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Economic and Energy Outlook towards FY2014
─Japan's economy gets back on track and energy demand starts to increase─

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◆ Summary of topics

1. Rigorous and well staffed safety checks lead to big impacts from nuclear restart ☞p.16

- The ability of the Nuclear Regulation Authority to complete its safety assessments will significantly influence the timing of nuclear reactors' restart. If the Authority forms three teams and if each assessment requires six months, conditional on reception from the nuclear host communities, six reactors at most and 16 reactors will restart by the end of FY2013 and FY2014, respectively. They will operate for seven months in FY2014 on average, generating 73 TWh of electricity (Mid–level Case).

- In the Mid–level Case, electricity generated from nuclear power in FY2014 will remain a quarter of the FY2010 level, increasing the power generation cost by JPY3.2/kWh from the FY2010 level. Total import value of fossil fuels will increase by JPY7 trillion ($70 billion) and the CO_2 emissions from fuel combustion will increase by 70 Mt–CO_2 (+6.2%).

- If the safety assessments take twice as long (i.e. one year rather than six months), only six reactors at most will restart by the end of FY2014 (Low–level Case). On the other hand, if the Authority increases the number of teams, 28 reactors will operate for seven months on average in FY2014 (High–level Case). "Full Operation Case" assumes that 28 reactors are operating throughout FY2014.

- The status of nuclear reactors' restart will have huge impacts on the Japanese economy. If the assessments proceed smoothly as in the High–level Case, fossil fuel import costs in FY2014 will decrease by about JPY800 billion ($8 billion) compared to the Mid–level Case, expanding real GDP in FY2014 by 0.12%. Power generation cost will decrease by JPY0.8/kWh, preventing further rises in electricity price. If the Full Operation Case is realised, fossil fuel import costs will decrease by JPY2.7 trillion ($27 billion) compared to the Low–level Case, expanding real GDP by 0.40% and decreasing power generation cost by JPY2.6/kWh.

Comparison of difference in nuclear reactors' restart impacts (FY2014)					
	FY2010	Low-level Case	Mid-level Case	High-level Case	Full Operation Case
Cumulative number of restarted nuclear reactors					
[By the end of FY2013]	−	[0]	[6 at most]	[10]	−
By the end of FY2014	−	6 at most	16	28	28
Average number of months for operation	−	9	7	7	12

	FY2010	Difference from FY2010			
		Low-level Case	Mid-level Case	High-level Case	Full Operation Case
Real GDP (JPY2005 trillion)	512.4	+24.8	+25.5	+26.1	+27.0
Changes against FY2010		+4.84%	+4.97%	+5.09%	+5.26%
Power generation cost (JPY/kWh)	−	+4.0	+3.2	+2.4	+1.4
Fossil fuel imports (JPY trillion)	18.1	+7.8	+7.0	+6.2	+5.1
Trade balance (JPY trillion)	5.4	-7.1	-6.5	-5.9	-5.1
Energy-related CO_2 emissions (Mt)	1,123	+104	+70	+36	-17
Changes against FY2010		+9.2%	+6.2%	+3.2%	-1.5%

Note: 39 reactors operated at the end of 2010.
     Full Operation Case assumes full operation of the 28 reactors throughout FY2014.

2. Pros and cons of FIT – Outlook for renewable energy use and costs ☞p.19

- Residential solar photovoltaic power and "Mega solar" show rapid penetration after FIT was introduced in July 2012 because of their shorter lead–time. By the end of FY2013, installed capacity of renewable power generation will increase by 5.8 GW, totalling 28.1 GW, (equivalent to 10% of Japan's total power generating capacity).

- Electricity generated by renewables in FY2013 reaches 74.8 TWh. This includes 13.2 TWh from solar PV and 5.0 TWh from wind power (assuming capacity factors of 12% for solar PV, 20% for wind, 70% for geothermal, 45% for hydropower and 70% for biomass).

- With existing and authorised capacity as of February 2013 alone (33.3 GW), the cumulative burden of FIT on consumers will reach as much as JPY10 trillion ($100 billion) over the next 20 years. It corresponds to JPY0.6/kWh, equivalent to 4% and 2% of electricity prices for the industrial sector and the residential sector, respectively.

3. Yen depreciation – Positive for the economy and mixed effects on energy demand ☞p.20

- If the yen depreciates by JPY10 against the dollar from the Reference Scenario assumption of JPY100/$, real GDP will grow by 0.4% and 0.6% in FY2013 and FY2014, respectively. The yen depreciation increases the yen–term import value of fossil fuels but it has a positive effect on macro economy.

- Primary energy supply shows almost no change from the Reference Scenario because the yen depreciation cancels the effects of a boosted economy and the raised energy prices. Final energy consumption decreases slightly because of the lower transport sector demand. While sales volume of city gas and electricity increase, those of fuel oil decrease because of the high retail price hike in yen term.

◆ Summary of economic and energy outlook towards FY2014

1. Macro economy – GDP will grow for the third consecutive year ☞p.6

- Real GDP grows by 2.7% over the previous year in FY2013 driven by growth of both domestic and foreign demand due to the positive effect of "Abenomics." The growth slows down to 0.8% in FY2014 partially because of a last–minute demand increase, assuming this tax increase to be realised in April 2014.

2. Energy supply and demand – Economic recovery pushes up energy consumption

- Despite electricity savings and energy conservation exerting downward pressure on demand, primary energy supply grows for the first time in three years by 1.3% in FY2013 due to the expansion of the economic activities. Primary energy supply continues to increase by 0.2% in FY2014. ☞p.9

- Final energy consumption also increases by 0.7% for the first time in three years in FY2013 while it levels off (+0.2%) in FY2014. Industry (mainly manufacturing) and commercial sectors increase energy demand due to the expansion of economic activities. Residential and transport sectors decrease energy demand due to electricity savings, energy conservation and the effect of a milder climate compared to the previous year. ☞p.11

3. Energy sales – Electricity and city gas increase, fuel oil decreases

- The supply and demand of electricity is expected to be more in balance than it has been for the past two years due to established electricity savings and the recovery of electricity supply capacity. In FY2013, electricity sales rise by 0.6% for the first time in three years due to the expanded economic activities; they will continue to rise by 0.7% in FY2014. ☞p.12

- City gas sales by the general gas utilities increase by 2.0% and by 2.3% in FY2013 and in FY2014, respectively, due to the recovery of production activities and fuel switching in the industrial sector which offsets the decline from the residential sector. ☞p.14

- Despite increase in naphtha sales, fuel oil sales fall by 0.1% in FY2013 for the first time in four years. This is due to improvements in fuel economy and fuel switching. As a consequence of restarting nuclear power generation (big reduction of heavy fuel oil C), the sales dip below the 190 GL level in FY2014 for the first time in 28 years. ☞p.15

4. CO_2 emissions – Record high for FY2013 but start to decrease in FY2014 ☞p.11

- Energy–related CO_2 emissions reach a historical high of 1,227 Mt–CO_2 (+16% from FY1990) in FY2013 due to the intensive operation of thermal power plants and increase in final energy consumption. They decrease by 2.8% in FY2014 for the first time in five years due to the reduction of fossil fuel use for power generation because of the increased nuclear power generation. Emissions will not be quite down to the level before the Great East Japan Earthquake in March 2011.

