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Economic and Energy Outlook of Japan for FY2014

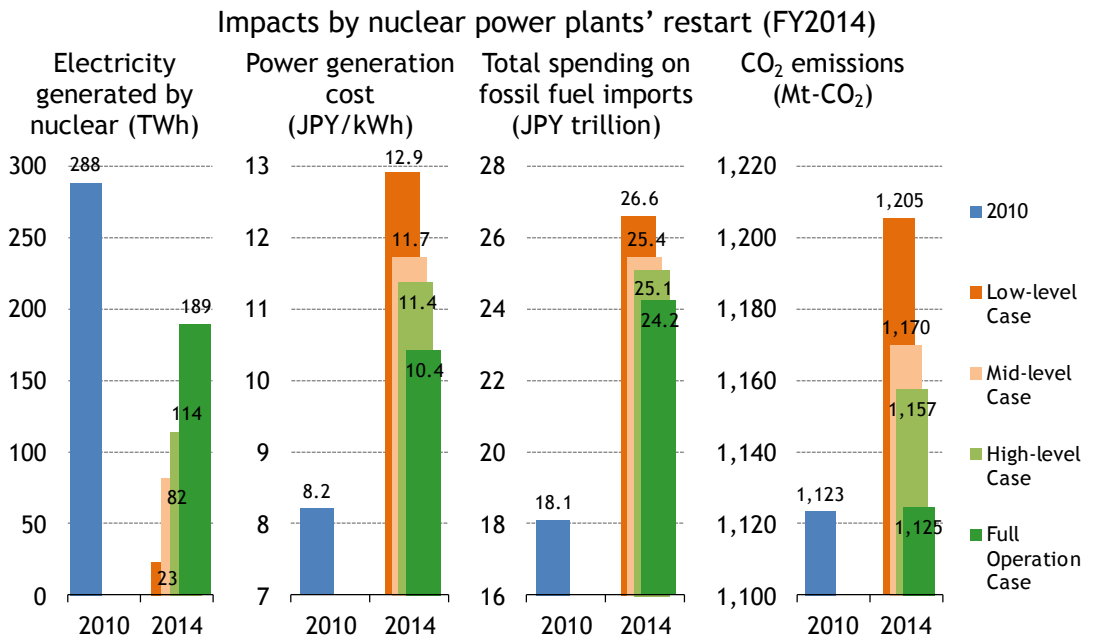
—Japan is reaching a crucial moment—

YANAGISAWA Akira, T. Yoshioka, H. Suzuki, Choi J. W., R. Ikarii, S. Iwata, Y. Shibata, K. Ito
The Energy Data and Modelling Center
The Institute of Energy Economics, Japan

◆ Executive summary of topics

1. Impacts of restarting nuclear power plants – swift approval procedures must follow the completion of the rigorous assessment ☞pp.17-19

- The application of the new regulation standard for the safety assessment of nuclear power plants, which entered into force in July 2013, requires more time than was originally anticipated. The current assumption is that the first group will need about nine months to complete the assessment and receive the assent from the local governments, resulting in no nuclear power plant restarts within this fiscal year (FY2013). Assuming a six months assessment period for the second and following groups, a maximum of 16 plants would restart and operate on average for eight months during the FY2014 [Nuclear Mid-level Case].
- During FY2014, the power generation cost will rise by JPY3,500/MWh, compared to FY2010, reflecting the additional spending on fossil fuel imports of JPY7.3 trillion required to replace the loss of electricity generated using nuclear power. Nuclear power generation will be about 30% of what it was in FY2010. The energy-related carbon dioxide (CO_2) emissions will increase by 46 Mt-CO_2, or 4.1% higher than during FY2010.
- Assuming a much longer (one-year) assessment period, no more than six plants would restart by the end of FY2014, generating electricity on average for nine months during FY2014 [Low-level Case]. If the Authorities could increase their staff as of April 2014 and if utilities submit the required materials smoothly and on time [High-level Case], up to twenty-two plants could restart and operate on average for eight months during FY2014. The hypothetical "Full Operation Case," assumes that the 22 plants of the "High-level Case" do generate electricity throughout the period rather than just for eight months.
- The extent to which the nuclear power plants can restart and operate has huge impacts on the Japanese economy. The difference in spending on fossil fuel imports between the High- and the Low-level Case is JPY1.5 trillion for FY2014. Lower spending means that power generation cost is reduced by JPY1,500/MWh, minimising the risk of further rises in electricity tariff while accelerating GDP by 0.17%. In the Full Operation Case, the spending on fossil fuel imports drops by JPY2.4 trillion, reducing power generation cost by JPY2,500/MWh while expanding GDP by 0.28%.



2. Effects and adverse effects of FIT – immediate improvement of the program is required for the proper and sustainable introduction of renewables ☞pp.19-21

- Solar PVs, with short lead-times and high purchased prices, accelerated the introduction of renewable power generation. The operating capacity of renewable power generation will reach 36.6 GW by the end of FY2014, an increase of 6.8 GW in FY2014.
- By the end of July 2013, a total capacity of 43.8 GW has been authorized under the FIT program. The cumulative burden over the next 20 years on electricity consumers of this capacity, if it all starts to operate, will total as much as JPY19 trillion and rise electricity tariffs by as much as JPY1,100/MWh – equivalent to 6.6% for industry and 4.6% for residential use. The burden rises with the penetration of renewable power generation.

3. Impact of TPP – energy demand increases led by an expansion of the economy ☞pp.21-22

- The establishment of the Trans-Pacific Strategic Economic Partnership Agreement, or TPP, will smooth market access via foreign trade and investments. The removal of duties will expand the Japanese economy by 0.9% as a whole.
- As a result of the TPP, total primary energy supply and total final energy consumption will both increase by 0.6%. Consumption will increase in almost all sectors and subsectors. Although electricity and fuel oil sales will increase, city gas sales will increase the most due to its higher share of industry use.
- If Japan depends too much on imported fossil fuel, has concerns over electricity supply and uses expensive electricity, the anticipated benefits of the TPP will be lower than anticipated. Japan needs to adopt a proper energy system to profit completely from the forthcoming economic partnership agreement.

◆ Executive summary of economic and energy outlook for FY2014

1. Macro economy – growth slows down due to downturn following the last-minute demand ☞pp.6-7

- Although external demand and public demand grow in real GDP in FY2014, private demand drops due to the downturn following the last-minute demand increase prior to the consumption tax increase. GDP growth in real terms slows down from 2.6% in FY2013 to 0.8% while in nominal terms it slows down from 2.3% to 2.0%.

