

Japan's energy position post-Fukushima

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As the world knows, on March 11th of this year, a massive quake and tsunami of an unprecedented scale struck the Pacific coastal areas of East Japan leading to a serious accident at the Fukushima Daiichi Nuclear Power Plant. We, the people of Japan, are working diligently to recover and rebuild with generous help from the peoples and the countries of the world, to bounce back from the immense loss of life and damage. At the same time, the catastrophe has forced us to focus again on our selection of energy resources. Japan will have to redouble its efforts to save on energy use and diversify energy sources. The country has already made great efforts to develop energy conservation technology and put it to practical use. Japan has promoted nuclear power and LNG for diversification. Renewable energy is also increasing, though its ratio to the total is very small.

The nuclear accident at Fukushima Daiichi Nuclear Power Plant has given a big push for anti-nuclear power movements in Europe. Japan is also under pressure to weigh again the pros and cons of the use of nuclear power. But we also have to consider one important point we had overlooked – that it is no simple matter to quit nuclear power once you start. Nuclear fuel rods including the used ones must be safely stored in permanent locations and the plants must be safely brought to a close. What is more, unlike oil plants, the permanent shut down and mothballing of nuclear power plants is not so straight forward. As with Chernobyl and Three Mile Island, closing the Fukushima plant will present us with problems we have never experienced before that we must deal with head on..

On the other hand, many emerging and developing countries consider nuclear energy as an option when selecting the best energy mix for themselves, and Japan intends to provide technology and support to these countries. Moreover, the United States and Russia which have been the pioneers in nuclear power generation and have experienced their own nuclear accidents, maintain that they will continue to use nuclear power. France, too, which is number one in terms of relative use of nuclear power at home, intends to expand export of nuclear electricity to neighbouring countries.

Immediate withdrawal from nuclear power is not the way to go. Rather, we should engage more vigorously in the use of nuclear power. Of course, we should fully bear the responsibility of solving the problems that we are saddled with now. In Japan, power companies and major equipment manufacturers have led and coordinated

nuclear power plant projects under the guidance of relevant government agencies. Future decisions on nuclear power will require more vigorous reexamination of safety. To that end, the International Atomic Energy Agency is working with the rest of the world and is calling for safety reviews and management based on harmonised global standards. I strongly recommend involving in these safety reviews experienced people from the oil, gas and chemical industries and the plant engineering industry which has long built and operated complex systems and equipment..

The other significant issue that needs to be reviewed when considering use of nuclear power generation is that of cost. It is argued that the cost of fossil fuels should reflect all their associated environmental damage. If you do the same for nuclear power, and add in the cost of used fuel disposal and plant dismantling, and the cost of paying compensation once a huge accident occurs, then it may no longer be feasible to fly the banner of "cheap electricity." We need to conduct correct and accurate economic evaluation that takes all of these factors into account and we must do it in conjunction with value assessments including safety.

All of us, including the people in the disaster hit area who froze in wind and snow after their infrastructure was destroyed by disaster, and businesses and ordinary people who had to scramble to deal with the sudden electricity shortage after enjoying the benefits of the world's most stable electricity supply, have had to admit once again what a blessing fossil fuel is as we began to receive emergency supply of kerosene oil and to hear the news of mothballed thermal power plants reopening. On the other hand, what has brought on the global warming and climate change is the accumulation of greenhouse gasses represented by CO₂ among others without regard for environmental balance. The basic policy that recognises the need for dealing with this particular problem will probably remain in place for the foreseeable future.

The current high price of oil is boosting development of shale oil and heavy oil, despite geographically difficult locations and high mining costs. Furthermore, improvements in mining technology are eagerly awaited as the producers aim to improve the recovery rate. But given the fact that its own demand of transportation fuel is in decline, Japan is looking into down-scaling its domestic refineries on the advice of the relevant government agencies. But while the domestic oil industry is on a downward trend, Japan still needs to secure a fixed amount of oil that includes backup



supplies in case of emergencies. One possible solution is to deepen economic ties with Asian countries where energy demand is still rising, and where the most advanced large scale oil refineries could be jointly built. This kind of investment would help Japan's neighbours and ensure redundancy of our domestic supply.

Natural gas is the cleanest fossil fuel. But the price of this precious resource seems a bargain compared to the price of oil. It has fallen over 8 per cent in the past year. One reason for the falling gas price is that gas has not been an object of speculative investment. Another reason is the recent increase in production of shale gas in the US. Gas is a clear-cut option as a wise use of resources in the future because gas, like oil, is a vital carbon/hydrocarbon element as raw material for chemical products. In recent years many Japanese have been opting for "the all-electric house" when choosing the energy mix for their homes. However, the Fukushima calamity has brought on black outs and power conservation mandates that the Japanese people had not experienced for several decades. This teaches us a lesson of how we need to prepare diverse energy supply chains and consider the best mix to use. The recent technological advances have improved the performance of equipment such as fuel cell batteries using municipal gas. Such effective uses of gas will expand even more. Either way, Japan remains the biggest importer of LNG and will continue to enjoy the benefits of this clean energy for a long time still to come.

As for renewable energy, the basis for renewable system operation is fundamentally local production and consumption. Therefore, the foundation of renewable energy will be individuals installing equipment in their homes to generate their own electricity, and communities jointly operating cluster-type facilities. Since investing in such systems will be made easier if all the excess power from these is purchased at a fixed price, Japanese Government is considering a bill to institutionalise such a scheme. Inevitably, there are challenges to be met including the quality of electricity generated, keeping the existing supply chain safe and intact, transporting power over long distances, and storing it in large amounts. When we consider optimising the use of renewable energy in Japan, we soon run into certain limitations because of local restrictions on siting and installation of equipment and facilities.

Another option for carbon-free energy is hydrogen. Large volumes of hydrogen have already been used in oil refining and petrochemical processes, but only recently has hydrogen been proposed as an energy source. Japan is promoting use of hydrogen by experimenting with small-scale electricity generation and automobiles that run on hydrogen fuel cell in specially designated areas.

Lack of safe and economical supply infrastructure is a big reason for the slow progress in promoting the use of hydrogen. The Chiyoda corporation has already completed the development of technology that allows for easy storage and transportation of large volumes of hydrogen under ambient temperature and pressure based on the chemical hydride method. Chiyoda has also completed the development of a technology for hydrogen separation and recovery, and is now preparing to construct a facility to demonstrate and eventually service these technologies. It is my hope that use of hydrogen for electricity generation and other usage will gain a big momentum once these infrastructures are completed.

It is vital that we all work together to achieve a sustainable society for future generations. For us to be able to do this, it is essential that we continue to develop technologies and nurture human resources to put these technologies to practical use. ■

Fukushima Daiichi nuclear power plant Number One reactor building

