

Economic and Energy Outlook of Japan for FY2020

Leveled off Japan's economic growth and shift to low carbon

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Major “assumptions”

Global economy

- Growth in global economic activity will be the worst in 2010's in 2019 and recover but lower than 2018 in 2020. 2019: 3.0%, 2020: 3.4%*
- The economic growth of the U.S. and China will slow down in 2019.
- The global economy will reaccelerate led by the Asian emerging countries other than China in 2020.

Import CIF prices

November 2019 → FY2019 → FY2020

- Crude oil: \$65/bbl → 68 → 66
- LNG: \$9.5/MBtu → 9.5 → 8.9
(\$489/t → 490 → 462)
- Steam coal : \$97/t → 100 → 87

Morikawa from IEEJ “Outlook for International Oil Market”, Hashimoto from IEEJ “Outlook for International Gas Market”, and Sagawa from IEEJ “Outlook for International Coal Market”

Foreign exchange rate

November 2019 → FY2019 → FY2020

- JPY109/\$ → 108 → 108

Nuclear power generation

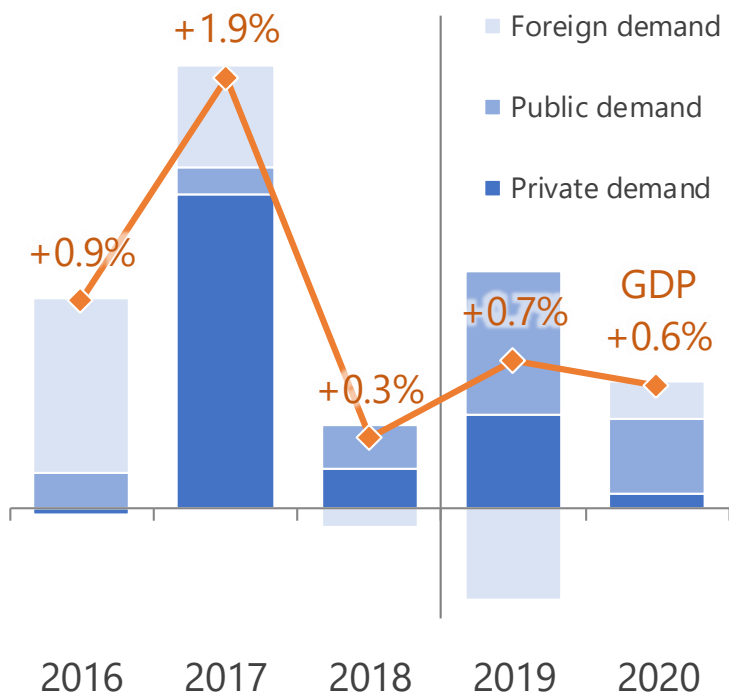
- A total of nine nuclear power plants have restarted. No more will be restarted within FY2019. In the year, they will operate for an average of eight months, generating 61.0 TWh (accounting for 6.4% of electric utilities' power generation and purchased).
- Four more will restart in FY2020, bringing the number of restarted nuclear power plants to 13. However, three will be halted due to delays in the completion of counterterrorism facilities. In the year, they will operate for an average of six months, generating 63.5 TWh (accounting for 6.6%).

Air temperature

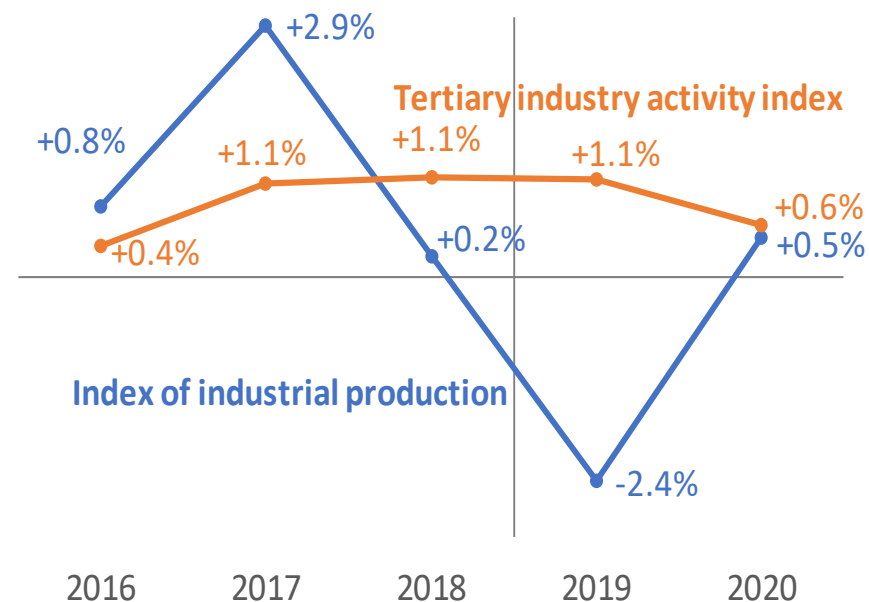
- According to the Japan Meteorological Agency's forecast, we assume the winter in FY2019 to be a slightly warmer than normal but colder than in the previous year. The summer in FY2020 will be cooler and winter colder than those of FY2019.

Economy will slightly grow depending on public demand

- Foreign demand will turn to a limited positive contribution, in line with global economic recovery.
- While inbound will increase, with smaller effects of measures against VAT hike, private demand will slow down.
- Real GDP growth and contributions**



- Industrial production will recover slightly in FY 2020 but not up to the level of FY 2017 after a sharp fall in FY 2019.
- Tertiary industry activity will rise five years in a row and the trend toward service economy will accelerate.
- Index of industrial production and tertiary industry activity index (Y-o-Y)**

