Chapter 5
Toward Recovery from the Great East Japan Earthquake

At 2:46 pm on March 11, 2011 a massive earthquake struck with a magnitude of 9.0 and its center off the coast of Sanriku. Due to this earthquake, strong tremors were observed mainly in the Tohoku and Kanto regions and towering tsunami were observed mainly along the Pacific coast. The earthquake and tsunamis caused the most tragic human suffering in Japan since World War II, particularly in a wide region of the Pacific Coast from the Tohoku region to the Kanto region, and had immeasurably enormous effects on daily life, such as destruction of buildings, damage of automobiles, and severance of things that are referred to as lifelines, such as electricity and running water. In addition, primarily in the Tokyo metropolitan area there were shortages of all kinds of daily necessities such as food and daily commodities, caused by factors such as severance of distribution channels for supplies and consumers hoarding non-essential and non-urgent goods.

From the perspective of impacts on the environment, problems have arisen such as the generation of large amounts of debris due to the collapse of buildings in each of the disaster areas, and there is an urgent need for prompt handling of and appropriate response to such problems. Support is also important for things such as dealing with the excrement of people living in shelters and debris related the disaster, keeping people and their pets in good conditions, and monitoring of air and water qualities.

As for electricity, which is closely related to fighting global warming, nuclear power plants and thermal power plants controlled by Tokyo Electric Power Company and Tohoku Electric Power Co. Inc. were seriously damaged, resulting in an extremely difficult situation for the balance between electricity supply and demand and thus creating the need for drastic measures concerning both supply and demand.

The damage from the Great East Japan Earthquake was of an unparalleled scale across broad areas, and the type of damage was also of a seriousness that had not been experienced in the past. Under such an unprecedented situation, it is necessary to move forward with efforts for recovery, taking into consideration the experiences of past major disasters such as the Great Hanshin Awaji Earthquake while keeping in mind the differences in the states of damage. In promoting efforts aimed at recovery from the earthquake, it is necessary to build a broad-area system based on leadership by the national government. Although the full spectrum of the damage is not yet clear and the tasks that require responses are constantly changing, in this White Paper we have laid out the situation up to the beginning of May.

1. Handling Environmental Problems Caused by the Earthquake

The government established an emergency headquarters for response to the 2011 Tohoku Region Pacific Coast Earthquake immediately after the disaster on March 11, and based on fundamental policies related to disaster emergency measures it has been collecting information at the relevant ministries and ascertaining the damage situation, conducting disaster emergency activities such as saving human lives, rescue activities for disaster victims, and firefighting activities, as well as restoring lifelines in disaster areas, securing required personnel and goods, and providing accurate information to residents and other people in disaster areas.

(1) Disposal of Debris Caused by the Collapse of Buildings

The “2011 Earthquake off the Pacific Coast of Tohoku” was Japan’s largest scale earthquake on record, and various areas along the coast were stricken by subsegment towering tsunamis. They caused an enormous amount of debris created by the collapse of buildings, and the disposal of such debris is an urgent task in order to restore the daily lives of residents and economic activities in the disaster areas.

In order to carry out smooth and rapid disposal of the enormous amount of debris generated by this major earthquake, immediately after the earthquake the Ministry of the Environment established a system for information collection and communication. After March 11 it dispatched its personnel to Iwate, Miyagi, and Fukushima prefectures. On March 13 the Ministry of the Environment established a task force for response to disaster waste and it has been coordinating and making arrangements with local governments and other organizations to build a broad-area collaboration system in order to dispose of the enormous amount of debris.

It will be extremely difficult to dispose of the debris generated by this earthquake if only the facilities of municipalities in the disaster areas are used. For that reason, the Ministry of the Environment has asked all local governments and related groups in Japan to support disposal of the debris of the disaster areas, and many

local governments and other organizations have offered to provide personnel and materials. Further, on April 8 the ministry sent requests to each of the prefectural governors asking for their cooperation with accepting and disposing of debris, and arrangements are being made to put in place a nationwide disposal system for the debris. In Iwate, Miyagi, and Fukushima prefectures, which suffered especially severe damage, committees of national and local governments have been established for quick response to disaster waste based on the local circumstances, and specific consultations have been held. Through these efforts, as of May 10 there were 329 locations secured to temporarily place debris and a total of 3.49 million tons of debris has been transported to those temporary locations.

