Myung Bak met in Tokyo. The joint statement says the countries reconfirm the utmost importance of boosting safety at nuclear plants, and will continue to operate nuclear facilities safely with transparency. The Japan, China and South Korea (ROK) leaders decided to enhance information sharing on nuclear safety. The leaders agreed to work together to build a framework for early notification of emergencies, and to discuss how to promote exchanges among experts. The joint statement stresses the importance of taking necessary measures based on scientific evidence in assessing the safety of products following nuclear accidents[1].

The first track action taken by sub-regional organization on Fukushima Daiichi nuclear disaster has initiated. The 3rd Meeting of "Study Panel on the Approaches toward Infrastructure Development for Nuclear Power" under the FNCA[2]was held on July 5 through 6 in Jakarta, Indonesia. The meeting shared information on the Fukushima Daiichi nuclear accident and learnt knowledge and lessons that Japan obtained by the accident, as well as discussed on assurance of nuclear safety in Asian region, stakeholder involvement, and Human Resource Development for Nuclear Power. The meeting also engaged in information exchange on Post - Fukushima era Nuclear Energy Program in China, Japan, and South Korea (ROK), and how the future program should be in collaboration with International Atomic Energy Agency (IAEA).

In Fukushima Prefecture, nuclear evacuees including foreigners, households, and farmers (vegetable, cattle and rice), and fishermen, who had shipments banned, have suffered damage from rumors about radiation contamination of their products, although rumors should be more scientific proof and evidence[3].

Speaking in an interview with the Wall Street Journal published on September 20, Prime Minister Yoshihiko Noda said in Tokyo, "From spring through next summer, we must bring (Japan's idle nuclear reactors) back up as best we can." PM Yoshihiko Noda had said earlier he would allow nuclear reactors to be restarted if their safety was confirmed. As of the end of November 2011, of 54 nuclear power plants installed in Japan, only 11 are operating. Without resumption of nuclear plants after regular inspection, there will be a mere 6 reactors operating in January, and most likely there will be none in the next summer in 2012.

In post-Fukushima days, uncertainty prevails surrounding the role of nuclear power in the global energy mix and what this could mean in the short-, medium- and long-term for energy markets and climate trends. “ The Low-Nuclear”case, that is illustrated in “World Energy Outlook” (WEO) published by International Energy Agency (IEA) in 2011, describes that it will be half of new additions compared to the nuclear power stations, which was assumed before Fukushima Daiichi accident, which accounts for 180 GW less nuclear, from 14% today to 10% of energy mix in 2035. It will impact in 2035;

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1 Japan National Broadcasting Corporation (NHK), May 22, 2011

2 FNCA (Forum for Nuclear Cooperation in Asia) is a Japan-led cooperation framework for peaceful use of nuclear technology in Asia, consisting of 12 member companies; Australia, Bangladesh, China, Indonesia, Kazakhstan, South Korea (ROK), Malaysia, Mongolia, Philippines, Thailand and Viet Nam.

3 In April, China says it will expand its ban on agricultural imports from Japan due to public concerns about radioactive contamination in food following problems at the Fukushima Daiichi (NHK, April 10, 2011).

+130 Mtceof coal (91 Mtoe),

+80 BCM of gas (74.5 Mtoe)

+460 TWh of renewables (19.5 Mtoe)

Therefore, electricity will be “more costly, less secure, and less sustainable”, according to the WEO 2011. The goal of achieving climate targets, particularly in light of an expected diminished role for nuclear, will require an even greater and more urgent investment in renewables. A coming “Golden Age of Gas” may provide a bridge, but the gas glut may end sooner than expected, due to the surging demand for gas, and also oil as the near-term alternative to nuclear energy, according to the WEO 2011 report. Japan stands in limbo on the border in looming anticipation of energy crisis in next summer, which will lead to seek for more conservation, more LNG cargo, or cross-border grids (electricity and natural gas pipeline).

3. Constraint of Electricity Grid in Japan

Three electric power companies in eastern Japan--HOKKAIDO, TOHOKU, and TOKYO adopt 50 Hz, whereas seven electric companies in western Japan--CHUBU, HOKURIKU, KANSAI, CHUGOKU, SHIKOKU, KYUSHU, and OKINAWA--adopt 60 Hz. The transmission line interconnects Hokkaido and Honshu, two of main island of Japan, by 42km long submarine cables carries 250kV direct current with capacity of 600MW. For power exchange between eastern and western Japan, frequency conversion stations have been set up by three utilities: J-Power, TEPCO, and CHUBU with total capacity of 1,000MW. The presence of the two difference frequencies can be traced back to the competition between Tokyo and Osaka during the burgeoning of the electric industry in Japan between 1800s and 1990s, according to the Denki Shimbun, or The Electric News Daily published in Japan.

