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Economic and Energy Outlook of Japan for FY2019

*Concerns over a slowdown could shadow stable economic growth.
Energy demand will slightly rebound from this year's decline.*

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Major “assumptions”

Global economy

- The global economy will expand moderately even amid uncertainties, growing by 3.7% both in FY2018 and 2019*.
- Tax cuts and government spending expansion will stimulate U.S. economic growth. Other countries will see economic deceleration.
- U.S. interest rate hikes and spreading “me first” policy are matters of concern. Expectations could affect realities.

Import CIF prices

October 2018 → FY2018 → FY2019

- Crude oil: \$79/bbl → 70 → 67
- LNG: \$11.0/MBtu → 10.9 → 10.4
(\$566/t → 562 → 538)
- Steam coal: \$125/t → 117 → 103

IEEJ Hashizume “Oil Market Outlook,” IEEJ Morikawa “Gas Market Outlook,” and IEEJ Sagawa “Coal Market Outlook.”

Foreign exchange rate

November 2018 → FY2018 → FY2019

- JPY113/\$ → 111 → 115

Nuclear power generation

- A total of nine nuclear power plants have been restarted. No more will be restarted within FY2018. In the year, they will operate for an average nine months and generate 61.2 TWh (accounting for 6% of electric utilities’ power generation and received).
- Two more will be restarted in FY2019, bringing the number of restarted nuclear power plants to 11. In the year, they will operate for an average eight months and generate 65.4 TWh (accounting for 7%).

Tax

- The standard VAT rate will be raised to 10% in October 2019, with a reduced rate introduced for some goods.

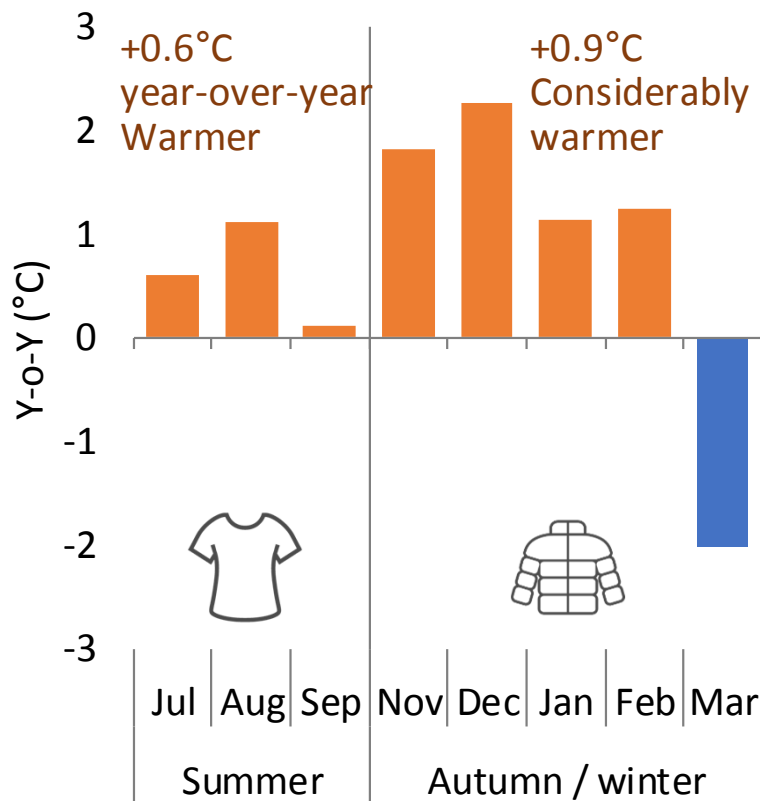
Air temperature

- Winter in FY2018 will be warmer than normal.
- Summer and winter in FY2019 will see normal temperatures. (→ next page)

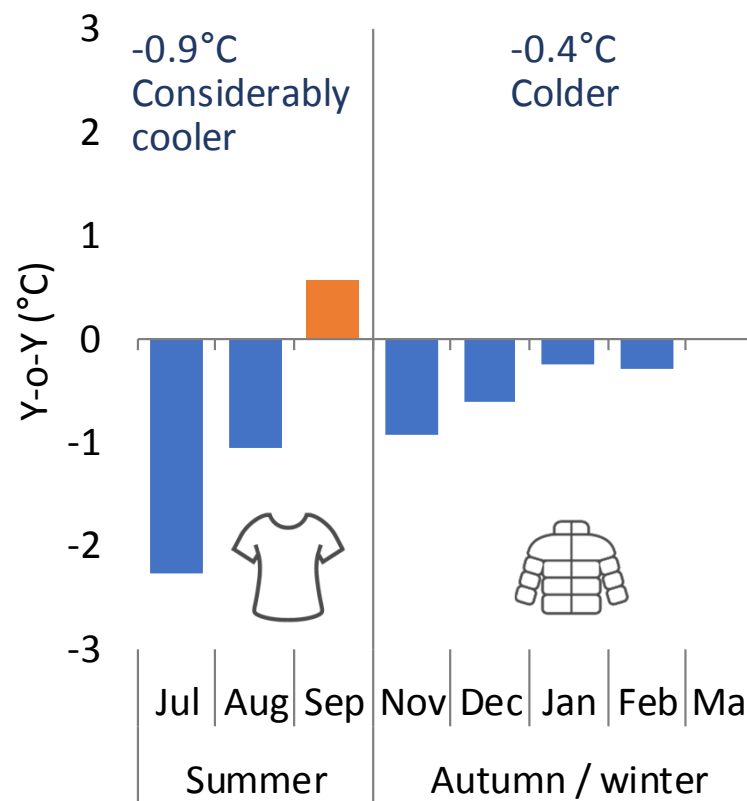
Pay attention to temperature changes' impact

- In winter FY2017, air temperatures were lower than normal. Particularly, western Japan saw the coldest winter in 32 years. In summer FY2018, eastern and western Japan posted record-high temperatures*.
- Winter FY2018 will be remarkably warmer than the previous winter.
- FY2019 will see a cooler summer and a colder winter than the previous year.

