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Short-term Energy Supply and Demand Outlook

－Energy Supply and Demand Outlook for FY2012－

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Report Summary

Background

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, downturn in consumer confidence, and the government's order to reduce electricity consumption for the first time in 37 years. Nevertheless, 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 the reconstruction demand, the Japanese economy is expected to gradually recover in 2012. Energy consumption fell in 2011 due to the slump in economic activities caused by the earthquake and the rise in awareness of energy conservation, but is now showing signs of rebounding from last year with the recovery of the economy, restoration of production equipment and supply networks, and the easing of the mood of self-restraint, although people appear to remain committed to saving electricity and conserving energy. Regarding concerns for the near future, the outlook for the European economies and the restarting of nuclear power stations in Japan is still unclear. The issue of restarting nuclear power stations is particularly serious due to the power shortage and the impact that a reduction in nuclear power generation capacity would have on the Japanese economy, although work is underway 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 supply and demand of energy for FY2012** based on the domestic and overseas situations described above.

Preconditions for the Supply and Demand of Electricity

The national average reserve rate of electricity for this summer is expected to be 3.9%, assuming that the

government's already-formulated power-saving programs and the planned power-saving goals are implemented without fail and that KEPCO's Ohi Nuclear Power Station Units 3 and 4 are restarted and operate smoothly. This summer, the electric power companies will be forced to meet the supply and demand for electricity with possibly the bare minimum reserve rate of 3%, whereas a reserve rate 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 the power generation facilities run without problems. Thus, the analysis does not include an economic impact caused by power shortages. In reality, however, the outlook for the electricity supply and demand is extremely unpredictable when considering temperature fluctuations and the fact that the thermal power stations are continuing to operate at full capacity.

Main Conclusions

I. Economic Outlook for FY2012

In **FY2012**, the Japanese economy has been recovering steadily thanks to rising exports and the upturn in consumer confidence due to the expanding world economy, and the reconstruction demand following the Great East Japan Earthquake. Assuming that the present problems, namely the supply stability of electricity on the domestic side and the European financial crisis overseas, will not become serious situations, we estimate the **real growth rate of GDP** of Japan to be 2.1% compared with the previous year. Production is likely to be driven in the first half of the year by the rebound from the earthquake disaster and programs such as the Eco-car Subsidies, and to be propped up in the second half by reconstruction demand. The **all-year index of industrial production** is estimated to **increase by 3.3%**. As a result of increased thermal power operation and rising fuel prices, fossil fuel imports will increase by 4.5 trillion yen (of which, 3.1 trillion yen for electricity generation) to 22.6 trillion yen. Japan is expected to suffer a second consecutive year of annual trade deficits despite the recovery in exports (customs-cleared excess of exports of -3.8 trillion yen).

(The estimated CIF import prices for FY 2012 are $103/barrel for crude oil, $825/ton for LNG and $120/ton for steam coal.)

II. Energy Supply and Demand Outlook for FY2012

Primary energy supply / Final energy consumption

The final energy consumption for FY2012 is estimated to **decrease by 1.1%** from the previous year despite the rebound from the disaster and the increase in economic growth due to the growing awareness of electricity-saving, and to the relatively moderate and normal temperature trend on which this analysis is based, which will hold down the demand for energy. Final energy consumption in the industrial sector is

expected to remain **unchanged from last year** despite the recovery of production driven by the reconstruction demand after the disaster, as the trend toward saving electricity and conserving energy has taken root. The figures for the consumer sector are **-2.8% from the previous year** due to electricity-saving and the impact of temperature, and for the transportation sector, **-1.5% from the previous year** due to the continuous improvement of gasoline mileage of individual vehicles, despite the recovery in the movement of goods due to reconstruction demand.