2. Energy supply and demand – while total energy consumption decreases, natural gas and coal hit historical high

- Total primary energy supply decreases (-0.3%) due to a stagnant economic activity, electricity saving and energy conservation. While oil shows a steep decrease of 8.8% being pushed out by nuclear, natural gas and coal hit historical high. Japan's self-sufficiency rate is up to 10%, still lower than before the Great East Japan Earthquake (18% in FY2010). ☞pp.9-10
- Total final energy consumption falls by -0.4%. Energy consumption in all sectors, namely industry, buildings including residential and commercial, and transport, remain below the pre-earthquake's levels. The buildings sector shows the largest decrease at 0.8% due to milder temperature in summer and winter, electricity savings and energy conservation. ☞pp.11-12

3. Energy sales – city gas increases steadily, electricity rises slightly and fuel oil drops sharply

- The supply and demand of electricity will be more in balance due to the operation of some nuclear power plants. Electricity sales by utilities increase for the second year in a row, for the first time since the earthquake, led by a recovery of production activities of the manufacturing sector in the second half. As in the previous year, sales to large industrial users drive total sales (+0.3%), although sales for lighting contract for the residential sector do not grow (-0.2%). ☞pp.12-13
- City gas sales by general gas utilities increase by 1.1%, recording an historical high for the fourth year in a row. Sales for industrial use show steady growth of 2.1% due to fuel switching and new demand for power generation. Sales for residential, commercial and others stay almost unchanged from FY2013, supported by more water-heating demand due to cooler summer than the previous year and penetration of gas cogeneration systems. ☞pp.14-15
- Fuel oil sales fall below 190 GL for the first time in 28 years (-5.8%). Fuel oil C drops sharply due to the restart of some nuclear power plants (-52.9%) whilst all petroleum products but naphtha decrease. ☞pp.15-16

4. CO_2 emissions – decrease in FY2014 after recording new high in FY2013 ☞pp.10-11

- Energy-related CO_2 emissions hit the new high of 1,221 Mt in FY2013 due to the intensive operation of fossil fuel-fired power plants, an increase of 1.5% from FY2005. The restart of nuclear power plants leads to a decrease of the emissions by 4.2% in FY2014. Although energy consumption is less than before the earthquake by 5%, CO_2 emissions are up by 4%.
- It is no easy matter to achieve simultaneously an expected full-scale economic recovery and the new emission reduction target for FY2020 from FY2005 of -3.8% for GHGs and of +0.4% for energy-related CO_2 emissions, which heavily depends on energy conservation. The introduction of more low-carbon energy should also be promoted.

Summary (Reference Scenario)

		Historical			Projection		Year-to-year changes		
		FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Energy indicators	Primary energy supply (Mtoe)[1]	514.1	491.1	484.3	487.7	486.1	-1.4%	0.7%	-0.3%
	Oil[2] (GL)	232.2	238.5	242.1	241.8	220.4	1.5%	-0.1%	-8.8%
	Natural gas[2] (Mt)	73.2	85.8	89.4	90.2	91.1	4.1%	0.9%	1.0%
	Coal[2] (Mt)	184.6	175.1	183.3	189.5	191.1	4.7%	3.4%	0.8%
	Nuclear[3] (TWh)	288.2	101.7	15.9	9.3	82.1	-84.3%	-41.6%	782.3%
	Final energy consumption (Mtoe)	343.6	334.4	329.9	331.5	330.3	-1.3%	0.5%	-0.4%
	Industry[4]	162.9	159.0	156.0	157.4	157.5	-1.8%	0.9%	0.0%
	Buildings	97.3	93.8	92.5	91.8	91.1	-1.3%	-0.8%	-0.8%
	Transport	83.4	81.7	81.4	82.2	81.6	-0.4%	1.0%	-0.7%
	Petroleum products	178.1	172.1	168.8	169.4	167.9	-1.9%	0.3%	-0.9%
	Natural gas and city gas	35.0	36.3	36.3	36.5	36.6	-0.2%	0.6%	0.4%
	Coal and coal products	38.0	37.8	37.7	37.8	37.8	-0.3%	0.4%	0.0%
	Electricity	88.9	84.8	83.9	84.6	84.8	-1.0%	0.8%	0.2%
	Electricity sales (TWh)	942.1	894.8	886.7	890.0	890.9	-0.9%	0.4%	0.1%
	City gas sales[5] (Billion m^3)	35.28	35.91	36.32	36.67	37.08	1.1%	1.0%	1.1%
	Fuel oil sales (GL)	196.0	196.1	197.5	196.4	184.9	0.8%	-0.6%	-5.8%
	Energy-related CO_2 emissions (Mt-CO_2)	1,123	1,173	1,207	1,221	1,170	2.8%	1.2%	-4.2%
	(FY2005=100)	93.4	97.6	100.3	101.5	97.3			
Import prices	Crude oil, CIF ($/bbl)	84	114	114	107	105	-0.2%	-6.3%	-1.7%
	LNG, CIF ($/t)	588	819	859	819	784	4.9%	-4.7%	-4.2%
	Steam coal, CIF ($/t)	115	143	127	107	110	-11.5%	-15.3%	2.4%
Economic indicators	Nominal GDP (JPY trillion)	480.2	473.7	472.6	483.6	493.1	-0.2%	2.3%	2.0%
	Real GDP (JPY2005 trillion)	512.5	514.0	517.5	530.8	535.0	0.7%	2.6%	0.8%
	Industrial production index (CY2010=100)	99.4	98.8	95.8	99.0	101.0	-3.0%	3.3%	2.0%
	Exchange rate (JPY/$)	85.7	79.1	83.1	99.4	100.0	5.1%	19.7%	0.6%

Notes:

1. Mtoe = 10^{13} kcal
2. Conversion factors for 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

1. Introduction

Expectations on the future course of the Japanese economy are growing thanks to favourable effects of Japanese Prime Minister Shinzo Abe's "Abenomics" economic policy and an overseas economic recovery forecast. However, an earlier-expected expansion in exports has yet to emerge, with wage improvements remaining uncertain. Under such situation, the Japanese economy is feared to slump due to a consumption tax hike planned for April 2014. It is plagued with a mountain of energy problems including the tight electricity supply and demand balance, safety assessment on nuclear power plants, risks of renewable energy diffusion concentrating in solar photovoltaic power generation, growing energy costs and rising dependence on energy imports. In a bid to contribute to analysing immediate challenges and considering a more desirable energy mix in Japan, we have projected the Japanese economy and energy supply and demand in a critical stage through FY2014 and analysed various implications of the projection.

2. Major assumptions in the Reference Scenario

(1) World economy

We assume that the world economy will continue recovery until the end of FY2014. Despite risks regarding the debt limit issue and monetary policy changes, the U.S. economy may log a growth rate of 2.5% or more in FY2014 due to firm private consumption and residential investment. The European economy, though still seeming stalled, may recover slowly as financial markets stabilise. The Asian economy may retain a firm economic growth rate of 6% or more as the Association of Southeast Asian Nations economy remains buoyant despite slower growth in China and India.

(2) Oil, LNG and coal CIF prices

We have assumed an average oil import CIF price for Japan at $105/bbl in FY2014 in view of a moderate easing in the supply and demand balance (Koyama K., "International Oil Situation and Oil Price Outlook for 2014," 2013). Applying the relationship between oil and liquefied natural gas (LNG) prices over the recent years to the assumed oil price, we have assumed the average LNG price for FY2014 at $784/t (Morikawa T., "International Gas Market Trends," 2013). Reflecting the tightening international markets for coal, we have assumed an average price of steam coal at $110/t for FY2014 (Sagawa A., "Coal Situation Outlook for 2014," 2013).

(3) Exchange rate

We have assumed an average dollar-to-yen rate at JPY100/$ for the second half of FY2013 and the whole of FY2014.

(4) Taxes

We have assumed that the consumption tax will be raised to 8% in April 2014, while additional JPY96 per tonne of carbon dioxide equivalent will be placed on the oil and coal tax.

