

Short-Term Energy Supply/Demand Outlook

—Forecast through FY2009 and Analysis on Effects of Crude Oil Price, Economic Growth and Ambient Temperature Changes—

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<Summary>

【Background】

The world economy has turned around for the worse since the so-called "Lehman Shock" in September 2008. The financial crisis that has originated from the United States has led to economic contraction in industrial countries and a fast slowdown after rapid growth in emerging countries. The Japanese economy has plunged into a downturn following its longest postwar expansion. As manufacturers have been adjusting production, employment fears have grown with consumer sentiment deteriorating. Energy demand has been accelerating a decline on sluggish production.

Given such conditions, this report presents forecasts on energy supply and demand in Japan for FY2008 and FY2009. For FY2009, we have made energy supply and demand forecast for the "base case" and analyzed effects of crude oil, economic growth and ambient temperature changes on energy supply and demand.

【Key Conclusion】

① Outlook on Key Economic Indicators for FY2008 and FY2009

During FY2008, the Japanese economy saw a slump in exports and large drops in production and capital investment in response to the global economic slowdown since the financial crisis. Japan's **real GDP** in FY2008 is expected to **decline 1.0%** from the previous year. As production has slackened for steel, chemicals, automobiles, electrical machinery, industrial machinery and the like, the **Index of Industrial Production** in FY2008 is projected to post a **5.0% decline** from the previous year.

In FY2009, exports and production are likely to decline substantially on a continued global economic slowdown. The yen's appreciation as well as the export and production decline is expected to seriously affect corporate earnings, and employment and income environments for households are projected to deteriorate. Under such circumstances, **Japan's real GDP** in FY2009 is estimated to **decline 0.9%** from

the previous year. The Japanese economy is thus expected to log the first postwar two-year consecutive contraction. Production is expected to remain slack for both industrial materials and machinery sectors. The **Index of Industrial Production** is projected to **decline 5.4%**. The mean **CIF-based crude oil import price** ^(see note) in FY2009 is assumed at **\$48/barrel**, the same level as seen at present.

Note: Based on "Prospects for the International Oil Market and Crude Oil Prices in 2009" by Ken Koyama (December 25, 2008).

② Outlook on Energy Supply and Demand in FY2008 and 2009

<Primary energy supply and final energy consumption>

In FY2008, **final energy consumption** is expected to **decline 3.6%** from the previous year. Final energy consumption is projected to drop 4.4% on slack production in the industrial sector, 1.3% on a plunge in air-conditioning demand in the consumer sector and 4.4% on weaker transportation demand and improvements in vehicle fuel efficiency in the transportation sector. **Domestic primary energy supply**, including energy consumption in power generation and energy conversion sectors, is estimated to **decrease 3.3%**. Energy-based **carbon dioxide emissions** in FY2008 are expected to **decline 3.8%** from the previous year on less energy consumption.

In FY2009 as well, **final energy consumption** is expected to **drop 2.8%** from the previous year on continued declines in production and transportation. Final energy consumption is projected to decrease 4.1% on slack production in the industrial sector, 2.8% on weaker transportation demand in the transportation sector and 0.5% on effects of ambient temperature changes and slack services operations in the consumer sector. **Domestic primary energy supply** is estimated to **decrease 2.9%**. Energy-based **CO₂ emissions** in FY2009 are expected to **decline 6.9%** from the previous year on less energy consumption and greater hydroelectricity and nuclear electricity generation.

The projected CO₂ emission decline is attributable primarily to a two-year consecutive economic contraction. Emissions may turn up on economic recovery. If energy conservation and new energy investment shrinks during the current economic slowdown, Japan may lag behind other countries in fighting against global warming after economic recovery.

<Sales-based energy demand>

In FY2008, **electricity sales** are expected to **decrease 1.2%** from the previous year as sales to the industrial sector turn down on slack production, though with those to the consumer sector leveling off. In FY2009, electricity sales are projected to **fall 1.2%** from the previous year for the second straight year of decline as a plunge in production continues to affect electricity demand.

