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## Chapter 5

# Future Perspectives

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### 1. Introduction

This concluding chapter deals with the ethical and safety debates that Japan should have before any restart of nuclear power plants is allowed. The Fukushima Nuclear Power Plant accident was the result of a combination of natural events, human and technical failure, and lack of adequate preparedness. As the preceding chapters make clear, the impacts of the hydrogen explosions and reactor core meltdowns have been widespread. They have changed nuclear energy plans and safety concerns in countries around the world. They have raised questions within Japan about the safety standards and procedures that were in place before the earthquake. They have altered the lives of those forced to evacuate, and led to demands for new and more transparent approaches to energy governance, planning and operation.

This chapter looks at several additional debates triggered by the Fukushima nuclear accidents. First, it looks at the case of Hokkaido. As Japan debates the future of its nuclear power plants, it is important to consider what issues need to be considered in reaching a decision about whether to restart nuclear facilities and what safety measures should be taken before any restarts occur. The case of Hokkaido, a region that is highly dependent on nuclear energy, but also blessed with much renewable energy potential, is reflective of a debate that should occur throughout the country. An appeal made by a group of experts in Hokkaido, of which Fumikazu Yoshida, is a member is presented to the reader for reflection. This is followed by excerpts from the conclusions reached by the German Ethics Commission for a Safe Energy Future, a group that was convened to advise the German government in the aftermath of the Fukushima accident on its meaning and implications for Germany. The intention here is to ask the reader to consider if similar questions as those that were raised by the Ethics Commission should be considered in Japan as a new energy policy

and future for the country is debated. Finally, in a concluding section alternative options to a status quo energy politics are considered. This is done with a focus on Hokkaido, but the arguments presented here could apply to other regions of Japan as well.

## 2. The debate about restarting nuclear power plants in Japan

Hokkaido has 3 nuclear reactors. There is particular concern about Unit 3 of the Hokkaido Electric Power Company's Tomari Nuclear Power Plant. A group of 50 researchers working in Hokkaido on this issue, produced the following statement in August 2011:

Since nuclear plants need water, all 54 nuclear power plants across the country are situated, like the Fukushima Nuclear Power Plant, beside the sea, where they can be greatly affected by earthquakes and tsunamis. It is now clear that if another accident were to occur, the range of the damage it would inflict would be even more extensive and equally fatal. The official claim that "Nuclear power is safe" has been put to the test and is no longer believed.

Units 1 and 2 of the Hokkaido Electric Power Company Tomari Nuclear Power Plant have been in service for more than 20 years while Unit 3 has now been in operation for more than three years. Seismologists have identified active fault lines not only along Japan's Pacific coast, but also off the coast that faces the Sea of Japan, and in 1993 an earthquake off the southwest coast of Hokkaido caused considerable damage; the Tomari Plant was among those installations that were affected. As the party in charge of business operations at the plant, and to reassure the people of Hokkaido, Hokkaido Electric Power Company has the obligation to disclose information and analysis with regard to these issues. At the same time, it is necessary that an impartial third party organization should perform a close investigation to verify the information given.

An "Agreement on Environmental Protection and Measures to Ensure the Safety of Tomari Nuclear Power Plant and its Surroundings" was first concluded in 1986, and has subsequently been revised three times. The agreement was drawn up between Hokkaido Electric Power Company and the Prefecture of Hokkaido, the village of Tomari, the towns of Kyowa and Iwanai, and the village of Kamoenai. Although Article 14 states that the signatories can request such measures as the "temporary stoppage of the nuclear reactor", only the prefecture and the four closely related localities have had any part to play in this agreement. Yet, as we have seen during the aftermath of the accident at Fukushima Dai-ichi Nuclear Power Plant, even the city of Fukushima, 60km

from the site of the accident, has suffered serious after-effects from radioactive fallout. If we take this into consideration, we see that it is essential to enlarge the range of localities that need to be parties to this agreement.

