

Short-term Energy Supply and Demand Outlook

—Energy Supply and Demand Forecast for FY2012—

and Forecasts for the International Oil and Gas Markets

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Summary

2011 was a year of tight constraints in economic and production activities resulting from the damage to production capacity and disruption of supply chains (supply networks) caused by the Great East Japan Earthquake, the downturn in consumer confidence, and the implementation of an order to restrict electricity consumption for the first time in 37 years. On the other hand, the world economy is gradually expanding, driven by the recovery of the United States and solid growth of emerging countries such as China. With the upturn of the external environment and the boost from reconstruction needs, the Japanese economy is expected to gradually recover in 2012. Energy consumption, which fell in 2011 due to the slump in economic activities following the Great East Japan Earthquake and the rise in awareness of energy conservation, is showing signs of rebound from last year with the recovery of the economy, reconstruction of production equipment and supply networks, and the easing of the mood of self-restraint, though people's propensity to save electricity and conserve energy appears to remain. Regarding the near future, the outlook for the European economy and the restarting of nuclear power stations in Japan remains highly uncertain. The issue of restarting plants is particularly worrisome due to the power shortage and its consequent impact on the Japanese economy which may result from the reduction in nuclear power generation capacity, although work is under way to restart the Ohi Nuclear Power Station Units 3 and 4 of Kansai Electric Power Company after all nuclear power stations in Japan were stopped in May this year. This report presents a forecast of the energy supply and demand in FY2012 based on the domestic and overseas situations outlined above.

Looking overseas, the major disruption of energy supplies caused by the Great East Japan Earthquake was not the only one the world saw in 2011. Disruption also occurred outside the country, due most notably to the spread of a series of insurgencies called the "Arab Spring" in the Middle East and North Africa. These events are still continuing today, strongly affecting the energy supply of Japan both directly and indirectly. In addition to these factors, other uncertainties have emerged since the start of the year, namely concerns for global recession stemming from the financial crisis in Europe and the strengthened sanctions by the West against Iran for its alleged attempts to produce highly enriched uranium. Domestically, Japan is being forced to modify the direction of its nuclear policy, and is expected to increase its dependency on fossil fuels at least in the short- to mid-term. Based on these domestic and overseas conditions, this report presents an outlook for energy supply and demand, an overview of the international situation surrounding oil and natural gas, and a price forecast for the near future.

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1. Introduction

This report presents the outlook for short-term energy supply and demand of Japan and a forecast of the international oil and gas markets up to FY2012. The structure of the report is as follows. Chapter 2 describes the outlook for short-term energy supply and demand of Japan up to FY2012. In presenting the supply-demand forecast, we first present an overview of the economic and production trends for FY2012 as inputs to the energy forecast, then estimate the supply and demand for energy based on the economic and production trends described in the preceding section, and detail the supply-demand forecast for each energy source (based on industrial statistics) as well as the primary domestic supply and final consumption of energy (based on the energy balance table). Furthermore, as part of the supply-demand forecast, a sensitivity analysis on nuclear power plant operation is presented to address the uncertainties surrounding nuclear power. Chapter 3 presents an overview of the respective international oil and gas markets, and a forecast of prices.

2. Short-term Energy Supply and Demand Forecast —Forecasts for FY2012—

The purpose of this short-term energy supply and demand forecast is to estimate the energy supply and demand of Japan for FY2012. As energy is considered to be a “derivative demand” of economic activities, which are a primary demand, it is important to first determine the trend of economic activities. At present, the world economy is expanding moderately driven by emerging countries such as China. Meanwhile, the Japanese economy is picking up pace gradually with the reconstruction after experiencing a significant drop due to the Great East Japan Earthquake on March 11, 2011. This also applies to the energy demands of Japan, which fell in FY2011 due to the drop in economic activities, implementation of the order to restrict electricity consumption and the rise in awareness of energy conservation, but is now recovering in line with the economy.

Premises for the Electricity Supply and Demand Forecast

The national average reserve margin of electricity this summer is expected to be 3.9%, assuming that the already-established power-saving practices and the government’s power-saving goals are implemented without fail and that Kansai Electric Power Company’s Ohi Nuclear Power Station Units 3 and 4 are restarted and operated stably. This summer, electric power companies may be forced to meet the electricity supply and demand requirements with a bare minimum reserve margin of 3%, whereas a reserve margin of 7–8% is normally required in operating the power grid. The analysis in this report does not take abnormally hot summers and harsh winters into account, and assumes that power generation facilities run without problems. Thus, the economic impact that would result from power shortages is not considered. In reality, however, the electricity supply and demand situation is tight, considering possible temperature fluctuations and the fact that the thermal power stations are continuing to run at full capacity.