		Historical			Projection		Year-to-year changes		
		FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Energy indicators	Primary energy supply (Mtoe)[1]	513.3	489.3	485.5	492.0	493.2	-0.8%	1.3%	0.2%
	Oil[2] (GL)	232.2	238.5	243.9	244.1	229.5	2.3%	0.1%	-6.0%
	Natural gas[2] (Mt)	73.2	85.8	89.4	90.9	92.3	4.1%	1.8%	1.5%
	Coal[2] (Mt)	184.6	174.3	182.7	187.7	189.2	4.8%	2.7%	0.8%
	Nuclear[3] (TWh)	288.2	101.7	15.9	16.9	73.2	-84.3%	6.0%	333.5%
	Final energy consumption[6] (Mtoe)	343.3	334.7	329.5	331.7	332.2	-1.5%	0.7%	0.2%
	Industry[4]	162.7	159.3	156.6	159.2	160.5	-1.7%	1.7%	0.8%
	Residential and commercial	97.0	93.5	91.8	91.5	91.4	-1.8%	-0.3%	-0.1%
	Transport	83.6	81.9	81.1	81.0	80.3	-0.9%	-0.2%	-0.9%
	Petroleum products	178.2	172.7	169.7	169.7	168.4	-1.7%	0.0%	-0.8%
	Natural gas and city gas	34.9	36.3	35.0	36.6	37.9	-3.6%	4.6%	3.5%
	Coal and coke	37.9	37.7	37.7	37.6	37.6	-0.1%	-0.1%	-0.1%
	Electricity	88.7	84.7	83.9	84.5	85.1	-0.9%	0.7%	0.7%
	Electricity sales (TWh)	942.1	894.8	886.7	892.2	898.4	-0.9%	0.6%	0.7%
	City gas sales[5] (Billion m^3)	35.28	35.91	36.32	37.04	37.91	1.1%	2.0%	2.3%
	Fuel oil sales (GL)	196.0	196.1	197.5	197.3	189.1	0.8%	-0.1%	-4.1%
	Energy-related CO_2 emissions (Mt-CO_2)	1,123	1,173	1,211	1,218	1,182	3.2%	0.5%	-3.0%
	(FY1990=100)	106.1	110.8	114.4	115.0	111.6			
Import prices	Crude oil, CIF ($/bbl)	84	114	114	102	98	0.3%	-10.4%	-4.1%
	LNG, CIF ($/t)	585	819	864	782	732	5.5%	-9.5%	-6.4%
	Steam coal, CIF ($/t)	114	142	127	112	114	-10.8%	-12.1%	2.1%
Economic indicators	Nominal GDP (JPY trillion)	480.1	473.2	474.8	485.8	495.3	0.3%	2.3%	1.9%
	Real GDP (JPY2005 trillion)	512.4	513.6	519.8	533.6	537.9	1.2%	2.7%	0.8%
	Industrial production index (CY2010=100)	99.4	98.7	95.8	99.3	101.2	-2.9%	3.7%	1.8%
	Exchange rate (JPY/$)	86.1	79.0	82.6	100.0	100.0	4.6%	21.0%	-

Summary (Reference Scenario)

Notes:

1. Mtoe = 10^{13} kcal

2. Conversion factors; Oil：9,126 kcal/L, Natural gas：13,043 kcal/kg, Steam coal：6,139 kcal/kg, Coking coal：6,928 kcal/kg

3. The Mid-level Case

4. Industry includes non-energy use.

5. Conversion factors; 1 m^3 = 10,000 kcal

6. Final energy consumption in FY2012 is estimation.

1. Introduction

Uncertainty over the prospects of the Japanese economy is receding due to the effects of "Abenomics" and expected recovery in overseas economies. Meanwhile, there are a number of worrisome factors regarding the energy situation, including: the continued tightness of the electricity supply–demand balance; developments relating to new safety regulation standards for nuclear power plants; risks associated with lopsided dependence on solar photovoltaic (PV) power generation in the introduction of renewable energy; and a possible rise in oil prices due to the instability of the Middle East situation. In this research, we projected Japan's economic condition and energy supply and demand in FY2013 and FY2014 and conducted various impact assessments and analyses in order to contribute to the analysis of challenges faced by the country and study on a desirable energy mix.

2. Major assumptions in the Reference Scenario

(1) Global economy

The global economy is assumed to continue recovering until the end of FY2014. The U.S. economy is assumed to stay firm, led by personal consumption and residential investment, growing by slightly under 2% in FY2013 and by between 2.5% and 3% in FY2014. We assume that the European economy will turn around from negative growth in FY2013 as concerns over the fiscal crisis subside and will grow moderately in FY2014. The Asian economy is assumed to maintain strong annual growth of 6% or higher despite the slowdown in the growth of China and India, as the ASEAN economy is expected to stay firm.

(2) CIF import prices of fossil fuels

Oil import CIF price is assumed to decline slowly to $102/bbl and $98/bbl in FY2013 and FY2014, respectively, from $114/bbl in FY2012 because easy trend in supply and demand since FY2012 remains while geopolitical risks support the prices to a certain extent.

LNG import CIF price is assumed $782/t and $732/t in FY2013 and FY2014, respectively applying correlation between oil price and LNG price in these years (Kobayashi and Morikawa (2013), "Outlook on the International Oil and Gas Situations" for more detail).

(3) Exchange rate

The assumed exchange rate is JPY100/$ on average in FY2013 and FY2014 (As for the impact of a further depreciation of the yen, refer to p.20)

(4) Taxation

The consumption rate is assumed to be raised to 8% in April 2014 and the petroleum and coal tax is assumed to be raised by JPY96/t–CO_2.

(5) Nuclear power generation

It is assumed that three teams will conduct safety assessment and that the assessment will require around six months. Conditional on reception from the nuclear host communities, it is assumed that six reactors at most will restart by the end of FY2013 and will operate for three months on average, generating 17 TWh of electricity, including the output of the Nos. 3 and 4 reactors at Oi Nuclear Power Plant. By the end of FY2014, 16 reactors will restart and operate for seven months on average, generating 73 TWh of electricity. [Mid–level Case] (As for the impact of restart of reactors, refer to p.16).

(6) Electricity supply and demand

Regarding electricity supply and demand, it is assumed in light of the results of meetings of the governmental subcommittee on supply–demand review that the reserve ratio in the service area of each electricity company will be kept at 3% or higher because of electricity savings, among other factors.

(7) Climate conditions

In light of three–month forecasts issued by the Japan Meteorological Agency, it is assumed that the climate in the summer of FY2013 will be warmer than in the previous year (0.6 degrees Celsius higher in temperature) but less warm than in the previous year (0.7 degrees Celsius lower). The climate in the winter of FY2013 is assumed to be less cold (0.2 degrees Celsius higher in temperature than in the average year and 0.4 degrees Celsius higher than in the previous year), while the climate in both the summer and winter of FY2014 is assumed to be the same as in the previous year.