On March the 7th 2011, the Hokkaido Electric Power Company Tomari Nuclear Power Plant commenced a test operation of Unit 3. This reactor is at the cutting-edge of nuclear power technology, but it has been planned for plutonium thermal use, which intensifies the dangers and their effects immensely. Adjustment operations continued for over five months until such time as the Unit was due to start commercial operations, but the accident at the TEPCO Fukushima Dai-ichi Nuclear Power Plant has been a lurid illustration of how an earthquake and/or a tsunami can transform what has been thought a safe nuclear power plant into a huge source of radioactive contamination that brings fear not only to the neighborhood directly surrounding the plant, but to all the residents of areas within range of the fallout.

In April 2012, the Hokkaido Electric Power Company announced emergency measures to strengthen the safety properties of the Tomari Nuclear Power Plant. The Company has also indicated how long it will take to carry out such measures and ensure that they are properly put into place.<sup>1</sup>

- (1) To be able to supply electric power from sources outside the power plant: about 4 years
- (2) To deploy additional mobile generator sets: within 2 years
- (3) To secure a seawater electric pump and its substitute: within 1 - 2 years
- (4) To implement measures against submersion of electrical equipment: about 4 years
- (5) To implement measures against submersion of the area where critical safety equipment has been installed: about 3 years

In addition, the Company is considering the construction of a seawall.

The Japanese archipelago is one of the most seismically active in the world. This calls for the speediest implementation of the highest possible safety measures. Yet, yearly budget allocations for the implementation of new safety measures mean that their implementation will need to be stretched out over another two to four years. So slack a response demonstrates that the Company has no sense of urgency, and the people of Hokkaido have been shocked by this dilatory attitude.

Even the Governor of Hokkaido, who is an important party to the safety agreement that includes a clause on “the temporary stoppage of the nuclear

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<sup>1</sup> Hokkaido Electricity Power Company, [http://www.hepco.co.jp/ato\\_env\\_ene/atomic/fukushima/moreover.html](http://www.hepco.co.jp/ato_env_ene/atomic/fukushima/moreover.html)

reactor," has had to make a disclosure of information request to obtain information concerning Hokkaido Electric Power Company's response and push for the acceleration in the implementation of the proposed measures. She has also had to urge a review of the range of localities included within the agreement. The start of the commercial operation of Unit 3 at the Hokkaido Electric Power Company Tomari Nuclear Power Plant will be the first in Japan since the accident on March 11. Since this could set a precedent for similar operations in the future, we need a more than usually detailed assessment and a conformity inspection of the Unit and must insist on severe operating conditions regarding safety before the units can be restarted. We should therefore refuse to tolerate the start of commercial operations that lack any of the required conditions, and we should immediately prepare a concrete schedule to ensure the safety of Tomari Nuclear Power Plant and draw up an evacuation plan that takes within its scope the area within a 80km - 100km radius of the plant.

We have therefore proposed five conditions that we insist should be fulfilled before there can be any restart of commercial operations at Unit 3 of the Hokkaido Electric Power Company Tomari Nuclear Power Plant: information disclosure and impartial third party verification, expansion of the range of concerned localities, acceleration in the implementation of countermeasures, a concrete schedule to ensure safety, and a wide area evacuation plan. We have asked all parties concerned to consider these proposals with the greatest seriousness.

From a nationwide point of view, we need in response to the accident at Fukushima Dai-ichi Nuclear Power Plant to be told what were the true causes of the accident and how the course of events unfolded thereafter, and we must insist on the application of drastic standards and stronger safety measures. Niigata Prefecture, for one, will not accept the restart of nuclear power plants until this is assured. Hirohiko Izumida, governor of Niigata Prefecture, is insistent on the need for a true account of the causes and the unfolding course of the accident at Fukushima Dai-ichi Nuclear Power Plant as a prerequisite for the restart of nuclear power plants. "Is the tsunami the only cause for the loss of power supply? Did the earthquake rupture a pipe? In the event of accident, who has the right to decide on a seawater injection in order to prevent core meltdown? We do not know anything."<sup>2</sup>

While Governor Izumida is certainly right, and we may not yet know all that we should like to know about the accident and its aftermath, we have at least

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<sup>2</sup> *Hokkaido Shimbun*, August 7, 2011.

learned some lessons from the consequences of the disaster of March 11, and we must consider most carefully what the lessons teach us. And once the current periodic routine inspections have been concluded, we must debate what conditions we shall need to impose before the restart of nuclear power plants across the country can be authorized. We need a careful policy statement that will clarify these issues.