Frequency conversion stations with total capacity of 1,000MW are not far enough to meet imbalance between 50 HZ/60 HZ zone in today’s critical situation. In another word, electricity market divides into two independently in a single economy; one is eastern Japan market; another is western Japan market, of which unique issue becomes more complicated and critical to deal with prevailing electricity shortage problems.

In September 2010, the “Collaborative Smart Grid Experiment” has started in Rokkasho-mura, in Aomori Prefecture in Japan. This experiment is undertaken by four Japanese companies (Japan Wind Development, Toyota Motor Corporation, Panasonic Electric Works and Hitachi Ltd) to investigate the effective use of energy as a means to achieve a “low-carbon society”[4] .

4. Cross-Border Grid Plan with Japan

On September 13, the Washington Post, a US daily newspaper, reported that “SoftBank founder outlines plan to shift Japan to renewable energy, and investment could lead to Asian power grid.”

Mr. Masayoshi Son’s Softbank is internet providers and mobile operators. The business leader has already invested 1 billion yen ($13m) of his own money to create the foundation, and announced that SoftBank would invest 10-20 billion yen ($130-260m) in a new renewable energy business. Son said the 2,000km nationwide

[4] APEC ENERGY OVERVIEW 2010

power grid he proposed could eventually be expanded to all of Asia, in a massive grid that would run 36,000km and link Japan with countries including India, China, and Russia, as the Washington Post reported.

The “Nihon Sousei Kaigi” (Japan Creation Council), the NGO panel, has proposed on October 8, the grand design that “Japan should take the lead in building a power grid that extends from Japan through Southeast Asia to Australia for seeking a new path in post-Fukushima era.” Such a broad-area power grid would enable exchanges of renewable energy across national borders and serve as an energy equivalent of the Trans-Pacific Partnership free trade agreement now under discussions in Japan at large” and also that "Cross-Border cooperation is the most badly needed in the domain of energy," said Hiroya Masuda, a former Minister for Internal Affairs and Communications who heads the group stressing that "Japan (with its technological excellence) can take the initiative." The proposal comes at a time when calls are growing for Japan to end its reliance on nuclear power following the accident at the Fukushima Daiichi accident[5].

On October 15, Japanese Prime Minister Yoshihiko Noda and his Russian counterpart Vladimir Putin held their first talks by telephone. They agreed to continue joint efforts in the energy sector, including the construction of an LNG plant in Vladivostok at an early date. Putin said Russia hopes to cooperate with Japan in supplying energy, including liquefied natural gas and electricity. Putin expressed hope that the Japanese Diet would quickly approve a pact on nuclear energy signed between Japan and Russia in 2009. The agreement includes cooperation on building power plants. Noda also conveyed his hope for cooperation with Putin to resolve the territorial issue over 4 Russian-held islands claimed by Japan north of Hokkaido[6].

We look back the history of negotiation between Russia and Japan in early 2000s. Sakhalin I project is owned by the US Exxon Mobil (30%) which also operate the project, the Sakhalin Oil Development Company [SODECO] (30%), the Indian Natural Gas Company (20%), and two Russian companies Rosneft/Sakhalinmorneftegaz (20%). While its proven oil reserves are large and its gas reserves huge, Sakhalin I is still at a developmental stage. This is mainly because Exxon and its partners had once intended to export gas by pipeline direct from the gas field to Niigata or further south on Honshu of Japan, with a project that has given rise to wildly differing estimates of its cost. In early 2000s, this uncertainty is in turn affecting the cost at which the gas could be offered to possible buyers, and hence, slowing down the process of making firm contracts, and the negotiation had been virtually given-up at that time in 2003 through 2004. The Fukushima Daiichi accident will trigger at driving- force for both Russia and Japan to move new round of negotiation.

South Korea (ROK) experts of the Seoul National University proposed the “Power system interconnection scenario and analysis between Korean peninsula and Japan in July 2003. In this paper, it provides for the interconnection of the electric power grids between South Korea and North Korea and between South Korea and Japan. The first scenario involves the interconnection of the 765 kV HVAC power transmission system between the Kyungin area in the northwest part of South Korea and Shinpo in the eastern part of North Korea. The second scenario concerns the interconnection of the HVDC power transmission system between the

5 Asahi Shimbun, October 9 2011
6 NHK, October 15, 2011

Busan area in the southeast part of South Korea and the Kyushu area in the northwest part of Japan[7].

