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Japan Energy Brief

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Inui Building Kachidoki, 13-1 Kachidoki 1-chome, Chuo-ku, Tokyo 104-0054 Japan
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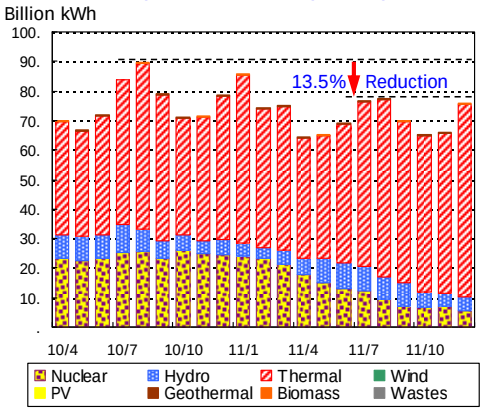
Japan struggles to sort out energy policy after Fukushima accident

One year has passed since the Great East Japan Earthquake and Tsunami hit Japan on March 11, 2011. Except for the Fukushima Daiichi nuclear plant accident casting a gloomy shadow on the electric supply throughout Japan, energy supply has been mostly restored. The Sendai refinery of JX Nippon Oil & Energy Corporation has fully resumed its operation to restore the petroleum products supply system in the Tohoku (Northeast) area to the pre-quake level. Damaged thermal power stations are all back on-line except the Haramachi coal-thermal station (2,000MW), which is scheduled to restart in summer, 2013. City gas supply has recovered to the normal level though provisional facilities are still used in several towns.

As the quake-stricken provinces are gradually settling down, 343,935 evacuees are still away from home due to the horrible disasters. Only 6% of debris and rubble, amounting to more than 22 million tons, has been disposed of. The central and local governments have been tackling reconstruction plans since late last year, but are yet to produce any realistic pictures as the damage was overwhelming. In the energy field, treatment of nuclear power generation remains the central issue for the national energy policy. An immediate question is: whether or not Japan can ride out the 2012 summer peak demand season without nuclear power. For the longer run, where should Japan position nuclear in the energy mix in its pursuit of energy security and low-carbon society? Of course, these problems will have to be solved keeping industrial activities and daily life at reasonably acceptable or comfortable levels.

Figure-1 Monthly Electricity Supply
(10 Power Companies)



Source: METI "Monthly report on electricity supply statistics

Government aims to prevent rolling blackout

Nuclear power stations throughout Japan remain dormant after routine inspections. As the No.6 unit

of Kashiwazaki-Kariwa nuclear power station of Tokyo EPC was shut down on March 26, only one reactor, Tomari #3 unit of Hokkaido EPC, is now in operation, and this is scheduled to be shut down early May. The Nuclear and Industrial Safety Agency of the Ministry of Economy, Trade and Industry (METI) appraised and gave a rating of "appropriate" to the primary stress test reports on Oh-i #3 and #4 units of Kansai EPC in February, and on Ikata #3 unit of Shikoku EPC in March. The Nuclear Safety Commission of the Cabinet Office re-examined the reports and concluded on March 13 that reports on Oh-i #3 and #4 units were both "appropriate." The Japanese Government explains that, after making a political judgment on these results, they will have talks with local governments and societies.

Junichi Ogasawara, Group Leader of Electric Power Group at IEEJ, however, warns that we cannot be optimistic on the outcome, analyzing the situation as follows:

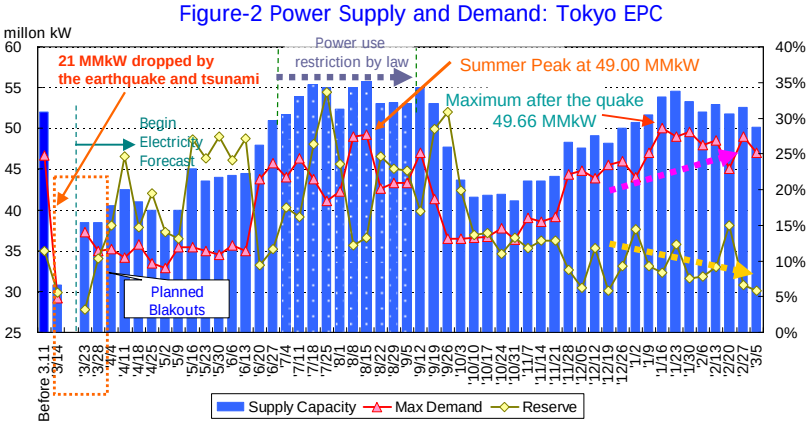
- It is still uncertain if local governments and societies would accept restart of nuclear power plants even if the Noda administration came to such a political judgment. There are voices that call for new safety standards established based on lessons from Fukushima Daiichi accidents before making judgments on restarting nuclear power plants, inevitably entailing a much longer time and process while Fukushima Daiichi is under full investigation. Then, as each local government has its own agenda, even if consent is obtained from one, it does not necessarily mean that others may follow suit to restart nuclear power plants.