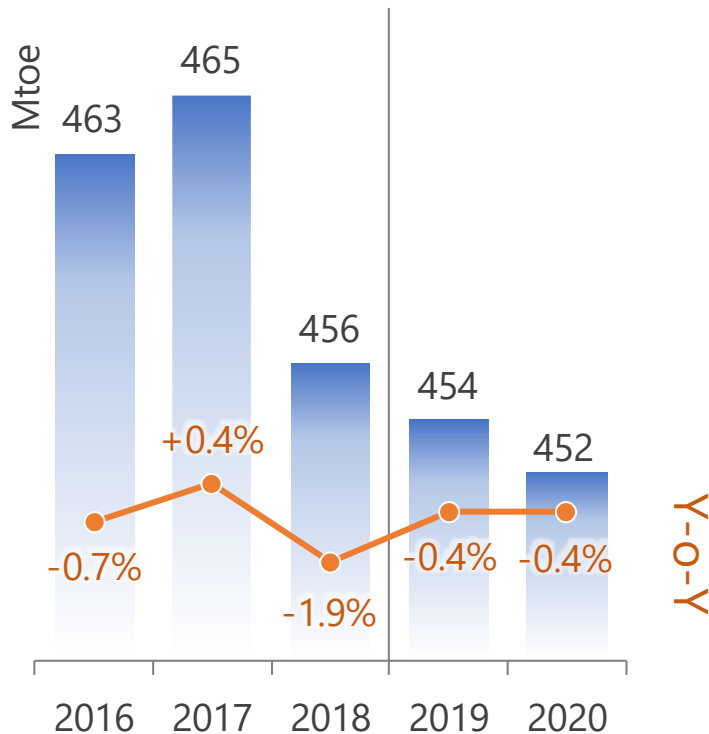


Total energy consumption continue to decrease less than 1%

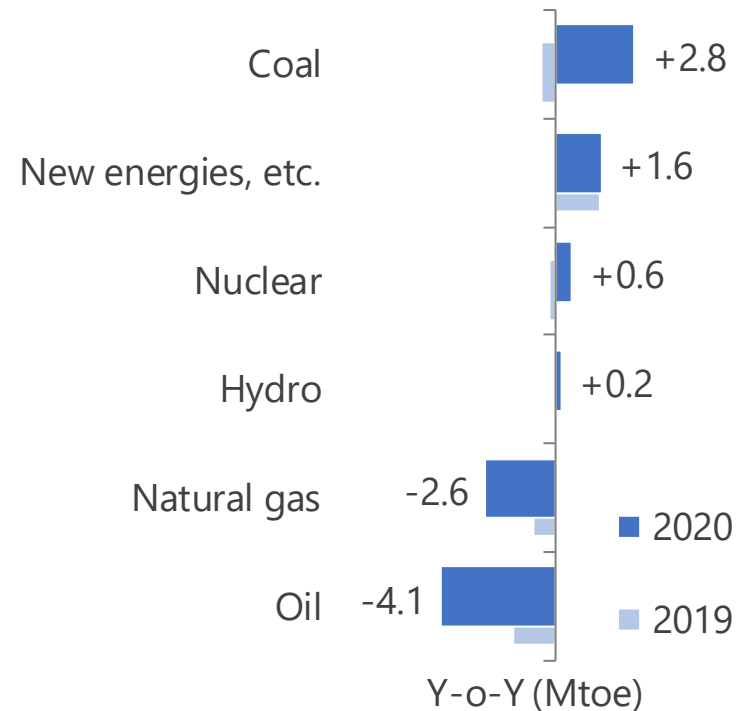
- Total energy consumption decrease three years in a row.
- The slight decrease in FY2020, reflects a decline in ethylene production and energy efficiency improvements

- With newly installed coal power generation, the share of coal in FY2020 accounts for 27% for the first time in 53 years.
- The share of oil will fall to less than half of the first oil crisis.

Primary energy supply



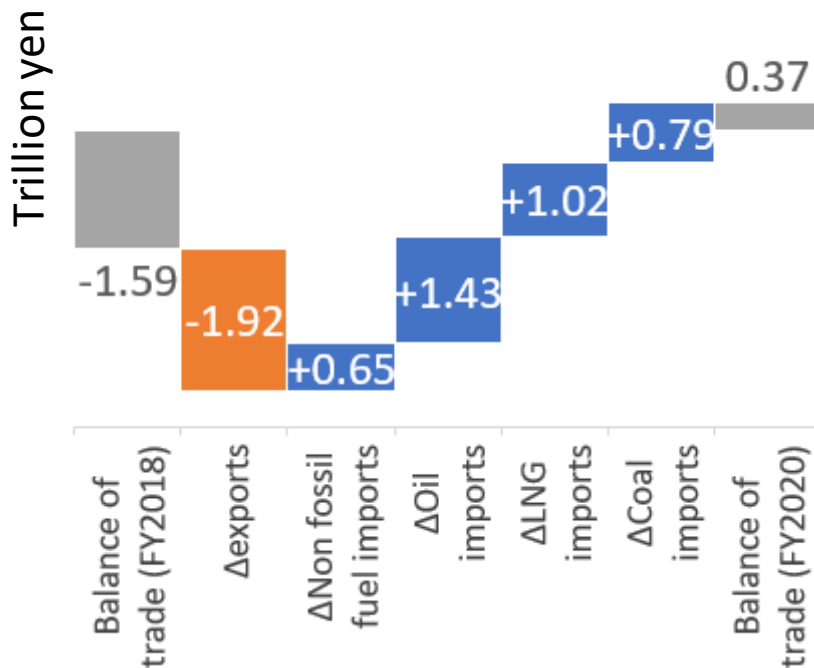
Primary energy supply changes



Balance of trade will turn to be positive

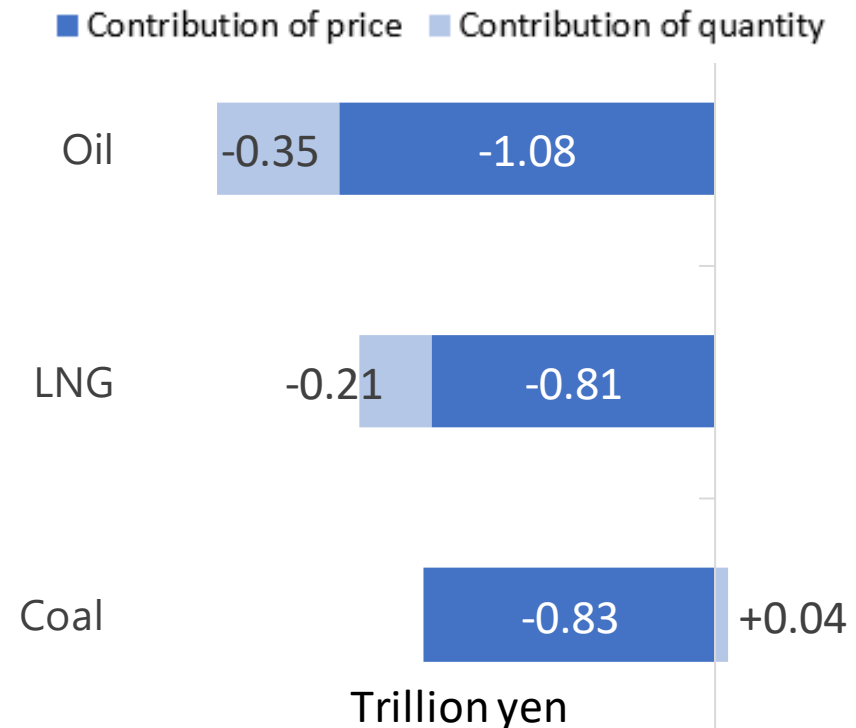
- Balance of trade will be negative with non-fossil fuel goods because exports decrease due to the global economy slowdown.
- Balance of trade will turn to be positive with the decrease of fossil fuel imports.

