25 July 2017
The 426th Forum on Research Work

Economic and Energy Outlook of Japan through FY2018

Energy supply and demand structure significantly changes

The Institute of Energy Economics, Japan

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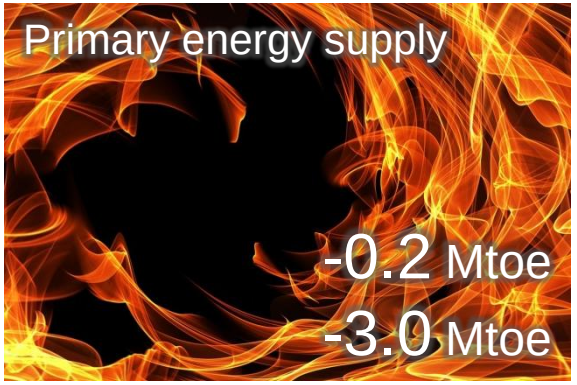
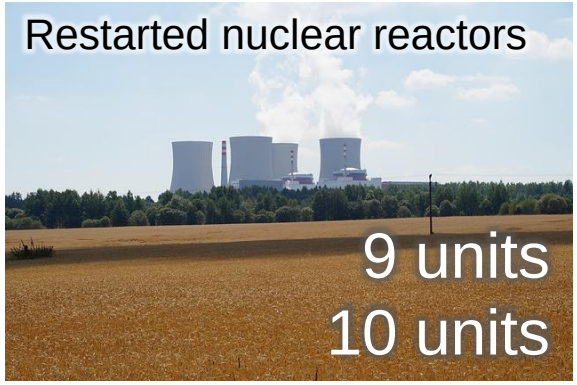
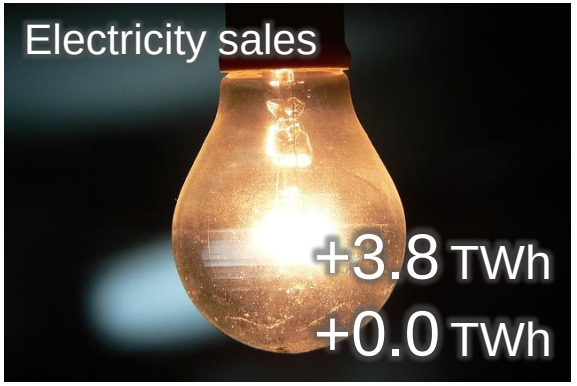
FY2017-2018 Data







Major “assumptions”

Global economy

- In the U.S. economy, the employment market will sustain recovery, encouraging private consumption.
- The European economy will feature brisk private consumption, being supported by investment and export recovery.
- The Asian economy will sustain relatively high growth due to export recovery and brisk private consumption.

Import CIF prices

June 2017→ FY2017 → FY2018

- Crude oil: $52/bbl → 51→ 52
- LNG: $432/t → 399 → 395
  ($8.3/MBtu → 7.7 → 7.6)
- Steam coal: $103/t → 93 → 87

Sources: Morikawa “Outlook for International Oil Market,” Kobayashi “Outlook for Gas Market” and Sagawa “Outlook for International Coal Market”

Foreign exchange rate

June 2017 → FY2017 → FY2018

- JPY111/$ → 115 → 115

Nuclear power generation

- A total of nine nuclear power plants will have been restarted by FY2017. In the year, they will operate for an average eight fiscal months and generate 55.6 TWh.
- By the end of FY2018, a total of 10 nuclear power plants will have been restarted. In the fiscal year, they will operate for an average nine months and generate 65.6 TWh (accounting for 7% of total power generation).

See pp. 24-26 for an analysis comparing impacts of three different nuclear power plant restart cases – Reference Scenario, Low Case and High Case.

Electricity supply and demand

- We expect that Japan will secure the generation reserve margin of 3% required for stable nationwide electricity supply.

Basic Policy Subcommittee on Electricity and Gas

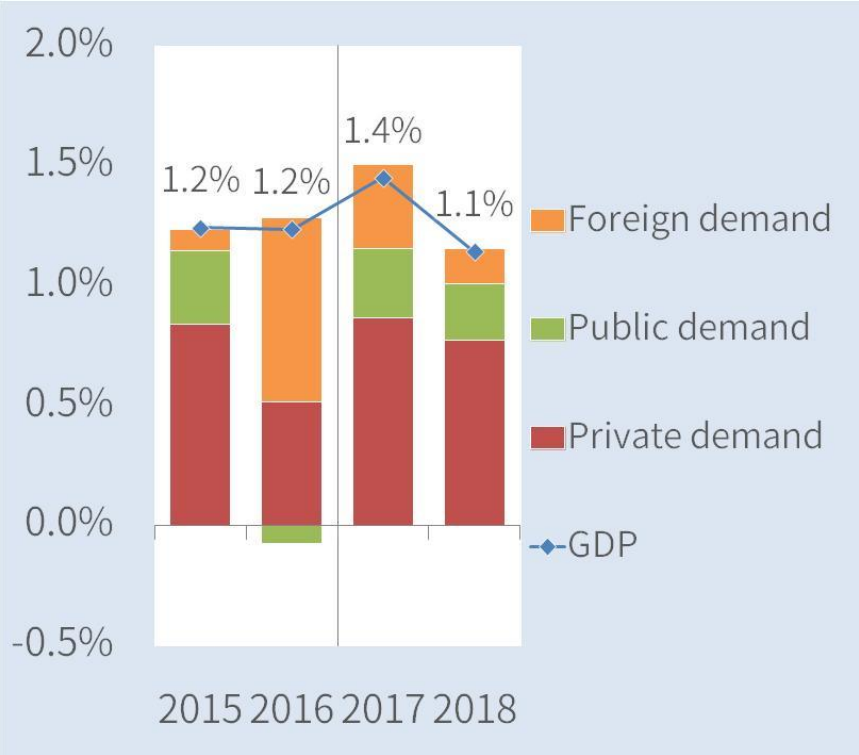
Air temperature

- Summer in FY2017 will be as warm as in the previous year and winter will be as cold as in the previous year.
- In FY2018, summer will be cooler (-0.5°C) than in the previous year and winter will be as cold as in the previous year.