- Given the circumstances as above, METI is now struggling to work up conditions to manage the electricity supply/demand balance for this summer without nuclear power. Candidate measures under discussion include allowing greater power interchange through flexible operation of regional interconnections, reviewing methods of estimating peak supply capacity of pumped hydropower and solar PV, applying differentiated tariff systems for day and night or by time zones, and promoting power savings through negative tariffs for peak cut efforts (Nega-Watt Trade), while none of them is decisively effective.

- Power companies are scrambling to beef up thermal power capacity, while many others are trying to reinforce own-generation plants. However, many thermal plants face increasing risks of failure and dropout after prolonged continuous operation, and reactivated old thermal plants are often unable to produce the full name-plate output. Availability of water will also have a substantial impact on the maximum supply capacity during the summer period. It requires some more time to see more accurately how these elements affect supply and demand balance of electricity in this summer.

- Kansai EPC, which used to be heavily dependent on nuclear, will find it hard to meet demand without nuclear this summer. Likewise, even Tokyo EPC may not be able to meet the normal year electricity demand peaks similar to those in 2009, if not the inordinately high

Figure-2 Power Supply and Demand: Tokyo EPC



Source: Tokyo Electric, "Electricity forecast" and other information

demand of 2010 with a hot summer and cold winter, while the electricity demand within its service area is on a recovering trend of late.

The Japanese government aims to announce its projection on this summer's supply and demand outlook and power saving targets before the holiday spell of early May, as industries request the government to indicate its policy for the summer season as soon as possible to adjust their business plans. The government wishes to avoid the "forced power saving" invoking the Electricity Business Act as much as possible. Last summer, various measures were employed for power saving, with their estimated costs ranging from only a few yen up to even a few hundred yen per kWh. In other words, some measures were prohibitively costly and inefficient. The government thinks it is necessary to build an appropriate system that promotes a rational means for power saving rather than a forced one. Thus, METI is studying a "Nega-Watt Trade" and other innovative programs, but it would have to go a long way in clearing many hurdles such as setting appropriate power saving goals as criteria to implement effective yet workable systems.

How to decrease nuclear dependency practically

Accidents at the Fukushima Daiichi nuclear power station prompted Former Prime Minister Naoto Kan to declare last July that Japan would aim to be independent of nuclear power generation. Prime Minister Yoshihiko Noda, who took over from Mr. Kan last September, committed more modestly to aim at a less nuclear dependent society as much as possible in a mid-to-long term time scale. As a result, the Japanese government set up a ministerial-level Energy-Environment Council last July. Then in September, the Japan Atomic Energy Commission (JAEC) under the Cabinet Office put forth four options on utilization of nuclear power generation: (1) restore it to the pre-accident level, (2) maintain it at a certain level with a lowered rate of nuclear dependence, (3) gradually lower the level to abolish it within a certain timeframe, and (4) eliminate it immediately, along with ten issues to be considered including reprocessing of the spent nuclear fuel, safety regulations, waste disposal, and so on. The Basic Energy Planning Subcommittee of the Advisory Committee for Natural Resources and Energy has been actively debating future energy policy since last October. The Basic Energy Plan is scheduled for revision this summer based on these discussions and debates.

At the 12th Subcommittee meeting held on February 14, Mr. Masakazu Toyoda, Chairman and CEO of IEEJ gave his views on the future energy policy; "While energy security of Japan is vulnerable to crises or uncertainties, risks on energy security are increasing. Market mechanism alone is insufficient to guarantee energy security and we need to mobilize other measures including subsidies and grants on R&D, resource diplomacy, and safety regulations. The contribution of nuclear energy to enhancing energy security is not small in view of its low cost, large scale, and high energy density." Mr. Nobuo Tanaka, Global Associate of IEEJ and former Executive Director of IEA, recently said in an interview, "Japanese energy policy will have significant effect on the world energy policy. Growing energy demand in China, India, and other emerging countries has tremendous impact on the world energy supply and demand. Competition over energy will be inevitably aggravated in the future, even though nonconventional oil and natural gas are now being actively developed. In other words, abundant and cheap energy is a thing of the past now. Japan has to formulate its energy policy based not solely on domestic context but on energy security for the whole of Asia. … Capitalizing on the lessons learnt from the Fukushima Daiichi accidents, we should keep certain amount of nuclear generation capacity."