Contribution of balance of trade



- Contribution of the price change corresponds to the 80% of the decrease in fossil fuel imports.
- Oil contributes the most among fossil fuel due to the highest amount and prices.

Contribution of fossil fuel imports



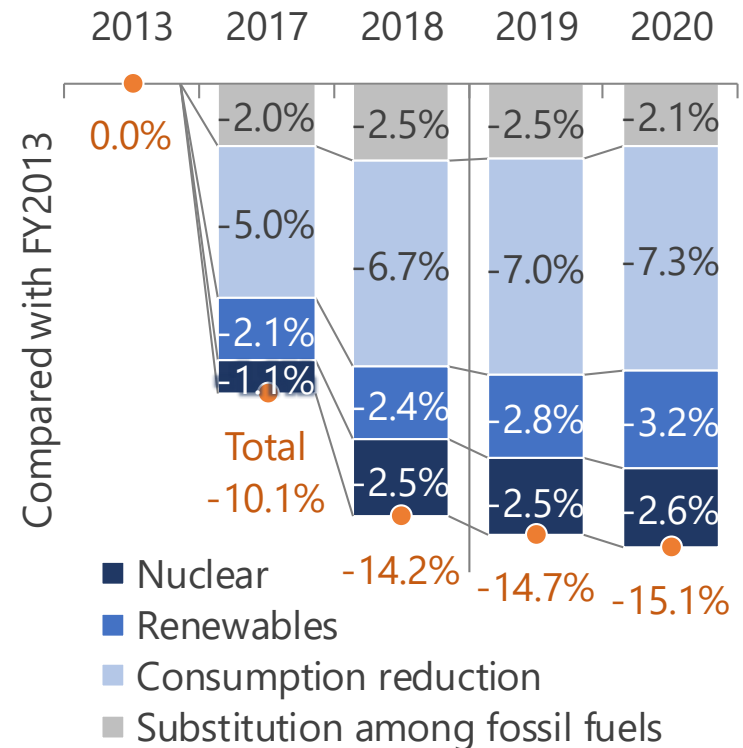
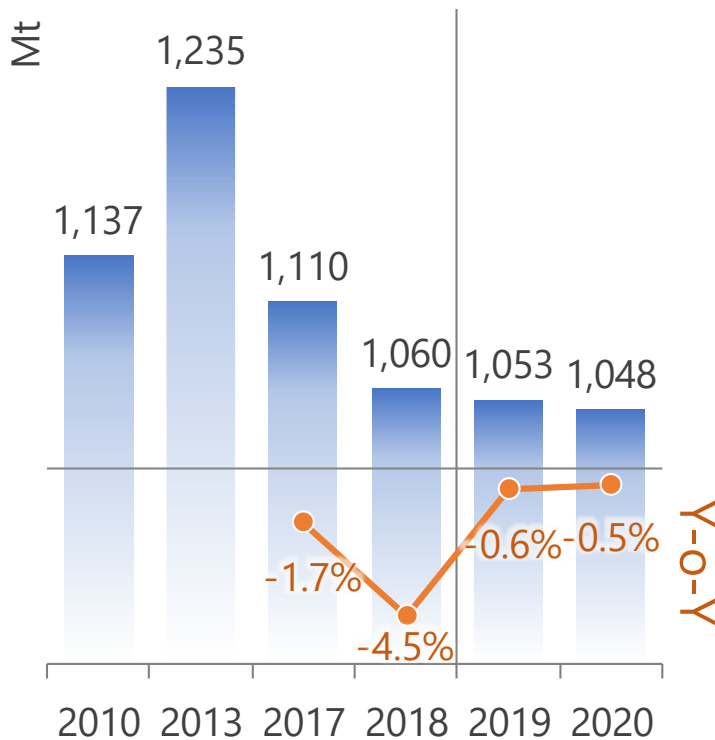
CO₂ will decrease seven years in a row, but at a slower pace

- According to the statistics, CO₂ will be less than 1,050Mt for the first time since FY1990.
- However, the reduction rate is less than 1% for two years in a row.

- Consumption reduction contributes the most. 60% of the reduction target of energy-related CO₂ emissions set for FY2030 is achieved in FY2020.
- Only renewables will continuously contribute to reduce CO₂ at the same pace.