FY2018 temperature results and assumptions



FY2019 temperature assumptions

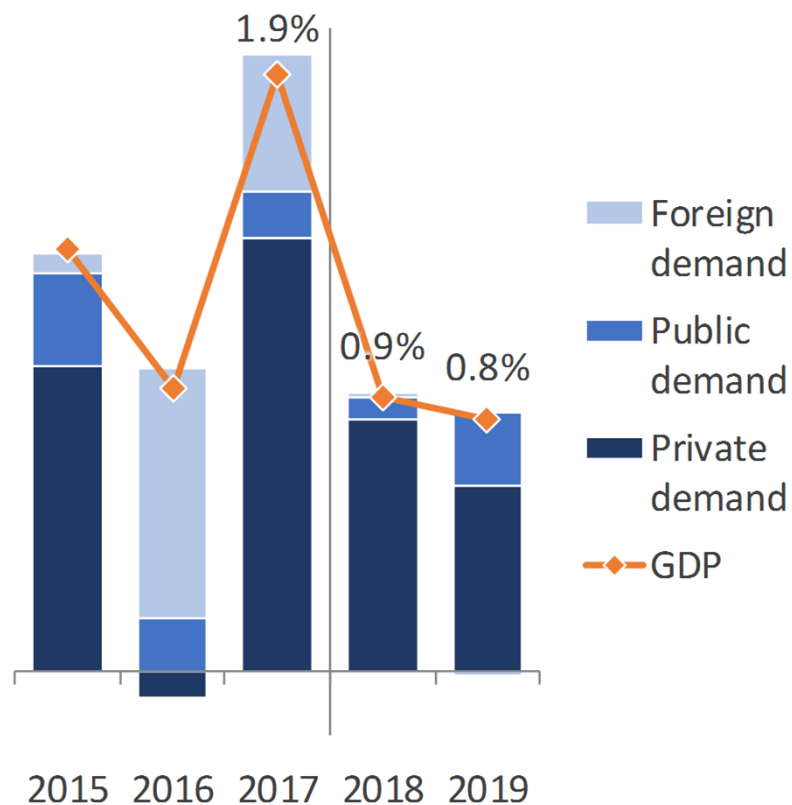


* Japan Meteorological Agency (December 2017 - February 2018, June - August 2018)

The economy and industrial production will expand by a little less than 1%.

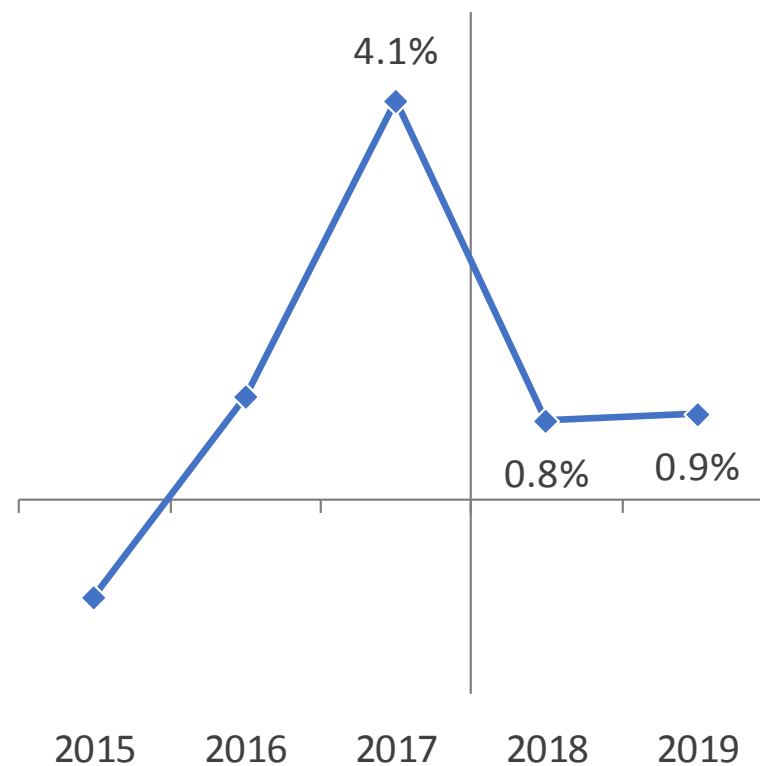
- The Japanese economy will post moderate growth close to potential, led by domestic demand.
- The impact of the planned VAT hike would be inevitable but not so serious adding up four quarters in FY2019.

Real GDP growth and contributions



- Industrial production will expand by a little less than 1%, supported by productivity-enhancing investment, etc.
- The expansion represents a substantial deceleration from FY2017 when industrial production grew too much amid simultaneous global growth.

Index of industrial production (y-o-y)

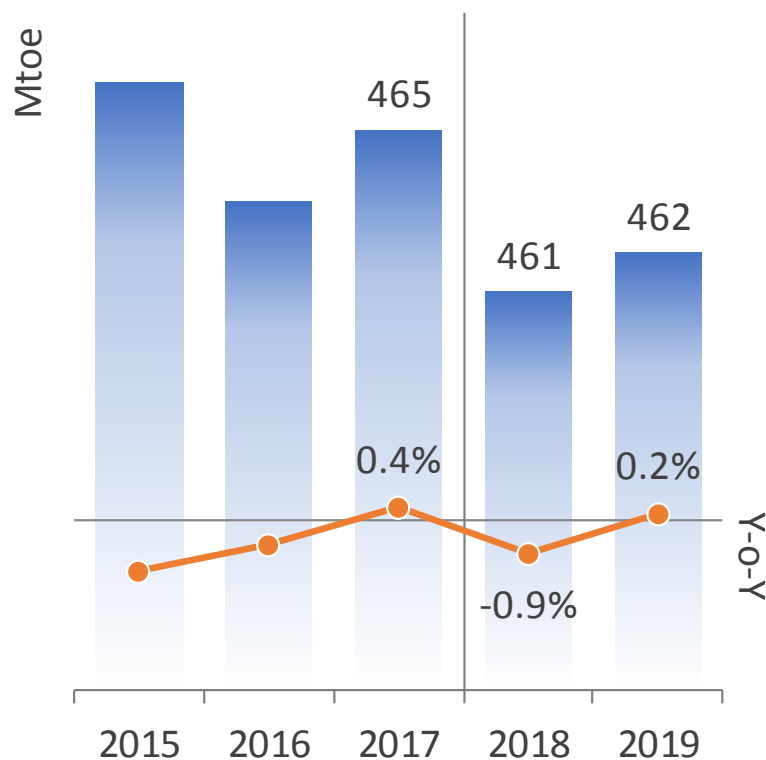


Total energy consumption decreases before increasing slightly.

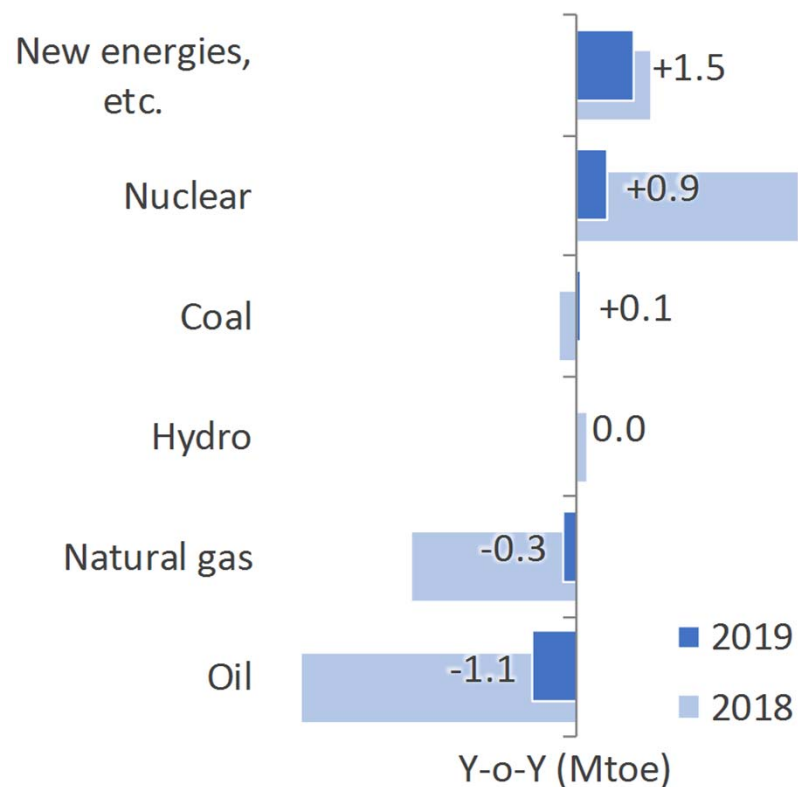
- Primary energy supply decreases in FY2018 from the previous year before increasing in FY2019.
- However, it will fall short of recovering the FY2017 level.