3. Macro-economic conditions

Real GDP will grow 2.7% in FY2013; the Japanese economy will return to the recovery path

Regarding private demand, consumption is expected to increase due to the governmental economic package and improvement in consumer sentiment resulting from the effects of higher stock prices. Residential investment will also grow due to expectations of a wage rise and the effects of higher stock prices as well as a last–minute demand increase prior to the consumption tax increase in April 2014. Non–residential investment will expand as a result of improvement in sentiment on the economic outlook and a production recovery in the manufacturing industry due to the yen depreciation. Public demand will increase because of public investment for post–earthquake reconstruction and infrastructure improvement. Exports will recover, mainly in the manufacturing industry, because of the yen depreciation, while imports are likely to show slower growth due to reduced price competitiveness of imported goods.

Real GDP will grow 0.8% in FY2014 as lower domestic demand is more than offset by higher external demand

Regarding private demand, non–residential investment is expected to increase due to the yen depreciation and the positive effects of tax system reform on investment. Both consumption and residential investment will decline because of a decrease in purchasing power due to a tax increase and a demand downturn following the last–minute increase prior to the consumption tax increase. Public demand will decrease slightly as an increase in social security costs is offset by the gradual reduction of investment. Exports will continue growing due to increased effects of the yen depreciation and a recovery in global economies, among other factors, while growth of imports are expected to level off compared to the previous year. As a result, external demand will make positive contributions to GDP.

Table 1: Macroeconomic indicators

	Historical			Projection		Year-to-year changes		
	FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Real GDP (JPY2005 trillion)	512.4	513.6	519.8	533.6	537.9	1.2%	2.7%	0.8%
Private demand	377.1	382.5	387.0	395.2	395.3	1.2%	2.1%	0.0%
Private consumption	300.1	304.7	309.6	315.1	313.0	1.6%	1.8%	-0.7%
Private residential investment	12.5	13.0	13.7	14.8	13.9	5.3%	7.9%	-5.8%
Private non-residential investment	64.8	67.5	66.5	67.4	69.8	-1.4%	1.3%	3.5%
Public demand	118.5	119.6	124.7	128.5	128.3	4.3%	3.0%	-0.2%
Government consumption	97.9	99.3	101.5	103.0	104.0	2.2%	1.5%	1.0%
Public investment	20.7	20.3	23.3	25.4	24.1	15.0%	9.0%	-5.2%
Net exports of goods and services	16.8	12.0	8.2	10.2	14.6	-31.1%	24.0%	42.9%
Exports of goods and services	83.6	82.3	81.3	85.3	91.7	-1.3%	5.0%	7.4%
Imports of goods and services	66.8	70.3	73.0	75.1	77.1	3.8%	2.9%	2.6%
Nominal GDP (JPY Trillion)	480.1	473.2	474.8	485.8	495.3	0.3%	2.3%	1.9%
Balance of trade (JPY Trillion)	5.4	-4.4	-8.2	-8.0	-1.1	84.9%	-2.4%	-86.4%
Exports	67.8	65.3	63.9	72.0	80.1	-2.1%	12.5%	11.4%
Imports	62.4	69.7	72.1	79.9	81.2	3.5%	10.8%	1.6%
Fossil fuels	18.1	23.1	24.6	27.0	25.1	6.6%	9.6%	-7.0%
Domestic corporate goods price index (CY2010=100)	100.2	101.6	100.6	100.8	103.7	-1.0%	0.2%	2.9%
Consumer price index (CY2010=100)	99.9	99.8	99.5	99.3	102.0	-0.3%	-0.2%	2.7%
GDP deflator (CY2005=100)	93.7	92.2	91.3	91.0	92.1	-0.9%	-0.3%	1.1%

Notes: GDP components may not add up to the total GDP due to minor data deviations.

The balance of trade will improve as a result of an increase in exports due to the yen depreciation and a decrease in fossil fuel imports. The trade deficit, which amounted to JPY8.2 trillion in FY2012, will shrink to JPY1.1 trillion. As for the price trend, although unconventional monetary easing by the Bank of Japan has had some effects, it will not be easy to realise 2% price growth within two years, excluding the effects of the consumption tax increase.

4. Production activity

Crude steel production will recover as increased exports offset lower demand for automotive use

In FY2013, domestic demand is expected to decline slightly despite a recovery in demand for steel used for construction and manufacturing, which will be offset by lower demand for automotive steel products. External demand will remain firm due to the yen depreciation. Crude steel production will grow (+0.8%). In FY2014, domestic demand will decline slightly because of a demand downturn following the last–minute increase prior to the consumption tax increase. As for external demand, exports of steel sheets with high added value will recover, and yet production will increase only marginally (+0.3%).

Ethylene production will recover as domestic demand bottoms out and external demand grows gradually

In FY2013, as domestic demand for ethylene is expected to grow for the first time in three years, production will also increase (+3.9%). In FY2014, while the increase in domestic demand will be smaller, external demand will grow as the effects of the yen depreciation gradually appear. Production will continue to grow (+1.5%).

Cement production will increase due to reconstruction–related demand and other domestic demand

In FY2013, domestic demand will expand because of reconstruction–related demand and full–fledged implementation of disaster prevention and/or mitigation construction projects as well as a recovery in residential and non–residential investment. However, production volume will amount to just over 60 Mt (+1.9%) because of constraints on equipment capacity and manpower. In FY2014, although there will be potential demand due to production carried over from the previous year and continued firmness of domestic demand, production will increase only marginally (+0.3%) due to the abovementioned constraints.

Paper and paperboard production will decline again after a rebound due to the yen depreciation

Although domestic demand for paper is on a long–term downtrend because of a shift to electronic media, paper and paperboard production in FY2013 is expected to rise (+1.2%) for the first time in three years due to the last–minute demand increase prior to the consumption tax increase and the yen depreciation. In FY2014, paper demand will decline because of a demand downturn following the last–minute increase, while paperboard demand is expected to increase marginally again as a result of continued growth in demand for transportation. Paper and paperboard production will decline slightly (-0.2%).

Automobile production will be flat or decrease due to a demand downturn following the last–minute demand increase despite increased exports offsetting lower domestic demand

In FY2013, domestic demand is expected to decline as a last–minute demand increase (conditional on the tax measure) is offset by the termination of a subsidy program for environment–friendly automobiles. Meanwhile, production will increase marginally (+0.1%) due to an increase in exports resulting from the yen depreciation. In FY2014, although exports are expected to continue increasing, domestic demand will decline because of a downturn following the last–minute increase, leading to lower production (-1.8%).