Energy-related CO₂ emissions

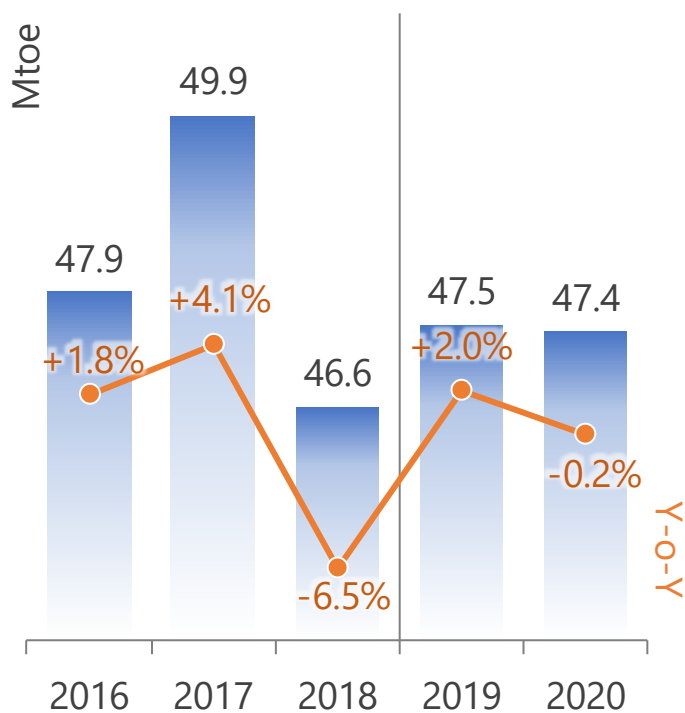
CO₂ emissions change and contribution



Residential energy consumption is largely dependent on temperature

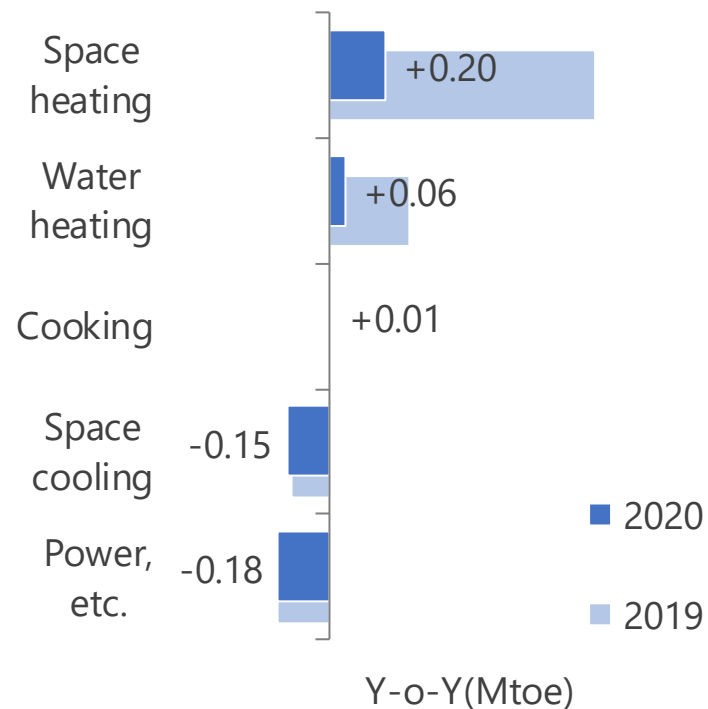
- Residential energy consumption in the household is largely dependent on temperature in the short term.
- Residential energy consumption will slightly decrease due to a slight change in temperature.

Residential energy consumption



- Power, etc energy will decrease due to penetration of energy-efficient appliances.
- Cooking will increase slightly but it will decrease per household (for tenth year).
- Share of electricity will increase for Space heating and water heating

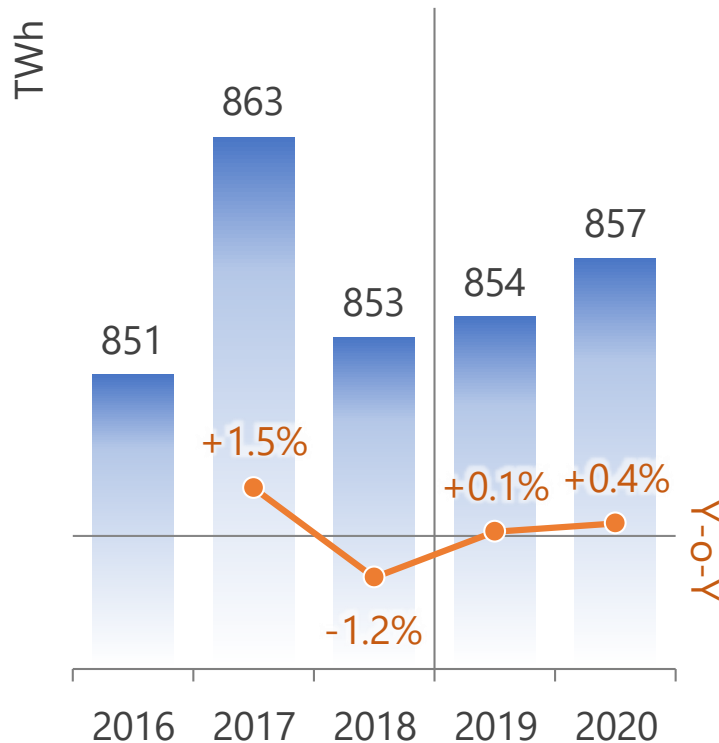
Residential energy consumption by use



Electricity sales will increase gradually

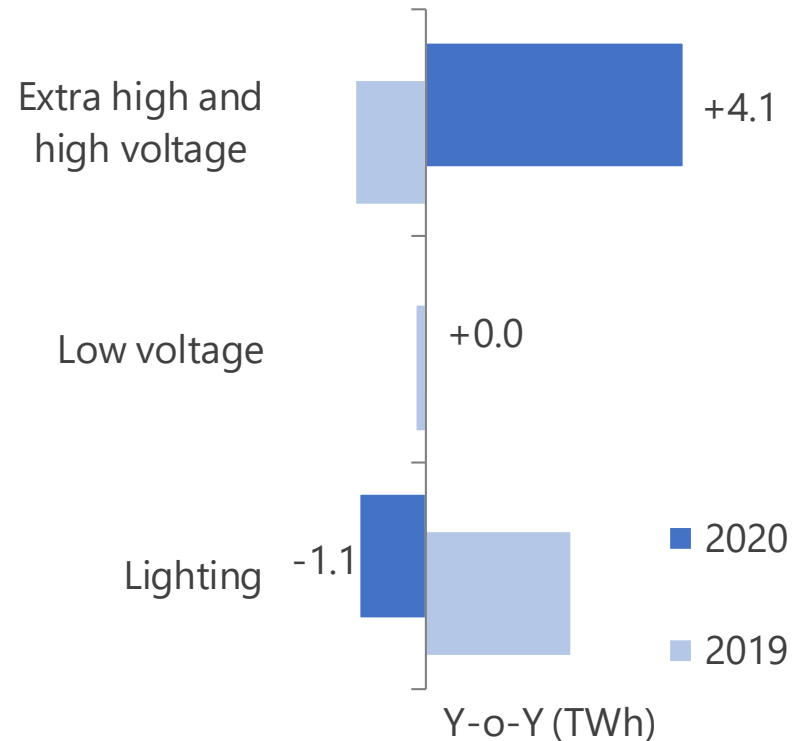
- Electricity sales will increase two years in a row slightly due to small temperature changes in FY2020.
- FY2020 is second to FY2017 when world economy was strong and winter was cold.