In FY2008, **town gas sales** are expected to limit growth from the previous year to 0.5% as air-conditioning demand in the commercial sector has plunged with the industrial sector implementing production adjustments. In FY2009, town gas sales are estimated to **decline 0.8%** from the previous year, the first drop in 32 years, due to effects of temperature changes on the household sector and production cuts in the industrial sector.

In FY2008, fuel oil sales are projected to **decline 5.7%** from the previous year as the industrial sector cuts production and switches from oil to other energy sources and as sales of automobile fuel decrease. In FY2009, fuel oil sales are estimated to **decrease 4.7%** from the previous year on slackening production, weakening transportation demand and less demand for fuel oil for power generation.

③ Evaluating Possible Impacts of Factors Affecting Energy Supply/Demand in FY2009

If the **crude oil import price** is **\$20/barrel higher** than in the base case, **growth will fall by 0.1 percentage point in real GDP and by 0.5 point in domestic primary energy supply**. Over a short term, any crude oil price hike will have limited impacts on the Japanese economy. Impacts on industrial and transportation sectors will be larger than on other sectors due to the economic slowdown. Higher crude oil prices will have greater impacts on oil consumption than on electricity and town gas demand.

If the **real GDP growth rate** is 1.0 percentage point lower than in the base case, **domestic primary energy supply will decline by 0.6%**. An energy demand change will be smaller than indicated by the economic growth change. Lower economic growth's impact on the industrial sector will be relatively greater than on other sectors. The impact on oil will be greater than on other energy sources.

If the **mean ambient temperature in summer (July to September)** is 1°C higher than the average-year level, **domestic primary energy supply will increase by 1.3%**. The higher temperature will boost energy demand in the commercial sector with greater air-conditioning demand faster than in the household sector. It will also increase energy demand in the transportation sector as greater air-conditioning demand in cars deteriorates fuel efficiency. Under the higher temperature, electricity demand will expand faster than town gas demand.

If the **mean ambient temperature in winter (January to March)** is 1°C lower than the average-year level, **domestic primary energy supply will increase by 1.2%**. Reversing the higher summer temperature case, the lower winter temperature will have a greater impact on the household sector than on the commercial sector by expanding heating and hot-water demand. Under the lower winter temperature, town gas demand will expand faster than any other energy demand.