The subcommittee will need to continue working for establishment of a viable growth path

by examining and sorting out the following points and their mutual relationships comprehensively, where position of nuclear energy in the mid-to-long term energy strategy will be the central issue:

1) Nuclear energy: overall planning and approvals for construction, expansion, operation extension, and decommissioning of nuclear power units; coordination with local governments; safety regulations; nuclear fuel cycle; nuclear waste disposal; and decommissioning of the Fukushima Daiichi station and clearing of contaminated areas.
2) *Energy demand policy*: peak cut measures and other energy and power savings; linkage and optimized management of supply and demand via smart grids; reforms of urban structure, industries, and life style to establish a low-carbon society; innovative technology development; and establishment of institutional systems and markets to ensure effective implementation of these measures.
3) *Electricity*: reforms on the electric system such as unbundling of power generation and distribution and creation of a rational electricity market; reinforcement of interconnection among power companies; efficient use of fossil fuels; and flexible introduction of renewable energies.
4) *Gas*: stable procurement of natural gas and elimination of the Asian premium via measures such as joint procurement of LNG, LNG stockpiling, import of piped natural gas, and securing interests in development projects; construction of a trunk pipeline system; and restructuring of the gas market through consolidation of small-scale distributors.
5) *Oil*: policy to secure resources to reinforce oil supply security; positioning of oil in the energy mix; role of oil in responding to emergency events as well as addressing declining population in rural districts; and refining and retail marketing plans under declining demand environment.
6) *Renewable energy*: viability, introduction incentives, and innovative technology development to achieve breakthrough including cost cutting, smoothing out intermittent power generation, and securing supply capacities.

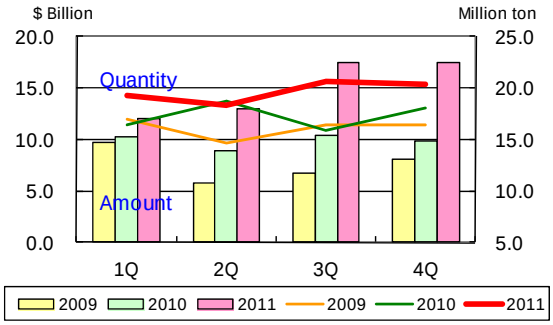
Immediate answers unfortunately are not readily available for most of the above issues. The Fukushima Daiichi site is now under control but only with temporary facilities, while we are yet to fully understand the status and conditions of the actual site; all requiring devising a number of processes and countermeasures to resolve the situation. Not much progress has been made in clearing of contaminated areas or preparing policies to reinforce other energies, which the accident prompted the Japanese government to act on. The government plans to reform the Basic Energy Plan by this coming summer, but it would be a provisional one again in the sense that it will have to be based on various uncertain assumptions as above. Although much of the present discussions are developed just on extensions of the past paradigm, we need to draw up an innovative grand design of the future society taking into account the primary issues facing Japan such as hollowing out of manufacturing industries, declining birthrate as well as aging population or depopulation of rural areas, in order to lay down energy and environment strategy accordingly. It is not an easy task that can be done in a short time. We would have to proceed step-by-step to create a better society by examining the above points and incorporating the results of progress in various research and development efforts.

Asian premium on gas strikes LNG importing countries

Japan's LNG import increased significantly to 78.5 million tonnes in 2011 from 69.2 million tonnes in 2010, reflecting continual shut downs of nuclear power plants one after another following the Great East Japan Earthquake of March 2011. In addition to the 13.5% increase in the import quantity, soaring LNG prices have boosted the monetary amount of LNG imports

further. Japanese payment for LNG import increased by 37.5% to 4.8 trillion yen in 2011 from 3.5 trillion yen in 2010, or 52.0% in US dollar terms to $60.0 billion from $39.5 billion. In particular, sharp increases were seen in the third and fourth quarters of 2011. Although this increase was partially offset by appreciation of the yen, Japan's LNG import amount seems to have exceeded 1% of the GDP for the first time in history.

Figure-1 LNG Import of Japan

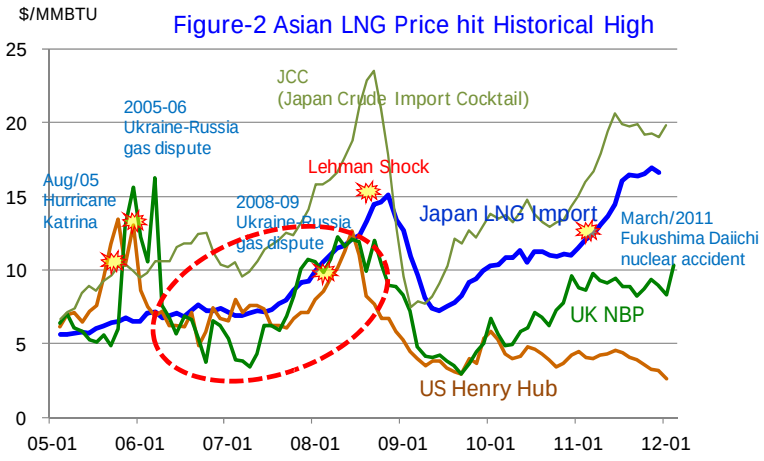


Source: IEEJ, compiled from MOF *Japan Tradre Statistics*

In 2011, the world LNG trade amounted to about 240 million tonnes, up 8% year-on-year. On the demand side, LNG imports surged in Japan following the Great Earthquake, and also in other booming Asian countries. On the supply side, exports from Qatar shot up significantly as its large-scale plants went on stream in sequence, , delivering nearly 12 million tonnes to Japan (up 4 million tonnes from the previous year) to account for the largest portion of the increase in Japan's LNG imports. Japan also increased its imports from the Atlantic region, including West African countries, to 4.7 million tonnes in 2011 from 3.0 million tonnes in 2010.