Further, **domestic primary energy supply**, which consists of final energy consumption combined with the consumption in energy conversion sectors such as electricity generation, is estimated at **-0.9% from the previous year**. This will push up **CO_2 emissions** originating from the energy field by **3.5%** from the previous year (**up 11.5% from 1990 levels**). Thermal power plant operation is expected to continue to increase as nuclear power plant operation remains low. Fossil fuel imports are expected to increase by 4.3 million kL for oil (up 10.4 million kL from FY2010), 5.4 million LNG-converted tons for natural gas (up 17.90 million tons from FY2010) and 5 million tons for coal (down 80,000 tons from FY2010).

Energy Demand based on Sales

The sales volume of electricity for FY 2012 is estimated at **-0.9%** from the previous year considering the recovery of production, electricity-saving and temperature impact. Demand for residential electricity will decrease as a result of relatively mild temperatures nationwide, as well as electricity-saving practices that have taken root. Likewise, commercial and industrial electricity demand will increase only slightly despite the recovery of production due to the spread of electricity-saving and energy conservation practices.

The **sales volume of city gas** for FY2012 is estimated to **increase by 1.9%**. Gas for residential use will decrease due to energy conservation and the temperature trend, while gas for industrial use will increase steadily as its conversion into natural gas continues and as production increases. As for commercial and other uses, the sales volume will increase only slightly from last year despite the anticipated recovery of the economy due to electricity-saving and energy conservation practices as well as the temperature trend.

The **sales volume of fuel oils** for FY2012 is expected to **increase by 1.3%** in total from the previous year due mainly to the significant increase of Bunker C for electricity generation. The significant increase in the demand for Bunker C and crude oil for electricity generation will necessitate extremely tight supply logistics, including the securing of domestic vessels, to ensure a stable supply for electricity generation. As for other oils, the sales volume of naphtha will decrease due to the cutback in production of ethylene. Demand for gasoline and light oil will remain high due to construction demand, but will decrease in sales volume due to the continued improvement in gasoline mileage. The sales volume of heating oil will drop due to the temperature trend as well as electricity-saving and energy conservation practices. The sales

volume of Bunker A and Bunker C (excluding that for electricity generation) will decrease due to the shift to other fuels.

Impact of Reduction in Nuclear Power Plant Operation on the Supply and Demand of Electricity, Fuel Import and CO_2 Emissions

As mentioned above, all nuclear power stations are currently stopped, and assuming that no other plants except for Ohi Units 3 and 4 will be restarted, then: (i) The reserve rate for the summer will be 3.9%, but the supply-demand balance will be tight, especially in Hokkaido during wintertime. (ii) The increased operation of thermal power will cause the cost of fossil fuel imports to soar to 22.6 trillion yen, raising concerns about the outflow of national wealth and rise in electricity costs. (3) CO_2 emissions will also soar, with serious implications for the 3E's, namely Energy Security, Economy and the Environment.

III. Sensitivity Analysis on the Operation of Nuclear Power Stations (FY2012 and 2013)

As mentioned, this analysis considers the restart of only Ohi Units 3 and 4 as the outlook for restarting other plants is uncertain. Meanwhile, as of June 2012, 22 units (including Ohi Units 3 and 4) have completed and submitted the results of stress tests, and could be restarted at any time. Considering that moves for restarting are already underway for some plants, we performed our sensitivity analysis based on the assumption that 6 units and 20 units will be additionally restarted in 2012 and 2013, respectively.

The results of the sensitivity analysis show that for 2012, the restarting of additional units will improve the electricity supply by raising the reserve rate during the winter, and will lessen fuel imports, namely coal by 2.1 million tons, LNG by 1.06 million tons and oil by 3 million kL, reducing fuel costs by 0.24 trillion yen in total. For 2013, the restarting of additional plants will raise the reserve rate by 10.9%, and reduce fuel imports, namely coal by about 12.5 million tons, LNG by about 6.2 million tons and oil by about 176 million tons, lowering fossil fuel costs by about 1.4 trillion yen, all compared to when only Ohi Units 3 and 4 are running. Further, CO_2 emissions will drop by 92 million tons.