(5) Nuclear power generation

We have assumed that each nuclear power plant will take some six months to clear the assessment of its conformity with new regulatory standards under a setup of three assessment teams and get approval by relevant local governments before restarting operation. Given data submission and assessment progress in the past, however, the first group of plants is expected to take about nine months before restarting operation. This means that it is difficult to expect any plant to restart operation within FY2013. In FY2014, up to 16 plants are assumed to restart operation. They are estimated to operate for eight months on average, generating 82.1 TWh [Nuclear Mid-level Case] (see pp.17-19 for the impact of nuclear power plants' restart).

(6) Electricity supply and demand

Based on discussions at the government's Electricity Supply-Demand Verification Subcommittee, we have assumed that each electric utility will secure a reserve capacity of at least 3% through capacity enhancement and electricity saving.

(7) Temperatures

Based on the three-month weather forecast by the Japan Meteorological Agency, we have assumed a warmer winter for FY2013 than in the previous year (+0.6 degrees Celsius) and a normal summer and winter for FY2014, which means a cooler summer (-1.4°C) than in the previous year and a slightly warmer winter (+0.2°C).

3. Macro economy

The Japanese economy will recover thanks to the Abenomics policy and other factors, with real gross domestic product growing by 2.6% in FY2013.

Among private demand components, final consumption expenditure will increase due to the government's economic measures and consumer sentiment improvements amid asset effects. Residential investment will increase thanks to last-minute demand before the consumption tax hike. Non-residential investment will expand due to business confidence improvements. Public demand will increase as public investment for reconstruction after the Great East Japan Earthquake and infrastructure renovation, and expenditure expand. Exports will recover in line with a weaker yen mainly for manufacturers, while imports will continue increasing on brisk domestic demand.

Real GDP growth in FY2014 will decelerate to 0.8% (2.0% in nominal terms) as private demand decreases despite expanding external and public demand.

Among private demand components, non-residential investment will increase thanks to the depreciation of the yen, tax incentives and subsidies. Final consumption expenditure and residential investment will decrease due to a purchasing power drop by the consumption tax hike and demand fall following last-minute demand before the tax hike. The whole of private demand will log a slight decrease. Public demand will expand as social security expenditure increases with public investment remaining unchanged under an economic stimulus package as much as JPY5 trillion. Exports will continue to increase thanks to emerging effects of the depreciation of the yen and an overseas economic recovery, while import growth will slow down. External demand will thus make a positive contribution to GDP growth for the first time in four years.

The trade balance will improve in line with the export expansion under the depreciation of the yen and a decrease in fossil fuel imports. The trade deficit will rise to a record JPY9.8 trillion in FY2013 before falling back in FY2014 to JPY6.2 trillion, still the third largest in history. "Kuroda's Bazooka," the Bank of Japan's unusual monetary easing, will exert some impact on the economy. However, it will not be easy for the central bank to achieve an inflation rate of 2% (excluding the impact of the consumption tax hike) in a little more than one year.

Table 1: Macroeconomic indicators

	Historical			Projection		Year-to-year changes		
	FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Real GDP (JPY2005 trillion)	512.5	514.0	517.5	530.8	535.0	0.7%	2.6%	0.8%
Private demand	377.2	383.2	388.7	397.0	396.3	1.4%	2.1%	-0.2%
Private consumption	299.8	303.8	308.5	316.4	313.8	1.5%	2.6%	-0.8%
Private residential investment	12.5	12.9	13.6	14.6	13.6	5.3%	7.1%	-6.7%
Private non-residential investment	64.9	68.0	68.5	69.0	71.4	0.7%	0.7%	3.5%
Public demand	118.5	119.2	120.9	125.7	126.7	1.4%	4.0%	0.8%
Government consumption	97.9	99.1	100.6	102.5	103.5	1.5%	1.9%	1.0%
Public investment	20.7	20.1	20.3	23.2	23.1	1.3%	14.0%	-0.3%
Net exports of goods and services	16.8	12.0	8.3	8.7	12.4	-30.3%	3.7%	43.4%
Exports of goods and services	83.6	82.3	81.3	84.7	90.2	-1.2%	4.2%	6.4%
Imports of goods and services	66.8	70.3	73.0	76.1	77.7	3.8%	4.3%	2.2%
Nominal GDP (JPY trillion)	480.2	473.7	472.6	483.6	493.1	-0.2%	2.3%	2.0%
Balance of trade (JPY trillion)	5.3	-4.4	-8.2	-9.8	-6.2	84.9%	20.3%	-37.4%
Exports	67.8	65.3	63.9	72.2	77.7	-2.1%	12.9%	7.7%
Imports	62.5	69.7	72.1	82.0	83.9	3.5%	13.7%	2.3%
Fossil fuels	18.1	23.1	24.6	27.1	25.4	6.6%	10.0%	-6.1%
Domestic corporate goods price index (CY2010=100)	100.2	101.6	100.5	102.4	106.3	-1.0%	1.8%	3.8%
Consumer price index (CY2010=100)	99.9	99.8	99.5	100.0	102.7	-0.3%	0.5%	2.7%
GDP deflator (CY2005=100)	93.7	92.2	91.3	91.1	92.2	-0.9%	-0.2%	1.2%

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

4. Industrial production

Crude steel production will recover in FY2013 on a domestic demand expansion led by the civil engineering and construction sectors and remain high in FY2014 on an export recovery.

In FY2013, crude steel output will increase by 2.1% from the previous year, supported by brisk new residential construction and non-residential investment. In FY2014, domestic demand will decrease in reaction to last-minute demand before the tax hike. External demand will score a limited rise though exports recovery supported by the continued depreciation of the yen. Output will level off (+0.0%).

Ethylene production will continue to recover thanks to an end to a domestic demand fall and a gradual rise in external demand.

In FY2013, ethylene production will expand by 5.3% from the previous year thanks to a domestic demand recovery and an export rise, posting the first upturn in four years. In FY2014, imports will decrease due to the continued depreciation of the yen, while exports will increase slightly. Domestic demand will remain firm. Production will continue to rise despite a decrease in capacity through ethylene plant shutdowns, logging a 0.4% increase from the previous year.

Cement production will be brisk due to expanding domestic demand including post-disaster reconstruction demand.

In FY2013, cement production will increase by 1.0% from the previous year due to post-disaster reconstruction and a recovery in residential and non-residential investment. In FY2014, domestic demand will be potentially firm due to a production carryover from the previous year and progress in disaster prevention and reduction programs. However, production will level off at 60 million tonnes under capacity and personnel constraints.

Paper and paperboard production will turn up due to the depreciation of the yen in FY2013 before falling back.

In FY2013, paper and paperboard production will increase by 2.0% from the previous year, helped by last-minute demand before the tax hike and the depreciation of the yen, logging the first rise in three years. In FY2014, paper production will decline as a shift to electronic media coincides with a consumption drop following the last-minute demand. Paperboard production will also decrease due to a shift to thinner and lighter products. Paper and paperboard production in FY2014 will thus turn down with a 0.8% fall.

Automobile production will decrease in reaction to last-minute demand before the tax hike, even though robust export growth will help cover a domestic demand drop.

In FY2013, automobile production will rise by 1.4% from the previous year, supported by the last-minute demand. In FY2014, exports will continue to increase under the weak yen, while domestic demand will fall in reaction to the last-minute demand. Production will decrease by 0.8% to 9.61 million units. However, the level will still be the second largest since after the Lehman Shock, following the previous year's record.