By a closer look on the world gas markets, extremely high prices of LNG destined for Asia stand out. World gas prices were once converging into a narrow range in the mid-2000s when gas shortage was anticipated in the United States, but they have shown varying trends in recent years among the U.S., European, and Asian markets, as shown in Figure 2. For example, in the U.S., where the impact of the shale gas revolution is now prevalent, natural gas prices expressed in US$ per million BTU were once equivalent to about 55% of that of West Texas Intermediate (WTI) during 2006–2008 (just before the Lehman Shock), but continued decreasing to 32% in 2010, 25% in 2011, and even to below 20% after November 2011. Although current gas prices are extraordinarily low, few people would expect the U.S. natural gas prices to rise again to about 50% of crude oil equivalent in the near future.

Figure-2 Asian LNG Price hit Historical High



Source: MOF, USEIA

Natural gas prices in Europe have been more or less following the crude oil price trends; after the turbulent period of the Lehman Shock, they have been relatively stable at around 50% of Brent crude prices on a million-BTU basis. In Europe, LNG imports from the Middle East and Africa are on the rise, along with reinforced natural gas import from Russia after completion of the Nord Stream pipeline, driving the market toward decoupling of gas and oil prices. Natural gas supply to Europe is expected to remain stable for some time to come.

Meanwhile, LNG prices for Japan on long term contracts are mostly linked to crude oil prices. Thus, LNG prices delivered into Japan, on a million-BTU basis, stood at about 90% (an average of 91% between 2000 and 2005) of the Japan Crude Cocktail (JCC; the average crude oil import

price CIF Japan) in the first part of the 2000s. However, as crude oil prices spiked, the price ratio had decreased to 55% just before the Lehman Shock suggesting a decoupling phenomenon from oil prices. Thereafter, however, the ratio recovered to 69.5% in March 2011 just before the Great Earthquake, and even to 83.8% in December 2011. As crude oil prices continued to rise during the same period; crude oil and LNG import prices in December 2011 were up 11% and 33%, respectively, from the March levels. As large nuclear power plants were running as the base load electricity supplier at high operating rates before the Great Earthquake, their sweeping shut-downs caused a dramatic increase in LNG imports to Japan.

Such a significant amount of the Asian premium on LNG is putting considerable pressure not only on Japan but also on other Asian countries importing LNG from the same sources. If the nuclear power plants continue to sit idle for the rest of this year while the yen depreciates as observed recently, the value of Japan's LNG imports would shoot up from 3.5 trillion yen in 2010 to more than 6.5 trillion yen in 2012, exceeding the previous estimate by IEEJ (see JEB No.17, January 2012) by 1 trillion yen or more. In January 2012, Japan's trade deficit hit a record 1.48 trillion yen, no small part of which was owing to imports of LNG and other energy commodities. Such situations will inevitably result in huge hikes in electricity and city gas tariffs, dealing a serious blow to the Japanese economy as well as to the development of the LNG market in Asia.

Given the circumstances discussed above, Hiroshi Hashimoto, Senior Analyst at IEEJ, analyzes the mid- to long-term outlook of the world LNG market as follows:

1) Between now and through 2015, several Southeast Asian countries will emerge as new LNG importers, while LNG demand in the existing markets will increase steadily. On the supply side, however, only a small number of new projects are coming on line; these are the Pluto LNG project in West Australia (starting up in 2012), the Angolan LNG project (2012), and the Algerian LNG project (2012–2013). Consequently, it is widely viewed that the world LNG market will tighten up. However, there will be uncertainties to work either as plus or minus factors, such as the prevailing European economic crisis, to cause a sluggish energy demand, or prolonged shutdowns of nuclear power plants in Japan to keep its LNG demand high.

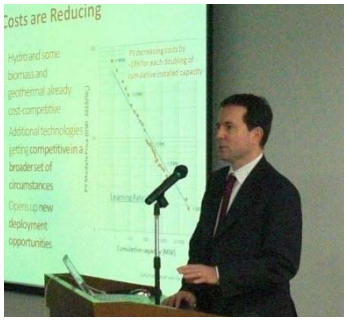
2) Final investment decisions (FIDs) were made in 2011 for several LNG plants in the Pacific basin scheduled to go on stream in 2015 or later. These projects, if commissioned without delay, would contribute to stabilize the LNG market in the long run. The overall LNG production capacity of Australia - including the Ichthys LNG project, which was given the green light in early 2012 - will exceed 80 million tonnes a year around 2018, making the country the largest LNG exporter in the world. The Ichthys LNG project, to be operated by INPEX with its primary export destination being Japan, is considered virtually a *Japan-made* project. As some of the Japanese buyers have formed a consortium for joint purchasing, it could provide a model case for structuring future purchasing strategies. In addition, new prospective supply sources are coming up in East African countries like Mozambique.