- Oil will fall in FY2019 for the seventh straight year while decelerating a fall from the previous year. Natural gas will post its first ever three-year losing streak.
- Fossil fuels' share of total energy consumption will fall to 88% from 90% in FY2017.

Primary energy supply



Primary energy supply changes

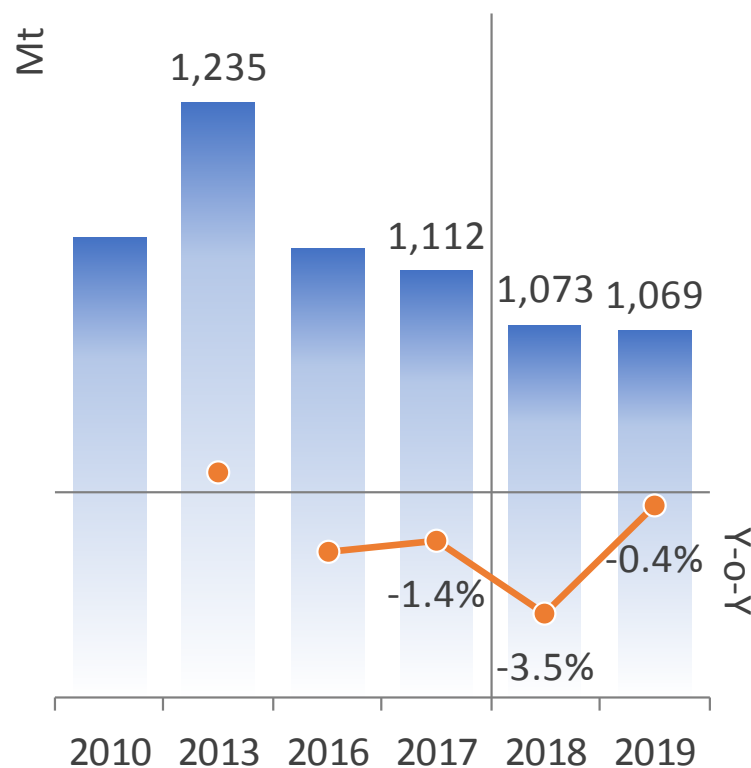


CO₂ emissions will continue to decline, though with a drop decelerating in FY2019.

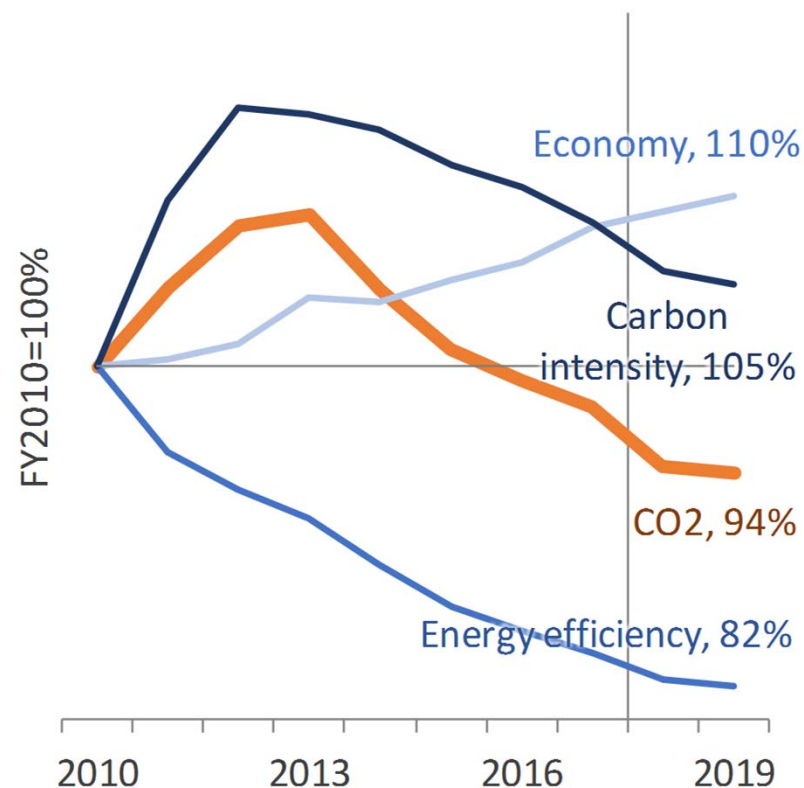
- CO₂ emissions will slip below 1,100 Mt for the first time in a quarter of a century excluding FY2009 when emissions were limited due to the financial crisis.
- An emission fall in FY2019 will be the slowest in six years as non-fossil fuel power generation decelerates growth.

- Emission cuts have so far been led by energy efficiency improvements. Carbon intensity, though improving, will still be higher than before the Great East Japan Earthquake.

Energy-related CO₂ emissions



CO₂ emission changes and contributions



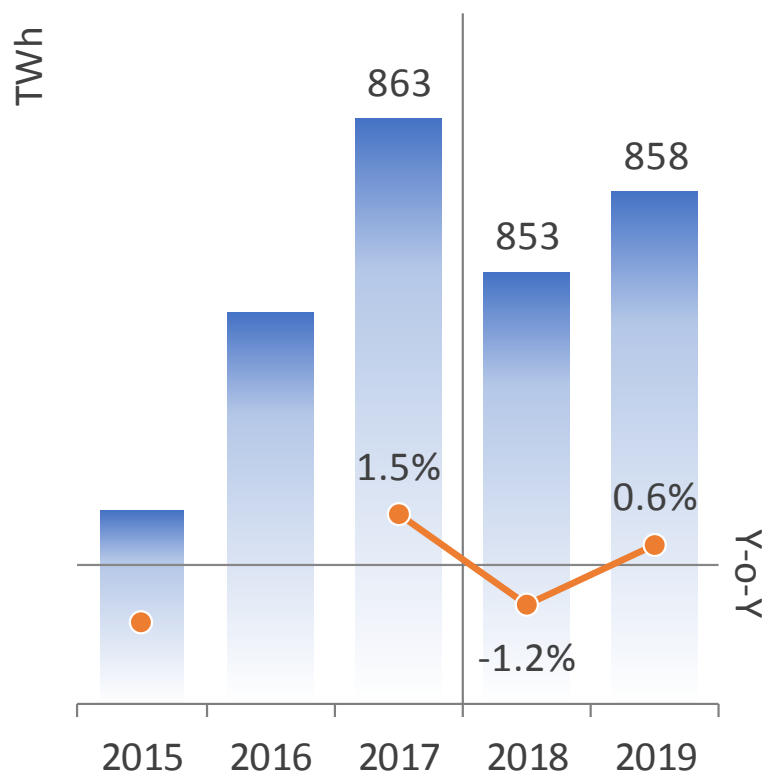
Note: CO₂ = Economy * Energy efficiency * Carbon intensity.