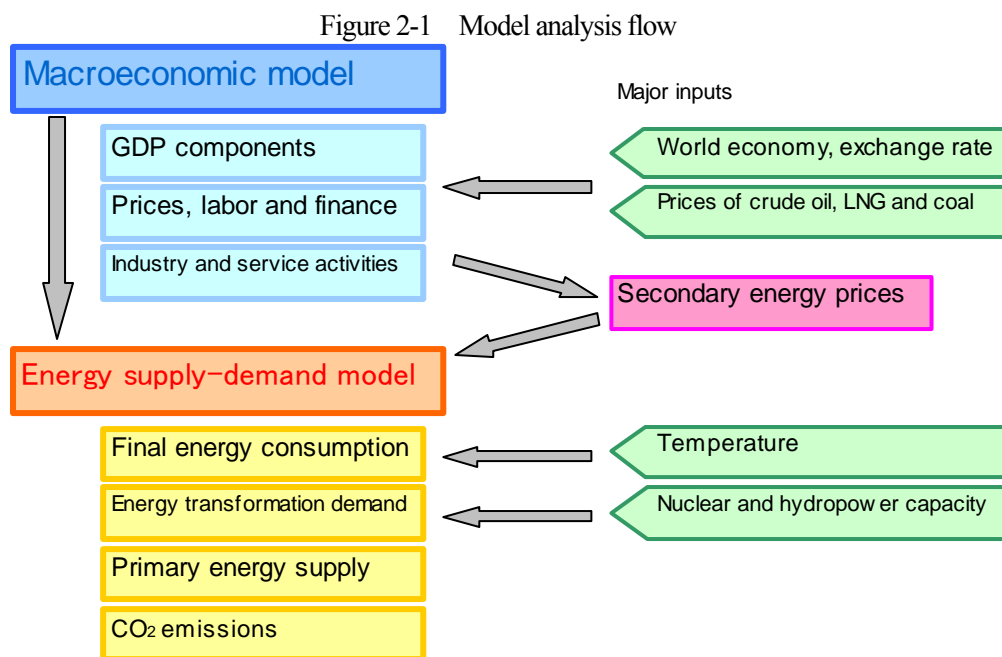
2-1 Forecast of Major Economic Indices for FY2012

2-1-1 Framework for the Short-term Forecast¹

In this forecast, we evaluated the trends of elements that define the supply and demand for energy, using two measurement models: (i) a macro economic model and (ii) an energy demand model. The major indices used

¹ Note) This forecast is based on the information dated no later than June 18, 2012.

in the forecast are assumed as follows. The world economy is expected to continue to expand driven by emerging countries such as China, regardless of the slowdown due to the currency turmoil in Europe. The CIF import price for crude oil, which is used as an input in this forecast, is estimated on average to be 103 USD/barrel (cf. 114 USD/barrel for FY2011) (estimation based on Kobayashi, Y. & Morikawa, T. (2012. July 3), *International Oil and Gas Outlook*). The exchange rate is expected to remain at the 80 yen/USD level. Regarding temperature which affects the energy demand, especially in the buildings sector, we based the first half of the year on the three-month forecast of the Japan Meteorological Agency (published on May 24) assuming slightly higher temperatures than average, and the second half on the average temperature of the past ten years. As for nuclear power, this forecast considers the restart of only Ohi Units 3 and 4. The economic, energy and environmental policies currently being considered by the government in principle were not incorporated in this forecast, as they are still mostly uncertain in terms of the timing and scale of implementation.



2-1-2 Outlook for the Macro Economy and the Industry

The world economy is expected to expand moderately in 2012, driven by emerging countries such as China, despite the slowdown due to the currency turmoil in Europe. The U.S. economy will grow steadily, backed by solid private consumption and exports to emerging countries. The European economy is expected to suffer negative growth due to the financial turbulence mainly in Greece and other Southern European countries, despite the growth in German exports to emerging countries. The emerging economies such as those of Asia, despite a gradual slowdown, are expected to maintain their high growth rates

We estimate the real growth rate of Japanese GDP for 2012 at 2.1% from the previous year. Japan will be back on the recovery track as it was before the earthquake, driven by the rise in exports due to foreign demand such as the expansion of the world economy and the increase in private consumption due to the upturn in consumer confidence. The contribution of domestic private demand will be 1.6% points in total. Growth of final private consumption will be positive due to an upturn in consumer confidence. Private housing investment will continue to grow from last year due to the continued reconstruction demand. The contribution of public demand will be 0.6% points in total. Public investment will continue to grow in 2012 as government assistance for reconstruction will continue. Government consumption supported by continued

government assistance for the disaster victims, will continue to increase following last year. The contribution of foreign demand is estimated at 0.0% points in total. While significant growth in exports is expected due to the recovery of domestic production capacity and strong exports to emerging countries, imports will also remain solid due to the economic turnaround and to the increase in fossil fuel imports for electricity generation.