### 3. Alternative policy: The “why” and the “how” of German denuclearization

One of the most divisive debates facing Japan is the question of whether it should permanently shut down its nuclear power plants? Can Japan live without nuclear power? In response to the Fukushima nuclear accident, German Chancellor Angela Merkel created the “Ethics Commission for a Safe Energy Supply,” a group of 17 societal, academic, and corporate leaders to consider the ethical dimensions of energy use in light of the Fukushima nuclear accident, an accident which occurred in a highly advanced industrial society. Since the conclusions of the Commission may offer important ideas for Japan to reflect on, the “why” and “how” of the German denuclearization process are explored below.

The fact that the Fukushima accident occurred in the words of the Ethics Commission, in “a highly organized, high-tech country like Japan” has had a very great impact on the German people. The accident, was followed intensively by German television, which repeatedly aired the images of the hydrogen explosions at the Fukushima Dai-ichi Nuclear Power Plant. In some ways Germany seemed better prepared than Japan for such an accident. While the German Federal Ministry for the Environment and the German Meteorological Service immediately began publishing detailed information about the accident on their website, the Japanese Meteorological Agency failed to make relevant information available. This led to much panic and uncertainty. Many Japanese turned anxiously to the German information sources, including a map prepared by the German Meteorological Service, the “Relative distribution of radioactive particles emitted by Fukushima.”

While the radioactive contamination of Germany from the fallout of the accident at the Chernobyl Nuclear Power Plant in 1986 was the original spur to the institution of a law in 2001 to phase out nuclear power plants in Germany by the early 2020s, the accident at Fukushima Dai-ichi Nuclear Power Plant put a new sense of urgency behind a phase out decision. It also put an end to efforts by some pro-nuclear groups in Germany to slow down

Germany's phase out schedule. As a result of the accident in Japan, Germany made a decision to speed up the phase out rate of Germany's nuclear power plants.

The report of the Ethics Committee of which Miranda Schreurs was a member makes the following points<sup>3</sup>:

- Even if the safety of nuclear power plants is high, accidents can happen.
- Should a major accident occur in a nuclear power plant, the potential damage is greater than with any other source of energy.
- To leave the responsibility of spent fuel disposal to the next generation is an ethical issue and one that we cannot neglect.
- There are safer sources of energy than nuclear power.
- Yet because of global warming, the use of fossil fuels is not a solution.
- The development of renewable energy and energy efficiency measures that would be a corollary of the gradual phasing out of nuclear power offers a great opportunity for the economy of the future.

If Japan is to learn from these conclusions, the country must ask whether nuclear power is really the best or appropriate means of supplying energy. Earthquake-prone Japan needs to evaluate and compare the cost and risks of nuclear power with other forms of power generation, the scale and extent of damage in the case of an accident, and her responsibility toward future generations. The choice of technology should be decided by society on the basis of such ethical value judgments.

How is it that Germany chose a path of denuclearization? Germany's new energy policy, confirmed by an amendment of Germany's Atomic Energy Act, aims to abolish nuclear power plants by 2021-2022. Over the decades numerous nuclear power plants have been shut down and decommissioned or are being decommissioned. A few were shut down in the 1980s. Six were shut down in 1990 as a result of unification. In the 2000s, two were shut down as part of the initial plan to phase out nuclear energy. After Fukushima, eight of the oldest reactors were stopped and disconnected from the power grid. In 2010, Germany's nuclear energy counted, as it does in Japan, for about 11percent of the country's primary energy supply, and 22percent of its electric power. Oil is the largest source of primary energy, accounting for 33percent, while brown coal is the largest source of electric power, accounting for 24percent in 2010. Such data indicate how challenging is the task of taking measures against global warming while at the same time phasing out nuclear energy. Even when

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<sup>3</sup> Deutschlands Energiewende — Ein Gemeinschaftswerk für die Zukunft vorgelegt von der Ethik-Kommission Sichere Energieversorgung Berlin, den 30. Mai 2011.

stopped, the safety of a nuclear reactor remains an important issue. In Germany, too, the storage and disposal of spent fuel are serious concerns, and while not planning to reprocess fuel the country needs to address questions of safety and the use of new technology.