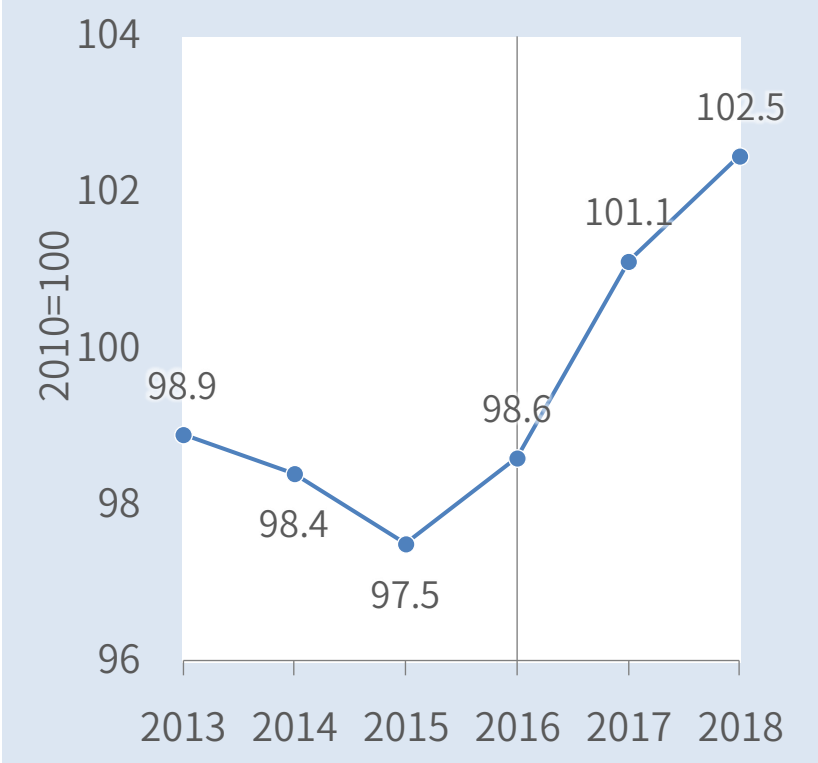
The Japanese economy will grow by more than 1% for the fourth straight year

- The Japanese economy will moderately grow on brisk domestic demand, despite decelerating exports.
- Industrial production in FY2017 will exceed the FY2013 level inflated by a demand increase before a consumption tax increase, hitting a nine-year high.

Real GDP growth and its breakdown



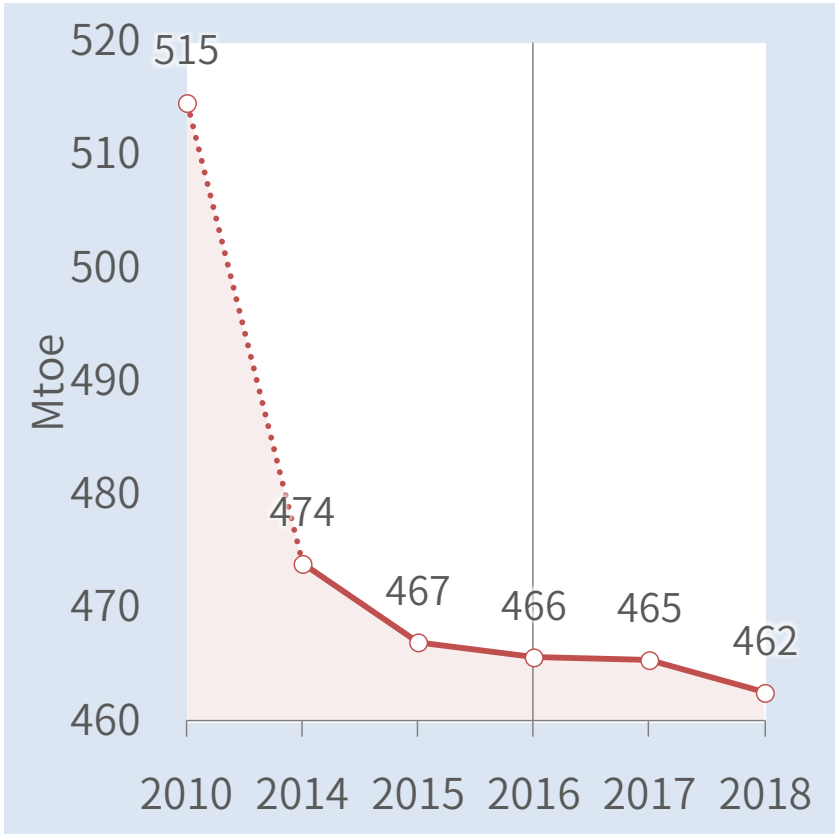
Industrial production



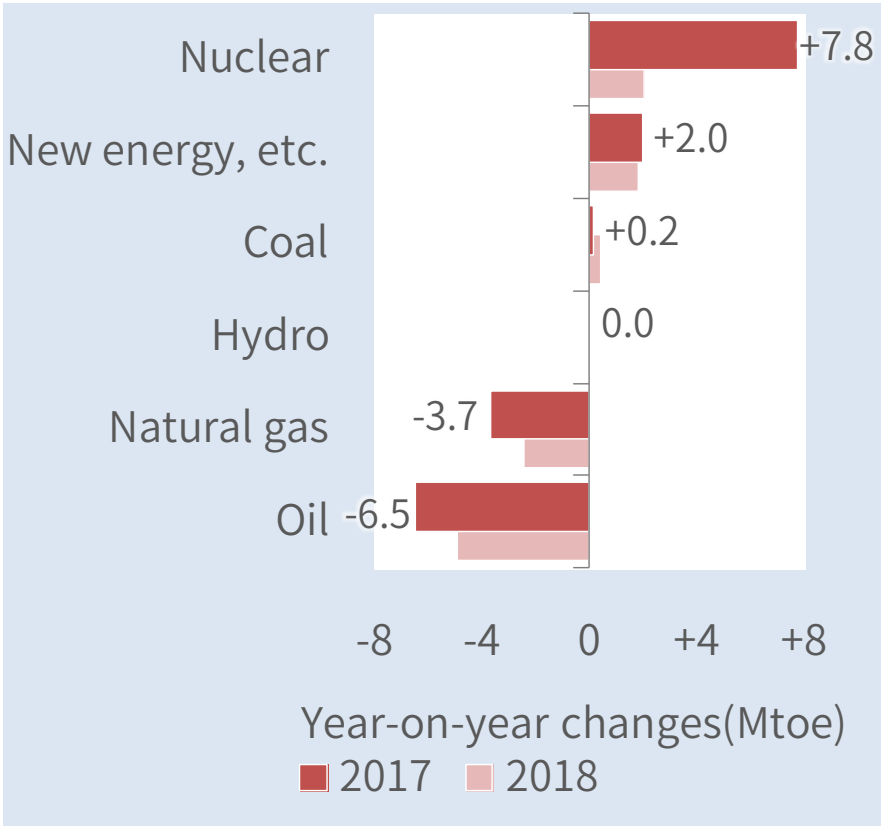
Primary energy supply will fall slightly, with non-fossil energy supply increasing

- Primary energy supply in FY2017 will fall slightly on progress in energy conservation, despite economic expansion. In FY2018, primary energy supply will decline on slow production recovery.
- Power generation will influence supply. LNG and oil will reduce their shares of the power generation as nuclear and new energy expand their shares.
- The energy self-sufficiency rate will rise back beyond 10% for the first time since the Great East Japan Earthquake.