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	109.5	109.6	0.8%	2.1%	0.0%
	Ethylene (Mt)	7.00	6.47	6.26	6.59	6.62	-3.3%	5.3%	0.4%
	Cement (Mt)	56.1	57.6	59.5	60.1	60.1	3.3%	1.0%	-0.0%
	Paper and paperboard (Mt)	27.3	26.5	25.7	26.2	26.0	-3.0%	2.0%	-0.8%
	Automobiles (Million units)	8.99	9.27	9.55	9.69	9.61	3.1%	1.4%	-0.8%
Production indices	Mining and manufacturing (CY2010=100)	99.4	98.8	95.8	99.0	101.0	-3.0%	3.3%	2.0%
	Food	98.1	97.3	96.7	99.0	99.7	-0.6%	2.4%	0.7%
	Chemicals	99.8	98.3	96.5	99.6	100.9	-1.9%	3.3%	1.3%
	Non-ferrous metals	98.9	97.5	96.6	98.6	99.1	-1.0%	2.1%	0.5%
	General and electrical machinery, etc.	101.3	100.3	93.1	97.3	99.5	-7.2%	4.5%	2.2%
Tertiary industry activity index (CY2005=100)		97.8	98.4	99.2	101.2	102.2	0.8%	2.0%	1.0%

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 in Japan will increase for the first time in three years before falling back in FY2014. However, natural gas and coal demand will reach record levels.

Primary energy supply in Japan in FY2013 will increase by 0.7% from the previous year. In FY2014, primary energy supply will fall by 0.3% due to effects by a reaction to last-minute demand before the consumption tax hike as well as electricity and energy conservation, although manufacturers' production will recover in the second half of the year.

Coal demand in FY2013 will increase beyond the level before the Great East Japan Earthquake, scoring a 3.2% increase from the previous year and a 2.0% rise from FY2010. FY2014 will see rising coal prices amid the tightening international markets and the oil and coal tax hike. However, coal demand will expand by 0.9% from the previous year to a record level, marking the fourth straight annual rise. Demand for power generation increases on a rise in coal-fired power generation capacity and industrial demand soars from cement producers retaining robust output and steelmakers supported by a recovery in

manufacturing industry output. Coal's share of primary energy supply will exceed a quarter for the first time in about half a century.

Oil demand excluding heavy fuel oil C for power generation in FY2013 will increase slightly from the previous year. However, total oil demand will post a small fall of 0.1%. In FY2014, demand for oil for petrochemical will continue to increase. Demand for expensive oil-fired power generation will drop as some nuclear power plants restart operation. As a result, oil demand will plunge by 20 million tonnes of oil equivalent (Mtoe) or 8.8% from the previous year to 201 Mtoe, a level seen before the first oil crisis.

Natural gas demand in FY2013 will increase by 0.9% from the previous year as demand rises for both power generation and city gas. In FY2014, demand for power generation will remain firm even with nuclear power plants restarting operation. City gas demand will increase steadily due to large-scale fuel switching. Overall natural gas demand in the year will expand by 1.0% from the previous year, rewriting a record for the second straight year. A natural gas demand increase (from FY2010) after the Great East Japan Earthquake will total 17.8 million tonnes of LNG equivalent.

Nuclear in FY2013 will decrease by 41.6% from the previous year as no nuclear power plant has been in operation in Japan since the Oi nuclear plant's shutdown in last September for regular inspection. Nuclear will gradually increase with some plants restarted one after another in FY2014. Total nuclear power generation in the year will still be limited to less than 30% of the FY2010 level. Nuclear power generation will gradually contribute to reducing fossil fuel consumption and improving energy self-sufficiency rate.

Table 3: Primary energy supply

	Historical			Projection		Year-to-year changes		
	FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Primary energy supply (Mtoe)	514.1	491.1	484.3	487.7	486.1	-1.4%	0.7%	-0.3%
Coal	119.1	112.8	117.7	121.5	122.5	4.3%	3.2%	0.9%
Oil	211.9	217.6	220.9	220.6	201.1	1.5%	-0.1%	-8.8%
Natural gas	95.5	112.0	116.6	117.6	118.8	4.1%	0.9%	1.0%
Hydro	18.2	18.5	16.7	16.7	17.1	-9.3%	-0.2%	2.0%
Nuclear	60.7	21.4	3.4	2.0	17.3	-84.3%	-41.6%	782.3%
Others	8.7	8.8	9.1	9.3	9.4	2.5%	2.3%	1.6%
Self-sufficiency	18%	11%	7%	7%	10%			
Energy intensity (FY2005=100)	94.1	89.6	87.7	86.1	85.2	-2.1%	-1.8%	-1.1%
Energy-related CO_2 emissions (Mt)	1,123	1,173	1,207	1,221	1,170	2.8%	1.2%	-4.2%
(FY2005=100)	93.4	97.6	100.3	101.5	97.3			

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

Energy-related carbon dioxide emissions in FY2013 will hit a record 1,221 million tonnes of CO_2 equivalent, up 1.2% from the previous year and 1.5% from FY2005. In FY2014, these emissions will decrease by 4.2% from the previous year for the first drop in five years as fossil fuel-fired power generation decreases with some nuclear power generation restarted.

Nevertheless, the emissions in the year will be far above levels before the Great East Japan Earthquake.

6. Final energy consumption

Japan's final energy consumption as well as its primary energy supply will increase in FY2013 for the first time in three years before turning down in FY2014.

Final energy consumption in FY2013 will increase by 0.5% from the previous year, marking the first rise in three years, before falling by a slight 0.4% in FY2014. The industrial sector will expand final energy consumption in FY2014 for the second straight year as its production recovers in the second half of the year following a slump resulting from the consumption tax hike. The buildings sector – residential and commercial sectors – will cut energy consumption in FY2014 for the fourth straight year due to electricity and energy conservation and mild temperatures. The transportation sector will expand energy consumption in FY2013 from the previous year for the first time in three years, due to last-minute demand before the consumption tax hike. In reaction to the last-minute demand, the sector's energy consumption will fall back in FY2014. All sectors will see energy consumption drops from levels before the Great East Japan Earthquake. Their consumption will decrease by 2.2-6.6% from FY2010.

The industrial sector will expand energy consumption in FY2013 by 0.9% from the previous year as economic activities recover thanks to greater domestic demand, including post-disaster reconstruction and disaster prevention/reduction measures, as well as rising external demand under the weak yen. FY2014 will see correction phase in post-disaster reconstruction demand and a reactionary demand drop after the consumption tax hike in its first half. But a recovery in manufacturers' production in the second half will allow the sector to offset an energy consumption fall in the first half. The sector's energy consumption in the whole of FY2014 will thus level off from the previous year.

The residential sector will reduce energy consumption in FY2013 by 0.8% from the previous year as a warmer winter reduces space and water-heating demand. In FY2014, mild temperatures, rising electricity saving consciousness and the diffusion of energy-efficient equipment will allow the sector to cut energy consumption by 1.3% from the previous year. It will thus reduce energy consumption for the fourth straight year.

The commercial sector will reduce energy consumption in FY2013 by 0.8% from the previous year due to a warmer winter, and electricity and energy conservation efforts, despite space cooling demand increased under summer heat waves. In FY2014, the sector will post a small fall of 0.1% from the previous year in energy consumption due to milder summer and winter temperatures and continued electricity and energy conservation efforts, with the fall concentrating in space-heating and cooling demand. Like the residential sector, the commercial sector will thus reduce energy consumption for the fourth straight year.