Electricity sales will weaken a medium-term downtrend.

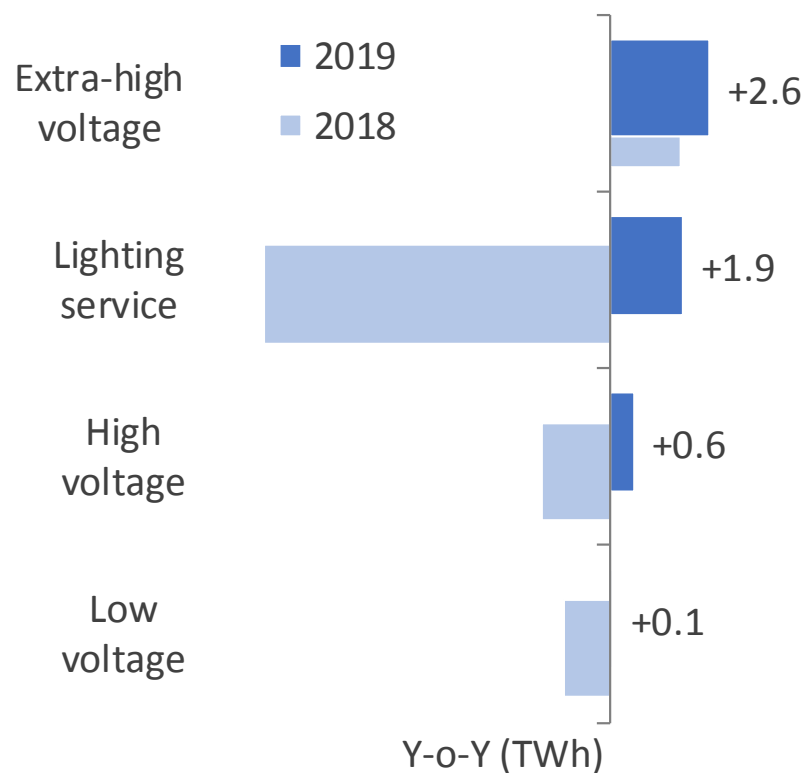
- Electricity sales plunge in FY2018 after increasing rapidly on a colder-than-normal winter.
- They will rise back in FY2019, though failing to restore the FY2017 level.

- Electricity sales to industrial users will increase on a moderate rise in machinery production.
- Electricity sales to lighting service users will increase for the first time in two years on air temperature changes and electrification, despite the further penetration of energy-efficient appliances.

Electricity sales



Electricity sales changes



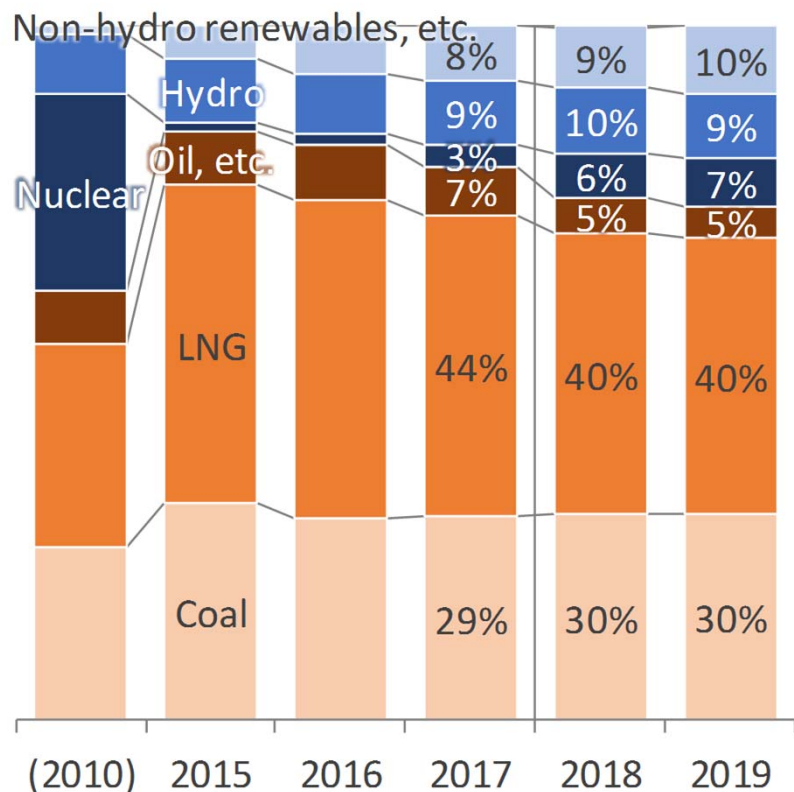
Note: Data lose continuity as data in FY2015 are based on old standards.

Fossil fuels' share of power generation mix will shrink, with LNG's share falling to 40%.

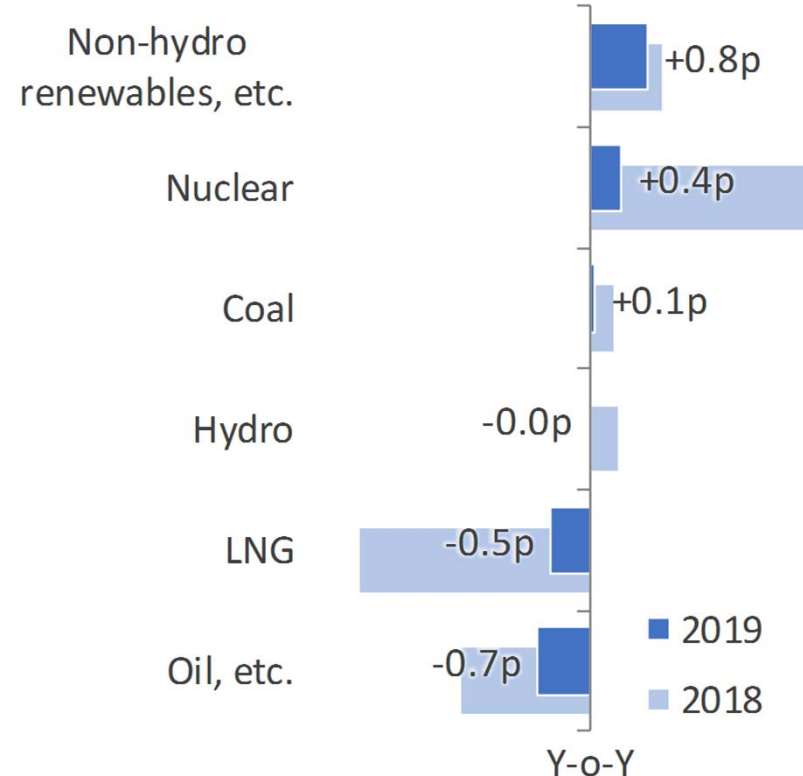
- Zero-emission power sources (renewables and nuclear) will expand their power generation mix share to a quarter.
- The share, though expanding for the seventh straight year, will still be some 10 percentage points lower than before the Great East Japan Earthquake.

