

Economic and Energy Outlook of Japan for FY2022

Increasing energy expenditure and CO₂ emissions
while back to a normal economic situation

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Major “assumptions”

COVID-19

- FY2021: Gradual improvement
- FY2022: Back to normal (the promotion of COVID-19 medical treatments in addition to vaccination)

Global economy

- 2021: +5.9%, 2022: +4.9%*
- 2021 will recover mainly with western countries.
2022 will recover mainly with developing countries.

Import CIF prices

November 2021 → FY2021 → FY2022

- Crude oil: \$82/bbl → 71 → 68
- LNG: \$14.3/MBtu → 11.1 → 11.9
(\$742/t → 574 → 614)
- Steam coal : \$187/t → 144 → 142

Ichihara from IEEJ “Outlook and Challenges for Oil Market”,
Hashimoto from IEEJ “Outlook and Challenges for Gas Market”, and
Ito from IEEJ “Outlook and Challenges for International Coal Market”

Foreign exchange rate

November 2021 → FY2021 → FY2022

- JPY114.0/\$ → 111.6 → 113.5

*PPP based

Nuclear power generation

- A total of nine nuclear power plants have restarted.
- In FY2021, one nuclear power plant was to restart. They will operate for an average of ten months, generating 67.6 TWh (+82.7%). Two will be stopped due to delays in the completion of counterterrorism facilities.
- In FY2022, two nuclear power plants will restart bringing the cumulative number of restarted plants to 12. They will operate for an average of nine months, generating 71.8 TWh (+6.2%). One will stop due to delays in the completion of counterterrorism facilities.

Air temperature

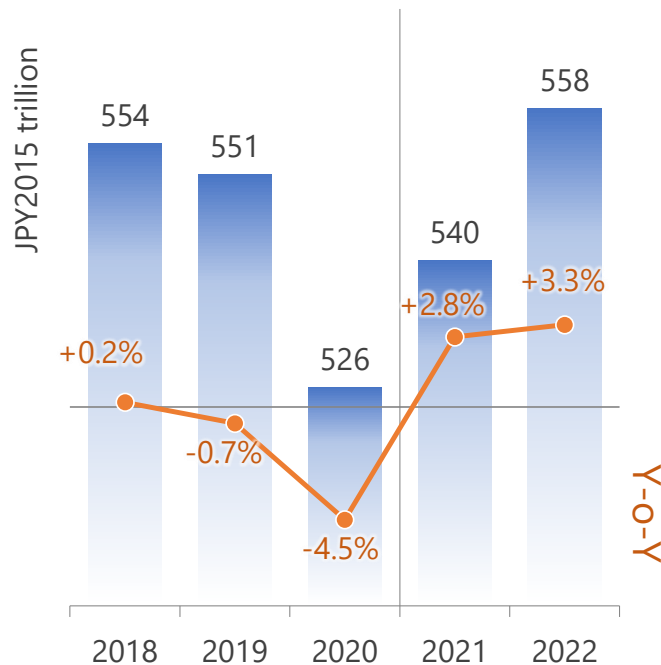
- According to the Japan Meteorological Agency’s forecast, we assume the winter in FY2021 to be as cold as normal but colder than in the previous year (-0.9°C). The summer in FY2022 will be hotter (+0.2°C) and winter as cold as FY2021 (-0.0°C).

GDP growth rate will be 3% range for the second years

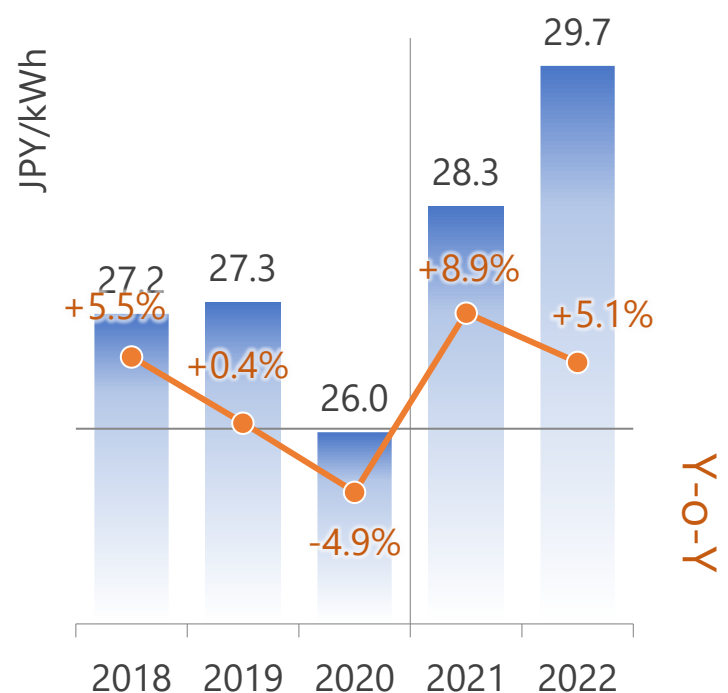
- Real GDP for FY2022 will be larger than FY2018 and hit a record high.
- Private demand will increase with increased people's movement and resolved automobile supply constraint but be lower than FY2019.
- Public demand will hit the record high.