【Table 1】

		FY2009	FY2010 (actual)			FY2011 (Forecast)			FY2012
		(actual)	1st half	2nd half	total	1st half	2nd half	total	(forecast)
Major Economic Indexes	Gross Domestic Product (GDP) (Chained to year 2005, in billions of yen)	**495,439** (−2.0)	**253.044** (5.0)	**258,101** (1.5)	**511,145** (3.2)	**250,329** (−1.1)	**260,772** (1.0)	**511,101** (−0.0)	**522,053** (2.1)
	Private sector demand	**364,714** [−3.1]	**187,266**	**188,462**	**375,729** [2.2]	**185,906**	**191,891**	**377,797** [0.4]	**384,229** [1.6]
	Public sector demand	**118,036** [0.9]	**57,204**	**61,535**	**118,739** [0.1]	**58,248**	**63,251**	**121,500** [0.6]	**124,061** [0.6]
	External demand	**11,687** [0.2]	**8,638**	**8,180**	**16,818** [0.8]	**6,349**	**5,740**	**12,089** [−1.0]	**12,990** [0.0]
	Corporate goods price index (Year 2005 = 100)	**102.6** (−5.2)	**102.9** (0.1)	**103.7** (1.4)	**103.3** (0.7)	**105.5** (2.5)	**104.7** (1.0)	**105.1** (1.8)	**105.0** (−0.1)
	Consumer price index (Year 2010 = 100)	**100.5** (−1.5)	**100.0** (−0.9)	**99.8** (−0.4)	**99.9** (−0.6)	**99.8** (−0.2)	**99.4** (−0.3)	**99.6** (−0.2)	**99.8** (0.1)
	Index of industrial production (Year 2005 = 100)	**86.1** (−8.8)	**94.6** (17.4)	**93.7** (2.3)	**94.1** (9.4)	**91.5** (−3.3)	**95.0** (1.4)	**93.2** (−1.0)	**96.3** (3.3)
	Crude steel production (1,000 tons)	**96,449** (−8.6)	**55,424** (27.9)	**55,369** (4.2)	**110,792** (14.9)	**53,318** (−3.8)	**53,144** (−4.0)	**106,462** (−3.9)	**106,251** (−0.2)
	Ethylene production (1,000 tons)	**7,219** (10.7)	**3,327** (−5.3)	**3,671** (−0.9)	**6,999** (−3.0)	**3,293** (−1.0)	**3,181** (−13.4)	**6,474** (−7.5)	**6,306** (−2.6)
	Currency exchange rate (JPY/USD)	**92.8** (−7.6)	**88.9** (−6.8)	**82.5** (−8.6)	**85.7** (−7.7)	**79.8** (−10.3)	**78.3** (−5.0)	**79.1** (−7.7)	**80.0** (1.2)
	CIF price of crude oil (USD/barrel)	**69.0** (−23.5)	**78.6** (27.5)	**89.5** (17.3)	**84.0** (21.9)	**114.0** (45.0)	**114.2** (27.7)	**114.1** (35.8)	**102.7** (−10.0)
	Heating degree days	**952** (6.1)	**77** (122.4)	**998** (8.8)	**1,075** (12.9)	**53** (−31.1)	**1,044** (4.6)	**1,097** (2.0)	**980** (−10.6)
	Cooling degree days	**329** (−17.5)	**560** (70.6)	**0** (−75.0)	**560** (70.5)	**472** (−15.7)	**2** (1600.0)	**474** (−15.4)	**400** (−15.7)
Major Energy Indexes	Domestic primary energy supply (10^10kcal = KTOE)	**491,315** (−4.0)	**251,174** (8.6)	**263,054** (1.1)	**514,228** (4.7)	**235,205** (−6.4)	**257,847** (−2.0)	**493,052** (−4.1)	**488,732** (−0.9)
	Final energy consumption (10^10kcal = KTOE)	**331,043** (−2.4)	**164,231** (6.7)	**177,512** (0.2)	**341,743** (3.2)	**154,955** (−5.6)	**174,048** (−2.0)	**329,003** (−3.7)	**325,280** (−1.1)
	Industrial sector	**155,327** (−3.2)	**78,626** (8.3)	**82,463** (−0.3)	**161,089** (3.7)	**75,137** (−4.4)	**79,654** (−3.4)	**154,791** (−3.9)	**154.823** (0.0)
	Consumer sector	**92,901** (−1.7)	**42,991** (7.5)	**54,072** (2.2)	**97,063** (4.5)	**39,153** (−8.9)	**53,464** (−1.1)	**92,617** (−4.6)	**90,051** (−2.8)
	Transportation sector	**82.815** (−1.7)	**42,614** (3.3)	**40,977** (−1.4)	**83,591** (0.9)	**40,665** (−4.6)	**40,931** (−0.1)	**81,596** (−2.4)	**80,406** (−1.5)
	Electricity sales volume (billion kWh)	**889.4** (−3.4)	**476.0** (9.1)	**466.1** (2.9)	**942.1** (5.9)	**439.7** (−7.6)	**455.1** (−2.4)	**894.8** (−5.0)	**886.5** (−0.9)
	City gas sales volume (million m^3/10,000kcal)	**33,837** (−1.9)	**16,574** (8.3)	**18,710** (0.9)	**35,283** (4.3)	**16,380** (−1.2)	**19,532** (4.4)	**35,912** (1.8)	**36,595** (1.9)
	Fuel oil sales volume (1,000 kl)	**195,122** (−3.0)	**92,031** (2.4)	**103,990** (−1.2)	**196,021** (0.5)	**88,968** (−3.3)	**107,087** (3.0)	**196,055** (0.0)	**198,593** (1.3)
	CO2 emissions (energy-derived) (million tons-CO2) (FY1990=100)	**1,075** (−5.6) **101.5**			**1,123** (4.5) **106.1**			**1,142** (1.6) **107.8**	**1,181** (3.5) **111.5**