In addition, in order for disposal of debris to carry out smoothly, the government gave notice of guidelines about methods for removal and disposal of things such as damaged buildings, automobiles, and ships, handling precious metals, and handling private properties such as Buddhist memorial tablets and photo albums in order to dispose of such items (Table 5-1-1). The government also gave notice of guidelines urging caution in disposing of and handling waste asbestos, PCB waste, infectious waste mixed in the debris, computers, automobiles and other items subject to the Home Appliance Recycling Act. As for pollution from radioactive substances, because it is necessary to take all possible measures for safety, the short-term handling of disaster waste in Fukushima Prefecture was made public on May 2, and the Ministry of the Environment and the Nuclear and Industrial Safety Agency are conducting surveillance and holding briefing sessions for relevant municipalities in Fukushima Prefecture.

As for expenses required when local governments dispose of waste caused by the disaster, conventionally half of expenses are subsidized for local governments that conduct such disposal, using disaster waste disposal operating expense subsidies that are based on the Waste Management and Public Cleansing Law. However, for the disposal costs for debris caused by this major earthquake, the Law Related to Special Financial Aid and Assistance for Dealing with the Great East Japan Earthquake raised the percentage of national subsidies, and the monetary amount is handled using disaster response loans for local governments in the disaster areas in the law, and 100% of the repayment of interest on those loans is to be made into tax allocation measures.

(2) Support for victim in Disaster Areas

A) The State of Household Garbage and Excrement Disposal

In the Great East Japan Earthquake disaster areas, it is also necessary to deal with disposal of household, excrement and trash from evacuation shelters. For that reason, to local governments that offered support,vacuum vehicles and garbage collection trucks dispatched from other local governments and related industrial groups, and temporary toilets were provided.

In Iwate Prefecture, in order to secure a system for collecting excrement immediately after the disaster occurred, industrial groups provided support (approximately 30 trucks from outside the prefecture) and excrement was collected. In Miyagi Prefecture, excrement was collected by vacuum vehicles donated by industrial groups and local governments to areas affected by the disaster. The 8 vehicles were donated

Figure 5-1-1 The Situation in Disaster Areas

Heaps of debris in front of Sendai Airport Station

Damaged automobiles

Temporary location for debris

Removal of debris using heavy machinery

Photos: Ministry of the Environment

Table 5-1-1 Guidelines Related to Removal of Buildings Damaged by the Earthquake off the Pacific Coast of Tohoku

Item		Main Content	Notes
1. Entering private property in order to conduct work		It is acceptable to temporarily enter private property in order to conduct work, even without contacting the property's owner or obtaining his or her permission. Because it is desirable to obtain permission from the owner if possible, it is recommended that the planned schedule should be made publicly known in advance.	
2. Removal of damaged buildings		As for things that have collapsed and are in a state of debris and buildings that were washed away from their sites, it is acceptable to remove them even without contacting the owner or obtaining his or her permission.	
	(1) Buildings	As for buildings that remain on their site, for those that retain some of their original form, in principle the intention of the owner, etc. should be confirmed. However, when the owner cannot be contacted or when there is a danger of the building collapsing, it is acceptable to have a real-estate surveyor make a judgment. If the judgment is that the building has no value, it is acceptable to remove it.	It is recommended that a record be kept by taking photographs, etc. of the current situation.
	(2) Automobiles	It is acceptable to make a judgment based on external appearance and then move automobiles that have no function to temporary location. In addition, when the owner can be identified, make efforts to contact the owner and deliver the automobile to him or her if he or she requests. In other situations, it is necessary to dispose of automobiles as end-of-life vehicles, according to the Automobile Recycling Law. As for automobiles other than the above, after moving them to a temporary location, make efforts to contact the owner and deliver the automobile to him or her if he or she requests.	It is recommended that a record be kept by taking photographs, etc. before moving or disposing of automobiles. Motorbikes are considered equivalent to automobiles.
	(3) Ships	It is acceptable to make a judgment based on external appearance and move ships that have no function to a temporary location. In addition, when the owner can be identified, make efforts to contact the owner and deliver the ship to him or her if he or she requests. In other situations, dispose of them. As for ships other than the above, after moving them to a temporary location, make efforts to contact the owner and deliver the ship to him or her if he or she requests. For ships that are difficult to move, it is necessary to handle them through consultation with the owners.	It is recommended that a record be kept by taking photographs, etc. before moving or disposing of ships.
	(4) Personal assets	Precious metals and other valuables are to be temporarily kept. If the owner is identified, efforts are to be made to contact him or her, and the item(s) are to be returned to him or her if he or she requests. If the owner cannot be identified, the item(s) are to be disposed of according to the Lost Property Act. As for things of value to the individual owner, such as Buddhist memorial tablets and photo albums, if they are discovered and can be easily recovered, it is recommended that they should be kept separately instead of being disposed of and that opportunities to deliver them to the owner should be provided. As for items other than the above, it is acceptable to remove and dispose of them.	Handling of personal assets found within buildings, automobiles, or ships is to be conducted according to (4).