Germany is currently shifting to alternatives to nuclear power, such as photovoltaic power, solar thermal power, wind power, geothermal power, wave power, and biomass. This is being complemented with the expansion of cogeneration, investment in a new high voltage power grid, research and development of batteries and other electric storage systems, and smart grid technology. Germany is seeking to collaborate with Japan in carrying out research and development in many of these fields. And despite the reduction in nuclear energy dependence, Germany has over-achieved in terms of its goals for the reduction of greenhouse gases in accordance with the Kyoto Protocol. Emissions are now close to 30 percent below 1990 levels. The 2010 energy policy of the German government makes energy saving and renewable energy development two main pillars towards the further reduction of greenhouse gas emissions. By 2020, Germany has a goal to reduce its carbon dioxide emissions by 40percent of 1990 levels, to achieve an 18percent share of renewable energy in primary energy consumption, and enhance energy efficiency by 20percent.

The 2010 energy policy has been complemented by further energy programs that seek to promote more rapid deployment of renewable energy, storage and grid technology development and use, energy saving, improvement of building insulation, transportation, and the improvement of conventional power generation, among many others. In contrast with Japan, which had little renewable energy capacity at the time of Fukushima, Germany had already expanded its share of renewable energy in the previous decade. In 1990, Germany had only 3 percent renewables in its electricity mix, by 2010 it was over 16 percent. And, in the 18 months after the Fukushima renewable capacity developed so rapidly, that Germany was able to meet 25 percent of its electricity consumption from renewables. Non-governmental organizations (NGOs), citizens, farmers, political parties, entrepreneurs and the government have all been involved in achieving these changes.

What Japan now urgently needs is the establishment of a new energy policy framework with well-defined goals for renewable energy and energy efficiency. In addition, it must build expert capacity through the formation of bodies of professionals who have the impartial expertise necessary to guide the energy decisions of politicians. It requires time to make political decisions based on public debate. This is nevertheless essential for Japan if Japan is to achieve a stable, safe, and low-carbon energy structure.



Although the cost of the project will be high, the EU is slowly moving in the direction of developing of a more inter-connected European-wide electricity grid system and electricity market. There are also projects underway considering how to enhance inter-connectivity with North Africa.

Some have likened efforts to transform the German energy system toward a low-carbon, no-nuclear system as Germany's Apollo Program. The expectation is that the transformation will bring new research and development opportunities through the participation of universities, think tanks, corporations, and communities. For example, the development of alternatives to the fossil-fuel automobile is a chance to strengthen the automobile industry's long-term competitiveness. Smart grid technologies could transform not only how we use energy, but how we do business. New urban designs could make cities not only less energy intensive, but also more livable. Japan, too, during the process of overcoming the problems of pollution and the oil crisis in the 1970s, succeeded in developing a world-class economic structure based on energy efficiency and environmental technology. That system was, however, still based on fossil fuels and nuclear energy. Now a new revolution that will bring Japan in the direction of a renewables based energy system is needed.

To be able to turn a crisis into an opportunity for renewal will depend upon the willingness and demands of the people. Since the Japanese would not want to be told that "The wise learn from other's experiences, while the fool cannot even learn from his own mistakes," Japan has to draw lessons from the Fukushima accident. Learning from the German example, Japan too can begin to make concerted efforts to set appropriate goals for denuclearization by establishing a comprehensive policy framework under the necessary aegis of trained and independent professionals. And at the same time, Japan has to strengthen cooperation with other countries on the promotion and development of renewable energy and energy saving.