Source: All figures were taken from various documents. Forecasts were made by IEEJ.

Note) 1 The numbers in brackets in the bottom lines represent the year-on-year increase or decrease. However, the numbers under the GDP breakdown represent the contribution ratio.

2 The constituents of the GDP do not add up to the total GDP due to deviations.

3 The industrial sector consumption includes non-energy uses.

【 Table 2 】

			FY2009 (actual)	FY2010 (actual) 1st half	FY2010 (actual) 2nd half	FY2010 (actual) total	FY2011 (Forecast) 1st half	FY2011 (Forecast) 2nd half	FY2011 (Forecast) total	FY2012 (forecast)
Per Sector (10^10 kcal)	Industrial sector		**155,327** (−3.2)	**78,626** (8.3)	**82,463** (−0.3)	**161,089** (3.7)	**75,137** (−4.4)	**79,654** (−3.4)	**154,791** (−3.9)	**154,823** (0.0)
	Consumer sector		**92,901** (−1.7)	**42,991** (7.5)	**54,072** (2.2)	**97,063** (4.5)	**39,153** (−8.9)	**53,464** (−1.1)	**92,617** (−4.6)	**90,051** (−2.8)
		Residential sector	**51,552** (−0.8)	**21,889** (9.4)	**32,561** (3.2)	**54,450** (5.6)	**20,244** (−7.5)	**32,458** (−0.3)	**52,702** (−3.2)	**50,705** (−3.8)
		Commercial sector	**41,349** (−2.7)	**21,102** (5.6)	**21,511** (0.7)	**42,613** (3.1)	**18,908** (−10.4)	**21,006** (−2.3)	**39,915** (−6.3)	**39,346** (−1.4)
	Transportation sector		**82,815** (−1.7)	**42.614** (3.3)	**40,977** (−1.4)	**83,591** (0.9)	**40,665** (−4.6)	**40,931** (−0.1)	**81,596** (−2.4)	**80,406** (−1.5)
Major Energy Indexes	Coal		**34,418** (−4.6)	**18,294** (15.0)	**18,042** (−2.5)	**36,336** (5.6)	**17,494** (−4.4)	**17,340** (−3.9)	**38,834** (−4.1)	**34,959** (−0.4)
	Oil		**177,180** (−1.7)	**83,231** (2.9)	**95,131** (−1.2)	**178,362** (0.7)	**78,541** (−5.6)	**92,961** (−2.3)	**171,502** (−3.8)	**167,443** (−2.4)
	City gas		**32,472** (−0.6)	**16,204** (12.2)	**18,598** (3.1)	**34,802** (7.2)	**15,811** (−2.4)	**19,287** (3.7)	**35,098** (0.9)	**35,573** (1.4)
	Electricity		**83,554** (−3.4)	**44,699** (8.9)	**43,880** (3.3)	**88,579** (6.0)	**41,520** (−7.1)	**42,723** (−2.6)	**84,244** (−4.9)	**84,085** (−0.2)
	Other		**3,419** (−7.8)	**1,803** (14.3)	**1,861** (1.1)	**3,664** (7.2)	**1,588** (−11.9)	**1,737** (−6.7)	**3,325** (−9.3)	**3,221** (−3.1)