At the same time, LNG export from North America is emerging rapidly as a next-generation supply source. The Sabine Pass project, which has recently fixed sales agreements for 16 million tonnes, uses low-cost gas brought about by the shale gas revolution. Its cost is estimated to be about 30% to 40% lower than the LNG procurement cost of Japan. Other LNG projects coming up in North America, if materialized as proposed could have a sizeable impact on the LNG pricing system in the Asia-Pacific region.

To date, Japan has been working on energy security concentrating on ensuring supply of oil and stabilizing its price. However, following the Great East Japan Earthquake, unexpected problems have surfaced such as shutdowns of nuclear power plants and the huge Asian premium on LNG prices. This made it necessary to rebuild Japanese energy policy carefully re-examining what measures are practicable, feasible and effective. Nuclear option is now diminishing and can no longer be considered as the single central pillar, while renewable energy could not be a leading player. On balance, no special measures appear available other than those adopted during the oil crises in the 1970s. For example, if Japan had 170 days (as is the case for oil) equivalent or 30 million tonnes of LNG stockpiling, Japan, even facing the earthquake-led crisis, would not have rushed to take up every spot cargo available in the market. As LNG prices have soared significantly, relative costs of stockpiling facilities or long haul transport are now lower compared to the value of LNG itself. Thus, stockpiling and supply diversification of LNG have become realistic options in considering energy security. Also possible as options are construction of domestic trunk gas pipelines as well as piped natural gas import from Russia, though substantial reform of the Japanese gas and electricity industries is needed to "bundle" the wholesalers and independent gas buyers as a prerequisite. In this regard, particular attention will need to be paid to development of Japan-Russia relations in the era of Putin's new administration.

Best-practice policy should be pursued deploying renewables, says IEA

On March 7, Mr. Paolo Frankl, Head of Renewable Energy Division of the International Energy Agency, made a presentation at the IEEJ Energy Seminar introducing IEA's "Deploying Renewables 2011, Best and Future Policy Practice". With mounting interest in renewable energies, the seminar was attended by an eager audience.



He explained that RE electricity generation is developing remarkably and shifting its weight to Asia. The world wind power generation has grown at a compounded annual growth rate of 26.5% between 2005 and 2010, and photovoltaics (PV) even at 50.8%. Meanwhile, the cost for PV has recorded a significant reduction, with its learning curve, i.e., a cost reduction rate for each doubling of cumulative installed capacity, as high as 19.3% during the past 34 years. Citing policy costs of promoting onshore wind power in various countries, he explained that cost-effective policy must be selected. So far, countries which employed a fixed support system such as FIT (Feed-In Tariff) have been more successful compared with others who adopted a system based on market mechanisms such as RPS (Renewable Portfolio), because conditions are clearer for players to calculate project cost and profit under a fixed support system.

However, the fixed support system also has its own shortcomings. For example, the gap between FIT rates and costs are always large for the PV in Germany, suggesting that project players are enjoying unreasonably high returns, leading to a higher burden of surcharges imposed on electricity consumers. Quick adaptation to the rapidly declining PV cost is therefore essential. Although the German government cut the tariff for PV four times just in the past two years, even this did not seem to be sufficient as a steep "sales rush" was seen in every month just prior to the tariff revision while players were trying to secure advantageous rates.

As RE electricity is expected to grow fast, Mr. Frankl discussed that flexibility is the key and four resources are needed to enhance large scale integration of renewable energy in the

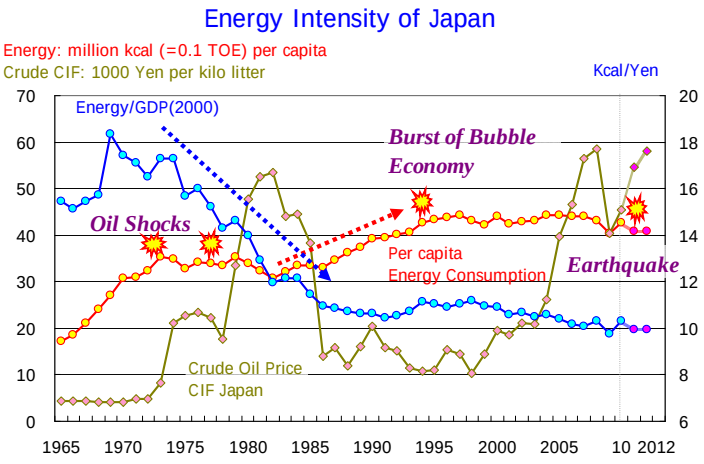
electricity supply system without causing electricity supply disruptions. They are 1) Dispatchable power plants such as gas/biomass fired thermal and hydro power stations; 2) Demand side response via smart grids; 3) Energy storage facilities such as pumped hydro and large scale batteries; and 4)Interconnection with adjacent markets, which allow power trade for further operational flexibility and smoothing effect of intermittent generation. He was relatively pessimistic about the integration potential of renewables in the Japanese electricity market at present because: 1) rigid power sources such as nuclear and coal have high shares in the power supply structure, 2) lack of international connection being an island country, and 3) the electricity market is rigorously segmented by ten independent regional power companies; indicating, in particular, the needs for the Japanese electricity market to be integrated removing regional borders.