Electricity sales



- Sales for lighting services will decrease slightly due to the further penetration of energy-efficient equipment.
- Sales for power services will grow on production recovery in machinery and other industries in FY2020.

Electricity sales changes



Zero-emission power sources will make a difference between winning and losing

Zero-emission power sources (renewables and nuclear) will expand their power generation mix share to over one quarter.

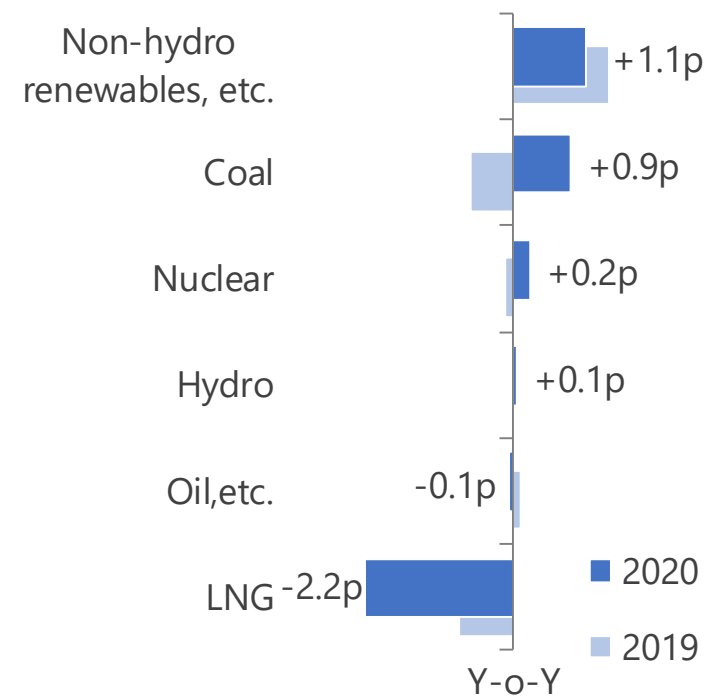
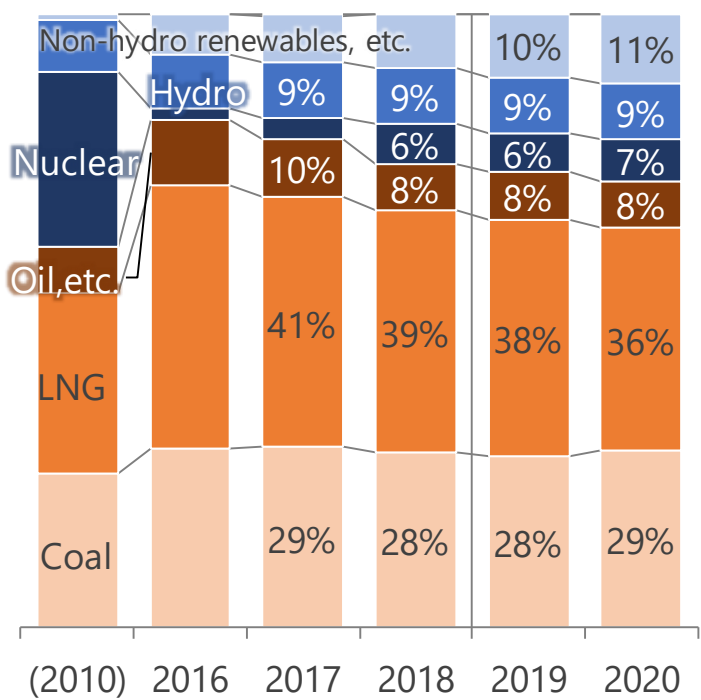
Note that they are more than 10p lower than before the earthquake and the pace of expansion is significantly slower.

Non-hydro renewables will increase before the deadline of the penalty set for the FIT.

For oil, etc., the decrease of oil-fired power generation will be offset by the increase of city gas-fired power generation.

Electric utilities' power generation mix

Power generation mix changes



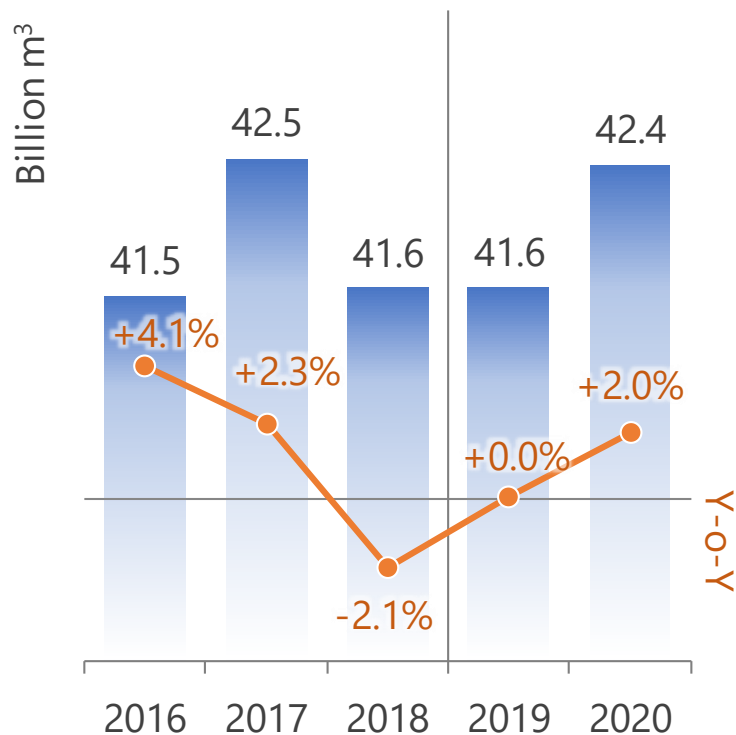
Note 1: FY2010 data are for general electric utilities under a former classification. Data lose continuity as data in FY2015 are based on old statistics.