- Two nuclear power plants will be restarted, bringing the total number of restarted nuclear power plants to 11. Renewables power generation capacity under the Feed-in Tariff scheme will reach 73 GW.
- Oil-fired power generation capacity totalling more than 13 GW will have been subjected to long-term idling or retirement.

Electric utilities' power generation mix



Power generation mix changes



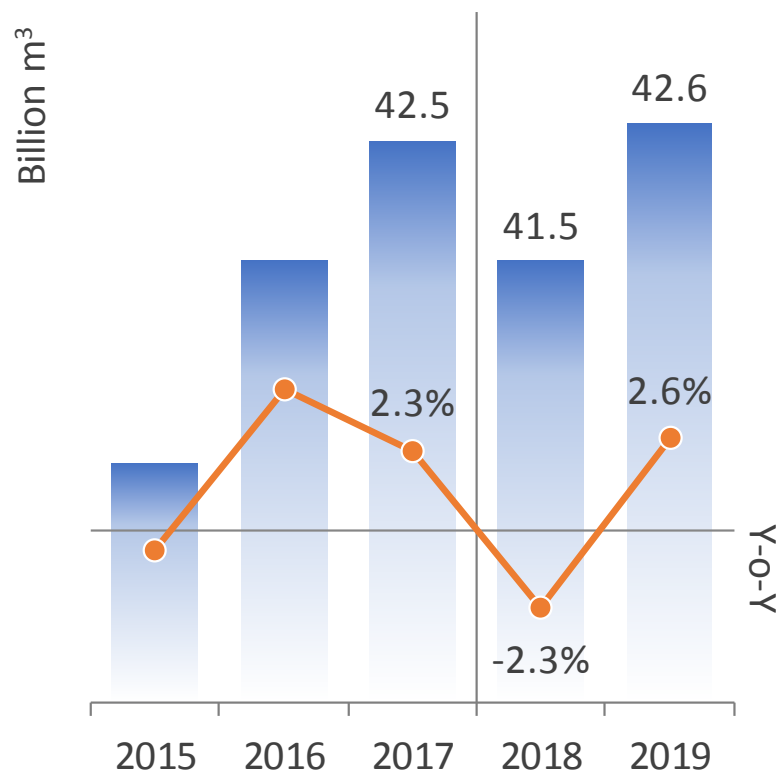
Note: FY2010 data are for general electric utilities under a former classification. Data lose continuity as data in FY2015 are based on old standards.

City gas sales decline before hitting a record high again.

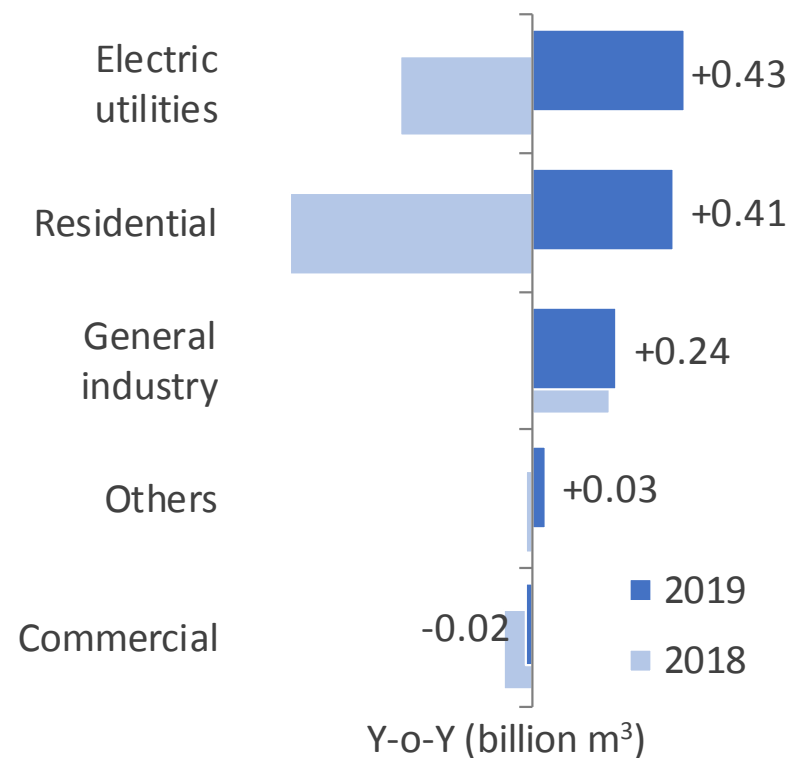
- City gas sales decline in FY2018 for the first time in three years before hitting a record high in FY2019.
- However, the record high will be only a little higher than the previous high.

- Contributing greatly to the FY2018 and 2019 city gas sales changes will be the residential sector vulnerable to temperature changes and the power generation sector influenced by power plant launching and operations.

City gas sales



City gas sales changes

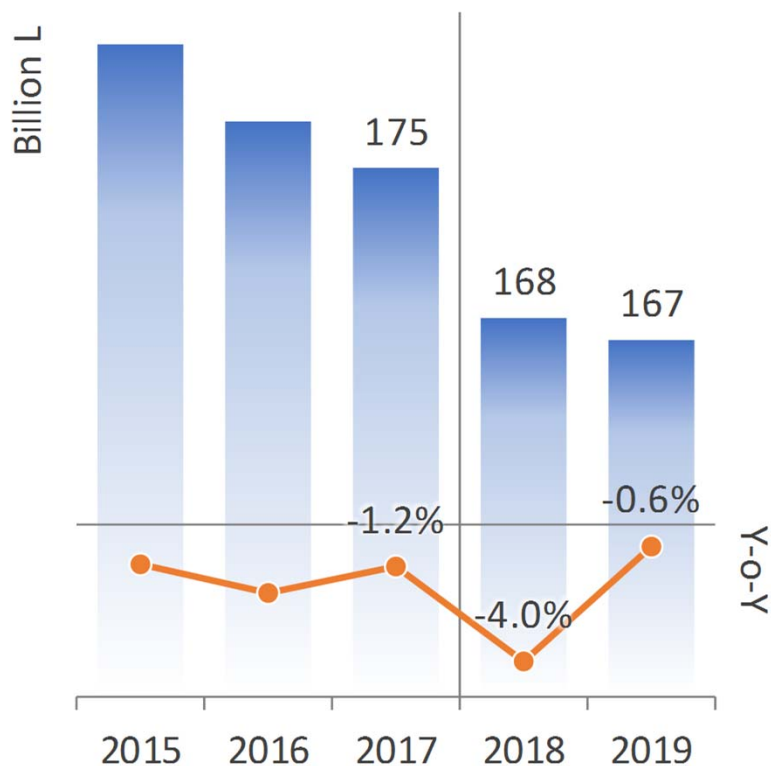


While overall fuel oil sales will decline, diesel oil will boost its share of fuel oil sales to 20%.