Table 2: Industrial activities

		Historical			Projection		Year-to-year changes		
		FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Production	Crude steel (Mt)	110.8	106.5	107.3	108.2	108.5	0.8%	0.8%	0.3%
	Ethylene (Mt)	7.00	6.47	6.26	6.50	6.60	-3.3%	3.9%	1.5%
	Cement (Mt)	56.1	57.6	59.5	60.6	60.8	3.3%	1.9%	0.3%
	Paper and paperboard (Mt)	27.3	26.5	25.7	26.0	26.0	-3.0%	1.2%	-0.2%
	Automobiles (Million units)	8.99	9.27	9.55	9.57	9.39	3.1%	0.1%	-1.8%
Production indices	Mining and manufacturing (CY2010=100)	99.4	98.7	95.8	99.3	101.2	-2.9%	3.7%	1.8%
	Food	98.2	97.3	96.8	97.8	98.8	-0.5%	1.0%	1.0%
	Chemicals	99.7	98.3	96.5	98.7	99.4	-1.9%	2.3%	0.8%
	Non-ferrous metals	98.9	97.5	96.6	98.3	99.2	-0.9%	1.8%	0.9%
	General and electrical machinery, etc.	101.3	100.3	93.1	99.4	102.6	-7.1%	6.8%	3.2%
Tertiary industry activity index (CY2005=100)		97.8	98.5	99.4	100.7	101.7	1.0%	1.3%	0.9%

Note: Chemicals include chemical fibre.

General and electrical machinery includes general machinery, electrical machinery, information and telecommunications equipment, electronic parts and devices, precision machinery and metal products.

5. Primary energy supply

Primary energy supply will grow for the first time in three years due to economic recovery

Despite electricity savings and further dissemination of energy conservation technology exerting downward pressure on demand, primary energy supply is expected to increase in FY2013 for the first time in three years because of a production recovery in the manufacturing industry and economic growth. In FY2014, primary energy supply will increase marginally due to continued economic growth.

Table 3: Primary energy supply

	Historical			Projection		Year-to-year changes		
	FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Primary energy supply (Mtoe)	513.3	489.3	485.5	492.0	493.2	-0.8%	1.3%	0.2%
Coal	119.1	112.4	117.6	120.7	121.6	4.7%	2.6%	0.7%
Oil	211.9	217.6	222.6	222.8	209.5	2.3%	0.1%	-6.0%
Natural gas	95.5	112.0	116.6	118.6	120.4	4.1%	1.8%	1.5%
Hydro	18.2	18.4	17.6	18.2	18.1	-4.4%	3.6%	-0.7%
Nuclear	60.7	21.4	3.4	3.6	15.4	-84.3%	6.0%	333.7%
Others	7.9	7.6	7.6	7.9	8.0	0.0%	3.9%	1.6%
Energy intensity (FY2005=100)	94.0	89.4	87.6	86.5	86.0	-2.0%	-1.3%	-0.5%
Energy-related CO_2 emissions (Mt)	1,123	1,173	1,219	1,227	1,193	3.9%	0.7%	-2.8%
(FY1990=100)	106.1	110.8	115.1	115.9	112.7			

Note: "Others" include geothermal energy, new energies, etc.

Coal demand for industrial use will grow due to a production recovery in the manufacturing industry, including cement and crude steel production. Coal demand for power generation use will also increase because of a rise in the operating rate of coal–fired thermal power plants restored from earthquake damage and the construction of new coal–fired thermal power plants. In FY2013, demand will recover to the level before the Great East Japan Earthquake in March 2011. In FY2014, demand growth will slow down due to a rise in international prices caused by a tighter supply–demand balance and a hike in the petroleum and coal tax rate.

As for oil, although import prices in dollar terms will decline, the effects of the yen depreciation will fully or partially offset the price drop. In FY2013, while oil demand for petrochemical use is expected to increase, overall oil demand will level off because of fuel economy improvement in the transport sector and a downtrend of demand due to fuel switching in the industrial, residential and commercial sectors. The decline in oil demand for power generation use will gradually accelerate in line with an increase in nuclear power generation, as the cost of oil–fired power generation is relatively high compared to the cost of power generation using other fuels. The decline of 13.3 Mtoe in FY2014 will be similar in size to the drop that occurred at the time of the collapse of Lehman Brothers.

Natural gas demand for industrial use is expected to increase because of a production recovery in the manufacturing industry and fuel switching. Demand for power generation use will not grow steeply as it did in the past two years, as nuclear power plants restart. However, the demand will remain firm because of natural gas' superiority in environmental–friendliness. Overall natural gas demand will remain on an uptrend, led by demand for city gas use.

Nuclear power plants are assumed to restart. However, after reactors at Oi Nuclear Power Plant are shut down for periodic inspection in September 2013, there will be no nuclear power generation until around the end of 2013. The volume of electricity generated by nuclear power in FY2013 will remain little changed from the FY2012 level. In FY2014, the

volume of electricity generated by nuclear power will grow significantly. Still, the volume will remain a quarter of the FY2010 level. Restart of nuclear power plants will gradually contribute to a decline in fossil fuel consumption and an improvement in energy self–sufficiency.

Energy-related CO_2 emissions will reach a historical high before start to decrease

Energy–related CO_2 emissions will reach a historical high of 1,227 Mt–CO_2 (+16% from FY1990) due to the intensive operation of thermal power plants and an increase in final energy consumption. In FY2014, emissions will decrease (-2.8%) for the first time in five years due to the reduction of fossil fuel use for power generation because of the increased nuclear power generation. Still, emissions will not be quite down to the level before the Great East Japan Earthquake in March 2011.

6. Final energy consumption

Final energy consumption will increase also for the first time in three years, led by the industrial sector

Final energy consumption will increase in FY2013 for the first time in three years and will grow marginally in FY2014. However, consumption will vary considerably from sector to sector. While final energy consumption in the industrial and commercial sectors is expected to increase due to a recovery in economic activities, mainly in the manufacturing industry, consumption in the residential and transport sectors will decline because of electricity savings and energy conservation as well as the climate effects.

Table 4: Final energy consumption

	Historical		Estimation	Projection		Year-to-year changes		
	FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Final energy consumption (Mtoe)	343.3	334.7	329.5	331.7	332.2	-1.5%	0.7%	0.2%
Industry	162.7	159.3	156.6	159.2	160.5	-1.7%	1.7%	0.8%
Residential and commercial	97.0	93.5	91.8	91.5	91.4	-1.8%	-0.3%	-0.1%
Residential	54.5	52.6	51.4	51.0	50.7	-2.4%	-0.6%	-0.7%
Commercial	42.6	40.9	40.4	40.5	40.7	-1.1%	0.2%	0.6%
Transport	83.6	81.9	81.1	81.0	80.3	-0.9%	-0.2%	-0.9%
Coal and coal products	37.9	37.7	37.7	37.6	37.6	-0.1%	-0.1%	-0.1%
Oil	178.2	172.7	169.7	169.7	168.4	-1.7%	0.0%	-0.8%
City gas	34.9	36.3	35.0	36.6	37.9	-3.6%	4.6%	3.5%
Electricity	88.7	84.7	83.9	84.5	85.1	-0.9%	0.7%	0.7%
Others	3.7	3.4	3.3	3.3	3.2	-2.0%	-0.9%	-0.7%

Note: Industry includes non-energy use.