by the private sector and 30 vehicles were donated by Yamagata Prefecture. The collected excrement is disposed of broadly, using treatment facilities in Miyagi Prefecture as well as through assistance by Yamagata Prefecture. In Fukushima Prefecture, since the disaster this matter has been handled through assistance of businesses within the prefecture. As for disposal of trash and debris, in Iwate Prefecture support was provided in ways such as industrial groups from outside the prefecture dispatching approximately 30 dump trucks and carrying out work.

On the other hand, in many areas waste disposal facilities and excrement treatment facilities were affected by the disaster, and some facilities still require repairs even now.

B) The State of Care for Pets Affected by the Disaster

At many evacuation shelters, cages are provided to the shelters for pets that were evacuated with their owners, people and animals are separated, and the owners are taking care of their pets upon their own responsibility. In order to take care for pets in the disaster areas, on March 14 the Japan Society for the Prevention of Cruelty to Animals, the Japan Animal Welfare Society, the Japan Pet Care Association, and the Japan Veterinary Medical Association set up an "emergency disaster animal rescue headquarters" and they have been providing assistance such as distributing monetary donations, sending pet food to disaster areas, and giving advice to various local governments. The Ministry of the Environment distributed 1,398 animal cages and 56 tents to local governments in disaster areas and local governments accepting disaster victims.

C) The State of Sewage Treatment

Since an early stage following the earthquake, all sewage pipe lines in urban areas have been quickly checked to drain away untreated sewage. In cases of broken sewage pipes or pumps, efforts were made to recover public sanitation by carrying out emergency responses using temporary pumps or laying temporary pipes and draining away polluted water. At sewage treatment centers that had been damaged by tsunami, etc., temporary sedimentation basins were set up and emergency responses are also being carried out by simple treatment that disinfects the supernatant fluid of those basins.

(3) Measures against Environmental Pollution

There are concerns about harmful materials leaking from factories that were damaged by the Great East Japan Earthquake and about asbestos becoming airborne due to removal of debris. There have been more than twenty reports of environmental pollution accidents involving things such as harmful substances and oil outflow.

In order to prevent secondary damage to people's health from environmental pollution in the disaster areas, a decision has been made to conduct monitoring of air and water quality.

In order to prevent damage from asbestos, efforts were made under the "Handling Manual for Preventing Asbestos from Becoming Airborne in Times of Disaster," and dust-blocking masks were distributed free of charge with notice of how to wear and use them. In several places in Miyagi, Fukushima, and Ibaraki prefectures preparatory surveillance was conducted before a full-scale surveillance on asbestos atmospheric contamination. The results of those surveillances showed that at all of the monitoring points the asbestos concentration was nearly the same as that of the ordinary general environment.

Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Plant also suffered massive damage from the earthquake and tsunami. The government is currently handling the situation based on the Act on Special Measures Concerning Nuclear Emergency Preparedness and other laws. And ministries such as the Ministry of Education, Culture, Sports, Science and Technology and the Ministry of the Environment, governors of local governments, and other groups are continuously monitoring radioactive substances released into the environment.

2. Efforts to Deal with the Tight Balance between Electricity Supply and Demand

Due to several power plants stopping operations as a result of the Great East Japan Earthquake, the capabilities of electricity supply from Tokyo Electric Power Company and Tohoku Electric Power Co., Inc. have declined significantly in comparison to before the disaster. There has been a tight balance between electricity supply and demand. In addition, planned power outages have been conducted in some areas under Tokyo Electric's jurisdiction.