The transportation sector will expand energy consumption in FY2013 by 1.0%, marking the first increase in three years in line with more robust economic activities and rising transportation demand. In FY2014, the sector will reduce energy consumption by 0.7% from the previous year due to a reactionary decline in transportation demand after last-minute demand before the consumption tax hike, a plateauing vehicle fleet and continuous improvements in fuel and transportation efficiency resulting from eco-friendly and mini vehicles' expanding share of the vehicle fleet. Its energy consumption will go back into a long downward trend.

Table 4: Final energy consumption

	Historical			Projection		Year-to-year changes		
	FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Final energy consumption (Mtoe)	343.6	334.4	329.9	331.5	330.3	-1.3%	0.5%	-0.4%
Industry	162.9	159.0	156.0	157.4	157.5	-1.8%	0.9%	0.0%
Buildings	97.3	93.8	92.5	91.8	91.1	-1.3%	-0.8%	-0.8%
Residential	54.6	52.8	52.0	51.6	50.9	-1.5%	-0.8%	-1.3%
Commercial	42.7	41.0	40.5	40.2	40.2	-1.1%	-0.8%	-0.1%
Transport	83.4	81.7	81.4	82.2	81.6	-0.4%	1.0%	-0.7%
Coal and coal products	38.0	37.8	37.7	37.8	37.8	-0.3%	0.4%	0.0%
Petroleum products	178.1	172.1	168.8	169.4	167.9	-1.9%	0.3%	-0.9%
City gas and natural gas	35.0	36.3	36.3	36.5	36.6	-0.2%	0.6%	0.4%
Electricity	88.9	84.8	83.9	84.6	84.8	-1.0%	0.8%	0.2%
Others	3.7	3.4	3.3	3.2	3.2	-4.1%	-1.2%	-1.8%

Note: Industry includes non-energy use.

7. Electricity sales (electric utilities)

Electricity sales will turn up in FY2013 for the first time since the 2011 disaster and rise slightly in FY2014.

The electricity supply and demand balance in FY2013 will ease slightly from the previous two years thanks to electricity saving efforts and a supply increase through the expansion of fossil fuel-fired power generation capacity. Electricity sales in the year will rise by 0.4% from the previous year, the first increase after the 2011 disaster. The balance will ease further in FY2014 as some nuclear power plants restart operation. Electricity sales in FY2014 will score a small rise of 0.1% from the previous year as manufacturers' production recovers in the second half after a reactionary drop following last-minute demand before the consumption tax hike. The FY2014 sales will still be far less than levels before the disaster, posting a 5.4% decrease 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	890.0	890.9	-0.9%	0.4%	0.1%
Lighting contracts	304.2	288.9	286.2	286.3	285.8	-0.9%	0.0%	-0.2%
Power contracts	637.9	605.9	600.5	603.7	605.0	-0.9%	0.5%	0.2%
of which: Large-scale industrial users	300.2	290.8	284.0	285.5	286.4	-2.3%	0.5%	0.3%
Mining and manufacturing	251.3	244.6	237.9	238.8	239.3	-2.7%	0.4%	0.2%
Chemicals	28.1	27.2	26.3	26.4	26.4	-3.1%	0.3%	0.1%
Iron and steel	53.3	53.2	52.6	53.1	53.2	-1.1%	0.9%	0.2%
Machinery	74.6	71.6	69.0	69.6	69.8	-3.8%	0.9%	0.3%

Note: Power contracts and total include specified-scale demand.

Fossil fuel-fired power generation will hit a record in FY2013 and post a still-high level in FY2014.

Electric utilities' fossil fuel-fired power generation will hit a record 740 TWh level in FY2013. In FY2014, oil-fired power generation will decrease substantially as nuclear power generation increases. Coal-fired power generation will expand by 1.5% in the year as capacity factors rise for coal-fired power plants recovering from the disaster, with the addition of the unit 2 at the Hitachinaka Thermal Power Station and the unit 6 at the Hirono Thermal Power Station (in December 2013). Natural gas-fired power generation will increase by 1.7% to as much as 400 TWh as capacity expands on the launch of the units 1 to 3 at the Himeji Daini Thermal Power Station (in August 2013, and March and April 2014) and three generators of the unit 3 at the Chiba Thermal Power Station (in April, June and July 2014).

Table 6: Power generation mix (electric utilities)

	Historical			Projection		Year-to-year changes		
	FY2010	FY2011	FY2012	FY2013	FY2014	FY2012	FY2013	FY2014
Electricity generation (TWh)	918.2	857.4	822.0	825.9	827.2	-4.1%	0.5%	0.2%
Share						Year-to-year changes		
Hydro	8%	9%	8%	8%	8%	-0.5p	-0.1p	+0.2p
Fossil fuel thermal	60%	78%	89%	90%	81%	+10.4p	+0.8p	-9.0p
Coal	23%	24%	25%	27%	27%	+1.5p	+1.7p	+0.4p
Natural gas and city gas	31%	42%	47%	48%	48%	+4.8p	+0.6p	+0.7p
Oil, etc.	5%	11%	15%	15%	5%	+3.7p	-0.2p	-9.8p
Nuclear	31%	12%	2%	1%	10%	-9.9p	-0.8p	+8.8p
Others	1%	1%	1%	1%	1%	+0.0p	+0.1p	+0.1p

8. City gas sales (general gas utilities)

City gas sales in FY2013 will rewrite an annual record for the fourth straight year. In FY2014, city gas sales to the industrial use will surpass 20 billion cubic metres for the first time.

City gas sales in FY2013, though affected by higher temperatures in summer and winter, will increase by 1.0% from the previous year due mainly to fuel switching. In FY2014, sales to residential, commercial and others – medical and public – uses will level off from the previous year, with water-heating demand in summer increasing due to lower temperatures than in the previous summer. Sales to the industrial use will increase firmly due to fuel switching and power generation demand. Overall city gas sales in FY2014 will increase by 1.1% from the previous year for the fifth straight year of growth. Particularly, city gas sales to the industrial use in the Kanto region will expand remarkably.

City gas sales to the residential use in FY2013 will drop by 2.0% from the previous year because of higher summer and winter temperatures. In FY2014, sales to this use will level off, as water-heating demand will increase due to summer temperatures that are lower than the previous year. While the number of contracts for sales to the residential use will increase by a steady 0.5% annually due to the expansion of gas utilities' service areas and fuel switching, they will see a continuation of a long-term trend in which sales per contract decline due to the penetration of more efficient equipment and shrinking household sizes. The residential use, which had accounted for the largest share of city gas sales until 2000, will see its share shrink to less than a half of that for the industrial use.

Sales to commercial and others uses in FY2013 will decrease slightly (by 0.9% and 0.6%, respectively) from the previous year due to a plunge in water-heating demand under the temperature change as well as energy and electricity conservation. In FY2014, city gas sales to these uses will increase slightly (by 0.1% for each use) from the previous year because of greater water-heating demand under the temperature change, continued energy and electricity conservation and the further penetration of gas-fuelled air-conditioning and cogeneration systems under business and living continuity plans (BLCPs)[1]. While switching to city gas for water heating and air-conditioning has been making progress, the impact has been offset by the termination or bankruptcies of small enterprises. Therefore, city gas sales to these uses will continue the levelling-off trend that has remained since FY2004.