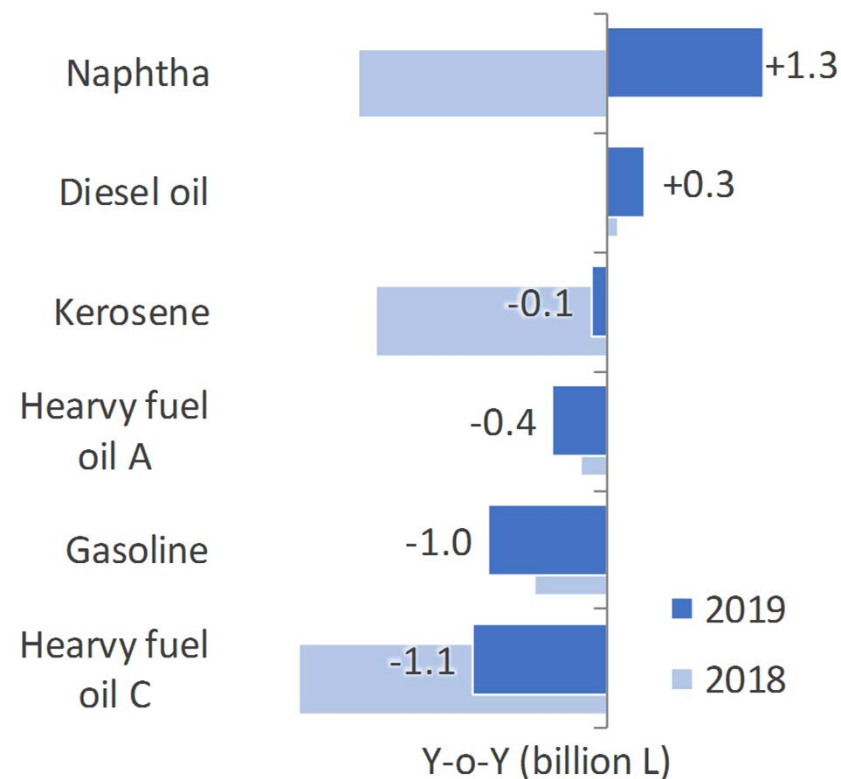
- Fuel oil sales will fall for the seventh straight year, slipping below 170 billion litres for the first time in 50 years since FY1969.
- The decline will decelerate in FY2019 due mainly to temporary factors.

- Sales in FY2019 will increase for naphtha supported by more ethylene plant operations and for diesel oil helped by brisk transportation demand.
- Gasoline sales will decrease close to 50 billion litres.

Fuel oil sales



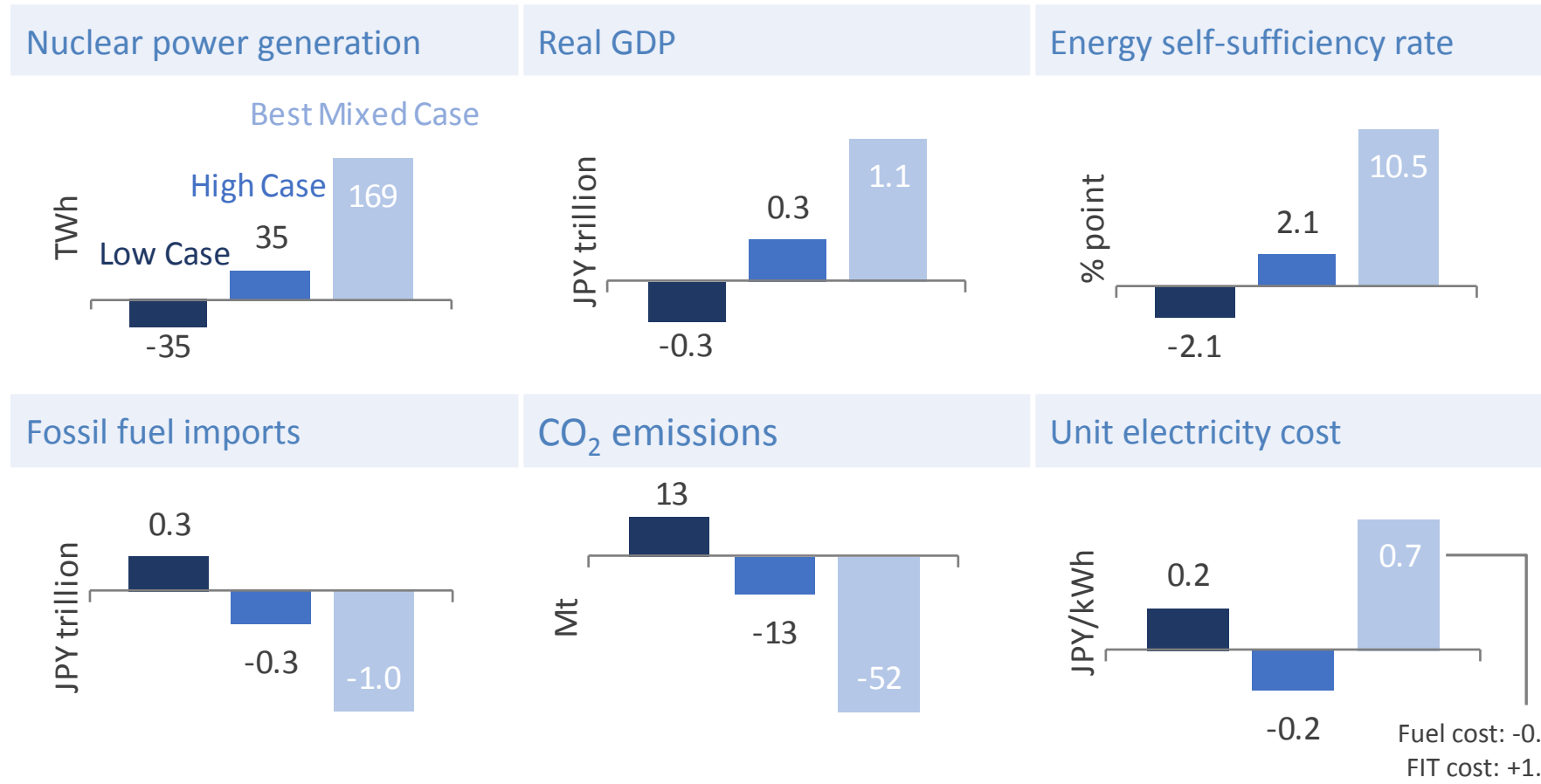
Fuel oil sales changes



Topic | Nuclear contributing much to 3E's

Nuclear power generation growth boosts the economy through fossil fuel import and electricity cost cuts, reduces CO₂ emissions in a manner to help mitigating climate change and contributes to energy security by improving the energy self-sufficiency rate.