#### 4. The potential of Hokkaido: Hopes for combined heat and power

We may begin thinking about how Japan can transition to a new energy system, by taking a look at renewable energy in Hokkaido. Hokkaido has much renewable energy resources, and especially wind power. Wind power is the least expensive renewable resource for Hokkaido. The Cape Soya Wind Farm in Wakkanai City is the largest in Japan with 57 wind power stations capable of producing 57,000 kilowatts of electricity. The Ministry of the Environment has calculated that there are sufficient suitable sites for wind power generation in Hokkaido, Tohoku and Kyushu to surpass the current

combined capacity of nuclear, thermal and hydroelectric power generation. Two major problems are the expense of laying transmission lines, although there are proposals to use the disused railroads of former Japanese National Railways as sites for transmission lines, and the rapid variation in output depending on wind speed. Another obstacle is institutional. The Hokkaido Electric Power Company decided to limit the introduction of wind power generation to only 5percent of the total installed capacity of 7.4 million kilowatts; this is a problem that will have to be faced if wind power is to have a future.

Another promising source of energy is photovoltaic power generation. The strength of the Japanese semiconductor industry is one of the reasons why Japan was the world leader in terms of installed solar power generation capacity until about 2003. However, Japan has subsequently been outdistanced on the use of solar power by Germany and Spain, and since Japan has wind power generation technology but a limited domestic market, it is mostly sold abroad. Other renewable resources provide possibilities for decentralized electricity production, such as biomass, geothermal and small hydroelectric generation. Renewable energy is expanding rapidly in many places in the world. It already represents 30percent of the total electric power consumption in Denmark and 25percent in Germany (data for the first half of 2012). Policy leadership and implementation is the key in Japan, too.

There are also many possibilities for energy efficiency improvements, such as with the combined utilization of heat and electricity, since it is possible to increase the heat utilization factor through cogeneration and district heating. This could be attractive in regions like Hokkaido. In Denmark, for instance, after the wheat has been harvested the straw is used as raw material for electricity generation and heat production. The generators are actually located on the wheat fields and the electricity and heat are supplied to the surrounding municipalities. There are approximately 700 cogeneration plants in Denmark. Denmark's total area is about the same as that of Hokkaido. Wind and solar power generation depend on the weather, but biomass systems provide storage and depend neither on the weather nor on light or darkness. This means it can provide base load.

When we consider that there are 7000 biogas plants in Germany operating on wood chips, straw and livestock manure, and compare this with the agriculture and forestry resources of Hokkaido, we see that the potential for cogeneration in Hokkaido is significant. We should recognize these systems as sustainable infrastructures and should finance mechanisms for their development amongst agricultural cooperatives.

Another important tool to consider is an environmental tax. The price of fuel in Denmark is a concrete example of how taxes can be used to promote low carbon fuels (see Figure 1). Before tax, the cheapest fuel is coal, followed by heavy oil and gasoline, with the most expensive fuels being wood pellets, wood chips and straw. If nothing is done to change this, mostly fossil fuels like oil will be used and large quantities of carbon dioxide will be emitted, but if an energy tax and carbon tax are imposed on fossil fuels, then wood pellets, wood chips and straw can become relatively less expensive. Such environmental taxes can lead to a reduction in the use of fossil fuels and to the promotion of non-fossil fuels. Tax revenues can also be used for social security costs.

A feed-in tariff policy is an effective way of promoting and diffusing sources of renewable energy with high initial installation costs that discourage investment, but if the duration of operations and the money that can be made from the electric power business were to be preset, investment in renewable energy would be stimulated and fund raising for renewables facilitated. As diffusion progresses, the costs of renewables will continue to decrease making them more available to a larger number of consumers. Due to the different costs of renewables, a system with a purchase price for each type of renewable energy is necessary.