In concluding the discussion, Mr. Frankl described key policy principles for RE deployment to be: 1) a predictable RE policy framework, 2) portfolio approach instead of concentrating on particular incentives and technologies, 3) dynamic policy approach based on global market trends, 4) removing non-economic barriers, and 5) addressing system integration issues including unbundling of the power supply system. He suggested that, because of the similarity with his home country, Italy, in its geography and resource endowment, Japan may be able to learn a lot from Italy on policies and institutions and their outcomes as well as experiences in promoting renewables with sound development of the electricity market.

Energy Committee Highlights

Revision of Energy Conservation Law Focuses on Curbing Peak-Demand

As exhibited in the long history of energy efficiency in Japan, the energy intensity per unit GDP decreased significantly after the oil crises of the 1970's. However, the pace of improvement began to stagnate in the mid-1980's when crude oil prices remained low, thereby allowing energy consumption per capita to expand by some 40% in a decade. Since 2005, when crude oil prices started to rise again, energy intensity and energy consumption per capita have both been on a modest declining trend. Although Japan is said to have grown into the world's most energy-efficient country, its energy efficiency and conservation (EEC) status has not really greatly advanced in recent years.



Source: Compiled from MOF and METI statistics, 2011/2012 are forecast.

However, with the electric power crisis triggered by the Great East Japan Earthquake showing signs of prolongation, demand-side measures pursuing the energy efficiency and conservation approach have increased their importance as a solution to energy supply-demand problems. Meanwhile, it was also a fact last summer that power saving was taken a little too far in some respects, e.g.- excessive cut-downs leading in part to restrained economic activities and the "self-restraint" affecting personal amenity or even health.

Given such circumstances, the Ministry of Economy, Trade and Industry (METI) resumed the EEC Working Group meetings of the Advisory Committee for Natural Resources and Energy on November 7 last year, and after five meetings announced an interim report at the end of February setting out the framework for forthcoming amendments to the Law Concerning the Rational Use of Energy (Energy Conservation Law). The recent review focused not only on countermeasures for the short-term response to power shortage but also on how sustainable EEC measures should be taken in the medium and long term future.

After the oil crises, Japan's EEC policy has always focused on curbing the consumption of oil and other fossil fuels. This time, however, an in-depth analysis of the energy supply-demand situation following the Great Earthquake has led to emphasis on 1) measures to curb peak electricity demand, and 2) promotion of EEC efforts in the housing and building sectors. The outline of the report is as provided below:

First, to achieve reduction of nuclear dependency as voiced by Prime Ministers Naoto Kan and Yoshihiko Noda, electricity requirement will have to be met with installations of new thermal plants as well as reopening of old, low-efficiency ones, pushing up the expenditure significantly. Lowering the peak demand should enable such incremental costs on the supply side to be avoided, while enhancing energy security and climate change responses. Solutions to peak-demand management may include energy storage via pumped hydropower and batteries, building energy management systems (BEMS) and home energy management systems (HEMS), own-use power plants, air conditioning systems with thermal energy storage and gas-powered air conditioning, for which effects are evaluated as follows:

- The storage battery market is still in its infancy and batteries presently cost as much as 400,000 yen per kWh. However, if mass production can effectively reduce the price to 50,000-60,000 yen per kWh, demand can be sufficiently expanded.
- BEMS and HEMS integrated with photovoltaic power generation and storage batteries can be expected to effectively reduce the peak demand. Developing such systems will require important elements such as timely information supplied by electricity companies about ongoing supply-demand balance and visualization of energy consumption status by individual appliances.
- Own-use power plants are effective means to lower the peak demand for the power grid and promise significant energy savings when a cogeneration system is adopted. Storage batteries and gas-thermal air conditioning systems can also shift peak demand effectively.

New measures addressing the peak demand control are required to be in alignment with the energy conservation approaches under the current legislation. They should be designed to encourage reduction of grid-connected electricity usage during the peak hours, while making the energy intensity goal at each entity more easily achievable by incorporating such efforts. The calculation method of energy efficiency under the new formula will be stipulated in an ordinance after the official revision of the Energy Conservation Law. Other points mentioned in the report for further deliberation include amplification of the tariff menu to introduce, for example, time-zone tariffs for different hours of the day or a special tariff for peak demand hours, and dissemination of smart meters to link up supply-side and demand-side information. The report considers these peak curbing measures as "the fundamental policy to improve energy efficiency as a whole region or society through supply-demand collaboration."

The second pillar places importance on the promotion of energy efficiency and conservation in the residential and commercial sector. A Committee member, and Chairman and CEO of IEEJ, Masakazu Toyoda explains the rationale: "If we impose an excessive burden upon the

industrial sector, which has been proactively pursuing energy efficiency and conservation measures since early times, we are risking a further hollowing-out of our industries. On the other hand, the residential and commercial sector holds much potential in reducing energy consumption, suggesting that future energy efficiency and conservation measures should be focused on housing and buildings. Japan's energy efficiency standards for buildings are not as stringent as those implemented in other countries and currently serve only as guidance for building design. In order to promote energy efficiency and conservation in this field, mandatory energy efficiency standards and enhanced institutional aids are required, and, to this end, corresponding revisions to the Building Standards Act must be considered."