5. Regional Grids in Asian-Eurasia

In Asian-Eurasia (NEA), natural gas fevers for cross-border pipeline construction are running through, and are reshaping sub-regional energy maps. After 16 months of construction, the China–Russia crude oil pipeline was completed in September 2010; this is designed to transport 150 million tons of crude oil per year from 2011 to 2030. In addition, the China–Central Asia natural gas pipeline was completed in December 2009. There has been rapid expansion in China's gas pipeline capacity. By the end of 2008, about 35,000 km of pipeline was built, with a total trunk-line transmission capacity of nearly 40 bcm per year. In December 2009, the China–Central Asia natural gas pipeline was completed, passing through China, Turkmenistan, Kazakhstan and Uzbekistan. Pipelines such as a second West–East gas pipeline and a Sichuan–East China gas transmission pipeline are under construction—the second West–East pipeline will be a main energy artery totaling 9,139 km and passing through 14 provinces and municipalities in China. Over the next 10 years, more than 25,000 km of pipeline are expected to be commissioned, to form a gas trunk line network running through east–west and north–south and connecting overseas. The technological scheme for the development of the giant Chayanda gas fields in Yakutia was approved in September 2010. The output of 25 bcm per year is expected to feed Russia's Far East region and the export gas pipeline to north China. The ESPO (East Siberia–Pacific Coast Oil Pipeline) is now under service to deliver crude oil in the Asia Pacific market. The construction of the Sakhalin–Vladivostok gas pipeline has completed in September 2011. The pipeline will take Sakhalin's offshore natural gas to the non-frozen harbor in Vladivostok in the south of Russia's Far East region for both domestic consumption, and will deliver to South Korea on transit of North Korea (DPRK).

On September 15, 2010, both Russia and North Korea signed a memorandum of understanding on the construction of a proposed trans-Korean gas pipeline. Russian President Dmitry Medvedev and North Korea top leader Kim Jong Il (died on December 17, 2011) agreed on the project when Kim visited Russia in August. The proposed 1,100-km pipeline will have a capacity of 10 bcm of gas per year. Some 700 km of the pipeline will be built on the North Korea territory, according to Russia's Energy News website reported. Both Gazprom and Korea Gas Corporation (KOGAS), a state-owned corporation in South Korea, initially signed a deal in June 2009. Should issues of transit risks be solved and economic feasibility be assured, the trans-Korean gas pipeline plan, at the next stage for the future, will be connected with Kyushu in Japan. (The proposed interconnection plan of the HVDC power transmission system between South Korea and Kyushu is elaborated in Chapter 4.)

Owing to high growth in electricity demand in Southeast Asia, market expansion and capacity build-up of electricity supply including generation, transmission and distribution would be expected. One strategy under the "ASEAN Vision 2020" was the realization of the Trans-ASEAN energy network, consisting of the ASEAN Power Grid and the Trans-ASEAN Gas Pipeline projects. There were 14 interconnection projects identified in the ASEAN region and three were already operational. The ASEAN Interconnection Project (electricity and natural gas) prove the practical and effective approach, with reduction of geopolitical risks.

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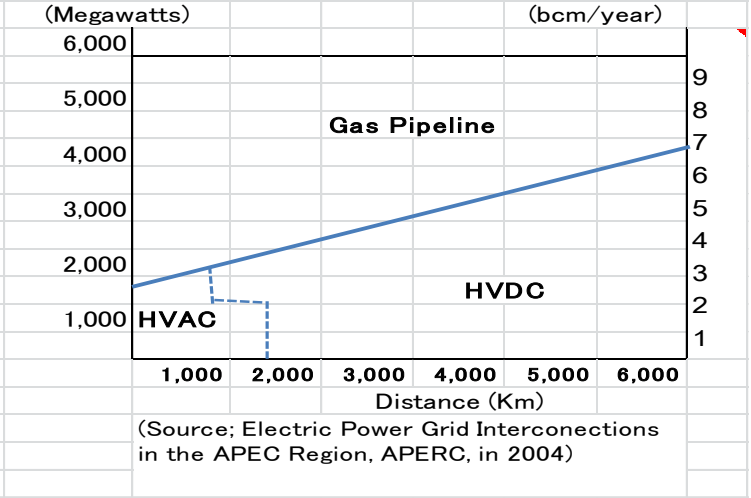
7 Electr. Eng. & Sci. Res. Inst., Seoul Nat. Univ., South Korea (ROK), Power Engineering Society General Meeting, 2003, IEEE, Issue Date: 13-17 July 2003 Abstract