Effect of nuclear power generation changes (compared with Reference Scenario) [FY2019]

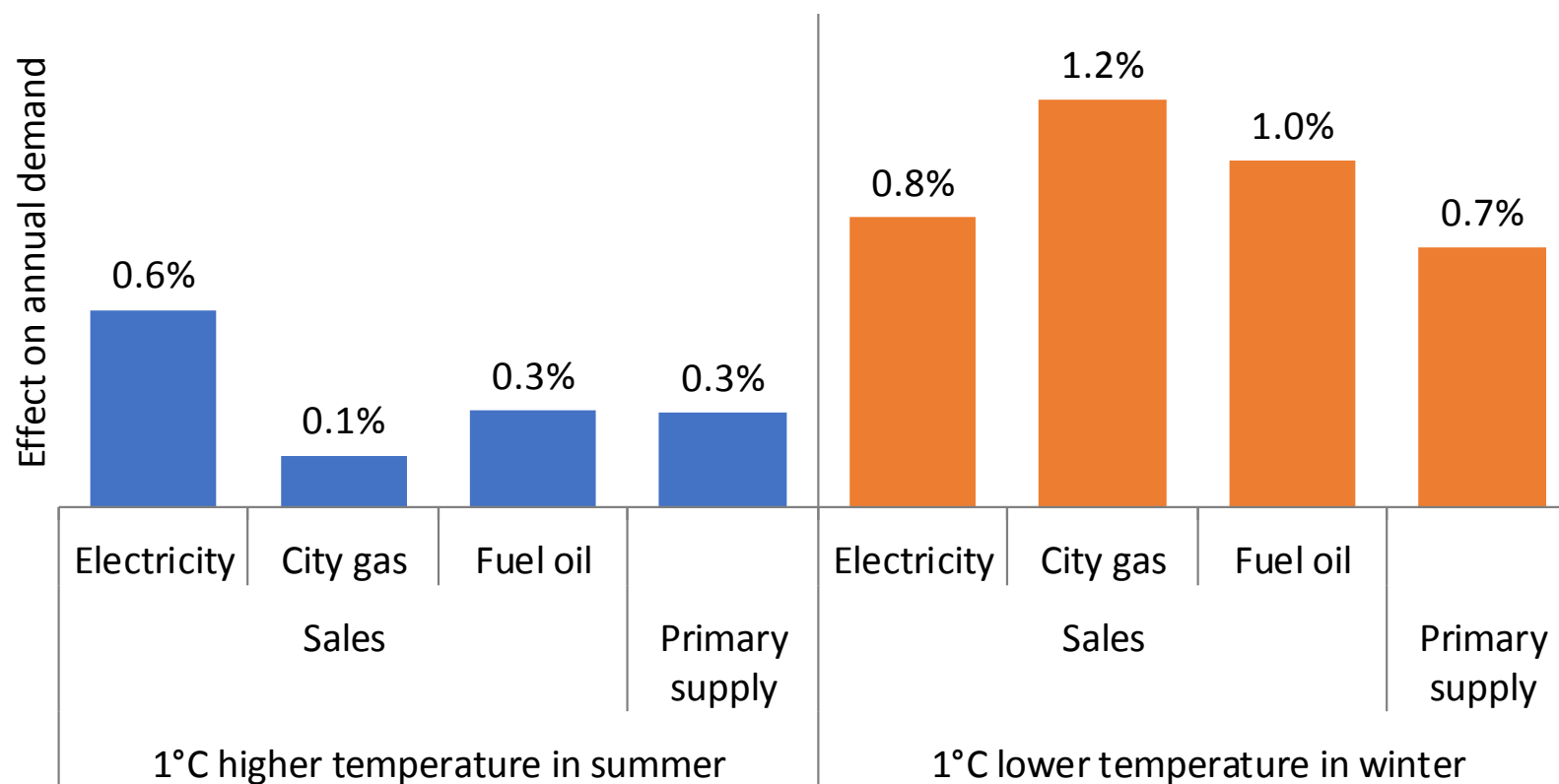


Reference | Air temperature sensitivity of energy demand

If the average summer (July - September) temperature is 1°C higher, air conditioning demand increases, though with water heating demand falling. Electricity demand rises more while fuel demand does less.

If the average winter (December - March) temperature is 1°C lower, space and water heating demand increases, indicating greater effects than the summer temperature change.