【Summary Table】

		FY2006 Actual	FY2007 (Actual)			FY2008 (Forecast)			FY2009 Forecast
			1H	2H	Total	1H	2H	Total	
Key economic indicators	GDP (Chained to year 2000, in billion yen)	552,273 (2.3)	276,682 (2.1)	286,129 (1.7)	562,811 (1.9)	276,922 (0.1)	280,495 (-2.0)	557,417 (-1.0)	552,395 (-0.9)
	Private demand	414,406 [1.7]	207,314 [1.0]	209,931 [0.1]	417,245 [0.5]	205,662 [-0.6]	205,301 [-1.6]	410,963 [-1.1]	405,769 [-0.9]
	Public demand	117,014 [-0.2]	56,679 [0.0]	61,235 [0.3]	117,913 [0.2]	56,263 [-0.2]	60,985 [-0.1]	117,248 [-0.1]	118,261 [0.2]
	External demand	21,570 [0.8]	12,904 [1.1]	15,245 [1.3]	28,149 [1.2]	15,209 [0.8]	14,640 [-0.2]	29,848 [0.3]	29,158 [-0.1]
	Corporate goods price index (Year 2005=100)	102.6 (2.0)	104.2 (1.6)	105.7 (3.0)	104.9 (2.3)	110.4 (6.0)	107.6 (1.8)	109.0 (3.9)	105.5 (-3.2)
	Consumer price index (Year 2005=100)	100.2 (0.3)	100.3 (-0.1)	100.8 (0.7)	100.5 (0.3)	102.1 (1.8)	101.7 (0.9)	101.9 (1.3)	101.5 (-0.4)
	Index of Industrial Production (Year 2005=100)	105.3 (4.6)	105.5 (2.4)	110.5 (2.8)	108.0 (2.6)	105.3 (-0.2)	99.9 (-9.6)	102.6 (-5.0)	97.0 (-5.4)
	Crude steel production (in '000t)	117,745 (4.5)	59,799 (3.0)	61,712 (3.4)	121,512 (3.2)	61,508 (2.9)	51,615 (-16.4)	113,123 (-6.9)	103,588 (-8.4)
	Ethylene production (in '000t)	7,661 (1.5)	3,745 (2.8)	3,814 (-5.1)	7,559 (-1.3)	3,472 (-7.3)	3,542 (-7.1)	7,014 (-7.2)	6,766 (-3.5)
	Exchange rate (Yen/US\$)	116.9 (3.3)	119.3 (3.4)	109.2 (-8.0)	114.2 (-2.3)	106.1 (-11.1)	95.0 (-13.0)	100.5 (-12.0)	90.0 (-10.5)
	Crude oil CIF price (US\$/Bbl)	63.7 (14.4)	67.9 (-0.3)	88.0 (48.4)	77.9 (22.4)	119.7 (76.3)	63.5 (-27.8)	91.6 (17.5)	47.5 (-48.1)
	Heating degree-days	865 (-22.5)	56 (-12.7)	940 (17.5)	996 (15.2)	36 (-36.5)	1,006 (7.0)	1,042 (4.6)	985 (-5.5)
	Cooling degree-days	377 (-16.1)	434 (15.3)	3 -	437 (16.1)	398 (-8.2)	2 (-26.0)	401 (-8.3)	421 (5.2)
	Key energy indicators	Primary energy supply (10 ¹⁰ kcal = KTOE)	533,849 (-0.9)	258,987 (-0.8)	275,944 (1.1)	534,931 (0.2)	253,815 (-2.0)	263,300 (-4.6)	517,115 (-3.3)
Final energy consumption (10 ¹⁰ kcal = KTOE)		365,627 (-1.3)	172,431 (-1.2)	190,530 (-0.3)	362,961 (-0.7)	167,878 (-2.6)	182,060 (-4.4)	349,938 (-3.6)	340,191 (-2.8)
Industrial sector		176,675 (0.3)	85,020 (0.1)	91,182 (-0.6)	176,202 (-0.3)	83,790 (-1.4)	84,607 (-7.2)	168,397 (-4.4)	161,490 (-4.1)
Consumer sector		99,311 (-4.1)	42,988 (-3.7)	56,411 (3.2)	99,399 (0.1)	41,493 (-3.5)	56,630 (0.4)	98,122 (-1.3)	97,647 (-0.5)
Transportation sector		89,641 (-1.2)	44,423 (-1.2)	42,937 (-3.9)	87,360 (-2.5)	42,596 (-4.1)	40,823 (-4.9)	83,419 (-4.5)	81,054 (-2.8)
Electricity sales (billion kWh)		922.3 (1.0)	473.0 (2.0)	481.8 (5.0)	954.7 (3.5)	473.2 (0.1)	470.1 (-2.4)	943.3 (-1.2)	932.1 (-1.2)
Town gas sales (million m ³ /10,000kcal)		33,763 (4.0)	16,526 (5.0)	19,370 (7.5)	35,896 (6.3)	16,712 (1.1)	19,380 (0.1)	36,092 (0.5)	35,813 (-0.8)
Fuel oil sales (1,000kl)		223,849 (-5.2)	101,775 (-2.6)	116,638 (-2.3)	218,412 (-2.4)	96,809 (-4.9)	109,203 (-6.4)	206,012 (-5.7)	196,373 (-4.7)
Energy-based CO ₂ emissions (million t-CO ₂)	1,186 (-1.4)			1,218 (2.7)			1,172 (-3.8)	1,090 (-6.9)	

Sources: Actual results data prepared from various publications; forecasts by IEEJ

Notes:

1. Bracketed figures indicate year-to-year percentage changes, except contributions to GDP growth.
2. Contributions to GDP growth may not add up to the total due to minor data deviations.
3. The industrial sector consumption includes non-energy uses.