Primary energy supply



Primary energy supply changes by energy source

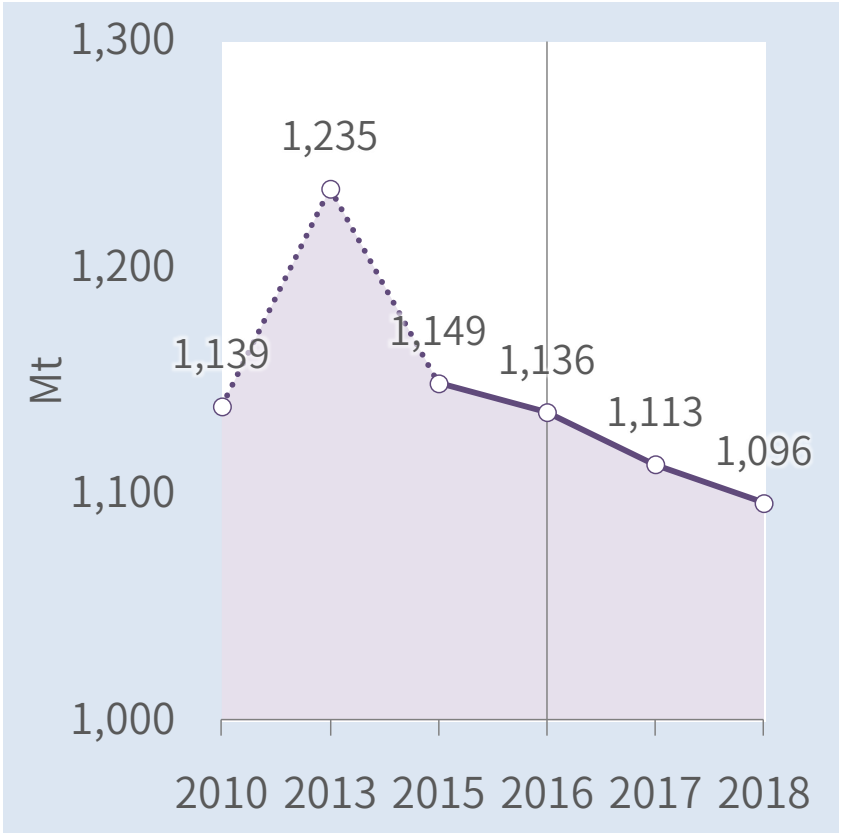


Note: The heat value has been revised since FY2013.

Energy conservation will have to be combined with decarbonation to cut CO_2 emissions

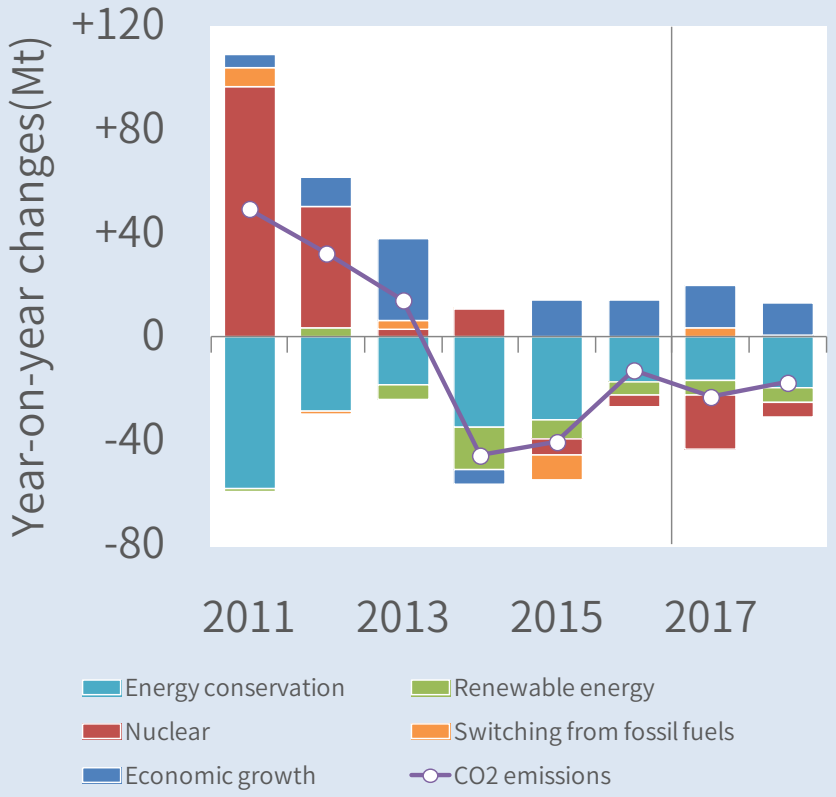
- After falling below the level before the Great East Japan Earthquake's impact, energy-related CO_2 emissions will continue to decrease. FY2018 emissions will slip below 1,100 Mt for the first time in 25 years excluding FY2009 when emissions fell exceptionally due to the Lehman Shock.

CO_2 emissions



- Energy conservation's contribution to the CO_2 emission reduction will slightly decrease.
- Decarbonation's contribution to the CO_2 emission reduction will gradually expand. In FY2017, nuclear and renewable energy's contribution will be nearly two times as high as that by energy conservation.