In the industrial sector, production of cement and iron and steel will increase because of post–earthquake reconstruction, infrastructure improvement and disaster prevention and/or

mitigation construction projects. Production of general machinery will also recover due to a pickup in exports, replacement of imported products with domestic products and a last–minute demand increase prior to the consumption tax increase. As a result, final energy consumption in the industrial sector will grow in FY2013. In FY2014, final energy consumption in the industrial sector will increase despite a temporary dip in demand in the first half after the last–minute increase prior to the consumption tax increase.

In the residential sector, final energy consumption will decline in FY2013 mainly because of a decline in heating demand due to a milder winter climate compared to the previous year as well as efficiency improvement of appliances. In FY2014 as well, final energy consumption in the residential sector will remain on a downtrend due to the dissemination of energy–conserving appliances.

In the commercial sector, although electricity savings and energy conservation are expected to exert downward pressure on demand, final energy consumption will increase because of a recovery in service activities. In FY2013, final energy consumption in the commercial sector will increase marginally despite the effects of a milder winter climate. In FY2014, final energy consumption will grow.

In the transport sector, final energy consumption will remain on a downtrend despite an increase in demand for freight transport due to increased economic activities, which will be offset by weak growth in car ownership and continued improvement in fuel economy and transportation efficiency. In FY2013, final energy consumption in the transport sector will decrease slightly despite growth in demand for transport due to a last–minute demand increase in the second half of the year. In FY2014, the decline in final energy consumption in the transport sector will accelerate, registering the largest decrease by sector in terms of both percentage and absolute number.

7. Electricity sales (electric utilities)

Electricity sales will increase for the first time in three years due to recovery in economic activities

The projection is based on the assumption that the supply and demand of electricity is expected to be more in balance than it has been for the past two years due to established electricity savings and an increase in supply capacity, including the restart of nuclear power stations. Electricity sales in FY2013 will increase for the fist time in three years due to expanded economic activities, with sales to large–scale industrial users showing a particularly large increase. On the other hand, the effects of a milder winter climate compared to the previous year and a rise in electricity prices dragged down sales of electricity for lighting use. In FY2014, supply and demand will still be more in balance as a result of an increase in the number of restarted nuclear power plants. Production activity in the manufacturing industry will continue recovering, albeit more slowly than in FY2013, and the positive effects of the recovery will gradually spread to households. As a result, electricity sales volume will rebound to just under 900 TWh. However, the volume will

remain lower than the level before the Great East Japan Earthquake (-4.6% from FY2010).

Table 5: Electricity sales (electric utilities)

	Historical			Projection		Year-to-year changes		
	FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Total (TWh)	942.1	894.8	886.7	892.2	898.4	-0.9%	0.6%	0.7%
Lighting contracts	304.2	288.9	286.2	286.7	288.4	-0.9%	0.2%	0.6%
Power contracts	637.9	605.9	600.5	605.5	609.9	-0.9%	0.8%	0.7%
of which: Large-scale industrial users	300.2	290.8	283.8	289.1	292.2	-2.4%	1.8%	1.1%
Industrial total	251.3	244.6	237.8	241.6	244.6	-2.8%	1.6%	1.2%
Chemicals	28.1	27.2	26.3	26.6	26.7	-3.1%	1.0%	0.4%
Iron and steel	53.3	53.2	52.6	52.9	53.3	-1.1%	0.6%	0.7%
Machinery	74.6	71.6	68.9	71.9	73.5	-3.8%	4.3%	2.2%

Note: Include specific supply by electric utilities but not own use.
Power contracts and total include specified-scale demand.

Electricity generated by thermal power will hit a record high in FY2013

The volume of electricity generated by thermal power will hit a record high of 810 TWh in FY2013. In FY2014, the share of oil–fired thermal power generation will decline significantly because of an increase in electricity generated by nuclear power. The volume of electricity generated by coal–fired thermal power will continue increasing because of a higher operating rate of power plants restored from earthquake damage and the construction of new power plants, Hitachinaka No. 2 and Hirono No. 6. Although the volume of electricity generated by natural gas–fired thermal power will increase marginally, the share of natural gas–fired power generation will decline because of an expansion of overall power generation.

Table 6: Power generation mix (electric utilities)

	Historical			Projection		Year-to-year changes		
	FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Electricity generated (TWh)	974.5	908.4	904.9	917.1	929.3	-0.4%	1.4%	1.3%
Share (%)						Year-to-year changes		
Hydro	9%	9%	9%	9%	9%	-0.6p	+0.1p	-0.2p
Fossil fuel thermal	62%	79%	89%	89%	83%	+9.7p	-0.2p	-5.9p
Coal and coal products	25%	25%	27%	28%	28%	+1.4p	+1.0p	+0.2p
Natural gas and city gas	30%	40%	45%	44%	43%	+4.5p	-0.9p	-0.3p
Oil	7%	14%	17%	17%	12%	+3.8p	-0.2p	-5.8p
Nuclear	29%	11%	2%	2%	8%	-9.2p	+0.1p	+6.0p
Others	1%	1%	1%	1%	1%	+0.1p	+0.0p	+0.0p

8. City gas sales (general gas utilities)

City gas sales will continue increasing, with industrial-sector sales surpassing 20 billion m³ for the first time in FY2014

City gas sales will increase in FY2013, as declines in sales in the residential and commercial sectors are more than offset by a significant increase in sales in the industrial sector. In FY2014, although sales in the residential sector are expected to decline slightly, overall city gas sales will increase because of an increase in sales of gas for commercial and other use (use by medical institutions and public organisations), in addition to continued growth in sales in the industrial sector.

Table 7: City gas sales (general city gas utilities)

	Historical			Projection		Year-to-year changes		
	FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Total (Billion m³)	35.28	35.91	36.32	37.04	37.91	1.1%	2.0%	2.3%
Residential	9.79	9.79	9.80	9.69	9.68	0.1%	-1.1%	-0.1%
Commercial	4.74	4.48	4.50	4.46	4.51	0.4%	-0.9%	1.2%
Industrial	17.63	18.67	19.03	19.91	20.70	1.9%	4.6%	4.0%
Others	3.13	2.97	3.00	2.98	3.02	1.0%	-0.6%	1.2%

Notes: Converted at 1m³ = 41.8605 MJ (10,000 kcal)

In the residential sector, the number of contracts will grow approximately 0.5% each year because of such factors as the expansion of service areas and fuel switching. However, sales per contract will remain on a downtrend due to the dissemination of highly efficient appliances and shrinkage of household size. In FY2013, although demand for water heating is expected to grow in the summer due to a cooler summer climate compared to the previous year, it will decline in the winter because of a milder winter climate, leading to a decline in annual city gas sales. In FY2014, city gas sales will decline slightly because of the mixed effects of such factors as an increase in the number of contracts and a continued downtrend in sales per contract, as the temperature remains similar to the previous year's level.

City gas sales for commercial and other uses will decrease in FY2013 because of a decline in air conditioning demand due to the climate effects as well as electricity savings and energy conservation. In FY2014, sales will grow because of increased use of gas–based air conditioning equipment and gas cogeneration systems, as the temperature remains similar to the previous year's level.