Faced with this situation, the Ministry of Economy, Trade and Industry (METI) began to ask the public and the industrial sector to conserve electricity. The Minister for Electricity Conservation Promotion and the Ministry of the Environment have called for households around the country to conserve electricity.

In particular, over thirty percent of total demand for electricity is household demand, and household efforts for conserving electricity will have a significant effect. Appliances that consume a large amount of electricity are the following four things: air-conditioners, refrigerators, lighting, and televisions. It is possible to effectively conserve electricity by efficient use of these appliances. Using appliances at off-peak demand times is another important way of conserving electricity.

At the end of March, the Cabinet and METI collaborated to request electricity conservation through newspaper advertisements, television commercials, and other means, and METI set up a public webpage that summarizes specific electricity conservation actions and tentative calculations of their effects.

The Ministry of the Environment also called for electricity conservation and gave the following seven points on reconsidering people's lifestyles: (i) frequently switching off household appliances, (ii) reducing standby power for appliances that are not being used, (iii) selecting the best temperature of air-conditioners, (iv) using refrigerators efficiently by reducing the amount of time their doors are open, (v) selecting the best brightness of lights, (vi) using televisions efficiently by selecting their best brightness and switching off the main power, and (vii) changing to a morning-based lifestyle.

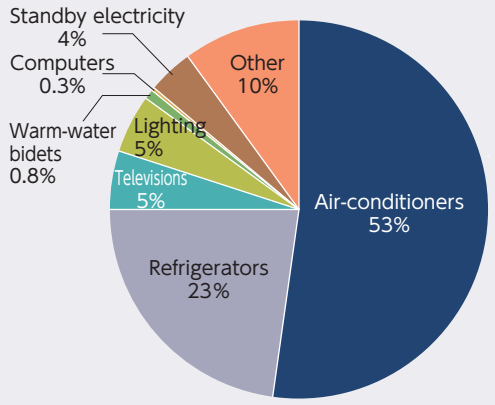
The tight balance between electricity supply and demand is expected to continue from now on. In particular, weekdays between July and September will be the peak demand time for electricity due to use of air-conditioning. Although the public and the industrial sector have made efforts for electricity conservation since the Great East Japan Earthquake and there have been improvements in the balance between electricity supply and demand, there is a possibility of a gap occurring again between supply and demand in the summer. On May 13, 2011 the government released measures for electricity supply and demand for this summer.

Specifically, for the peak demand time (weekdays from 9am to 8pm from July through September), Tokyo Electric Power Company and Tohoku Electric Power Co., Inc. set the target for restraint of demand in all areas as 15%. In order to achieve that target, a target of 15% was set as the restraint goal for commercial-scale consumers (more than 500kW), small-scale consumers (less than 500kW), and households.

Under these targets, the following are being given as examples of main measures concerning demand for each segment.

- For commercial-scale consumers, implementing measures for drastic restraint of demand that include their businesses operation style and their employees' lifestyles, such as efforts to make adjustments of operating and business hours, and shifting schedules for summer vacations.
- For small-scale consumers, announcing voluntary plans (plans for electricity conservation actions) that include restraint goals and efforts such as conserving electricity for lighting and air-conditioners, and adjustment of business hours and shifting schedules for summer vacations.

Figure 5-2-1 Electricity Consumed During the Daytime in the Summer (around 2pm) (average of all households)



Source : Estimation by Agency for Natural Resources and Energy
All figures are based on the maximum daily demand

Figure 5-2-2 Menu of Electricity Conservation Measures for Households

Check the actions that your household will take, and make "electricityconservation measures for my home."