In Northeast Asia, a number of proposals for gas grid interconnection between eastern Russia, China, Japan and Korea (ROK) were being considered, as elaborated in Chapter 4. In addition to fossil resources, the abundance of hydropower in East Siberia and Far East Russia were important factors that could lure NEA infrastructure projects[8].

6. Trade-off between Electricity and Gas Grid

Among major developed countries in the world, Japan is a mere country which has no cross-border electricity grid. Looking at the critical situation of electricity shortage throughout Japan, Japan has to initiate to study the new thinking of interconnection grid strategy. Generally speaking in the world, in deciding which elements of proposed electric power grids should be built, at least where the new power lines would largely be used to transport the output of gas-fired power plants, it is important to assess whether it would be most cost effective to transport gas by pipeline.

Fig. 1 Comparative Economics of Electric Transmission Lines and Gas Pipelines for Different Assured Transmission Line Capacities and Distances



(Source; Electric Power Grid Interconections in the APEC Region, APERC, in 2004)

Industry experts generally agree that expansion of power transmission grids is more cost effective than expansion of gas pipeline grids unless very large amounts of gas are being moved. That is because gas pipelines have relatively high fixed costs and relatively low variable costs per km or cubic meters (cm). The practical implications can be seen in Figure 1. If less than 2 GW of power interconnections are contemplated, electric grid expansion will almost always be more cost-effective than gas pipeline grid expansion. As the planned distance for moving gas increases, the ceiling below which gas pipeline makes sense increases. For moving gas 3,000 km, gas pipeline makes economic sense for capacities of 3 GW or less. To move gas 5,000 km, gas pipeline makes economic sense for capacities of 4 GW or less, according to the report compiled by Asia-Pacific Energy Research Centre (APERC) in 2004.

In Northeast Asia, the issue of whether electric transmission lines or gas pipelines would be preferable

[8] Overview of APEC Energy Working Group Projects Stage 2: Project Outcomes Report 1: Energy Efficiency and Conservation, Energy Data and Analysis and Promoting Energy Trade and Investment Prepared for APEC Energy Working Group Final Version 16 May 2008

might seem to arise with respect to a couple of the interconnections proposed. The link from Bratsk in East Siberia to Beijing in North China would carry 3 GW of power over 2,600 km. The link from Uchur in the Russian Far East to Shenyang in Northeast China and Seoul in South Korea (ROK)would carry 3.5 GW of power over 3,500 km. According to the Figure 1, both of these long-distance, high-capacity power lines might be economically replaced by gas pipelines if their main purpose were to ship gas-fired power from Russia to China and Korea (ROK). However, if the proposed Vladivostok-Shenyang-Seoul link, for example, may be taken as an indication, as described above, such massive interconnections might in fact be expected to foster seasonal diversity exchange between nuclear power in Russia and thermal power in China (presumably coal-fired for the most part) and Korea (ROK) (or, as far as Japan).

Japan is a leading country of LNG trade in the world, thanks to innovative technology of refrigeration/liquefication on land and seaborne LNG tanker. In selecting LNG as a fuel for electricity generation, Japan has long ignored gas pipeline, due to resource economics and geopolitical reasons. In consequence of Fukushima Daiichi accident, “risk premium” for LNG shipment destined to Japan has been remarkably increasing. In Japan imported LNG price (CIF) jumped at $17/MMBTU for October in 2011, comparing with at $13/MMBTU for April in 2011, while Central Asia natural gas from Turkmenistan to China is priced reportedly at $12/MMBTU, of which level remains same during April through November. Should “risk premium” for LNG continue and LNG price persist higher than pipeline gas price in the future, Japanese utilities will be forced to shift from LNG to pipeline gas for economic reason. To this end, Russia is better for its geographical proximity to Japan, although two countries quarrel at the northern islands territorial issue, as elaborated in Chapter 4.

7. Barriers to Electricity Grids in North East Asia

There grows the concerns about lack of energy infrastructure in North East Asia (NEA), in consequence of Fukushima Daiichi crisis. In comparison with ASEAN projects, as earlier explained in Chapter 5, North East Asia interconnection projects are mixed with complicated elements of frozen hardship, resource geography, pipeline politics and frontier economy with low level of density in population, as elaborated in Chapter 4 and 5.