City gas sales in the industrial sector will increase significantly due to a rise in the operating rate of gas equipment and facilities due to a production recovery in the manufacturing industry, an increase in new users due to fuel switching and firm gas demand for power generation use. In FY2014, city gas sales will show slower growth in the first half because of a demand downturn following the last–minute demand increase prior to the consumption tax increase. However, annual sales will continue to increase because of a production recovery and fuel switching in the manufacturing industry and an increase in new demand

for autoproducers of electricity. Annual sales will surpass 20 billion m³ for the first time.

9. Fuel oil sales

Fuel oil sales will decline for the first time in four years, with sales in FY2014 expected to dip below 190 GL for the first time in 28 years

Despite an increase in naphtha sales due to a rise in ethylene production, fuel oil sales are expected to decline in FY2013 for the first time in four years because of fuel switching to other fuels such as natural gas, improvement in the fuel economy of automobiles and further dissemination of energy conservation technology. In FY2014, fuel oil sales will decrease, falling below 190 GL for the first time in 28 years, because of a steep drop in sales of heavy fuel oil C as a consequence of the restarting of nuclear power generation.

Table 8: Fuel oil sales

		Historical			Projection		Year-to-year changes		
		FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Total (GL)		196.0	196.1	197.5	197.3	189.1	0.8%	-0.1%	-4.1%
	Gasoline	58.2	57.2	56.4	56.0	55.2	-1.3%	-0.8%	-1.4%
	Naphtha	46.7	43.7	43.2	43.8	44.0	-1.1%	1.4%	0.3%
	Jet fuel	5.2	4.2	4.0	4.2	4.3	-5.8%	6.5%	3.0%
	Kerosene	20.4	19.6	19.0	18.5	17.9	-3.3%	-2.5%	-3.3%
	Diesel oil	32.9	32.9	33.4	33.3	33.1	1.8%	-0.4%	-0.8%
	Heavy fuel oil A	15.4	14.7	13.7	13.6	13.4	-6.3%	-1.3%	-1.3%
	Heavy fuel oil B/C	17.3	23.7	27.7	27.9	21.3	16.8%	0.4%	-23.7%
	For power generation	7.7	14.9	19.5	19.6	13.3	30.8%	0.7%	-32.3%
	For other uses	9.7	8.9	8.3	8.2	8.0	-6.7%	-0.1%	-3.2%
LPG (Mt)		16.5	16.7	16.9	16.9	16.9	1.2%	-0.2%	0.0%

Gasoline sales will remain on a downtrend because of fuel economy improvement resulting from further dissemination of environmentally friendly automobiles and increased ownership of mini–vehicles. Gasoline sales will decline below 56 GL for the first time in 16 years.

Naphtha sales will increase in FY2013 for the first time in four years because of an increase in production of ethylene, a basic petrochemical material, resulting from economic growth and an improvement in competitiveness due to the yen depreciation. In FY2014, naphtha sales will increase marginally.

Demand for kerosene will remain on a downtrend due to such factors as fuel switching to electricity and natural gas in the industrial, commercial and residential sectors. In FY2013, demand will decline also because of a lack of growth in space and water heating demand due to a milder climate compared to the previous year. In FY2014, demand will continue to decrease.

Diesel oil sales grew in FY2012 because of demand for use in trucks and heavy machinery due to reconstruction–related demand. However, in FY2013, diesel oil sales will decrease as reconstruction–related demand subsides, ownership of diesel–powered vehicles decreases, and distribution efficiency improves. In FY2014, sales will remain on a downtrend.

Sales of heavy fuel oil A will decrease in FY2013 due to fuel switching, which will more than offset an increase in demand for private power generation due to a recovery in economic activity. In FY2014, sales will remain on a downtrend because of such factors as energy conservation and fuel switching.

The decline in sales of heavy fuel oil C for power generation use will gradually accelerate as a result of the restart of nuclear power plants, with sales in FY2014 expected to drop by more than 30% from the previous year. Sales of heavy fuel oil C for other uses will level off in FY2013 but will decline in FY2014 because of slower production growth as well as the effects of energy conservation and fuel switching.

LPG sales will recover, mainly in the industrial sector, because of a pickup in economic activity. However, sales in FY2013 will decline slightly due to such factors as a lack of growth in residential sector demand for space and water heating resulting from the effects of a milder winter climate. In FY2014, sales will level off.

Topics 1: Impact of restart of nuclear power generation on the economy and energy supply and demand (cases of different restart schedules)

Ensuring rigorous assessment and achieving cost savings of JPY850 billion at the same time by increasing the assessment staff at the Nuclear Regulation Authority

On 8 July 2013, a new regulation standard formulated after more than 20 sessions of deliberation held by the Nuclear Regulation Authority (hereinafter referred to as the "Authority") since October 2012 was put into force. The new standard imposes the world's most demanding safety requirements, reflecting Japan's strong resolve to prevent the recurrence of accidents similar to the Fukushima nuclear disaster. The main focus of attention is on how rigorously and effectively safety assessments will be conducted.

The Authority is expected to conduct safety assessments with three plant assessment teams (which will assess the safety of nuclear plants) and an earthquake and tsunami team (which will examine countermeasures against earthquakes and tsunamis) (these four teams will comprise a total of around 80 members), with each safety assessment to be completed in around six months to one year. It is presumed that the three plant assessment teams can assess a maximum of six reactors at three nuclear power plants at a time if the assessment is conducted in an efficient and rational manner as Chairman Tanaka of the Authority has mentioned. Meanwhile, nuclear power plant operators have applied for the restart of a total of 12 reactors at six nuclear power plants by the end of July since the new safety standard was put into force. This means that it will take six months to one year before the assessment

of half of those nuclear power plants starts in earnest.

The "Mid–level Case" assumes that three teams will conduct plant assessments, which are expected to be completed in six months on average. Conditional on consent from the nuclear host communities, six reactors at most and 16 reactors will restart by the end of FY2013 and FY2014, respectively, in this case. The restarted reactors will operate for seven months in FY2014 on average, generating 73 TWh of electricity. We also set the "Low–level Case," the "High–level Case" and the (hypothetical) "Full Operation Case" and conducted impact analysis. The Low–level Case assumes that the safety assessments will take one year and that only six reactors at most will restart by the end of FY2014 and operate for nine months on average in the year, generating 24 TWh of electricity. The High–level Case assumes that the number of assessment teams will be doubled and 28 reactors will operate for seven months on average in FY2014, generating 130 TWh. The Full Operation Case assumes full operation of the restarted 28 reactors throughout FY2014.