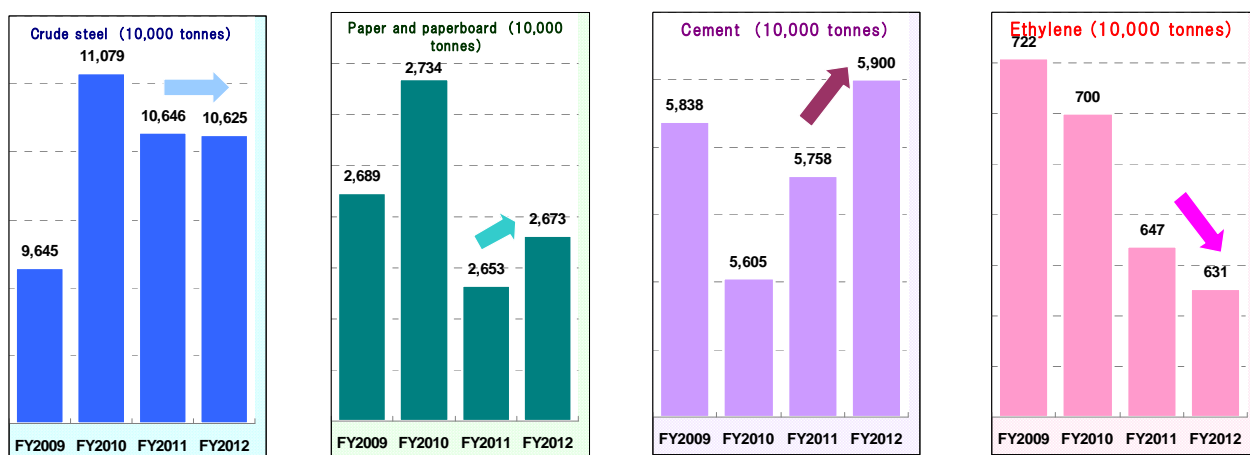
Figure 2-2 Forecasts of macroeconomic indices

	Historical		Forecast	Year-on-Year Changes (%)		
	FY2010	FY2011	FY2012	FY2010	FY2011	FY2012
Nominal GDP (trillion yen)	479.3	470.0	477.8	1.1	-1.9	1.7
Real GDP (trillion yen, 2005)	511.1	511.1	522.1	3.2	-0.0	2.1
Private consumption	299.6	302.9	306.8	1.5	1.1	1.3
Private investment	64.8	64.9	66.4	3.5	0.2	2.2
Public demand	118.7	121.5	124.1	0.6	2.3	2.1
Exports	83.6	82.4	86.2	17.2	-1.4	4.6
Industrial production index (2005=100)	94.1	93.2	96.3	9.4	-1.0	3.3
Consumer price index (2010=100)	99.9	99.6	99.8	-0.6	-0.2	0.1
Crude oil import price (USD/barrel)	84.0	114.1	102.7	21.9	35.8	-10.0
LNG import price (yen/tonne)	50,315	64,627	66,000	18.1	28.4	2.1
Exchange rate (yen/USD)	85.7	79.1	80.0	-7.7	-7.7	1.2

2-1-3 Outlook for Production Activities

The Japanese Indices of Industrial Production (IIP) is expected to grow by 3.3% from the previous year in FY2012. Production will be driven by the growth in export industries such as transport machinery and electric machines fueled by the continuing high growth of emerging economies and the upturn of the U.S. economy, despite concerns over the European economy. Production will also grow within Japan, driven by the growth in private demand supported by the eco-car subsidies and the reconstruction demand which is accelerating, pushing up the production of steel and cement. The production trends of the major industries are as follows.

Figure 2-3 Forecasts of raw materials production



(a) Crude Steel

Crude steel production is expected to decrease by 0.2% from the previous year in FY2012. Exports will decrease slightly due to the worsening trade conditions caused by the strength of the yen even though exports to the U.S. are expected to be solid, while imports are expected to grow because of the increasing crude steel production capacities in China and South Korea, resulting in a continued increase in steel imports from those countries for ship-building. Based on the estimated moderate recovery of private demand in Japan due to the full-scale reconstruction demand and the recovery of automobile production thanks to the eco-car subsidies, the positive domestic factors and the negative external factors will cancel each other out, and so crude steel production will remain mostly flat from last year at 106.25 million tonnes (-0.2% from the previous year).

(b) Ethylene

Ethylene production is expected to decline by 2.6% from the previous year in FY2012. Regarding foreign demand, domestic ethylene production is declining as exports continue to drop and imports rise due to the strong yen and the launch of overseas petrochemical plants. As for domestic demand, the full-scale reconstruction demand and the large increase in transport machinery production are raising hopes for an increase, though the overall size of any increase in demand may be small. Ethylene production for FY2012 is expected to face a third consecutive year of decline at 6.31 million tonnes (-2.6% from the previous year) as the tough external demand situation continues despite some boost from internal demand.