Table 1 show the conceptual matrix of policy risk analysis of resource importers such as Japan and Korea (ROK), and exporters such as Australia and Russia in NEA.

Table 1; Policy Risk Analysis of Resource Importers and Exporters

	Importers	**Exporters**
Objectives	Ease Impact	Profit Optimization
Constraints	Domestic Resource	Depletion and CO2
Measures Policy	Energy Security	Competitiveness
Financial	Captive Resource	Investment
Economic	Energy Decoupling	Industry Restructure
Technology	Diversification	Enhancement

(Source; The Quest for Energy Security in the 21ST Century, APERC in 2007)

In author's interpretation, with regarding to objectives of energy resource strategy (oil, natural gas and coal), importers seek easing impact from price hikes and severe supply disruptions, to stabilize consuming markets, while exporters seek profit optimization from resource sales abroad. Due to constraints of domestic resource, importers seek diversification of other fuels and supply sources, and energy conservation, while exporters concern resource depletion and CO2 emission. Importers worry about energy security at the priority issue of the national policies including stockpiling, while exporters put emphasis on competitiveness of price and behaviors of other exporting countries. Importers with abundant foreign currency reserves go out and intends to acquire resources in such captive manner including M&A, while exporters continues resource development investment policy at home. Importers deploy energy conservation policy to decouple GDP growth with incremental energy consumption, while exporters undertake upstream industry restructure including M&A. With regard to technology, importers emphasize the importance of innovative diversification of product technology to adapt for practical use, while exporters emphasize enhancement of upstream technology on development/production.

The analytical review made by APEC Energy Working Group (EWG)[9] has identified 14 commonly encountered barriers to interconnection, in which review 4 barriers are excerpted and listed here below. In the wake of Fukushima Daiichi accident, in anticipation of the NEA grid plans, author will take note four points in accordance with EWG recommendation;

First barrier is lack of political support, which EWG recommends to participate in the international institutions that regulate international energy trade and investment and in regional initiatives.

Second barrier is lack of common policies, which EWG recommend to develop a regional protocol and establish a regional organization. Author takes notes that Japan has ratified "Energy Charter Treaty" and is prepared to sign "Transit Protocol."

Third barrier is lack of an overall plan, which EWG recommend to develop a master plan to guide least-cost regional transmission development. Author takes notes that a master plan will be designed by stakeholders in collaboration with international project financiers, including Japan Bank for International Cooperation (JBIC) and Nippon Export and Investment Insurance (NEXI).

Fourth barrier is incompatible technical standards, which EWG recommends to develop compatible regional operating and technical standards to maintain reliable operation. Author takes notes that in Japan two different 50/60HZ frequency zones exist, and three conversion stations with capacity of 1,000 MW between 50/60HZ is not enough to transmit throughout Japan, as elaborated in Chapter 3.

8. Geopolitics of Grids in North East Asia

North East Asia countries intend to increase in self-sufficiency and diversify energy sources, and enhance less-dependence on the Persian Gulf oil and gas, by increasing oil and gas output in Russia, Central Asia and Australia as well as ASEAN countries in place. Inter-regional grid in NEA will increase enhancement of supply reliability, technological innovation, and decrease supply and demand tightness risk, market price risk

[9] APEC EWG03/2001T in Australia

and risk of natural disasters (like Great east Japan Earthquake and New Zealand earthquake), piracy, terrorism, strike, pollution and pandemic. Unlike European and American markets, which have well developed pipeline systems, the Asian natural gas (LNG) market relies on ship transportation. There is an increasing concern over sea lane safety within international trade routes, specifically the South China Sea, the Strait of Malacca and the Indian Ocean. Some of the geopolitical concerns include boundary disputes or resource war on land and at sea in NEA.

The cost for energy infrastructure development, in certain cases, is difficult to be borne by a single economy, such as North Korea. As such, investment cost sharing and regional resource cooperation could be a solution in NEA. Interconnection networks (electricity and gas grids) are a preferred choice since energy security is not only limited to resource availability and geopolitical concerns; it is also becoming more dependent on market mechanisms and regional cooperation[10].