Figure 1: Timetable of activities after the entry-into-force of the new regulation standard
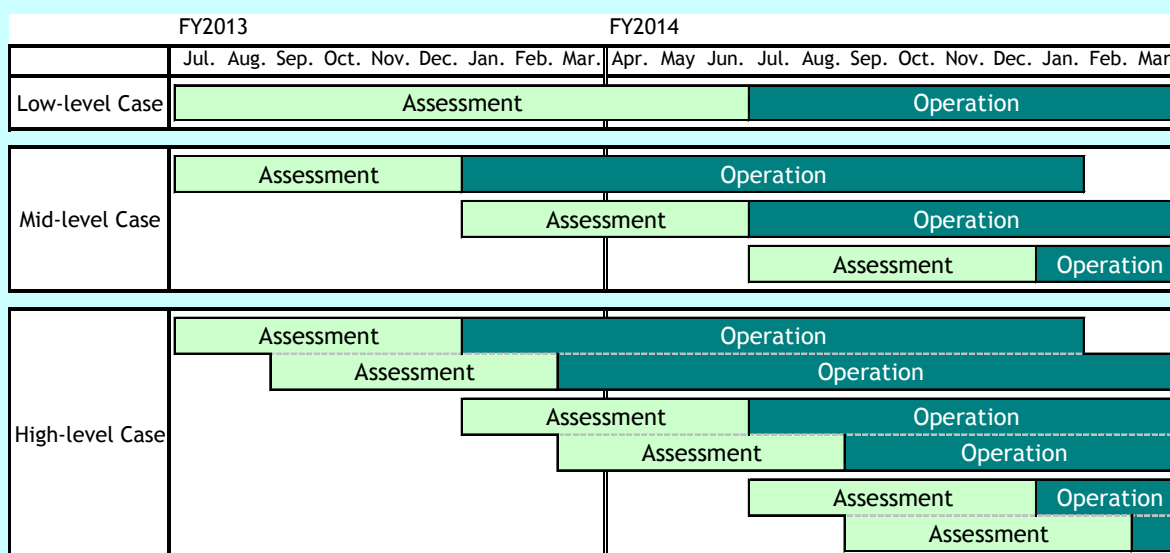
The impact in FY2013 does not vary very much from case to case, as nuclear power plants restarted after assessment will operate only for several months by the end of the fiscal year. Nonetheless, the fossil fuel import cost will be JPY120 billion lower in the Mid–level Case and JPY170 billion lower in the High–level Case than in the Low–level Case.

In FY2014, when the impact will fully appear, the fossil fuel import cost will be as much as JPY780 billion lower in the Mid–level Case, JPY1.58 trillion lower in the High–level Case and JPY2.68 trillion in the Full Operation Case than in the Low–level Case. The power generation cost will be JPY0.8/kWh lower in the Mid–level Case, JPY1.5/kWh in the High–level Case and JPY2.6/kWh in the Full Operation Case than in the Low–level Case. As for the impact on the economy as a whole, real GDP growth will grow an additional 0.12% in the Mid–level Case, 0.24% in the High–level Case and 0.40% in the Full Operation Case compared to the Low–level Case.

Table 9: Impact of nuclear restart (FY2014) (cases of different restart schedules)

	FY2010	Low-level Case	Mid-level Case	High-level Case	Full Operation Case
Cumulative number of restarted nuclear reactors	—	6 at most	16	28	28
Average number of months for operation	—	9	7	7	12
Power generation by nuclear (TWh)	288.2	23.7	73.2	130.1	227.5

| | FY2010 | Difference from FY2010 | | | |
		Low-level Case	Mid-level Case	High-level Case	Full Operation Case
Real GDP (JPY2005 trillion)	512.4	+24.8	+25.5	+26.1	+27.0
Changes against FY2010		+4.84%	+4.97%	+5.09%	+5.26%
Power generation cost (JPY/kWh)	—	+4.0	+3.2	+2.4	+1.4
Primary energy supply					
Oil (GL)	232.2	+9.0	-2.7	-11.1	-16.9
Natural gas (LNG equivalent Mt)	73.2	+19.3	+19.1	+15.8	+7.1
Coal (Mt)	184.6	+4.6	+4.5	+4.5	-0.1
Fossil fuel imports (JPY trillion)	18.1	+7.8	+7.0	+6.2	+5.1
Oil	12.3	+4.5	+3.8	+3.3	+2.9
LNG	3.5	+3.0	+3.0	+2.7	+2.1
Coal	2.3	+0.2	+0.2	+0.2	+0.2
Trade balance (JPY trillion)	5.4	-7.1	-6.5	-5.9	-5.1
Energy-related CO_2 emissions (Mt)	1,123	+104	+70	+36	-17
Changes against FY2010		+9.2%	+6.2%	+3.2%	-1.5%

Note: 39 reactors operated at the end of 2010.
    Full Operation Case assumes full operation of the 28 reactors throughout FY2014.

These findings have a very important implication. Namely, even though an additional cost of approximately JPY3.2 billion[1] may be required if the number of assessment staff members is doubled from 80 (Middle Nuclear Case) to 160 (High–level Case), an outflow of national wealth worth JPY850 billion can be avoided. Moreover, a decline in Japan's LNG demand will help to lower international LNG prices, bringing positive effects to Japan and other Asian countries. We will enjoy the positive effects not merely on the economic front. CO_2 emissions in the High–level Case will be 34 Mt lower than in the Middle Nuclear Case. In other words, while CO_2 emissions will grow 6.2% compared to FY2010 in the Mid–level Case, the growth will be limited to 3.2% in the High–level Case.

Expanding the assessment staff will ensure rigorous assessment but never foster lax assessment. To prevent the recurrence of accidents similar to the Fukushima nuclear disaster, everyone recognises the importance of and wants to see rigorous safety assessments conducted according to strict standards based on scientific knowledge. It is essential to quickly secure as many capable assessment staff members as possible.

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[1] Based on the assumption that an additional 80 personnel will be employed for two years with annual pay of approximately JPY20 million each, similar to the pay for the Secretary–General of the Authority.

Topics 2: Outlook for renewable energy use and costs

Solar PV power generation increasing conspicuously — concern arising over increased cost burden on consumers

Since the feed–in tariff (FIT) system was introduced in July 2012, the use of renewable energy is increasing rapidly. There are high expectations for renewable energy as purely domestic energy that does not emit CO_2 during the power generation process. Meanwhile, the rapid increase in the use of renewables under a system based on an electricity purchase price that is high by global standards results in an increase in the cost burden on consumers. It is necessary to review the FIT scheme and the purchase price so as to ensure sustainable use of renewables.

By the end of FY2013, the installed capacity of renewable power generation will increase by 5.8 GW, totalling 28.1 GW (equivalent to 10% of Japan's total power generating capacity). By energy source, solar photovoltaic (PV) power, with its shorter lead–time and high purchase price, is showing conspicuous growth. Although residential use accounts for three quarters of overall solar PV power generation now, the installed capacity will expand to 6.3 GW for each of residential use and non–residential use (e.g., Mega solar and others) by the end of FY2013. Wind power generation is showing limited growth compared to solar PV, as the procedure for starting wind power generation takes around five years. As the installed capacity of wind power generation at the end of FY2013 will be only 2.9 GW, it will take some more time before we see rapid growth. The volume of electricity generated by renewables in FY2013 will reach 74.8 TWh, including 13.2 TWh from solar PV and 5.0 TWh from wind power.