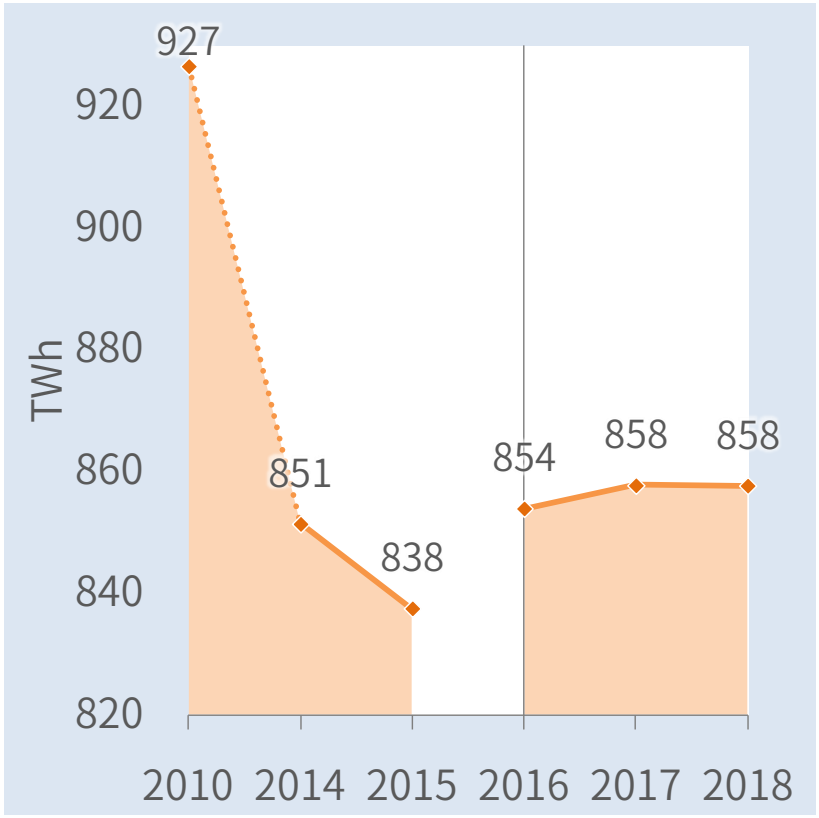
CO_2 emission changes and breakdown by energy source



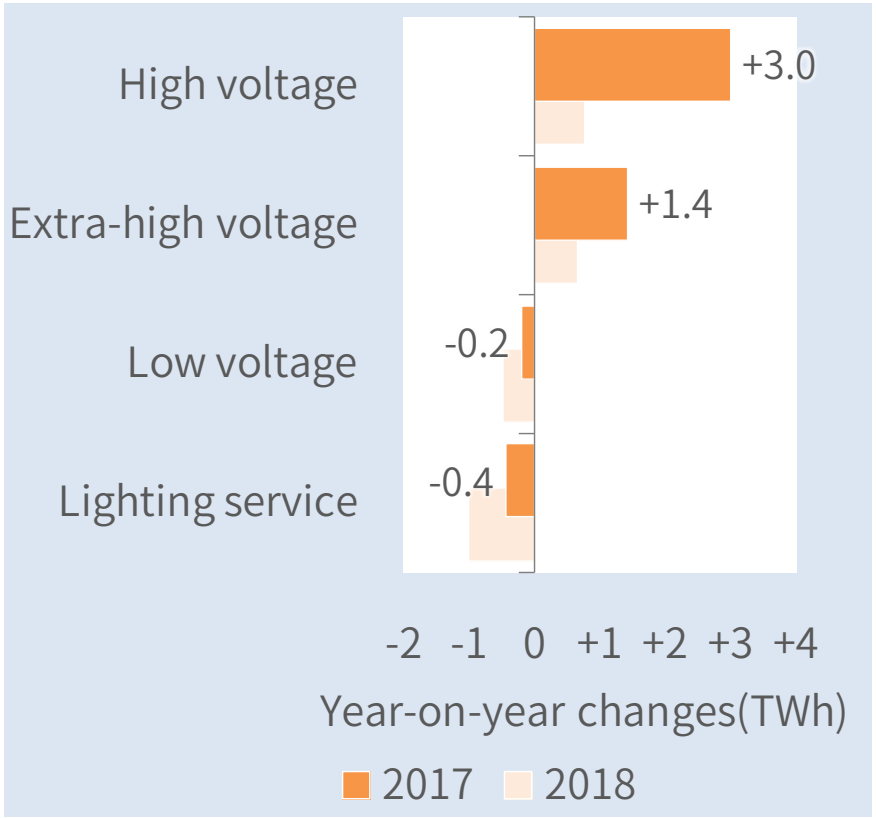
Electricity sales will end their rapid fall

- Electricity sales will stop declining after their rapid fall following the Great East Japan Earthquake.
- However, future growth will be slow.
- Electricity sales will be driven by those to high voltage and extra-high voltage industrial users as production expands.
- Electricity sales to lighting service users will slowly decrease on progress in energy conservation.