(c) Paper and Paperboard

Paper and paperboard production is expected to increase by 0.7% from the previous year in FY2012. Paper imports are expected to increase due to the high yen. In the current industry, as imports are starting to increase for paper board as well as for printing paper, both these imports are expected to continue to increase. Domestic demand for paper may increase temporarily in 2012 due to the Olympics, but will decrease overall due in part to the transition from paper to digital media. On the other hand, paperboard will grow steadily due to the increased movement of goods due to the reconstruction demand, and the expansion in production and consumption. In total, production of paper and paperboard for FY2012 will grow only slightly to 26.73 million tonnes (+0.7% from the previous year) due to the rise in imports driven by the strong yen, despite the restart of large, disaster-hit factories and steady domestic demand.

(d) Cement

Cement production is expected to increase by 2.5% from the previous year in FY2012. No significant growth in exports is expected due to inventory problems resulting from the shift of production timing in Japan. Domestic demand will grow strongly due to the increase in housing demand and redevelopment as the economy picks up, especially in the Kanto region. Reconstruction is also expected to boost the demand for cement as it gets into full swing. Consequently, cement production for FY2012 is expected to increase to 59 million tonnes (+2.5% from the previous year) at a rate similar to last year.

Figure 2-4 Forecasts of industrial production, services and automobile ownership

	Result		Forecast	Year-on-Year Changes (%)		
	FY2010	FY2011	FY2012	FY2010	FY2011	FY2012
Non-ferrous metal	89.3	87.7	91.7	6.4	-1.8	4.5
General and electric machinery	96.4	93.5	96.7	16.8	-2.9	3.4
Industrial production index (2005=100)	94.1	93.2	96.3	9.4	-1.0	3.3
Automobile production (10,000 units)	899	927	961	1.5	3.0	3.7
Tertiary industry activity index (2005=100)	97.8	98.5	99.2	1.1	0.7	0.8
Gasoline vehicle ownership (10,000 units)	6,843	6,892	6,936	0.4	0.7	0.6
Diesel vehicle ownership (10,000 units)	630	608	586	-4.4	-3.5	-3.6

(e) Automobiles

Automobile production is expected to grow constantly in FY2012, up 3.7% from the previous year. The North American automobile market is forecasting strong sales as consumer spending rebounds from the slump after the Lehman collapse, and as exports to emerging countries will remain relatively strong. Foreign demand is expected to rebound from last year regardless of the uncertainties in the European market. Domestic demand is also expected to grow in the first half of the year due to the boost in sales volume by the eco-car subsidies, but may slow down in the second half as the effects of the subsidies fade away. Automobile production is expected to increase to 9.61 million vehicles (+3.7% from the previous year), fueled by strong external and domestic demand.

(f) General and Electric Machinery

General and electric machinery production is expected to grow constantly in FY2012, up 3.4% from the previous year. Foreign demand will increase for electricity infrastructure systems as the growth of emerging economies remains solid. For domestic demand, constant demand for electricity-saving appliances, as well as strong growth in non-utilities power facilities and heavy electrical machinery for power generation, such as thermal power plant turbines, are expected. These trends will together boost the production of general and electrical machinery by 3.4% from last year.

2-2 Energy Supply and Demand Outlook for FY2012

2-2-1 Outlook for Domestic Primary Energy Supply

Domestic primary energy supply for FY2012 is expected to drop by 0.9% from the previous year. This is due to a drop in primary energy supply caused by further progress in electricity-saving and energy conservation, driven by concerns over electricity supply, despite the upturn in production and economic activities due to the post-earthquake reconstruction.

Coal will increase by 2.6% from the previous year as the coal-fired thermal power plants that were hit by the earthquake are restarted. Oil will increase by 1.8% due to the soaring demand for oil for generating electricity, despite the decrease due to the switch to other fuels in various sectors. Natural gas is estimated to rise by as much as 6.3% due to the increased fuel switch from oil and the operation of non-utilities power