Note 2: Hydro includes pumped storage and oil, etc. includes city gas, coal products and others.

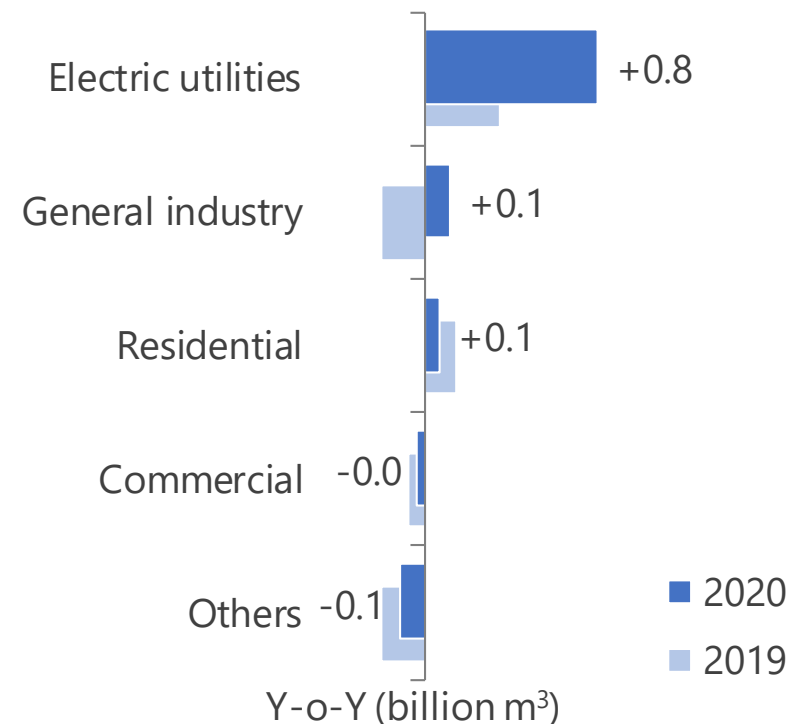
City gas sales will increase for the electric utilities but fuel switching will be limited

- Total gas sales will increase for the second year led by newly built large-sized city gas-fired power plants in FY2019.
- Fuel switching to city gas is limited and gas sales will not hit the record.
- Fuel switching in general industry will not be progressing.
- As no large-sized city gas-fired power generation are planned for after FY2020 the increase for FY2020 indicates the peak in demand for electric utilities.

City gas sales



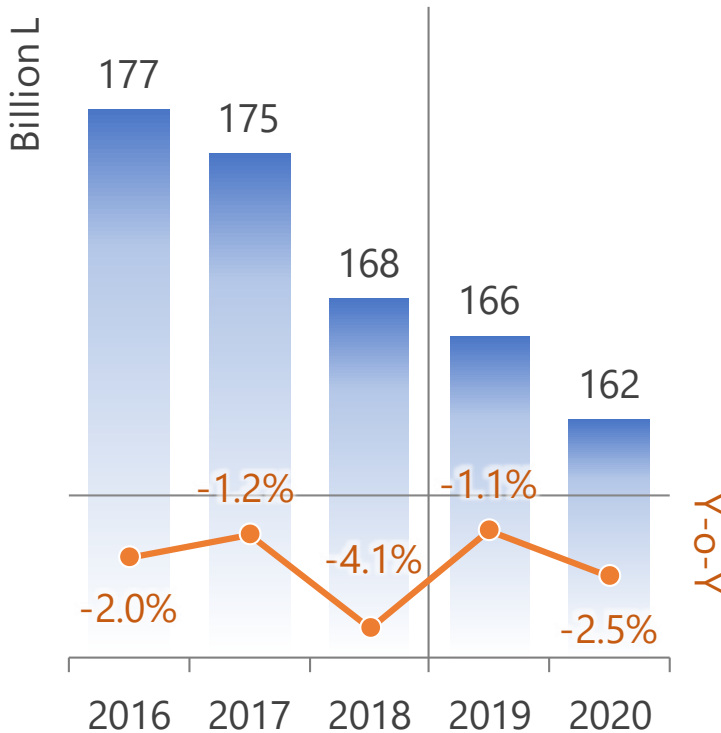
City gas sales changes



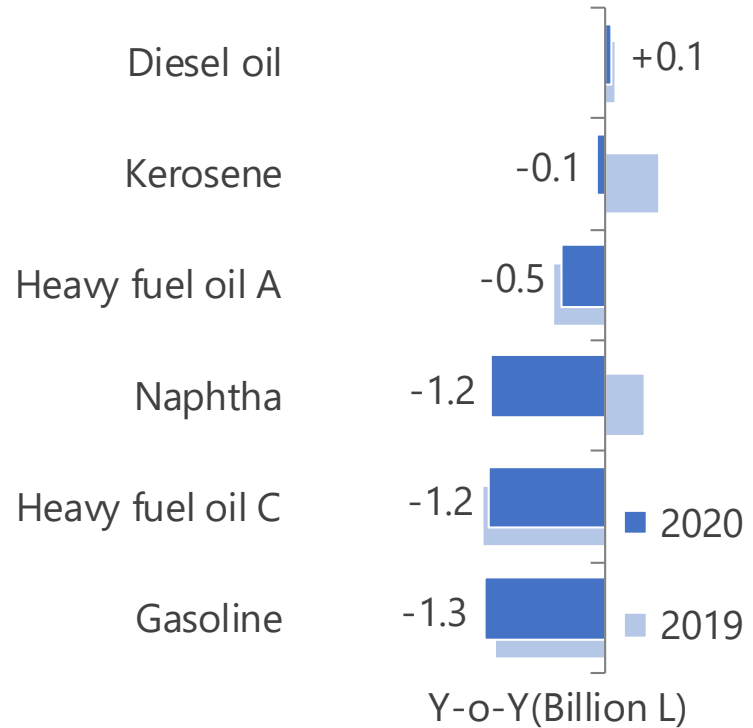
Fuel oil sales break the two-thirds of the peak

- Fuel oil sales will decline for an eighth consecutive year due to improvement in efficiency and fuel switching.
- The decrease rate will weaken in FY2019 but expand again in FY2020.
- Sales of naphtha will fall with more regular ethylene plant repairs.
- Sales of gasoline will be the largest fall for the first time since FY2012.