Sapporo consumes about one-third of the electricity used in Hokkaido. If an accident were to occur at the Tomari Nuclear Power Plant, Sapporo would be directly affected since it is located about 60km from the plant. That is one reason why Sapporo should promote measures concerning energy saving and heating and increase the use of renewable energy. In addition, further cooperation between urban and rural areas will allow an augmentation of wood

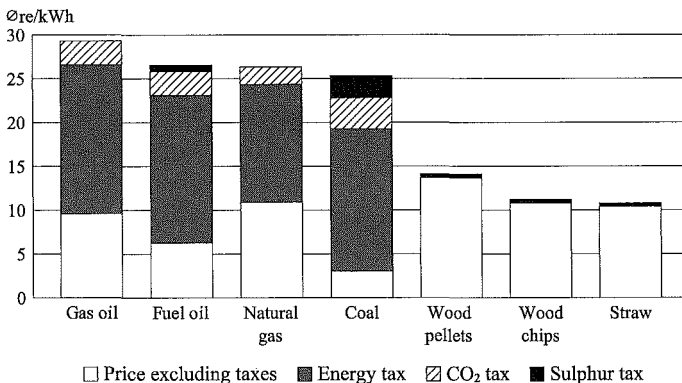


Figure 1 Environmental related Tax in Denmark.

biomass use. Sapporo and Hokkaido have many possibilities for developing safe and renewable forms of energy. For instance, Hokkaido Gas Company is building a liquefied natural gas reception terminal in Ishikari Bay New Port. If Hokkaido Gas Company and Hokkaido Electric Power Company were cooperate to build a natural gas-fired power plant, they could supply Sapporo with electricity and heat through the use of cogeneration. In the future, Sapporo and Hokkaido will need to cooperate more on questions of how to promote low-carbon urban planning. Doing so could also be the source of new business and employment opportunities. Similar suggestions could be applied to other regions of Japan as well.

### 5. Policy to reduce reliance on nuclear power: A review of short, medium and long-term prospects

With sufficient leadership low-carbon energy outcomes are achievable. As an example, since July 2009, when Sapporo began to charge for garbage collection and disposal, the city managed to reduce the amount of garbage it produces by more than 40percent. A significant reduction in the quantity of combustible garbage has made it possible to dismantle the most obsolete of the four incineration facilities located in the city without building any new ones, while generating a cost reduction of 37 billion yen. Charging for garbage disposal is a mechanism acts as a kind of environmental tax.

Since the Fukushima accident, Hokkaido Electric Power Company has taken such emergency safety measures as the deployment of mobile generator sets in Tomari Nuclear Power Plant, but as we have seen, the implementation of important new safety measures against the threat of a tsunami could take another 3 or 4 years. This is too long for comfort. We need urgent measures to ensure that the nuclear power plant can resist earthquakes and tsunamis at least of the same scale as those that devastated the Tohoku coast of the Japanese mainland. Clearly, since the Fukushima accident, Hokkaido residents have been very concerned about the Tomari nuclear power plant and want assurances that it can operate safely. No one wishes to see the Hokkaido Electric Power Company suffer the same fate as the Tokyo Electric Power Company. These measures will surely be extremely expensive and will add costs to the operation of Hokkaido Electric Power Company. Hokkaido Electric Power Company has a responsibility to make the new cost estimates for the safe operation of the plants available to the people. The costs burdens will have to be shared by consumers, but there is no real alternative as the safety of the plant must take the highest priority.

Should Unit 3 of the Tomari Plant, which has been operating since 2009, run until the end of its life expectancy, then it will be necessary to think much more carefully about how we are to secure its safety, while finding a way to close down Units 1 and 2 (which have both been operating for more than 20 years) and switch to other low carbon energy sources, as well as finding a way to reduce electricity consumption. Full and open discussions on these issues are essential. The prerequisite for such a debate is for a third party that is not associated with the government or the electricity company to undertake an impartial audit.

The accident at the Fukushima Dai-ichi Nuclear Power Plant has exposed the falsity of the claims that nuclear energy is safe and has clearly shown the need to reform Japan's national energy policy, including that of Hokkaido and the Hokkaido Electric Power Company. During a period of sudden environmental change, such as the one brought about by the collapse of the myth of safe nuclear energy, we have to reject the opacity of official communiqués, make continuing efforts for dialogue with Hokkaido residents, and break off the cozy relationship between the administration and business.