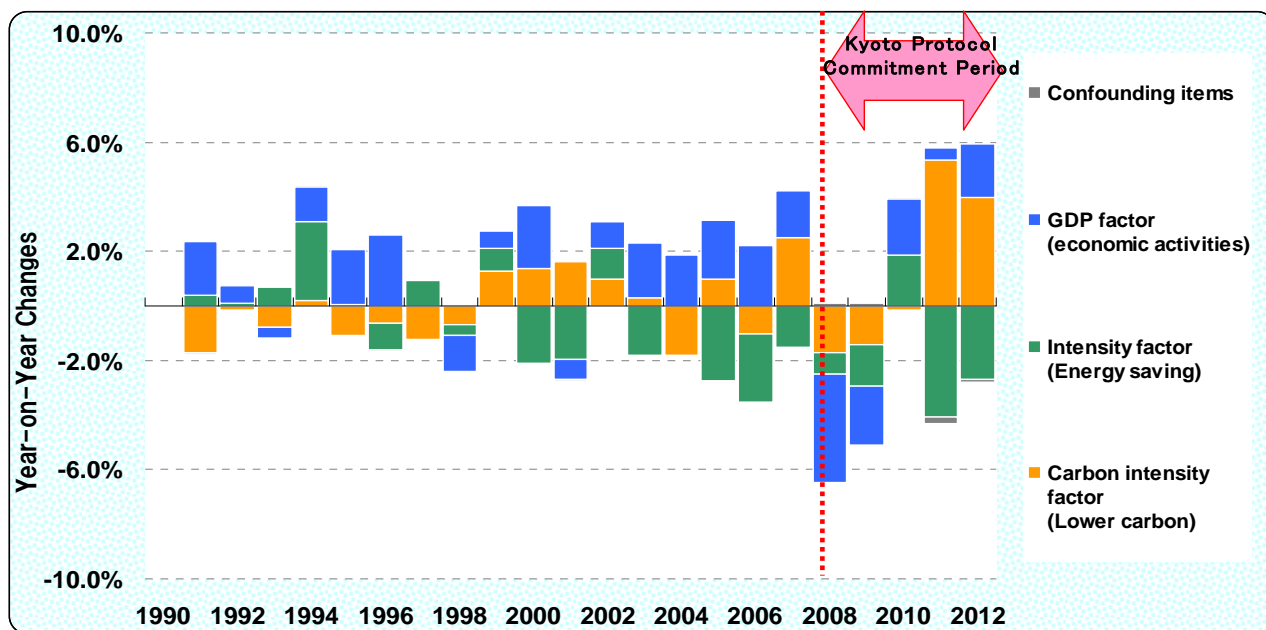
facilities, as well as to the increased use of city gas in the industrial sector resulting from the progress of fuel substitution and for electricity generation. Nuclear energy is estimated to drop drastically by 84.4%, as this analysis assumes that only two nuclear reactor units are restarted. Based on the above, energy-related CO₂ emissions will increase by 3.5% as a result of the upturn in economic activities and the increased use of fossil fuels for electricity generation.

Furthermore, as a result of the upturn in economic activities and the increase in use for electricity generation, fossil fuel imports will increase to 22.6 trillion yen in FY2012, up 4.5 trillion yen from 2010 levels (of which, 3.1 trillion yen for electricity generation). Consequently, fossil fuels will account for 31.7% of the total imports of Japan, and will become one of the reasons why Japan runs a trade deficit (customs-cleared export excess of -3.8 trillion yen).

Figure 2-5 Forecasts of domestic primary energy supply

(million tonne of oil equivalent)	Result		Forecast	Year-on-Year Changes (%)		
	FY2010	FY2011	FY2012	FY2010	FY2011	FY2012
Coal	120.2	117.1	120.2	11.4	-2.6	2.6
Oil	212.3	217.9	221.8	1.2	2.6	1.8
Natural gas	95.5	111.6	118.7	5.8	16.9	6.3
Hydro	17.9	17.5	17.0	5.3	-2.2	-3.0
Nuclear	60.7	21.4	3.3	3.0	-64.7	-84.4
New energies, etc.	7.7	7.5	7.8	3.7	-2.3	3.0
Total domestic primary energy supply	514.2	493.1	488.7	4.7	-4.1	-0.9
Energy self-sufficiency rates						
(without nuclear)	5.9%	6.1%	6.0%			
(with nuclear)	17.7%	10.4%	6.7%			
Energy-related CO ₂ emissions (million tonne)	1,123	1,142	1,181	4.5	1.6	3.5
(FY1990=100)	(106)	(108)	(112)			

Figure 2-6 Components of energy-related CO₂ emissions



2-2-2 Outlook for Final Energy Consumption

Final energy consumption for FY2012 is estimated to drop by 1.1% from the previous year. It is expected to decrease in all sectors due to the promotion of energy conservation such as electricity-saving and to relatively mild temperatures, despite the upturn in economic activities. Consumption is estimated to remain level from last year in the industrial sector despite the recovery of various sectors such as general machinery and automobiles, due to the progress in energy conservation such as electricity-saving. Consumption will drop by 3.8% in the residential sector due to the rebound from last year's temperature and the spread of electricity-saving appliances, and by 1.4% in the services sector despite the recovery of service activities due to the easing of the self-restraint mood, due to the relatively moderate temperatures compared to last year and strengthened electricity-saving. Final consumption will decrease in the transportation sector by 1.5% due to improved fuel economy and transportation efficiency, despite the increase in transportation demand in line with the economic recovery. Consequently, the final consumption for FY2012 is estimated at -1.1% in total.