Fuel oil sales



Fuel oil sales change

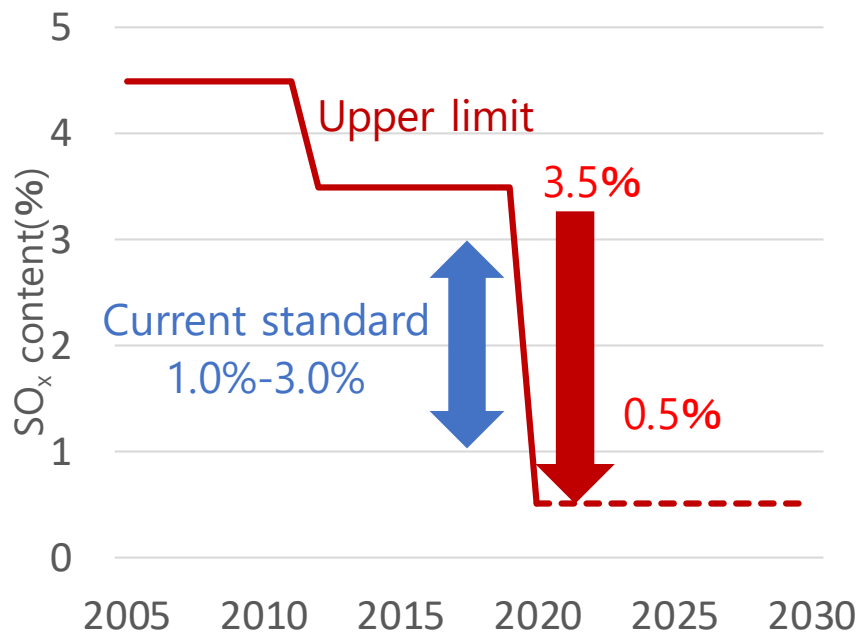


Impacts of regulation of sulfur content in ship fuel on domestic vessel

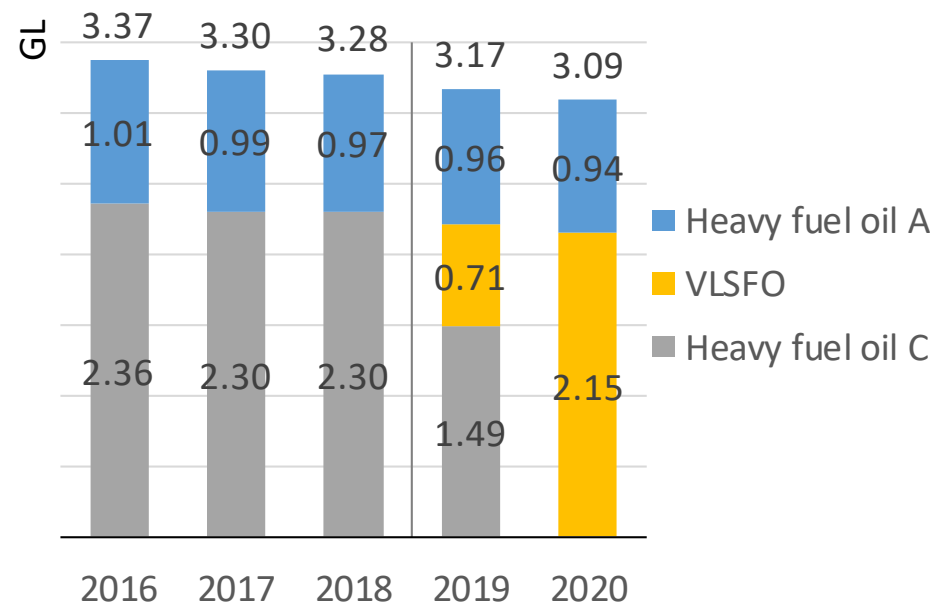
- Sulfur content in ship fuel will be regulated from current standard 1.0%~3.0% to less than 0.5% after Jan 2020.
- Fuel switching to VLSFO* is major in terms of economy.

- Sales of VLSFO will consist of one third of fuel oil C and more than half of fuel oil C except for power utilities.
- Mixing fuel oil C and VLSFO in oil tanks have no problem in terms of safety. Switching to fuel oil A will hardly occur.