Electricity sales



Electricity sales changes by user category

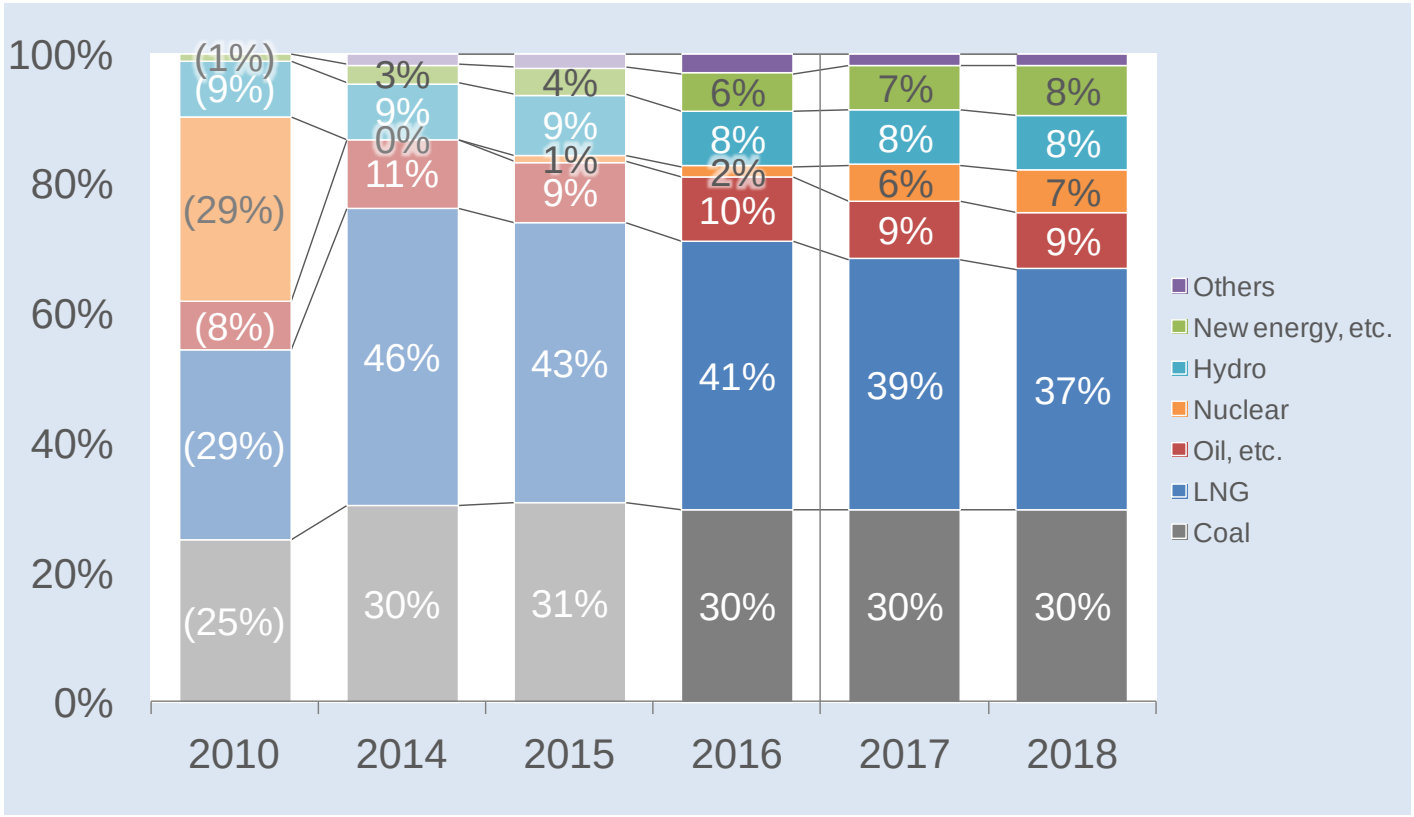


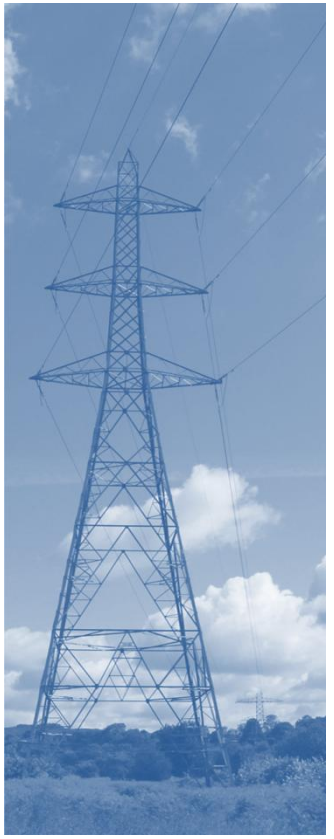
Note: Data lose continuity as data through FY2015 are based on old standards.

Fossil fuels' power generation share, though still being high, will gradually fall

- A cumulative total of 10 nuclear power plants will have been restarted by the end of FY2018. New energy power generation will expand capacity to 68.3 GW as FIT approval facilities launch operation.
- Fossil fuels' share of the power generation will still exceed the FY2010 level before its sharp increase following the Great East Japan Earthquake. However, their share has been gradually falling since the FY2013 peak and will drop to 75%. LNG's share will slip below 40%.

Electric utilities' power mix



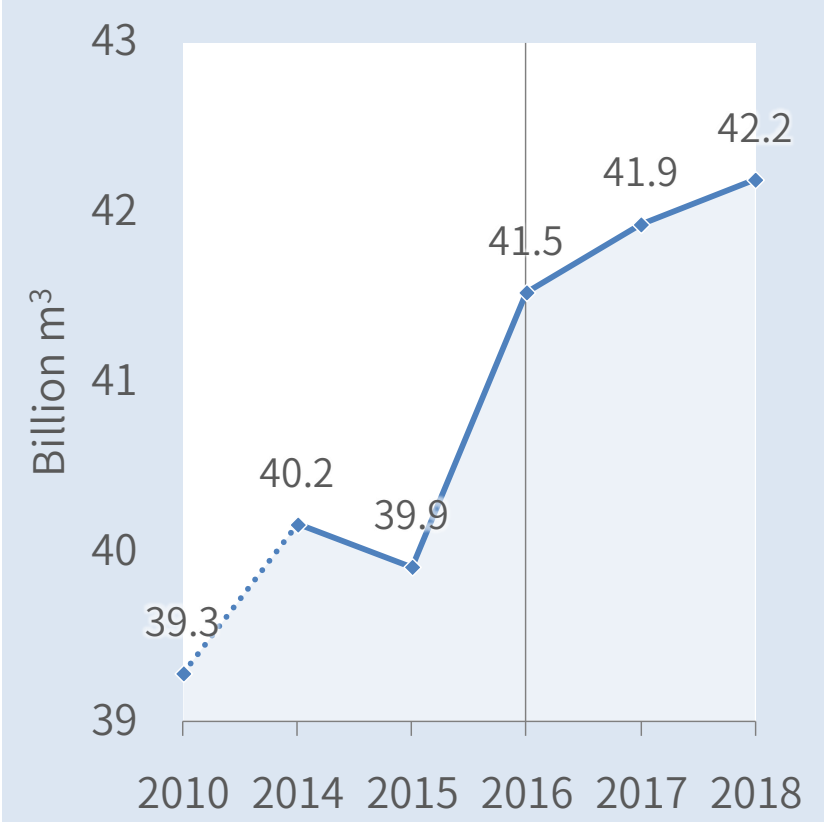


Note: FY2010 data are for general electric utilities under a former classification. Data lose continuity as data through FY2015 are based on old standards. The hydro category covers small and medium-sized plants with capacity at 30 MW or less, which account for an estimated 50% of hydro power plants.

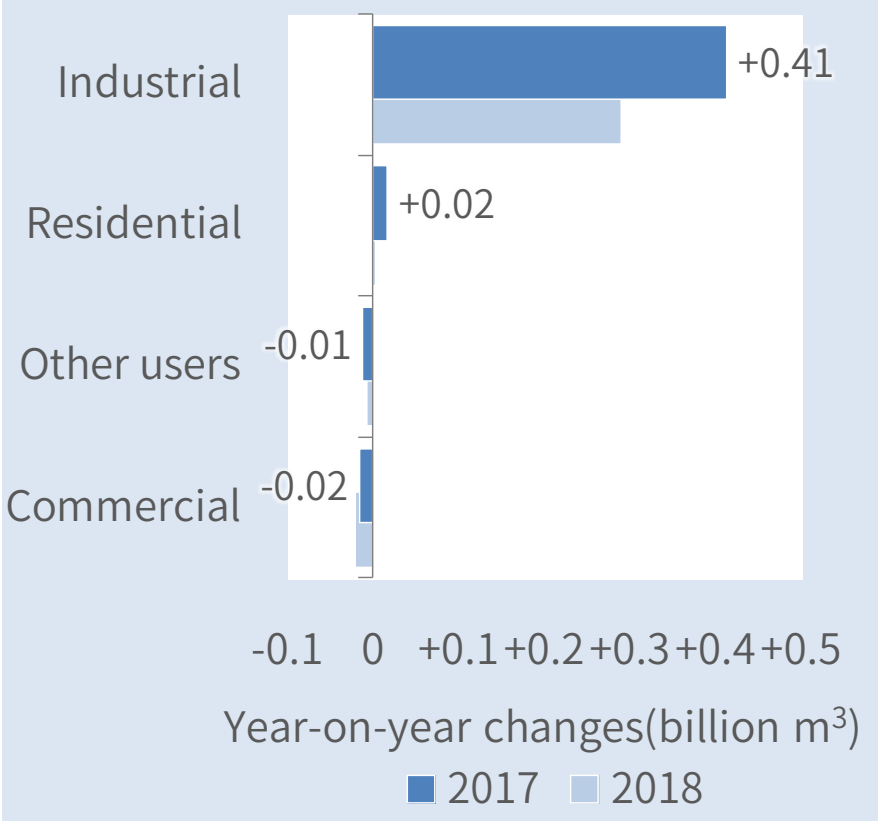
City gas sales will hit a record high for the third straight year