With existing and authorised capacity as of the end of February 2013 alone (33.3 GW), the cumulative burden of FIT on consumers will reach as much as JPY10 trillion over the next 20 years. It corresponds to JPY0.6/kWh, equivalent to 4% and 2% of electricity prices for the industrial sector and the residential sector, respectively. The rapid increase in the use of solar PV is considerably increasing the burden, as the purchase price of electricity generated by solar PV is the highest. It is prescribed that under contracts to be concluded over the next two years, particularly preferential (for renewable electricity suppliers) purchase prices should be set, so the burden on consumers will continue increasing in line with the growth in the use of renewables.

Regarding the power source mix and renewables as part of the mix, it is essential that an appropriate balance should be pursued with consideration given to the characteristics of each type of energy. However, solar PV continues to show outstanding growth, raising concern that the use of other renewables may be prevented. It is important to flexibly improve the FIT system based on evaluation and detailed analysis of the records of the use of renewables and a desirable energy mix.

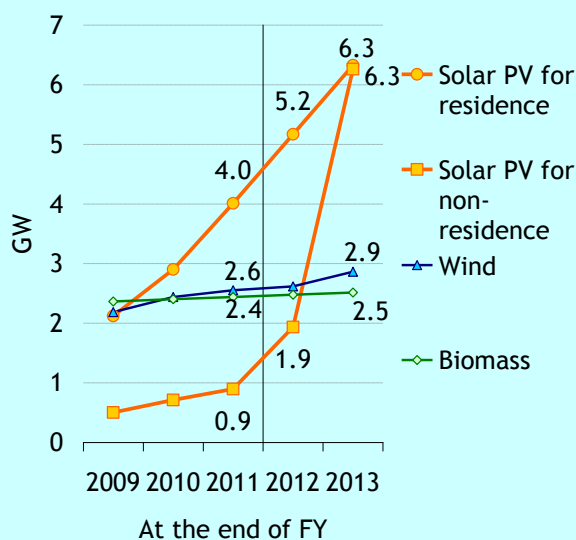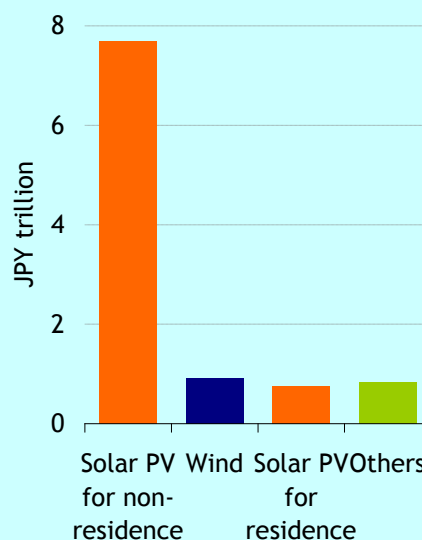Figure 2: Installed capacity of renewable power generation (Operation start basis)

Figure 3: Cumulative burden of FIT over the next 20 years (capacity authorised as of the end of February 2013)

Note: The remaining purchase period for capacity introduced before the start of FIT was taken into consideration. The capacity factor is 20% for wind, 12% for solar PV, 70% for geothermal, 45% for hydropower and 70% for biomass. The calculation was made at a marginal avoided cost of JPY10.4/kWh.

Topics 3: Impact of the yen depreciation on the economy and energy supply and demand

The economy will recover further while energy consumption will remain little changed despite a demand increase in the industrial sector

The yen has generally been on a downtrend in response to monetary easing by the Bank of Japan and the dollar appreciation caused by expectations that the Federal Reserve Board will curtail QE3. While our projections assume an exchange rate of JPY100/$ on average, there have been volatile movements in the currency market since late May. Depending on the currency market situation, the real economy could be considerably affected. Therefore, we set the "Further Yen Depreciation Case," which assumes that the yen will depreciates to JPY110/$ by JPY10 from the Reference Scenario assumption of JPY100/$, and conducted an impact assessment.

In this case, because of an improvement in international competitiveness due to a further yen depreciation, exports will increase, resulting in the expansion of production activity. Private demand will also grow with some time lag because of increases in production, jobs, income and dividends in yen terms received from abroad. As imported goods become less competitive, real imports will decrease (positive contribution to GDP). Real GDP will grow

by an additional 0.4% and 0.6% in FY2013 and FY2014, respectively, compared to the Reference Scenario.

Table 10: Impact of yen depreciation of JPY10/$

		Reference Scenario JPY100/$		Further Yen Depreciation Scenario JPY110/$			
						Difference from Reference Scenario	
		FY2013	FY2014	FY2013	FY2014	FY2013	FY2014
Econo-my	Real GDP (JPY 2005 trillion)	533.6	537.9	535.8	541.1	+0.4%	+0.6%
	Industrial production index (CY2010=100)	99.3	101.2	99.7	101.6	+0.4%	+0.5%
Energy indicators	Primary energy supply (Mtoe)	492.0	493.2	492.0	493.5	+0.0%	+0.1%
	Oil (GL)	244.1	229.5	243.5	229.0	-0.2%	-0.2%
	Natural gas (LNG equivalent Mt)	90.9	92.3	91.2	92.7	+0.3%	+0.5%
	Coal (Mt)	187.7	189.2	188.1	189.4	+0.2%	+0.1%
	Final energy consumption (Mtoe)	331.7	332.2	331.5	332.1	-0.1%	-0.1%
	Industry[1]	159.2	160.5	159.3	160.7	+0.1%	+0.1%
	Residential and commercial	91.5	91.4	91.5	91.4	-0.0%	+0.0%
	Transport	81.0	80.3	80.7	80.0	-0.4%	-0.4%
	Electricity sales (TWh)	892.2	898.4	893.7	900.8	+0.2%	+0.3%
	City gas sales (Billion m^3)[2]	37.04	37.91	37.13	38.07	+0.3%	+0.4%
	Fuel oil sales (GL)	197.3	189.1	196.5	188.3	-0.4%	-0.4%
	Energy-related CO_2 emissions (Mt)	1,218	1,182	1,218	1,182	+0.0%	+0.0%

Notes: 1. Industry includes non-energy use.

2. Converted at $1m^3$ = 41.8605 MJ (10,000 kcal)

While the economic growth will contribute to an increase in energy demand, primary energy supply will remain little changed due to the effects of an increase in energy prices in yen terms. However, the impact will vary from energy source to energy source. Natural gas and coal will increase but oil will decrease. Final energy consumption will increase in the industrial sector because of a production expansion mainly in the manufacturing industry. In the residential and commercial sectors, an income increase and economic growth will contribute to a demand increase but this will be offset by a price rise. Consequently, consumption will remain almost the same as in the Reference Scenario. In the transport sector, while transport demand will grow, consumption of oil will decline because of the effects of a steep price rise. CO_2 emissions will decrease in the transport sector, but overall emissions will remain little changed because of the effects of an increase in thermal power generation and energy consumption in the industrial sector.

Electricity sales will increase, mainly in the industrial sector, because of a production expansion and a shift to electricity purchase from private power generation, which is growing relatively costly. Sales of electricity for lighting use, mainly sold to residential users, will increase marginally because of an income improvement. City gas sales will increase, led by demand in the industrial sector in particular. On the other hand, fuel oil sales will decline in terms of volume because of a steep price rise. However, the value of sales will grow.

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