With high risk premium and uncertainty in LNG trade and price in NEA caused to Fukushima Daiichi will impede LNG investments. In another interpretation, here we have three options; first replacing of newly built LNG facilities with high cost structure, investors and financiers are encouraging electricity grid; second are also encouraging natural gas pipeline; third electricity grid is more favorable than natural gas pipeline, as elaborated in Chapter 6. Recent suggestions of a gas cartel between Iran, Russia and Qatar (also referred to as the gas troika) bring further uncertainty to the supply/demand balance.

9. Disaster Response Cooperation

Owing to the Great East Japan Earthquake Disaster and the accident at the Fukushima Daiichi nuclear plant, total numbers of evacuation people in Fukushima Prefecture accounts for around 150 thousand people, including the number of about 59 thousand people, who left Fukushima Prefecture. Of about 2 million population of Fukushima Prefecture, 48,903 people, or 2.5% of the population, who had once lived in, went out of the prefecture due to earthquake, tsunami and Fukushima Daiichi accident, according to Fukushima Minpo Shimbun, or a local newspaper dated on August 9.

The East Japan Earthquake and Tsunami, which damaged supply chain or lifeline of electricity, city gas and petroleum refinery, revealed the vulnerability of the nation's energy infrastructure. Japan pledged to strengthen safety regulations on nuclear power generation, adding the necessity of stress test of existing nuclear power generation, in accordance with IAEA methodology.

At the 6th East Asia Summit (EAS) on 19 November 2011 in Bali, with the 10 leaders of ASEAN as well as China, India, South Korea (ROK), Japan and New Zealand. Joining the meeting for the first time were Russia and the United States, disaster management received significant attention at the Summit. Recent natural disasters have exacted a heavy toll on EAS member countries, including flooding across the Mekong region; the earthquake and tsunami in Japan; the earthquake in New Zealand; and flooding in Queensland. EAS members accounted for eight of the world’s 10 deadliest disasters in 2009 and five of the 10 in 2010. The Prime Minister and President Yudhoyono of Indonesia presented a joint initiative to enhance the response to disasters in the

10 The Quest for Energy Security in the 21st Century, Resources and Constraints Asia-Pacific Energy Research Centre (APERC) 2007

region. It will help information sharing between EAS countries[11], overcome bottlenecks in providing assistance and allow countries to work more effectively in disaster responses.

In light of earthquake and tsunami, APEC has published; the “Earthquake Disaster Management of Energy Supply System of APEC Member Economies”, the “Earthquake Emergency Contingency Handbook for Energy Supply Systems” and “Seismic Codes and Standards for Energy Supply Systems” (2001 Chinese Taipei EWG SF01-10) Regarding nuclear safety in NEA, as elaborated in Chapter 2, The 3rd Meeting of "Study Panel on the Approaches toward Infrastructure Development for Nuclear Power" under the FNCA was held on July 5 through 6 in Jakarta, Indonesia.

10. Conclusion

On December 16 2011, Japan’s Prime Minister Yoshihiko Noda declared that the crippled reactors at the Fukushima Daiichi nuclear plant have been successfully brought to a state of “cold shut-down”. The Japan’s government decided to completely decommission all of four damaged reactors within 40 years. As it is so immensely long, nobody really knows how things will look, while nuclear power will solve near-term energy problems. “The timescales are completely wrong,” according to David Howell’s insight, who was appointed Minister of State at the Foreign and Commonwealth Office of the United Kingdom in June 2010, and he is also in charge of international energy policy[12].

Japan stands at the cross-roads, whether nuclear energy could remain susceptible in the future at the heart of Japan’s energy policy, because “nuclear renaissance” and “myth of nuclear safety” has suddenly collapsed. A coming “Golden Age of Gas” may provide a bridge in Japan as well as in NEA, but the gas glut may end sooner than expected due to low supply margin. High risk premium and uncertainty in LNG trade in NEA impede additional LNG investments. In another interpretation, we have three options selective for medium/long term path; first choice is for electricity grid; second is for natural gas pipeline; third is for additional LNG complex, in terms of least-cost option analysis (other than geopolitical risk assessment), as elaborated in Chapter 6. Looking at the critical situation of electricity shortage today throughout Japan, Japan has to study the new thinking of interconnection grid strategy. According to Figure 1, if less than 2 GW of power interconnections are contemplated, both electric grids plan between South Korea (ROK) /Japan and Russia/Japan will be more cost-effective than gas pipeline grid (and additional LNG complex). To this end, Japan should mobilize all necessary facilities, including project finance scheme with assistance of bilateral/multilateral cooperation in North East Asia region.

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