- City gas sales hit a record high in FY2016 and will continue to do so in FY2017 and FY2018, while decelerating growth.
- Sales to industrial users will drive overall sales growth, increasing on growing production of steel, chemicals and machinery and on fuel switching for industrial furnaces and boilers.

City gas sales volume



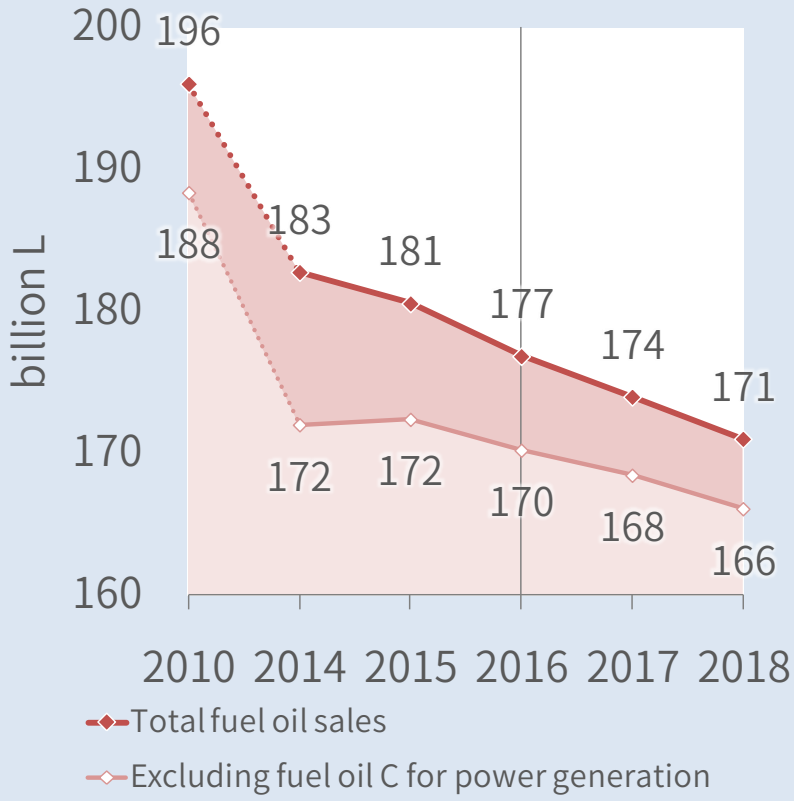
City gas sales changes by user category



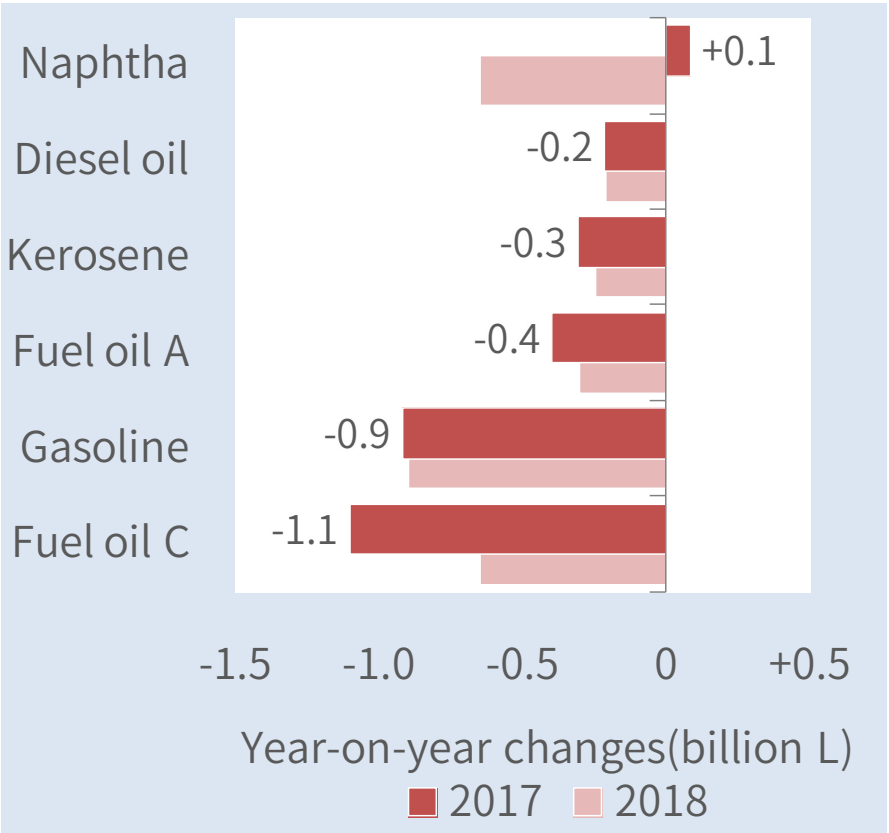
Fuel oil sales volume will fall for the sixth straight year

- Fuel oil sales will decrease by nearly 6 billion L in two years through FY2018, slipping below 70% of the peak of 246 billion L reached in FY1999.
- Fuel oil C sales for power generation will decline as nuclear power plants are restarted, with new renewable energy facilities launching operation.
- Gasoline sales will continue to decline on the diffusion of fuel-efficient vehicles, slipping below 51 billion L for the first time in 24 years.