Sales to the industrial use in FY2013 will increase by 3.2% from the previous year thanks to new demand arising from fuel switching, making it the only use to which city gas sales will expand in the year. Sales to the use will post a slower rise in the first half of FY2014 as some

[1] The business and living continuity plan, or BLCP, aims to improve the energy independence and the reliability of energy supply through multiplexing and has attracted attention particularly since the Great East Japan Earthquake.

manufacturers cut operating rates on a reactionary demand decline following the last-minute demand before the consumption tax hike. However, factors such as manufacturers' production recovery and the launch of major LNG-fired combined cycle power generators including the unit 3 at the Chiba Thermal Power Station in the second half will lead city gas sales to the use in the whole of the year to rise by 2.1% from the previous year for the fifth straight year of increase. The FY2014 sales to the industrial use will exceed 20 billion cubic metres for the first time ever.

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 m^3)	35.28	35.91	36.32	36.67	37.08	1.1%	1.0%	1.1%
Residential	9.79	9.79	9.80	9.60	9.60	0.1%	-2.0%	-0.0%
Commercial	4.74	4.48	4.50	4.46	4.46	0.4%	-0.9%	0.1%
Industrial	17.63	18.67	19.03	19.63	20.04	1.9%	3.2%	2.1%
Others	3.13	2.97	3.00	2.98	2.98	1.0%	-0.6%	0.1%

Notes: Converted at 1 m^3 = 41.8605 MJ (10,000 kcal)

9. Fuel oil sales

Fuel oil sales in FY2013 will decrease for the first time in four years. They will decline in FY2014 as well, slipping below 190 GL for the first time in 28 years.

Total fuel oil sales in FY2013 will drop by 0.6% from the previous year, the first decrease in four years. Excluding heavy fuel oil C for power generation, however, fuel oil sales will increase by 0.3%, the first rise in three years. In FY2014, heavy fuel oil C sales for power generation will decline substantially as some nuclear power plants restart operation. The year will also see continuous fuel switching, energy conservation progress including improvements in vehicle fuel economy, and a reactionary demand drop after the last-minute demand before the consumption tax hike. As a result, total fuel oil sales in FY2014 will decline by 5.8% from the previous year, slipping below 190 GL for the first time in 28 years.

A year-on-year gasoline sales fall in FY2013 will be limited to 0.2% as summer heat waves offset the impact of improvements in vehicle fuel economy. In FY2014, gasoline sales will drop by 1.4% from the previous year due to the greater impact of the fuel economy improvements that will accompany the further penetration of eco-friendly vehicles and mini vehicles. The year's sales will fall to 55 GL level for the first time in 16 years.

Naphtha sales in FY2013 will rise by 3.0% from the previous year, the first increase in four years. In FY2014, naphtha sales will score a small increase of 0.3% from the previous year despite a drop in ethylene production capacity as domestic and overseas demand firms for petrochemical.

Kerosene sales in FY2013 will decrease by 3.0% from the previous year as space and water-heating demand fails to grow under a milder winter. In FY2014, kerosene sales will decline by 2.7% from the previous year in line with a long-term downward trend: sales per household in the second half of the year fall below 30 litres per month. The year's sales will slip below 18 GL for the first time since FY1971.

Diesel oil sales in FY2013 will increase by 0.9% from the previous year thanks to post-disaster reconstruction demand. In FY2014, diesel oil sales will fall by 0.8% from the previous year due primarily to a slowdown in post-disaster reconstruction demand and a decline in diesel-fuelled vehicles.

Heavy fuel oil A sales in FY2013 will decrease by 2.9% from the previous year due mainly to fuel switching. In FY2014, they will continue a downward trend despite a rise in demand for fuel for auto-generation of electricity amid a recovery in manufacturers' production, logging a year-on-year fall of 3.7%.

Heavy fuel oil C sales for power generation will accelerate their decline in line with an expansion in LNG- and coal-fired power generation and the restart of some nuclear power plants, dropping year-on-year by 9.0% in FY2013 and by 52.9% in FYT2014. Nevertheless, the FY2014 sales will still exceed the level before the disaster. Heavy fuel oil C sales for other uses will also decline due mainly to fuel switching and energy conservation efforts.

Liquefied petroleum gas, or LPG, sales will roughly level off despite fuel switching. In FY2013, LPG sales will fall by 4.5% from the previous year as sales for industrial use fail to increase. In FY2014, however, they will increase by 2.3% from the previous year due primarily to an industrial production recovery in the second half.

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	196.4	184.9	0.8%	-0.6%	-5.8%
Gasoline	58.2	57.2	56.4	56.3	55.6	-1.3%	-0.2%	-1.4%
Naphtha	46.7	43.7	43.2	44.6	44.7	-1.1%	3.0%	0.3%
Jet fuel	5.2	4.2	4.0	5.0	5.0	-5.8%	26.2%	-0.3%
Kerosene	20.4	19.6	19.0	18.4	17.9	-3.3%	-3.0%	-2.7%
Diesel oil	32.9	32.9	33.4	33.7	33.5	1.8%	0.9%	-0.8%
Heavy fuel oil A	15.4	14.7	13.7	13.4	12.9	-6.3%	-2.9%	-3.7%
Heavy fuel oil B and C	17.3	23.7	27.7	25.0	15.5	16.8%	-9.7%	-38.1%
For electric utilities	7.7	14.9	19.5	17.7	8.3	30.8%	-9.0%	-52.9%
For other users	9.7	8.9	8.3	7.3	7.1	-6.7%	-11.5%	-2.2%
LPG (Mt)	16.5	16.4	16.6	15.8	16.2	1.0%	-4.5%	2.3%

Topic 1: Impacts of nuclear power plants' restart on the economy and energy supply and demand

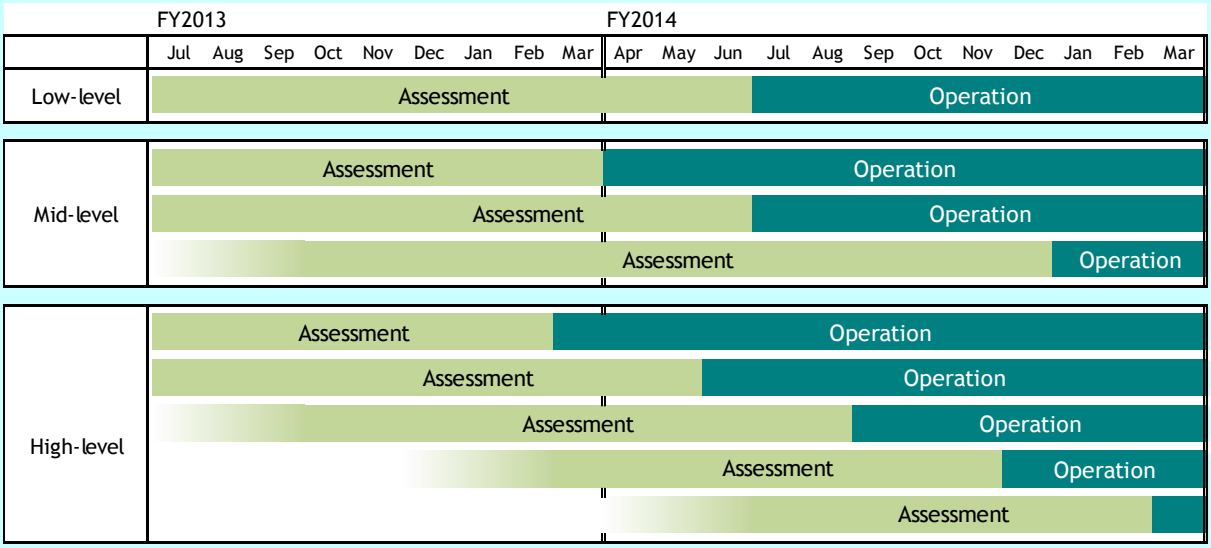
The assessment of nuclear power plants' conformity with new regulatory standards, though difficult, will be completed in the not-so-distant future. What would the next challenges be toward restarting nuclear power plants?