With regard to the residential and commercial sector (houses and buildings), the report concludes that: 1) as energy consumption is growing significantly due to increased floor area and the rising number of households, the sector is in urgent need of adopting EEC measures; and that 2) as the power-saving measures of last summer were in part dependent on excessive "self-restraint," it is important to pave the way so that sustainable energy efficiency and conservation can be pursued through improved energy efficiency in equipment and appliances at houses and other buildings. On this point, the report gives the following details:

The current energy efficiency standards for buildings, established in 1999, are non-enforceable, and therefore only 5% of existing houses meet them. Even among newly constructed buildings, only 30 to 40% of houses and about 70% of multi-storey buildings satisfy them. Furthermore, these standards are much lenient compared to those implemented in other countries that have adopted legally-binding measures ahead of Japan. To address the foregoing issues the report recommends that 1) mandatory energy efficiency standards be phased in for all newly constructed houses and buildings by 2020 and such standards be regularly upgraded at the same time. A roadmap of such measures for early implementation should be formulated on a priority basis. Also, in order to promote such measures, 2) a top-runner program should be introduced for building materials (i.e., windows, heat insulation materials, bathrooms, vanity units, and kitchen equipment) as their efficiency improvements and effective application are essential for both new constructions and renovation.

On March 13, the Cabinet approved the revised Energy Conservation Bill which focused on 1) measures to reduce peak demand and 2) measures to address the residential and commercial sector energy consumption. After approval at the Diet in this April, the amendment is scheduled to be enacted one year later, in April 2013.

Energy News in Japan & Asia

JX Energy starts up the tsunami hit Sendai refinery

JX Nippon Oil & Energy Corporation announced on March 9 that the company has resumed full operation of the Sendai refinary (145,000 bpd), which was seriously damaged by the Great Earthquake and Tsunami last year; JX has been test operating the refinery since January . It is the only refinery located in the quake-hit Tohoku (northeast) region. Petroleum products supply for the disaster area will be normalized and reinforced with its reintegration. As JX had resumed operations of another quake-hit refinery in Kashima last November; its refinery lineup is now fully reinstated.

In the restoration program of the refinery, various measures have been taken to stand against the potential threat from tsunamis, in such a way that important electric facilities including the operation control systems are relocated at an elevated level and watertight construction is widely adopted. In addition, the administration building is now equipped with new

electricity sources such as solar PV panels, fuel cell generators and batteries to enhance energy conservation and reduce environmental burden during ordinary operations, and to function as the disaster response headquarters in case of a total blackout. Stockpiling and shipping facilities for petroleum products have also been expanded and reinforced.

Presently, the Chiba refinery (220,000 bpd) of Cosmo Oil is the only one left among the quake hit refineries yet to be restored to full operation. An operation of several plants such as the fuel oil desulfurization unit was resumed in January, and the crude distillation unit (CDU) is expected to be restarted in March. However, operation of the CDU will for the time being remain at around 40% capacity until the LPG tanks that exploded due to the earthquake are reconstructed.

Gasification continues to send oil and LPG away for better economics and efficiency

The East Japan Railway Company (JR East), with its service area covering east Japan including the Tokyo metropolitan district, announced on January 23 its plan to replace the No.1 generation unit burning kerosene at its own Kawasaki Thermal Power Station with a gas turbine combined cycle (GTCC) generator to start operation in 2021. With this replacement, the unit's generating capacity will be raised to 200 MW from the current 144 MW and thermal efficiency to 50% from 41.3%.

JR East is already running No.2 and No.3 units on gas and presently working on the replacement of the No.4 unit, switching from heavy oil fired turbine to natural gas IGCC, with a capacity increase from 125 MW to 200 MW. Upon completion of these replacement programs, the generating capacity of the Kawaski Power Station will be raised to 786 MW from the present 655 MW. In 2010, its own thermal power station supplied 43.6% of the total electricity consumption of 6.1 billion kWh. The thermal power capaciy will be reinforced with minimal increase in fuel consumption through the use of GTCC, which is the most efficent technology available now.

The Hokuetsu-Kishu Paper Company and Mitsubishi Corporation announced on January 16 that they would jointly construct a gas co-generation unit of 40 MW with a heat recovery boiler at the Niigata paper plant of Hokuetsu. Currently a quarter of the electricity demand at the plant is supplied with a gas turbine generator burning heavy fuel oil and the rest with smaller steam turbine generators using natural gas, black liqueur and wood biomass, while low tariff electricity is purchsed during the night time. Mitsubishi is promoting the so-called "on-site generation" projects and this is its 7th project which qualifies for METI's support program on energy usage rationalization.