Figure 2-7 Forecasts of final energy consumption by sector

(million oil-equivalent tonnes)	Result		Forecast	Year-on-Year Changes (%)		
	FY2010	FY2011	FY2012	FY2010	FY2011	FY2012
Industry	161.1	154.8	154.8	3.7	-3.9	0.0
Residential	54.5	52.7	50.7	5.6	-3.2	-3.8
Services	42.6	39.9	39.3	3.1	-6.3	-1.4
Transportation	83.6	81.6	80.4	0.9	-2.4	-1.5
Total final energy consumption	341.7	329.0	325.3	3.2	-3.7	-1.1

(Note) The industrial sector includes non-energy use

2-2-3 Outlook for Energy Sales Volume

(a) Electricity

The sales volume of electricity for FY2012 is estimated to drop by 0.9% from the previous year. Lighting contract demand will drop by 3.0% due to the rebound from last year's unusual temperatures and the awareness of energy conservation that has taken root through strengthened awareness of electricity-saving, and to the spread of electricity-saving appliances. Power contract demand will increase by only 0.1% despite the continued recovery of production and service activities, due to the electricity-saving measures taken since last summer and the strengthened awareness of electricity-saving, particularly in the business sector such as offices. Demand from large industrial users is expected to grow by only 0.5% due to the sluggish growth in energy-intensive industries, despite the growth in overall activities and in some sectors such as the machine industry.

Figure 2-8 Forecasts of electricity sales volume by usage

	Result	Forecast	Year-on-Year Changes (%)			
			FY2010	FY2011	FY2012	
(TWh)						
Lighting	304.2	288.9	280.4	6.8	-5.0	-3.0
Power (including specified demand)	637.9	605.9	606.2	5.5	-5.0	0.1
Total electricity sales	942.1	894.8	886.5	5.9	-5.0	-0.9
Large industrial sales	300.2	290.8	292.1	6.9	-3.1	0.5
Chemical	28.1	27.2	26.8	5.2	-3.3	-1.3
Steel	53.3	53.2	53.0	15.2	-0.2	-0.5
Machinery and appliances	74.6	71.6	73.8	7.3	-3.9	3.0

(b) City Gas

The sales volume of city gas for FY2012 is estimated to grow by 1.9% from the previous year. Gas for residential use will decrease by 2.2% despite the solid growth in customers and the upturn after the earthquake, due to the rebound from the harsh winter last year. Gas for business use will also decrease by 0.5% for commercial use and 0.0% for others despite the recovery of service activities and solid growth in new developments, due to the rebound from last year's unusual temperatures and higher awareness of energy conservation. Gas for industrial use will increase by 4.9% driven by the increase in operation of existing facilities and that of non-utilities power facilities out of concern over power supply shortages, as well as fuel conversion from oil, as recovery from the damages caused by the earthquake progresses and various production activities remain strong.

Figure 2-9 Forecasts of gas sales volume by usage

	Result	Forecast	Year-on-Year Changes (%)			
			FY2010	FY2011	FY2012	
(100 million ?)						
Residential	97.9	97.9	95.8	1.7	0.0	-2.2
Commercial	47.4	44.8	44.6	2.7	-5.5	-0.5
Industrial	176.3	186.7	195.9	5.5	5.9	4.9
Other	31.3	29.7	29.7	8.3	-5.0	-0.0
Total city gas sales	352.8	359.1	366.0	4.3	1.8	1.9

(c) Oil

The sales volume of fuel oils for FY2012 is estimated to increase in total by 1.3% from the previous year. Gasoline sales will decrease by 2.1% as fuel economy improves with the spread of eco-cars and the increased usage of "Kei" mini-cars. Sales of diesel oil will decrease by 1.3% despite the upturn in the movement of goods, due to the improvement in transportation efficiency. Sales of naphtha will drop by 1.9% due to a decrease in ethylene production. The sales volume of kerosene will decline by 6.2% despite the

growth in demand due to economic recovery, due to the progressive shift to electricity and city gas in both the buildings (space and water heating) and industrial sectors, and to temperature effects. Fuel oil A will decrease by 1.4% despite the upturn in production and transportation activities, due to the progress in switching to city gas and in energy transformation. Fuel oil C for electricity generation will add to last year's growth by 43.4% this year due to the growth in fuel demand resulting from the drop in nuclear power plant operation. Extremely tight supply logistics operations, including securing domestic vessels, will be required to ensure a stable supply of Fuel oil C for electricity generation. Fuel oil C for other uses, such as industrial use, will continue to decline due to fuel substitution and energy conservation like Fuel oil A, but will decrease by only 0.7% as the increase in demand for privately-owned electrical power facilities will cancel out some of the decrease.

The sales volume of LPG for industrial use will continue to fall due to fuel substitution despite the growth in activities, and will decrease for use as a chemical raw material due to the decrease in ethylene production and also for civilian use due to temperature effects. It will decrease in total by 0.9%.