Menu of those electricity conservation measures the government would like people to take		Electricity conservation effects: Reduction rates	Electricity conservation effects: Reductions of consumed electricity	Checks
	① Try to keep room temperature at 28℃ or higher.	10%	130W	☐
Air-conditioner	② Buffer sunlight coming in from the windows by using bamboo blinds (This helps to conserve electricity used for air-conditioning.) (When the set temperature is raised by 2℃.)	10%	120W	☐
	③ If it is not too hot, turn off the air-conditioner and use electric fans instead. Note that using the dehumidifier or frequently turning the air-conditioner on and off increases electricity consumption.	50%	600W	☐
Refrigerator	④ Change the refrigerator setting from "strong" to "medium," reduce the amount of time the door is open, and don't fill the refrigerator with too much food.	2%	25W	☐
Lighting	⑤ Turn off lights during the daytime and try to use lights as little as possible at night.	5%	60W	☐
Television	⑥ Use the energy conservation setting, reduce the brightness of the screen, and turn off the television when it does not need to be used. (When the setting is changed from standard to energy conservation and the amount of time used is reduced to 2/3)	2%	25W	☐
Warm-water bidet (heated toilet seat)	⑦ Use the function to turn off the seat-heater/water-heater or the function to conserve electricity by using a timer, if the toilet is equipped with such functions. (When either of these measures is taken)	Less than 1%	5W	☐
	⑧ If the toilet is not equipped with such functions, remove the plug from the power outlet.			
Electric rice cooker	⑨ Use the timer function to make the entire day's rice early in the morning and then keep the rice in the refrigerator.	2%	25W	☐
Standby electricity	⑩ Turn appliances off using the main power source on the appliance instead of by using the remote control. For devices that are not used for long periods of time, remove the plug from the power outlet.	2%	25W	☐

Even when you are away from home, try to take measures (iv), (vii), (viii), and (x).

Try to conserve enough electricity that the total reduction rate exceeds 15%. % W

⚠ Be careful to avoid heatstroke brought on by excessively cutting back on air-conditioning.

※The stated amounts of electricity conservation effects are the objectives (estimates by the Agency for Natural Resources and Energy) for reduction rates and reduction of consumed electricity for the average electricity consumed by a household while at home (2pm: approx. 1200W). Numbers after the decimal place were omitted for all reduction rates.

Source : Agency for Natural Resources and Energy

– For households, the government will spread awareness of electricity conservation to promote actions for electricity conservation by publicizing a menu of electricity conservation measures (Figure 5-2-2) that includes actions such as the following: (i) Making efforts to keep room temperature at 28℃ in the summer, (ii) changing the setting on refrigerators from "strong" to "medium," and (iii) turning off lights during the daytime and reducing use of lights as much as possible at night.

The government is conducting activities for public awareness through various media forms such as newspapers, television, and the internet to build electricity conservation efforts into a national movement. As part of efforts for conserving electricity, each government branch is formulating plans for electricity conservation, based on the "government's fundamental policy for electricity conservation," and reducing the maximum amount of electricity by more than 15%.

In addition, after the summer of 2011, efforts are expected not only to quickly introduce thermal power plants, emergency power generation by gas turbines and home power-generating equipment, but also to introduce dispersed power generation systems and renewable energy. Demand-side efforts are needed to optimize energy use through introduction of smart meters for accelerating energy conservation.

From now on, it is expected that people will make their best efforts, including those for the ways of their lifestyles and business activities.

3. Toward Achieving a Sustainable Society through Recovery from the Earthquake

The experience of overcoming the disaster-caused tight balance of electricity supply and demand and saving energy will have aspects that can serve as future measures to fight global warming. The demand for electricity under the jurisdiction of Tokyo Electric Power Company decreased significantly after the earthquake due to electricity conservation by individual citizens and planned power outages (Figure 5-3-1). Although this decrease in demand was likely the result of efforts in people's daily lives and economic activity, it may have been an opportunity to newly acknowledge the scarcity and importance of energy.

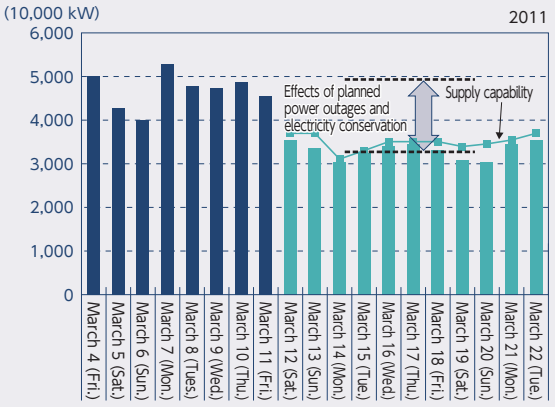
In order to break free from the constraints of electricity supply and demand, recover from the earthquake, and make a fresh start for Japan's economy, it will be necessary to improve on the measure for

both continue to make efforts for both supply and demand. It is also necessary to secure a stable energy supply and reduce the impact on the environment through introduction of renewable energy and dispersed autonomous energy, use of energy-efficient facilities, and efforts that include reconsideration of business styles and everyday lifestyles. These experiences can be hints for reconsidering how energy supply and demand and business styles should be, and for achieving a low-carbon economy, a new lifestyle, and sustainability and safety in society.