Meanwhile, in a similar move giving LNG a growing position vis-à-vis LPG, a petroleum product by definition, Tobu Gas Company in early March made presentation to the Akita prefectural government about its plan to construct a secondary LNG terminal in Akita, one of its service areas located in northern Japan. Tobu plans to construct a 10,000 kl LNG tank, a berth for 100m class tankers, regasification and other related facilities to receive LNG via coastal tankers from larger LNG terminals. Tobu is currently delivering city gas comprising locally produced natural gas, synthesized natual gas (SNG) produced from LPG, and LNG railed from Niigata. Tobu plans to discontinue the supply of SNG as its plant is aging, and plans to receive 25,000 tonnes of LNG in 2016.

As observed in the above developments, there is still room for medium-scale gasification in the Japanese energy market, even though the recent spike in LNG prices might hamper these trends. At the same time, development of a consolidated trunk gas supply network extending

across Japan to help promote further gasfication is highly desired, which should ultimately work to reinforce the energy security of the nation.

Private sector efforts intensify in developing offshore wind power farms

Earnest efforts are under way to develop wind power resources available off the extensive Japanese coastline as well as in littoral regions. In one such move a consortium made up of Marubeni Corp. as the project integrator, Tokyo University as the technical advisor, and nine other prominent private sector firms is embarking on a project for an experimental offshore floating wind power farm.

The METI-backed project comprises three floating wind turbines totaling 16MW in capacity and a world's first 66kV floating power substation with an undersea cable to be emplaced 20 to 40 Km off the coast of Fukushima Prefecture. Starting in 2012, the project is expected to be completed in a three-year period. It is further understood that one of the most important objects of the project is to demonstrate that the offshore wind farms are compatible, and therefore able to coexist, with the fishery industry.

Fukushima is one of the three prefectures situated in northeast Japan needing large-scale recovery efforts in the wake of the devastating earthquake and tsunami of last March, and looks to a future possibility of nurturing a robust wind farm industry along with other renewable energies to create jobs.

Meanwhile, Mitsui Ocean Development and Engineering Company (MODEC), a renowned expert in constructing offshore oil and gas development facilities for floating production, storage and offloading (FPSO) operations, reportedly has developed the world's first combined wind and tidal power generating system. Equipped with a vertical axis wind turbine mounted atop a simple floating structure and a tidal stream turbine underneath it to efficiently drive a single generator unit by two sources of energy simultaneously, the unique configuration, together with an economical anchor chain support, is expected to significantly cut down both installation as well as generation costs. MODEC plans to complete the necessary field demonstration tests based on prototypes by 2014, and to come up with a commercial model having a generation capacity of 1MW workable as a small scale distributed power source for use in remote islands and the like.

APERC Letter

Peer Review on Energy Efficiency for Indonesia Focuses on Need for Better Coordination

At the APEC Energy Working Group meeting held in March, the final report of the APEC Peer Review on Energy Efficiency (PREE) for Indonesia was approved; Indonesia is the 8th APEC economy to complete a PREE. Under APEC's PREE initiative, any member economy can volunteer to have its energy efficiency policies and programs reviewed by a panel of experts from other economies, which facilitates sharing of best practices. APERC coordinates the PREE initiative under the direction of the APEC Energy Working Group.

The review was conducted from October 10 to 14, 2011 in Jakarta, Indonesia. The review team engaged in a number of discussions with senior government officials from the Ministry of Energy and Mineral Resources, including the Director General of New Renewable Energy and Energy Conservation, the Energy Efficiency Clearing House (a joint initiative between the Danish Government and Indonesia), as well as private organizations such as the Green Building

Council of Indonesia. The review team also visited a textile manufacturing company site near Jakarta, and discussed energy efficiency practices employed at the factory and witnessed these measures first hand.

The review team found that within Indonesian laws there are many references to the implementation of energy efficiency policies. For example, companies that annually consume energy more than 6,000 tonnes of oil equivalent must appoint an energy manager. A voluntary energy auditing program organized by the government is also in place to offer suggestions on how to reduce energy consumption and promote energy efficiency.

On the other hand, they have found a gap between the ambitious laws and actual implementation programs, shortages in human and financial resources to effectively implement and monitor the energy efficiency programs according to the laws, and a lack of coordination among ministries and agencies to remove barriers. Altogether 49 recommendations were put forward covering all aspects of energy efficiency policy. Not surprisingly, most of the recommendations relate to better coordination among ministries. However, some of the recommendations also related to building human capacity, by developing energy managers and auditors and further expanding training courses on energy efficiency across Indonesia and engaging the general public of all ages.

The draft PREE report was accepted by the APEC Energy Working Group, and will be made available shortly for downloading at the APERC website: http://www.ieej.or.jp/aperc/

Acknowledgement

Kensuke Kanekiyo (right), Editor-In-Chief of the IEEJ Japan Energy Brief, and Akira Ishimura (left), Editor, will retire from the Institute of Energy Economics, Japan, at the end of March 2012. We thank the readers most sincerely for the warm support given us during our tenure. We hope the same will be kindly extended to our successors. We wish all the best for those who continue to work in the energy and environment fields, looking forward to continued development of our society.

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