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【Effects of Economic growth and Crude oil price】

	Base Case				Sensitivity analysis [Gaps with base case (FY2009)]			
	FY2006	FY2007	FY2008	FY2009	Crude oil price *		Economic growth	
	(Actual)	(Actual)	(Forecast)	(Forecast)	Higher price 68\$/bbl	Lower price 38\$/bbl	Lower growth GDP:-1.9%	Zero growth GDP:0.1%
Real GDP growth (%)	2.3	1.9	-1.0	-0.9	-0.1	+0.1	-1.0	+1.0
Private demand [contribution to growth]	[+1.7]	[+0.5]	[-1.1]	[-0.9]	[-0.1]	[+0.1]	[-0.9]	[+0.9]
Public demand [contribution to growth]	[-0.2]	[+0.2]	[-0.1]	[+0.2]	[-0.0]	[+0.0]	[-0.0]	[+0.0]
External demand [contribution to growth]	[+0.8]	[+1.2]	[+0.3]	[-0.1]	[+0.0]	[-0.0]	[-0.1]	[+0.1]
Consumer price index (%)	0.3	0.3	1.3	-0.4	+0.1	0.0	0.0	+0.0
Index of industrial production (%)	4.6	2.6	-5.0	-5.4	-0.2	+0.1	-1.4	+1.4
Crude oil CIF price \$/bbl	64	78	92	* 48	+20	-10.0	-	-
Primary energy supply (%)	-0.9	0.2	-3.3	-2.9	-0.5	+0.3	-0.6	+0.6
Final energy consumption (%)	-1.3	-0.7	-3.6	-2.8	-0.6	+0.4	-0.6	+0.6
Industrial sector (%)	0.3	-0.3	-4.4	-4.1	-0.7	+0.4	-0.8	+0.8
Consumer sector (%)	-4.1	0.1	-1.3	-0.5	-0.5	+0.3	-0.4	+0.4
Transportation sector (%)	-1.2	-2.5	-4.5	-2.8	-0.7	+0.4	-0.4	+0.4
Electricity sales (%)	1.0	3.5	-1.2	-1.2	0.0	+0.0	-0.6	+0.6
Town gas sales (%)	4.0	6.3	0.5	-0.8	-0.5	+0.3	-0.7	+0.7
Fuel oil sales (%)	-5.2	-2.4	-5.7	-4.7	-1.2	+0.7	-0.8	+0.8
LPG sales (%)	-0.1	-0.2	-3.7	-2.7	-0.4	+0.3	-0.5	+0.5
CO ₂ emissions (%)	-1.4	2.7	-3.8	-6.9	-0.5	+0.3	-0.8	+0.8

* Based on "Prospects for the International Oil Market and Crude Oil Prices in 2009" by Ken Koyama

【Effects of Temperature Changes】

	1°C rise in summer (July-September)		1°C fall in winter (January-March)	
	Change in demand	% change	Change in demand	% change
Domestic primary energy supply (10 ¹⁰ kcal)	1,668	(1.3)	1,587	(1.2)
Final energy consumption (10 ¹⁰ kcal)	575	(0.7)	962	(1.0)
Industrial sector	52	(0.1)	131	(0.3)
Household sector	105	(1.1)	608	(3.1)
Commercial sector	304	(2.7)	222	(1.9)
Transportation sector	114	(0.5)	-	(0.0)
Electricity sales (million kWh)	6,541	(2.6)	3,479	(1.4)
Town gas sales (million m ³ /10,000kcal)	31	(0.4)	276	(2.6)
Fuel oil sales (1,000kl)	460	(1.0)	499	(0.9)
LPG sales (1,000t)	-68	(-1.8)	119	(2.5)

Note: The industrial sector consumption includes non-energy uses.

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