As for natural resources, Rikuchu Kaigan National Park and other places suffered all kinds of damage due to this earthquake. In the Tohoku area peoples' lives were carried out in harmony with rich biodiversity and other nature, and tourism making the most of such nature was one of the region's important industries in addition to primary industries. It is desirable to recover primary industries and tourism in this region from the perspectives of preventing disaster, while maintaining human interaction between forests, rivers and the ocean, and utilizing the beautiful scenic areas and other rich natural resources.

Efforts in the areas affected by the disaster have been accelerated with the start of a "Conference on the Vision for Recovery from the Great East Japan Earthquake" by experts and people related to the disaster areas on April 11, 2011. The Diet also enacted the FY 2011 first

Figure 5-3-1 Maximum Amounts of Electricity Supply and Demand Per Day (Tokyo Electric Power Company)



Source: The Institute of Energy Economics, Japan

Column Reduction of Consumed Electricity by Using LED Bulbs

White-light LEDs were developed in Japan in 1996 and rapidly became widely used for lighting. They are an energy-saving, long-life light source. Compared with incandescent light bulbs, use of LED bulbs reduces consumed electricity to approximately one-sixth. For that reason, it can be calculated that when the cost of using LED bulbs is compared with the cost of using incandescent light bulbs, in a span of approximately 1.6 years it will be advantageous to use LED bulbs instead of incandescent light bulbs. Therefore, changing to LED and other energy-saving devices can be considered a way to conserve electricity in the home.

Comparison before and after replacing 40W Incandescent Light Bulb with LED Bulb.

	40W Incandescent Light Bulb	LED light bulb	Comparison
Photos (See Note 1)			
Consumed electricity	36W	6.3W	Reduction to approximately 1/6 (CO_2 emissions also reduced to approximately 1/6)
Life-span	1,000Hours	40,000Hours	40Times
Prices (See note 2)	JPY100	JPY2,380	約24Times
Electricity expenses for 40,000 hours of use (See Note 1)	JPY31,680	JPY5,544	Reduction of JPY 26,136
Costs for one year (See Note 3)	JPY1,784	JPY396	The price difference is recoverable in approximately 1.6 years.

Note 1: Photos were taken from Toshiba Lighting and Technology Corporation materials.
2: Prices are the findings of the Ministry of the Environment
3: One-year electricity expenses and purchase costs when used for 2,000 hours a year. Calculated by dividing the price by the life-span (hours) and adding that to the electricity expense for one hour. Target unit prices for electricity expenses are taken from Toshiba Lighting and Technology Corporation materials.

Source: Ministry of the Environment

supplementary budget.

In recovering from the earthquake, it is important to have a spirit that goes beyond restoring what used to be and instead establish a new wonderful Tohoku and Japan. National and local governments, the industrial sector, and the people of Japan must come together as one and move toward achieving sustainability and safety. Planning for recovery of the disaster areas was discussed at the conference. It is desirable to aim for a new type of town that will serve as a model to the world in terms of environmental conservation by creating eco-towns. These efforts should be based on the wisdom of these regions that have developed along with the natural resources of the sea and the forests.

The damage from the Great East Japan Earthquake was enormous. With the pain of the people who lost their lives and suffered from this disaster in our hearts, we must move toward recovery. It is necessary to have a new awe for nature, be deeply aware of the rarity and importance of natural resources, and make efforts toward achieving sustainability and safety in society. That is desirable from the perspective of environmental conservation.

The states of problems are still changing quickly. We must continue to deal with the damage of tsunami, still-occurring aftershocks, and the accident at the nuclear power plant with all of our efforts to move toward recovery.