The assessment of nuclear power plants' safety is ongoing under new regulatory standards that took effect on 8 July 2013. When the new standards were implemented, the assessment of each plant was expected to take six to 12 months. Some plants were thus expected to restart operation in early 2014 if early.

Slight time gaps between submissions of requests for the assessment had been feared to result in wide gaps between assessment starting points. Such result has been avoided through parallel assessment of plural plants. In the unprecedented assessment, however, regulators and electric utilities have been groping their way forward in proceeding with assessment meetings. Utilities have been requested to provide additional information. As massive requests have come for data that only pressurised water reactor makers can provide, utilities are consuming much time on preparing such data for assessment. It would be difficult for regulators to complete assessment of any plant by early 2014.

In the Nuclear Mid-level Case, we assume that three teams will conduct the assessment, with each capacity covering up to two plants simultaneously. Each plant is assumed to restart operation after spending six months for regulators' assessment and the relevant local governments' approval on the restart. Given data submissions and progress in the assessment in the past, the first group of plants is assumed to take nine months before restarting operation. This means that it would be difficult for any plant to restart operation before FY2013 ends on 31 March 2014. In this case, up to 16 plants will restart operation by the end of FY2014, with each operating for eight months on average during the year, generating 82.1 TWh in electricity for the year. We have also set the Low-level Case in which each plant will take one year from the launching of the assessment to its restart. In this case, up to six plants will restart operation by the end of FY2014, with each operating for nine months on average during the year, generating 23.7 TWh in electricity for the year. In addition, we have set the High-level Case in which each assessment team will be expanded to cover up to four plants simultaneously with utilities providing data smoothly. In this case, up to 22 plants will restart operation within FY2014, with each operating for seven months on average during the year, generating 114.5 TWh for the year. Furthermore, we have set the Full Operation Case in which the 22 restarted plants in the High-Level Case will be in full operation during the year, analysing effects.

Figure 1: Timetable of activities after the new regulation standard



Fossil fuel costs in FY2014 in the Mid-level Case will be JPY1.14 trillion less than in the Low-level Case. In the High-level Case, these costs will be JPY1.48 trillion less than in the Low-level Case. These costs in the Full Operation Case will be JPY2.35 trillion less. The unit electricity generation cost will be cut by JPY1,200/MWh from the Low-level Case for the Mid-level Case, by JPY1,500/MWh for the High-level Case and by JPY2,500/MWh for the Full Operation Case. While the unit cost in FY2014 will rise by 57% in the Low-level Case from indicative JPY8,200/MWh in FY2010, the rises are reduced to 43% in the Mid-level Case, to 38% in the High-level Case and to 27% in the Full Operation Case. The GDP growth rate in FY2014 will be raised by 0.13 percentage points from the Low-level Case for the Mid-level Case, by 0.17 points for the High-level Case and by 0.28 point for the Full Operation Case. CO_2 emissions will be reduced by 2.9%, 4.0% and 6.7%, respectively. Local pollutant emissions will also be cut.

Assessment arrangement problems, which had been a matter of concern earlier, are no longer viewed as any major constraint on smooth checks. Utilities are focusing on securing the safety of plants and strict assessment, while consuming much time on preparing massive data. The assessment of the first group of plants might have passed the halfway mark and may end by and by. Once safety is reaffirmed for a plant, the next step will be approval by the relevant local governments and prefecture. Even if the NRA reaffirms the safety of a plant, excessive time consumption in the following procedures may reduce the advantage of the efforts to secure safety as early as possible. Collected decisions looking at the whole picture should be made.

Table 9: Impacts of nuclear power plants' restart (FY2014)

	FY2010 Historical	FY2014			
		Low-level Case	Mid-level Case	High-level Case	Full Operation Case
Cumulative number of restarted nuclear reactors	-	6 at most	16 at most	22 at most	22 at most
Average period for operation (months)	-	9	8	7	12
Electricity generation by nuclear (TWh)	288.2	23.7	82.1	114.5	189.4

	FY2010 Historical	FY2014 (Changes from FY2010)			
		Low-level Case	Mid-level Case	High-level Case	Full Operation Case
Real GDP (JPY2005 trillion)	512.5	+21.8	+22.5	+22.7	+23.3
Changes against FY2010		+4.25%	+4.39%	+4.43%	+4.54%
Power generation cost (JPY/kWh)	8.2	+4.7	+3.5	+3.2	+2.2
Primary energy supply					
Oil (GL)	232.2	+2.5	-11.9	-12.2	-12.9
Natural gas (Mt of LNG equivalent)	73.2	+20.2	+17.8	+13.7	+3.0
Total fossil fuel imports (JPY trillion)	18.1	+8.5	+7.3	+7.0	+6.1
Oil	12.3	+4.9	+3.9	+3.9	+3.8
LNG	3.5	+3.5	+3.3	+3.0	+2.2
Trade balance (JPY trillion)	5.3	-12.3	-11.5	-11.2	-10.6
Energy-related CO_2 emissions (Mt-CO_2)	1,123	+82	+46	+34	+1
Changes from FY2010		+7.3%	+4.1%	+3.0%	+0.1%
Local pollutants by electric utilities (kt)					
NO_x	148	+73	+12	+8	-2
SO_x	136	+79	+3	+2	-3
PM	3.8	+1.2	+0.2	+0.1	+0.1

Note: Thirty-nine reactors operated at the end of 2010.
The 22 reactors at most of the High-level Case are assumed to operate throughout FY2014 in the Full Operation Case.
Power generation cost in FY2010 is for the general electric utilities, estimated based on their profit-and-loss statements.
Local pollutants are estimated based on emission intensity by Keisuke Nansai and Yuichi Moriguchi (2012), "NO_x, SO_x and PM emissions factors of Japanese stationary sources," National Institute for Environmental Studies.

Topic 2: FIT system effects and burdens

Renewable power generation capacity will reach 36.6 GW. Cumulative burdens for authorised projects alone will reach JPY19 trillion.

One and a half years have passed since Japan launched the feed-in-tariff, or FIT, system in which utilities purchase electricity generated with renewable energy sources at fixed prices, in July 2012. During the period, renewables have diffused rapidly. Great expectations are placed on renewables that are purely domestic resources and emit no carbon dioxide. However, various relevant challenges have emerged.

Renewable power generation capacity in operation in FY2014 will increase by 6.8 GW from the previous year to 36.6 GW. Remarkable growth will emerge in solar photovoltaic power generation that features shorter lead times and higher prices. After the residential sector accounted for two-thirds of solar PV generation capacity in July 2013, the non-residential sector (including "Mega-solar" systems) will surpass the residential sector in solar PV generation capacity by the end of FY2013 and expand its capacity to 11.5 GW by the end of FY2014. As some five years are required for any wind power generation project to start generation, wind power generation capacity at the end of FY2014 will still be limited to 3.5 GW. Renewable power generation in FY2014 will total 88.1 TWh including 20.6 TWh by solar PV and 6.1 TWh by wind.