Fuel oil sales volume



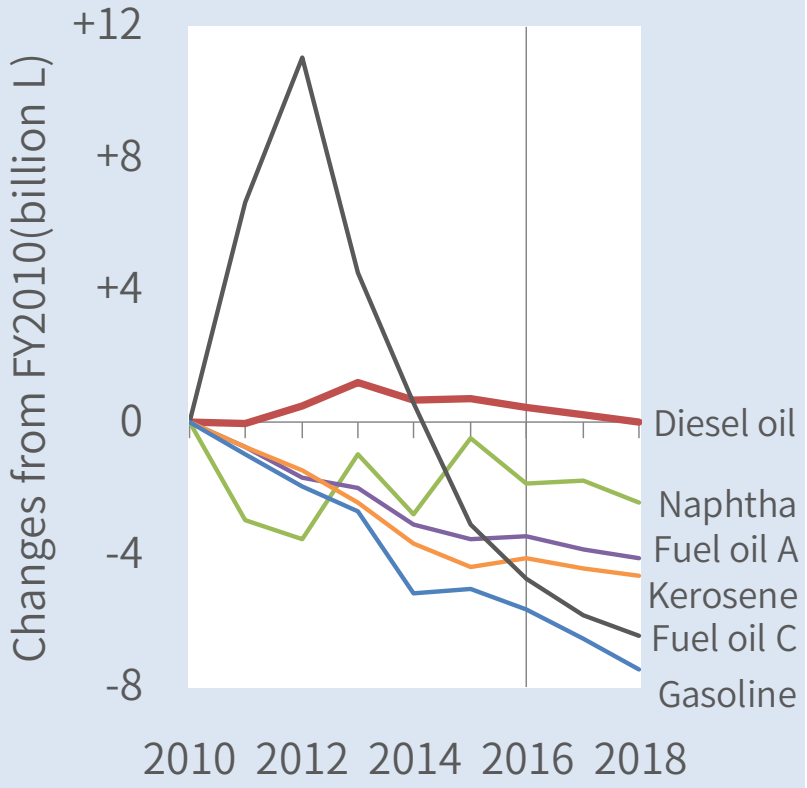
Fuel oil sales changes by category



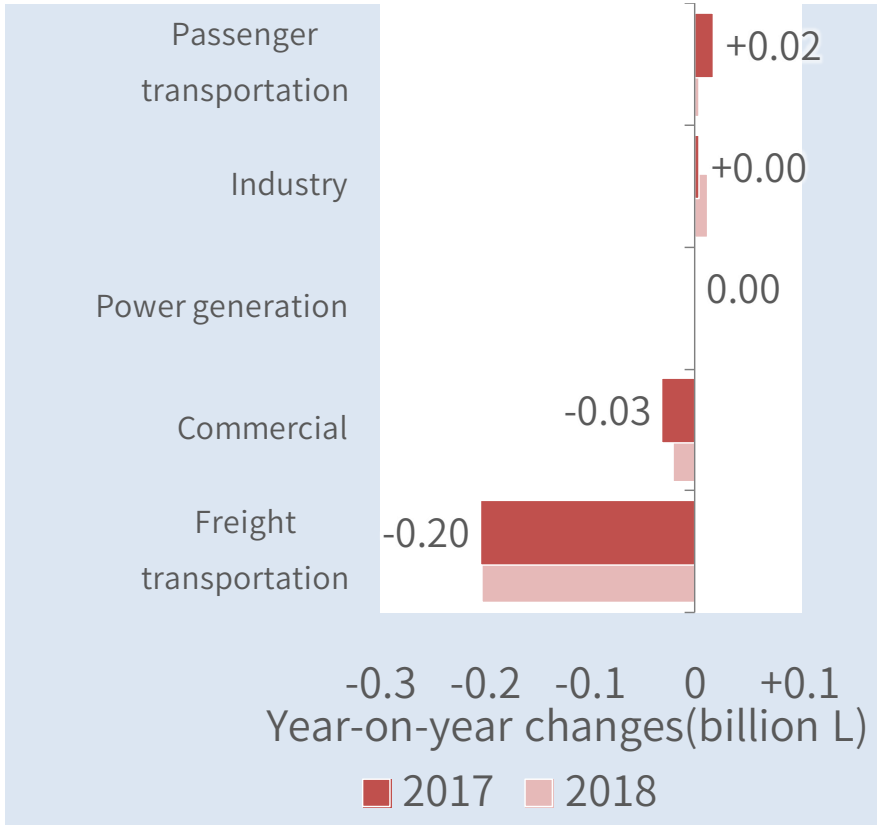
In-depth analysis | «1» Diesel oil demand trend

- Diesel oil is the only major fuel oil scoring a sales increase from FY2010 before the Great East Japan Earthquake seriously affected energy demand.
- Through FY2018, diesel oil will post slower sales decreases than other fuel oil products.
- Growth in home delivery demand will partially offset a fall in diesel oil sales for cargo transportation.
- Increasing foreign travelers' use of sightseeing buses, reconstruction after the Great East Japan Earthquake and the Tokyo Olympics will help expand diesel oil sales.

Fuel oil sales volume



Diesel oil sales changes by use



Effects of nuclear power plant restart

- Progress in the restart of nuclear power plants will boost economic growth through a cut in fossil fuel import value and in power generation costs and contribute to climate change measures by helping reduce CO_2 emissions.

Effect of differing paces for restarting nuclear power plants [FY2018]

Note: Data other than nuclear power generation represent comparison with the Zero Operation Case. See p. 15 of the report for the definitions of the Reference Scenario, Zero Operation Case, Low Case and High Case.

(Attached table) Effect of differing paces for restarting nuclear power plants [FY2018]