Figure 2-10 Forecasts of oil sales volume by oil type

	Result		Forecast	Year-on-Year Changes (%)		
	FY2010	FY2011	FY2012	FY2010	FY2011	FY2012
(million kL)						
LPG sales (million tonnes)	16.4	16.0	15.9	0.2	-2.7	-0.9
Gasoline	58.2	57.2	56.0	1.0	-1.6	-2.1
Naphtha	46.7	43.7	42.9	-1.3	-6.4	-1.9
Heating oil	20.4	19.6	18.4	1.5	-3.6	-6.2
Diesel oil	32.9	32.9	32.4	1.6	-0.1	-1.3
Bunker A	15.4	14.7	14.5	-3.9	-4.8	-1.4
Bunker B, C	17.3	23.7	30.1	5.5	36.9	26.9
(for electricity generation)	(7.7)	(14.8)	(21.3)	(3.9)	(93.5)	(43.4)
Total fuel oil sales	196.0	196.1	198.6	0.5	0.0	1.3

2-2-4 Impact of Reduction in Nuclear Power Plant Operation on the Supply and Demand of Electricity, Fuel Import and CO₂ Emissions

As already mentioned, all nuclear power stations are currently shut down, and assuming that no other plants except for Ohi Units 3 and 4 will be restarted, the following are expected to occur: (i) The reserve margin for the summer will be 3.9%, but the supply-demand operation will be like a tightrope and the situation will be extremely tight especially in Hokkaido during wintertime. (ii) The increased operation of thermal power plants will cause the costs for fossil fuel imports to soar to 22.6 trillion yen, raising concerns about the outflow of national wealth and rise in electricity costs. (3) CO₂ emissions will also soar, which could have serious implications in view of the 3E's, namely Energy Security, Economy and the Environment.

2-3 Sensitivity Analysis on the Operation of Nuclear Power Stations (FY2012 and 2013)

In this analysis, the restarting of only Ohi Units 3 and 4 is considered as the outlook for restarting other plants remains uncertain. As of June 2012, 22 units (including Ohi Units 3 and 4) have completed and submitted the results of the stress tests, and have the possibility of being restarted at any time. Considering that moves for restarting are already under way at some plants, we performed our sensitivity analysis based on the assumption that 6 additional units will be restarted in 2012 and 20 units in 2013.

The result of the sensitivity analysis shows that restarting additional units would improve the electricity supply by raising the reserve margin during the winter, and would lessen fuel imports, namely coal by 2.10 million tons, LNG by 1.06 million tons and oil by 3.00 million kL, reducing fuel costs by 0.24 trillion yen in total for FY2012. For 2013, restarting additional plants would raise the reserve margin by 10.9%, and reduce fuel imports, namely coal by about 12.50 million tons, LNG by about 6.20 million tons and oil by about 17.60 million kL, reducing fossil fuel costs by about 1.4 trillion yen, all compared to when only Ohi Units 3 and 4 are running. Furthermore, CO₂ emissions would drop by 92 million tons.

Figure 2-11 Summary of sensitivity analysis of nuclear power stations

	FY2012		FY2013		
	2 units	8 units	2 units	8 units	22 units
Fossil fuel costs for electricity generation	6.8 trillion yen	6.5 trillion yen	6.8 trillion yen	6.5 trillion yen	5.3 trillion yen
Increase in cost per unit of power (from FY2010)*	3.4 yen/kWh	3.1 yen/kWh	3.4 yen/kWh	3.1 yen/kWh	1.8 yen/kWh
CO ₂ reduction	10 Mtonnes (0.8%)	25 Mtonnes (2.1%)	10 Mtonnes (0.8%)	30 Mtonnes (2.5%)	100 Mtonnes (8.6%)
Electricity supply margin for summer	3.9%	-	3.9%	6.8%	14.8%

3. Outlook for Oil and Gas International Situation

3-1 Issues and Interests

2011 was a year of major disruptions in energy supply in both Japan and overseas, caused in Japan by the Great East Japan Earthquake and by the spread of the “Arab Spring” anti-government movement in the Middle East and North Africa. These events still strongly affect the energy supply of Japan today, both directly and indirectly. In addition, new uncertainties have emerged since the start of the year, namely concerns over global recession stemming from the financial crisis in Europe and the strengthened sanctions by Europe and the U.S. against Iran for allegedly attempting to produce highly enriched uranium. Japan is currently being forced to modify the direction of its nuclear policy, and is expected to increase its dependency on fossil fuels at least for the short- to mid-term. This chapter focuses on the international situation surrounding oil and natural gas, and presents a price forecast for the near future.

3-2 Short-term International Oil Situation and Forecast of Oil Prices

The international oil prices (Brent and Dubai), which have remained in the “high stable zone” of

\$110–120/bbl since the beginning of 2011, has been dropping after peaking in March this year to as low as \$100/bbl.