	Total		**331,043** (−2.4)	**164,231** (6.7)	**177,512** (0.2)	**341,743** (3.2)	**154,955** (−5.6)	**174,048** (−2.0)	**329,003** (−3.7)	**325,280** (−1.1)
Gross Domestic Product (GDP) (Chained to year 2005, in billions of yen			**495,439** (−2.0)	**253,044** (5.0)	**258,101** (1.5)	**511,145** (3.2)	**250,329** (−1.1)	**260,772** (1.0)	**511,101** (−0.0)	**522,053** (2.1)
Index of industrial production (Year 2005 = 100)			**86.1** (−8.8)	**94.6** (17.4)	**93.7** (2.3)	**94.1** (9.4)	**91.5** (−3.3)	**95.0** (1.4)	**93.2** (−1.0)	**96.3** (3.3)
Heating degree days			**952** (6.1)	**77** (122.4)	**998** (8.8)	**1,075** (12.9)	**53** (−31.1)	**1,044** (4.6)	**1,097** (2.0)	**980** (−10.6)
Cooling degree days			**329** (−17.5)	**560** (70.6)	**0** (−75.0)	**560** (70.5)	**472** (−15.7)	**2** (1600.0)	**474** (−15.4)	**400** (−15.7)

Source: All figures were taken derived from various documents. Forecasts were made by IEEJ.

Note) 1 The numbers in brackets in the bottom lines represent the year-on-year increase or decrease.

2 The industrial sector consumption includes non-energy uses.

【 Trade Balance 】

(unit: billion yen)

	FY2010 (actual)	FY2011 (actual)	FY2012 (forecast)
Export value (billion yen)	67,792	65,286	67,361
Import value (billion yen)	62,413	69,687	71,165
Fossil fuels	18,081	23,084	22,624
Customs-cleared excess of exports (billion yen)	5,379	▲ 4,401	▲ 3,803

【Reduction in fuel used for generating electricity by operating nuclear power plants (volume and value)】

Assumptions of the Impact Evaluation:
- For this impact evaluation, nuclear power plants were categorized into three groups: (1) Ohi Units 3 and 4, (2) those expected to be restarted at an early stage, and (3) all nuclear power stations whose stress test results have been submitted.
- Fossil fuel cost for electric utilities for FY2013 is assumed to be similar to that for FY2012.

	FY2012		FY2013		
	2 units	8 units	2 units	8 units	22 units
Reduction in fossil fuels (10^10 kcal)	3,296	8,704	3,295	10,322	35,148
Coal (1,000 tons)	1,283	3,366	1,294	4,066	13,831
LNG (1,000 tons)	644	1,704	645	2,016	6,861
Oil (1,000 kL)	1,829	4,837	1,819	5,695	19,404
Fossil fuel costs for electric utilities (trillion yen)	6.78	6.54	6.78	6.46	5.34

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