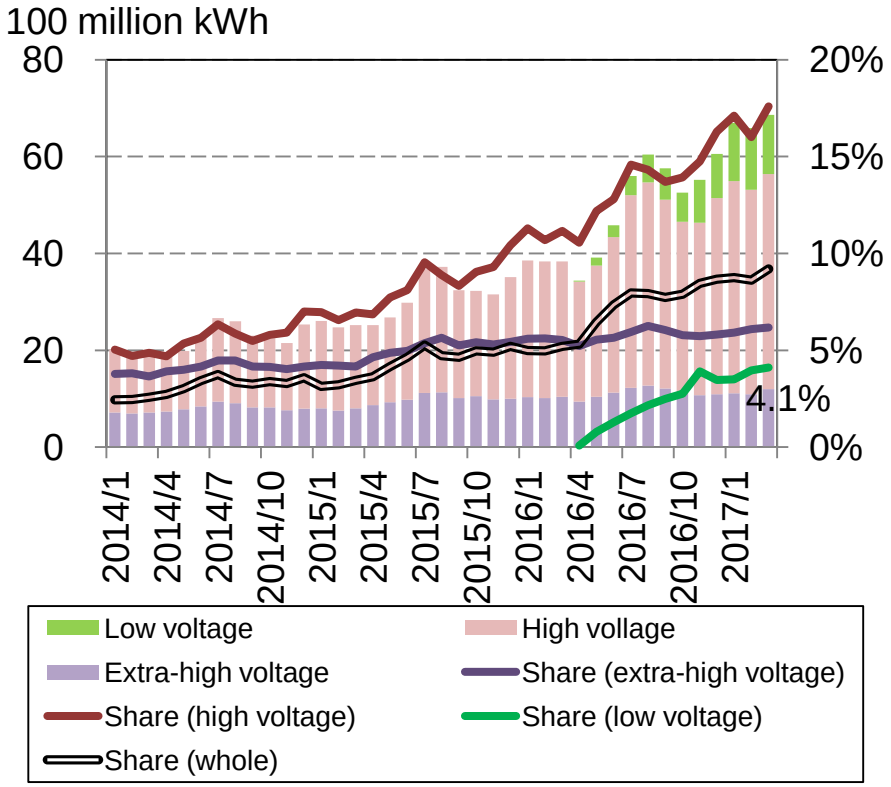
		Zero Case	Low Case	Reference Scenario	High Case	changes from the Zero Case		
						Low Case	Reference	High Case
Nuclear power presupposition	Cumulative number of restarted nuclear reactors [End of FY2017]	[0]	[5]	[9]	[9]	[+5]	[+9]	[+9]
	End of FY2018	0	5	10	17	+5	+10	+17
	Average period for operation(months)	0	10	9	8	+10	+9	+8
	Power generation by nuclear (TWh)	0	31.6	65.6	99.4	+31.6	+65.6	+99.4
	Power supply composition ratio	0%	3%	7%	10%	+3p	+7p	+10p
Economy	Electricity unit cost[1] (JPY/kWh)	6.1	5.9	5.8	5.6	-0.1	-0.3	-0.5
	Fuel cost	3.8	3.7	3.5	3.4	-0.1	-0.3	-0.5
	FIT purchasing cost	2.3	2.3	2.3	2.3	-	-	-
	Total fossil fuel imports (JPY trillion)	15.2	15.0	14.7	14.5	-0.2	-0.5	-0.7
	Oil	9.0	8.9	8.8	8.7	-0.1	-0.2	-0.3
	LNG	4.0	3.8	3.7	3.5	-0.1	-0.3	-0.5
	Trade balance (JPY trillion)	1.5	1.7	2.0	2.2	+0.2	+0.5	+0.7
	Real GDP (JPY2011 trillion)	536.1	536.3	536.6	536.9	+0.2	+0.5	+0.8
	Gross national income per capita (JPY thousand)	4,361	4,363	4,365	4,367	+2	+4	+6
Energy	Primary energy supply							
	Oil (GL)	197.3	195.1	192.8	190.8	-2.2	-4.6	-6.6
	Natural gas (Mt of LNG equivalent)	90.0	86.8	83.4	79.9	-3.1	-6.5	-10.1
	LNG imports (Mt)	86.8	83.7	80.3	76.7	-3.1	-6.5	-10.1
	Self-sufficiency rate	9.9%	11.3%	12.8%	14.3%	+1.4p	+2.9p	+4.4p
Environment	Energy-related CO_2 emissions (Mt-CO_2)	1,126	1,111	1,096	1,081	-15	-30	-45
	Changes from FY2013	-8.8%	-10.0%	-11.3%	-12.5%	-1.2p	-2.5p	-3.7p

1. Sum of fuel cost, FIT purchasing cost and grid stabilising cost divided by total power generation.

(Reference) Progress in electricity and gas system deregulation

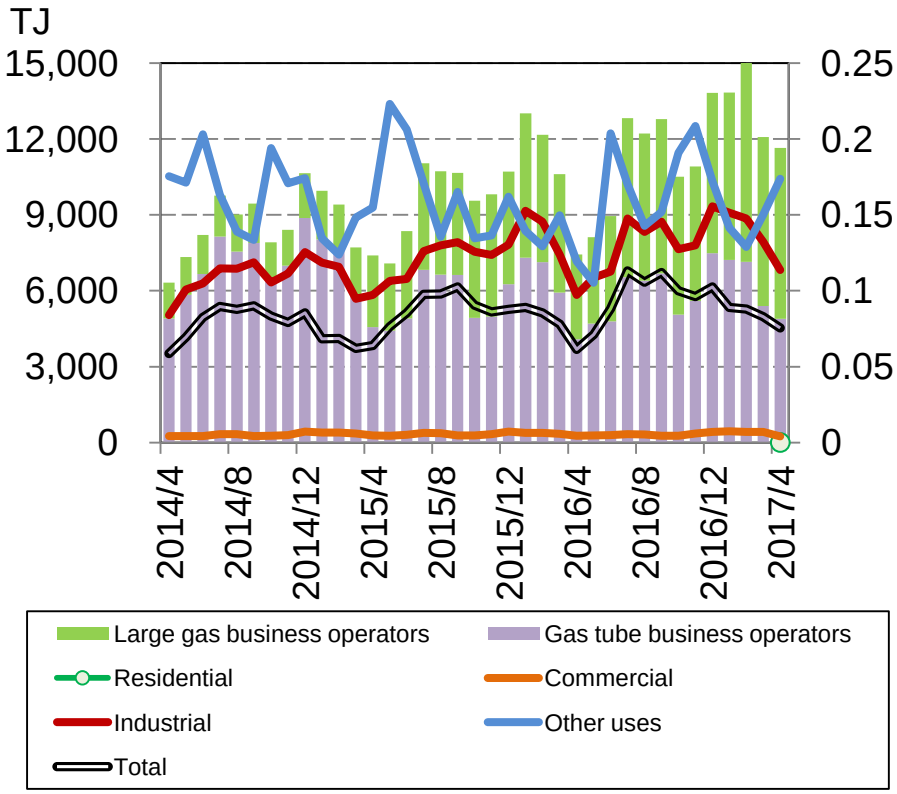
- Retail sales were fully deregulated for electricity in April 2016 and for city gas in April 2017.
- As of March 2017, 4.1% of low voltage users had switched electricity suppliers. As of April 2017 when gas retail sales were deregulated, only 0.0017% of users had switched gas suppliers.
- Supplier switching rates for electricity and gas differs sharply from region to region.

Electricity supplier switching rate trend



Source: Agency for Natural Resources and Energy "Electricity Survey Statistics"

City gas supplier switching rate trend



Source: Agency for Natural Resources and Energy "Statistical Survey on Gas Industry Production"

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