One main reason for this price drop is the easing of the supply-demand balance. On the supply side, oil-producing countries of the OPEC such as Saudi Arabia, Libya and Iraq have significantly boosted production. The OPEC countries in total increased their production by at least 3 million B/D since the start of the civil war in Libya from April 2011 to May 2012, dramatically easing the supply-demand balance worldwide. We must also note the steady growth in oil production in the U.S., supported by the recent high oil prices and the progress in the development of non-conventional oils. On the demand side, demand continues to drop in advanced countries such as Europe, U.S. and Japan, while the growth in demand is slowing in emerging countries that have been driving the global growth in demand in recent years. In China, where economic growth has been slowing down for the last five consecutive terms, demand for diesel oil and fuel oil, which are closely linked with economic activities, is also slowing.

In addition to the easing supply-demand balance, another reason for the current drop in oil prices is the global economic slowdown. In Europe, the Euro zone economies are becoming increasingly unpredictable due to a host of uncertainties, such as the economic policy of Greece after the general election and the colossal bad debts of the Spanish banks. Aside from Europe, the U.S. is also struggling as its employment situation shows no sign of recovery and due to the burden of the economic recovery, while the economies of emerging countries such as China and India that have been driving the world economy are showing signs of a slowdown. In view of these factors, the supply-demand balance is likely to continue to ease, causing oil prices to fall.

On the contrary, one factor that could cause the supply-demand balance to tighten is the confrontation between Iran and the West concerning Iran's nuclear development. Iranian oil in the international oil market is likely to decrease from this summer due to the series of economic sanctions enforced by Europe and the U.S. against Iranian oil exports. The strengthening of sanctions will inevitably enrage Iran and escalate its confrontation with European countries and the U.S., which in turn could lead to the much feared destabilization of the entire Middle East including Israel. In addition, there are many flashpoints and geopolitical risks in the Middle East and Africa, such as Syria which is currently trapped in civil war, the hostility between North and South Sudan, and the confrontation between the Iraqi government and the Kurdistan region of the country.

In view of these situations, oil prices are expected to rise to \$85/bbl for WTI, \$100/bbl for Brent and \$98/bbl for Dubai in the latter half of the year even though the supply-demand balance is likely to remain weak, since the reduction in Iranian oil exports from this summer, the drop in OPEC's production capacity margin, and geopolitical risks such as Iran all serve to prop up oil prices. Of course, these price levels could fluctuate significantly due to various factors in the international oil market. The current downward trend in oil prices could accelerate if the global economic slowdown stemming from the financial problems of Europe becomes worse than expected. On the contrary, oil prices could rise again if any of the geopolitical risks increases. Oil prices are likely to remain highly uncertain in the latter half of the year as well.

3-3 Short-term International Gas Situation

In 2011, demand for natural gas increased by 2.9% from the previous year to 3.31 trillion m³. Though there are regional differences, demand for natural gas is expected to grow further due to its price competitiveness against other fuels and relatively better environmental characteristics. The international trade volume of natural gas is growing faster than the overall demand, in particular LNG, which grew by 10.1% to about 240 million tonnes in 2011.

The international natural gas markets can be roughly divided into North America, Europe and Asia. North

America is currently experiencing an oversupply due to increased production, particularly of shale gas, and the Henry Hub price, the American natural gas price index, is stable at around \$2-3/MMBtu. The low price will not only expand the demand for natural gas mainly for electricity generation, but there is also hope that it will be exported to Asia through the many planned LNG export projects, and provide a new supply source to the area. In the European market, demand is expected to grow in the mid- to long-term although it dropped by as much as 4.5% from the previous year in 2011 due mainly to the economic slowdown. In Asian countries, demand for natural gas is growing rapidly due to economic expansion, with additional demand for LNG being generated in Japan for generating electricity.

The outlook for the global supply-demand balance of LNG is characterized by a solid expansion in demand and an abundant LNG supply potential to meet the demand, especially from 2015 when large additional volumes will become available. Regarding the Asian market, the supply-demand is likely to continue to be balanced by cargoes from the Atlantic market until 2014. From 2015, however, the need for supplies for European and U.S. markets will lessen due to the increase in supply from the Asia and Oceania regions, particularly Australia. Moreover, the need for such supplies could lessen even further if more nuclear power stations are restarted in Japan. It is important to note the international situation and oil price in 2012, as LNG prices for Asia are linked with oil prices.

The gap in gas prices between Asia, particularly Japan, and the West is widening. To lower the Asian LNG prices, it is necessary to not only increase the supply volume but also to diversify supply sources and hold down demand. In terms of supply, it is important to launch new projects smoothly and to consider importing gas through pipelines. In terms of demand, it is important to suppress additional demand by improving the combustion efficiency by introducing latest combined cycle power generation when replacing conventional thermal power plants, and to promote the expansion of gas co-generation.

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