Japanese citizens also have the right to require the full release of public information on energy policy. In order to ensure more fairness and transparency, there must be public audits and regulations ordered and carried out by third party organizations. This is true in relation to Hokkaido Prefectural Assembly as well.

It is important to review the energy policy and keep the public fully informed of policy goals and safety measures for the short-, medium- and long-term.

### **5.1 Short term goals**

Many experts insist on the complete revocation of the thermal use of plutonium. At least until the official investigation report on the Fukushima accident is released, Units 1 and 2 of the Hokkaido Electric Power Company, which are now undergoing routine inspection, should not be restarted. Countermeasures against earthquakes and tsunamis that take new realities of their dangers into account should be carried out as soon as possible. Safety measures concerning Unit 3 should be strengthened and their implementation moved forward. If Unit 3 continues to operate, then measures to ensure that the nuclear power plant can resist earthquakes and tsunami of the same scale as those of the Great East Japan Earthquake should be undertaken with all possible speed.

## 5.2 Medium term goals (until 2020)

In order to reduce reliance on nuclear power, Japan should begin at once to increase the use of natural gas-fired power generation and renewable energy while strengthening the transmission network and intensifying the proactive planning of cogeneration. As the Act on Special Measures concerning the Procurement of Renewable Electric Energy by Operators of Electric Utilities has already been passed, the concrete implementation of its directives in Hokkaido is essential. Hokkaido Electric Power Company has already announced plans for natural gas-fired power generation in cooperation with Hokkaido Gas Company, and has said that it is considering the expansion of the framework for the introduction of renewable energy.

## 5.3 Long term goals (until 2050)

As long as there are no new construction projects or additional installations, it should be possible to phase out all nuclear power units by 2050: Tomari Unit 3 could be the last nuclear reactor operating in Japan. In the meantime, we have to examine strategies and plans to achieve denuclearization through energy saving and renewable energy. In Hokkaido, the future potential of such renewable sources of energy as wind power, biomass, photovoltaic power, geothermal power and others, is considerable.

A study made by the Japan Center for Economic Research has calculated that where there is sufficient diffusion of renewable energy (not only wind power and photovoltaic power but also geothermal power, biomass and small hydroelectric generation) and if improvements are made in energy saving, the cost in 2050 would be cheaper than if we were to continue operating nuclear power plants.<sup>4</sup> Specifically, the cost of nuclear power will be 20 JPY / kWh, while during the period of an oil crisis the energy saving would be 1.5 percent per year. The amount of energy supplied by nuclear power before the Fukushima accident can be covered by newly introduced sources of renewable energy and energy saving. Denuclearization represents a cost rise in the short term, but in the long term the benefits are likely to far outweigh the disadvantages.

I should therefore like to propose the establishment of the “Hokkaido Energy and Environment Council.” The council would be composed of members of the national government, Hokkaido Prefecture and the prefectural assembly, concerned localities, Hokkaido Power Company, Hokkaido Gas Company, energy specialists, and citizens’ groups. Their task would be to make

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<sup>4</sup> Japan Center for Economic Research, Bulletin, January, 2012.

extensive investigations, conduct consultations and seek consensus. Although not itself a decision-making body, it is needed as a forum for deliberation and the sharing of information.

In 2012, all three of the Tomari reactors were stopped. It is essential that Hokkaido Electric Power Company should work in partnership with other energy-related businesses and all relevant administrative agencies if it hopes to gain the cooperation of residents in programs to save energy through the development of alternative forms of power generation, such as thermal power. The initiative of the Governor of Hokkaido will be especially crucial.

The future presents us with three crucial risks: the risk of global warming, the risk of nuclear disaster, and the risk of over reliance on imported fossil fuels. It is of vital importance that we adopt an outlook that seeks for a reduction of all of these risks. A reconstruction plan that takes into account the short-, medium- and long-term goals discussed above, and with the support of the people of Hokkaido, could transform the crisis engendered by the Great East Japan Earthquake into the cornerstone of a peaceful life in the 21st century. This is important for the future generations in Hokkaido, Japan and the world.