SO_x content of domestic vessel



Fuel consumption of domestic vessels

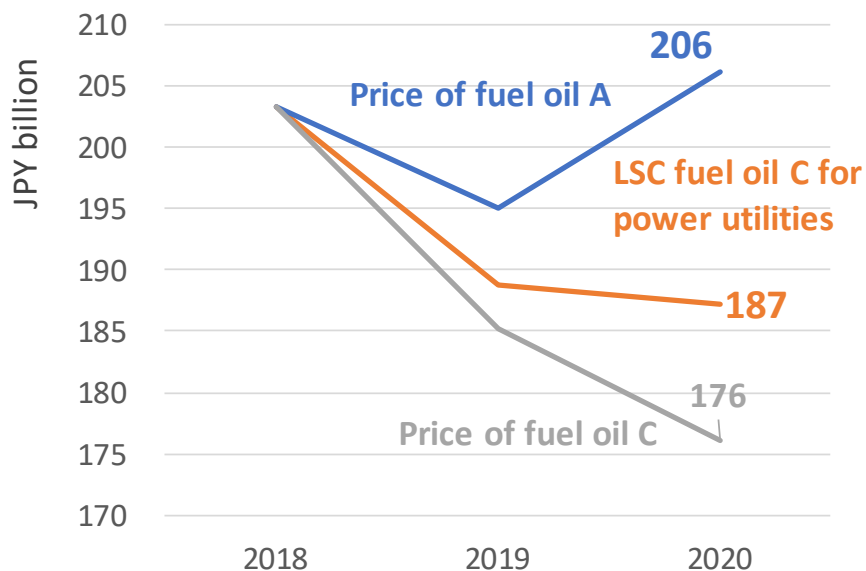


*VLSFO:Very Low Sulfur Fuel Oil

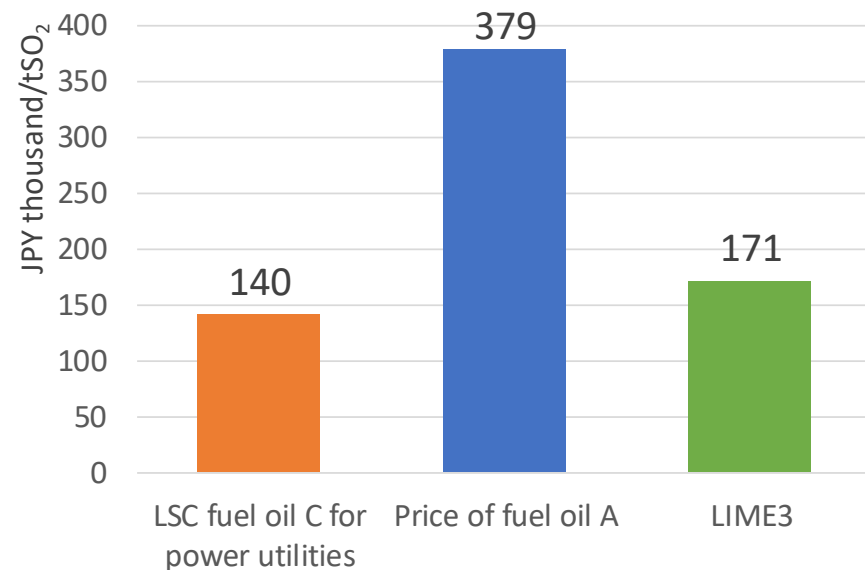
Impacts of regulation of sulfur content in ship fuel on domestic vessel

- If the price of VLSO amounts to LSC fuel oil C for power utilities, the price will rise JPY3.6/ L and fuel costs increase 11.1 billion JPY(6.3%).
- If the price amounts to fuel oil A, will rise will be JPY9.8/ L and fuel costs will increase 30.1 billion JPY (17.1%).
- 79 ktSO₂ will be reduced in FY2020*.
- The reduction costs may exceed willingness to pay for SO_x in LIME3 **.
- Other measures such as energy saving and fuel switching are required to reduce other gases such as CO₂.

Fuel costs of domestic vessel



SO_x reduction costs of domestic vessel



* Sulfur content is set 2.2% for the current fuel oil C and 0.3% for VLSO for the estimation of SO_x reduction.

** LIME3 :Life cycle Impact assessment Method based on Endpoint modelling 3). JPY108円/\$ is used.

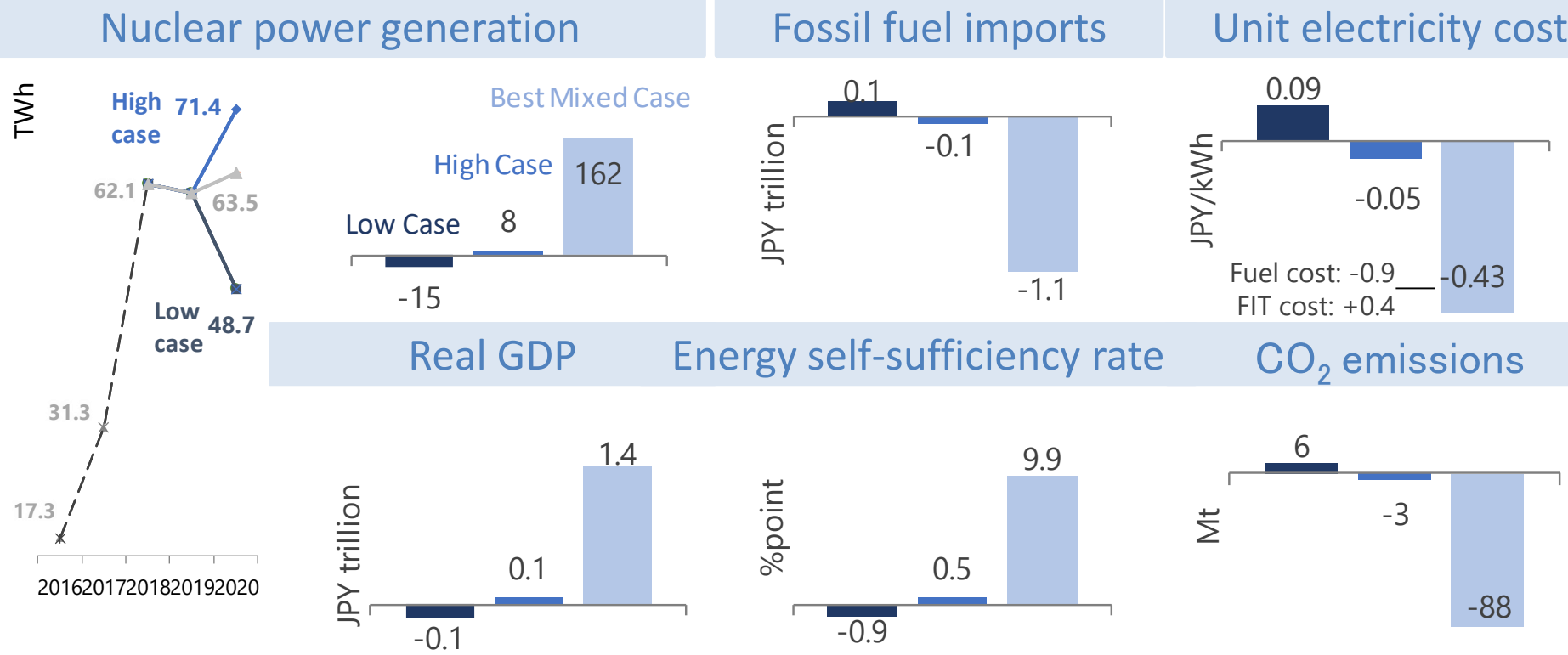
This study covers domestic vessel but LIME3 shows Japan's reduction cost.

Impacts of the completion of counterterrorism facilities and delays in nuclear plant restart

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

Plants which have a deadline of counterterrorism facility completion after FY2020 will increase. Smoothing the restart of the nuclear power generation with functional examinations contributes to achieving 3Es.

Effects of nuclear power generation changes (compared with Reference Scenario) [FY2020]



Note: See the report for definitions of the Reference Scenario and each case. The Best Mixed Case covers the effect of a change in renewables power generation.

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

If the average crude oil import price falls by \$10/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, and weak oil demand, the economy will grow by 0.1%, with energy sales expanding by up to 0.3%.

Effects of lower crude oil price (compared with Reference Scenario) [FY2020]