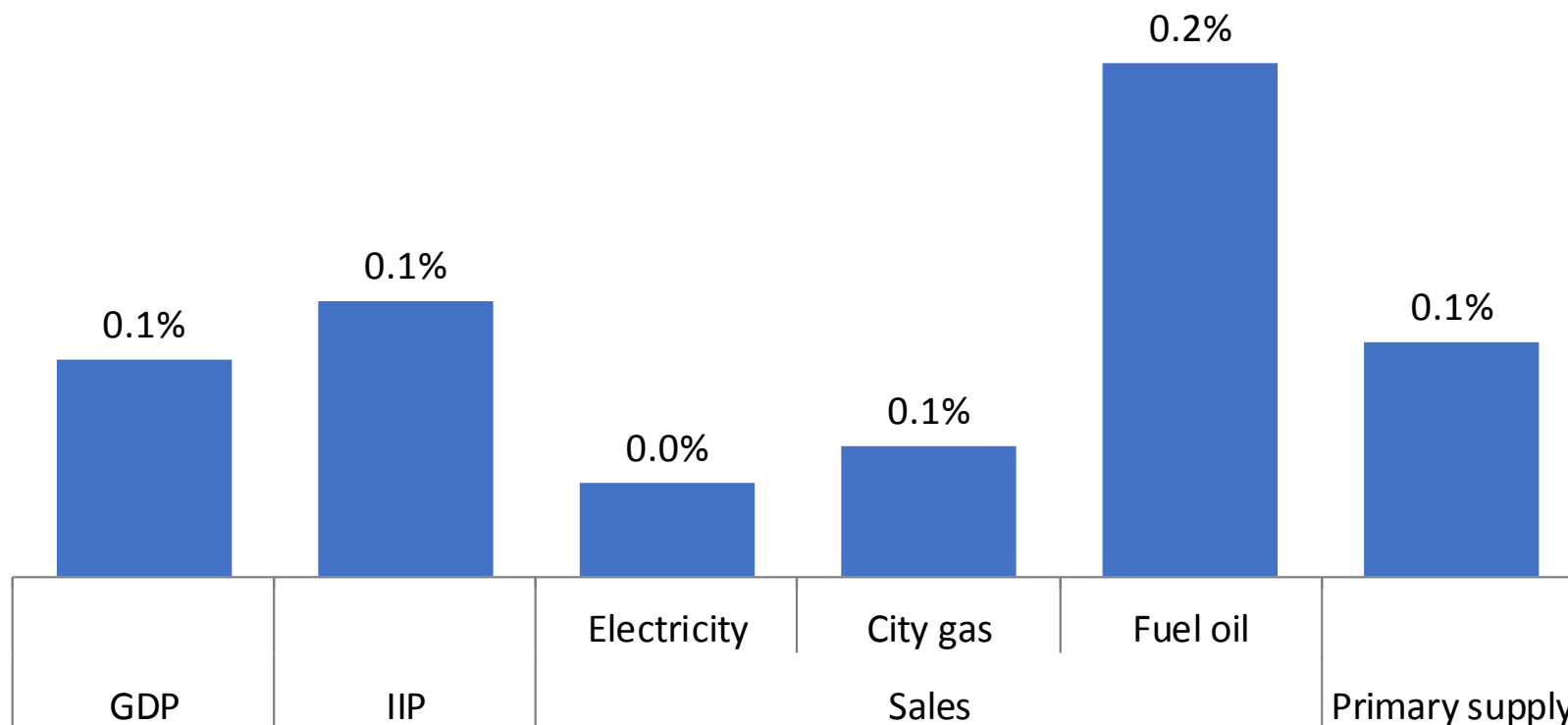
Air temperature sensitivity



Reference | Effects of lower crude oil price – Lower Oil Price Case

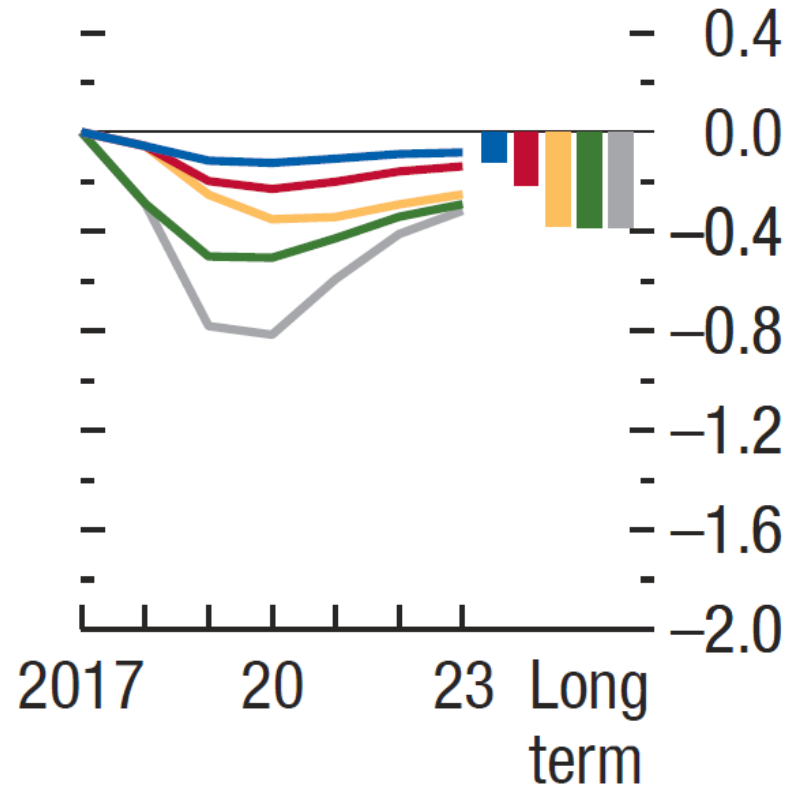
- If the average crude oil import price falls by \$9/bbl from the Reference Scenario due to a looser supply-demand balance resulting from such factors as further U.S. crude oil production expansion, OPEC and other oil producing countries' low rate of compliance with their coordinated production cut, a stop to a fall in Iranian crude oil exports and weak oil demand, the economy will grow by 0.1%, with energy sales expanding by up to 0.2%.

Effects of lower crude oil price (compared with Reference Scenario) [FY2019]

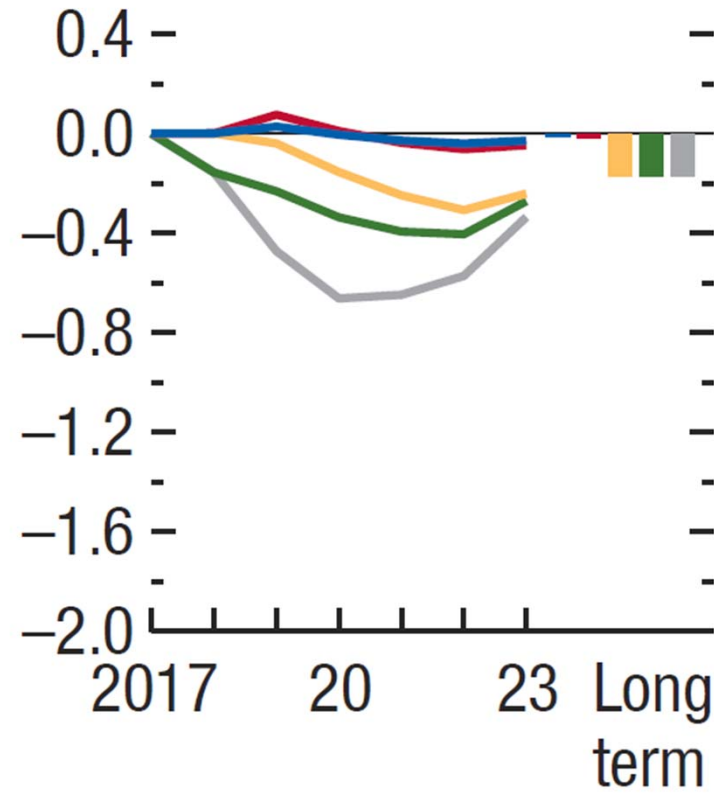


Reference | Trade war's impact on global economy (IMF)

World



Japan



- Tariffs in baseline
- Add China (25 percent on \$267 billion) with retaliation
- Add cars, trucks, and parts with retaliation
- Add confidence effect
- Add market reaction

Reference | Trade war's impact on Japan

- If Japanese GDP decreases by 0.5% from the Reference Scenario in FY2019 on the spread of the trade war's adverse effects on financial and capital markets, energy sales will decrease by 0.2% - 0.3%.
- Of the primary energy supply decline, coal affected by a fall in manufacturers' demand will account for a half and natural gas affected by electricity and city gas demand will drop for a quarter.

Trade war's impact (compared with Reference Scenario) [FY2019]