Consumers' burdens for renewable power generation have also expanded rapidly. Even if only capacity that had been authorised by the end of July 2013 becomes operational, consumers' cumulative burdens for the next 20 years will reach as much as JPY19 trillion[2]. The inevitable burdens amount to a hike of JPY1,100/MWh in electricity bills – 6.6% and 4.6% for the industrial sector and for the residential sector, respectively. The rapid expansion of solar PV generation subject to higher prices has substantially pushed up the burdens. Particularly, higher prices are fixed for FIT contracts that will be concluded by 2015. The burdens will increase as wind power and other renewable power generation capacity with longer lead times become operational following solar PV.

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

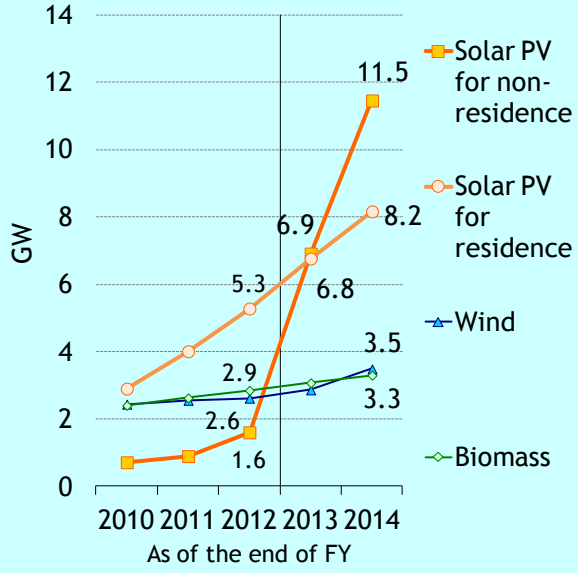
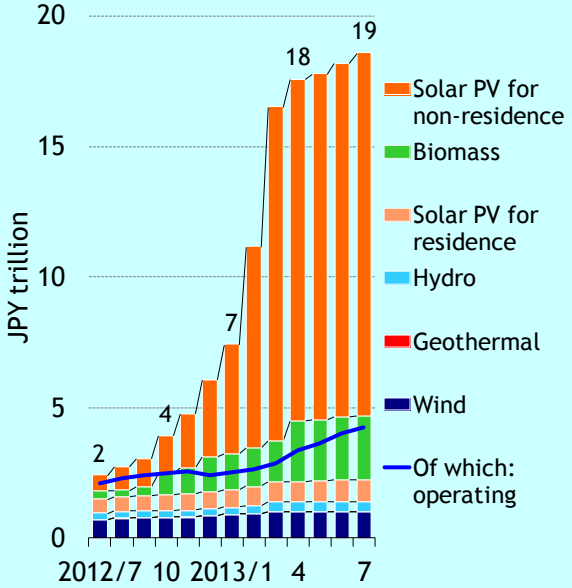


Figure 3: Cumulative burdens of FIT over the next 20 years (capacity authorised as of the end of each month)



[2] The remaining FIT periods for capacity introduced before the FIT system launching are taken into account. The marginal avoidance cost at JPY10,400/MWh is assumed.

One problem under the current situation is that renewables in areas far from those with strong electricity demand have failed to be used efficiently due to insufficient capacity for linking grids of utilities. But massive costs and time are required for increasing capacity to link grids of utilities. In order to fully utilise renewables, low-cost and practical measures including temporary restrictions on output may have to be taken. It is important to smartly diffuse renewables while setting appropriate prices to rebalance among renewables.

Topic 3: TPP's impact on the economy and energy supply and demand

Customs repeal will work to expand the Japanese economy by 0.9%. Primary energy supply will increase by 0.6% due partly to an energy consumption rise in the industrial sector.

Negotiations on the Trans-Pacific Strategic Economic Partnership, or TPP, are entering the final stage. The TPP talks pursue high-level trade liberalisation and are expected to achieve smooth market access for trade and investment and improve social utility. We have developed a scenario in which customs will be repealed under a TPP agreement for trade between the TPP participants including Republic of Korea seeking to take part in the talks. We have then assessed the impact of the scenario on the Japanese economy and energy supply and demand[3].

The Japanese economy will expand by 0.9% thanks to the facilitation of market access between TPP participants[4]. While some industries will be affected by cheaper imports, internationally competitive industries will be able to expand exports of goods and services and their production. Employment environment improvements through production expansion and purchasing power growth through lower prices of imports will work to expand consumption, inducing a further economic expansion.

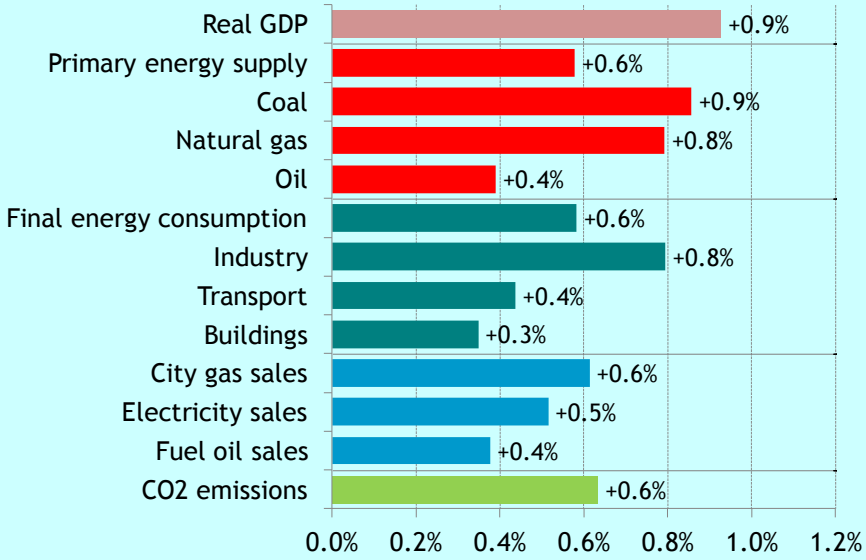
Primary energy supply will increase by 0.6% due to the economic expansion. Coal and natural gas demand will expand substantially thanks to growth in industrial production and electricity generation demand. The industrial sector, including manufacturers that will increase production, will exert a great impact on final energy consumption. Greater freight movement will prompt the transportation sector to raise energy consumption by 0.4%. CO_2 emissions will increase by 0.6% due to growth in fossil fuel-fired power generation and in final energy consumption.

[3] The government's unified estimation of customs repeal's economic effects (in March 2013) also covered only the effects of customs repeal. The government estimation was for the case where Japan would join 11 then participants in the TPP talks.

[4] The effect is for the time when economic and industrial structure adjustments accompanying the customs repeal are completed for a new medium to long-term equilibrium. The expansion is from the case without the customs repeal.

Electricity and city gas sales will increase, supported mainly by the industrial sector. Particularly, city gas sales will receive a great impact due to the industrial sector's large share of the sales. Fuel oil sales will also increase due to growth in those for transportation, despite a decline in those for agriculture.

Figure 4: Impacts of TPP



As far as Japan heavily depends on imported fossil fuels and uses high-cost electricity with concerns lingering on electricity supply, the TPP's economic benefits will be limited. Japan will have to develop a better energy system to secure the full benefits of the forthcoming economic partnership agreement.

Contact: report@tky.ieej.or.jp