- Prices of Electricity (Lighting) will rise for the second years due to higher renewable energy surcharge in addition to fossil fuel import CIF prices.
- Prices of Electricity (Lighting) will be higher than FY1985 which used to be the highest with increased tax such as VAT and petroleum and coal tax.

Real GDP



Prices of Electricity (Lighting)

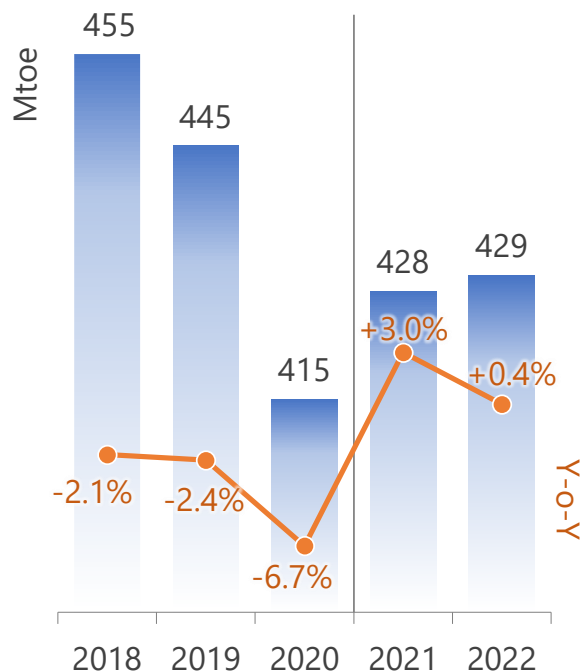


Total energy consumption will increase two years in a row with back to a normal economic situation

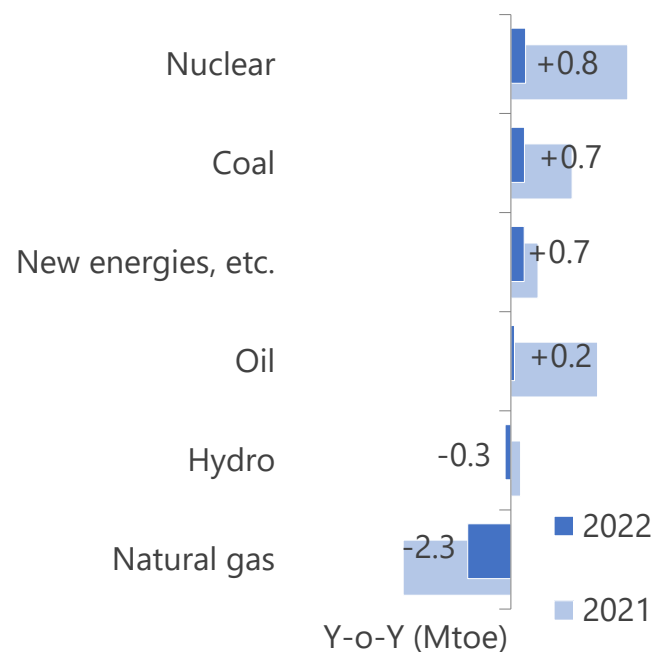
- Total energy consumption will increase but more slightly than the previous year with recoveries in machinery production and service industries.
- Total energy consumption per GDP will be improved.

- Coal will increase with newly installed coal power generation while a recovery of material production will slow down.
- Oil will slightly increase with the decrease of non-energy use due to the fall of ethylene production while transport demand will increase.

Primary energy supply



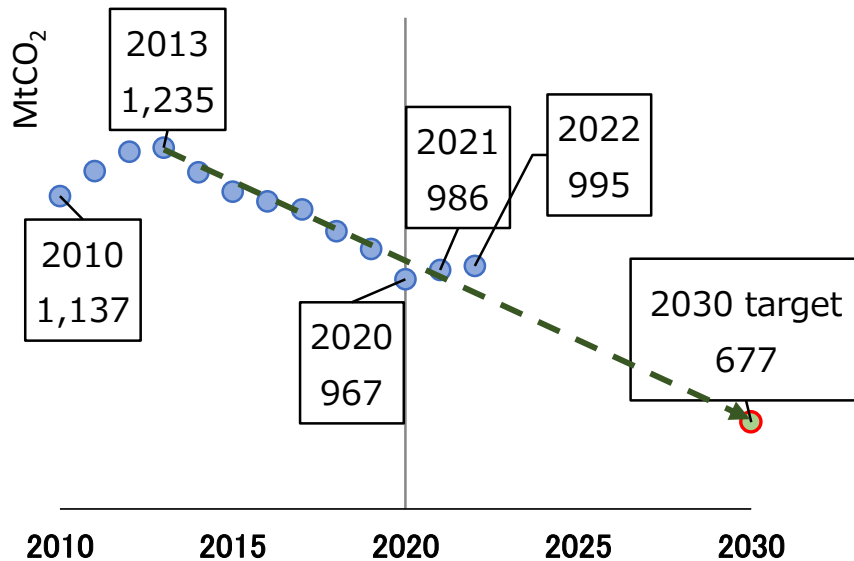
Primary energy supply changes



CO₂ reduction pace will slow down

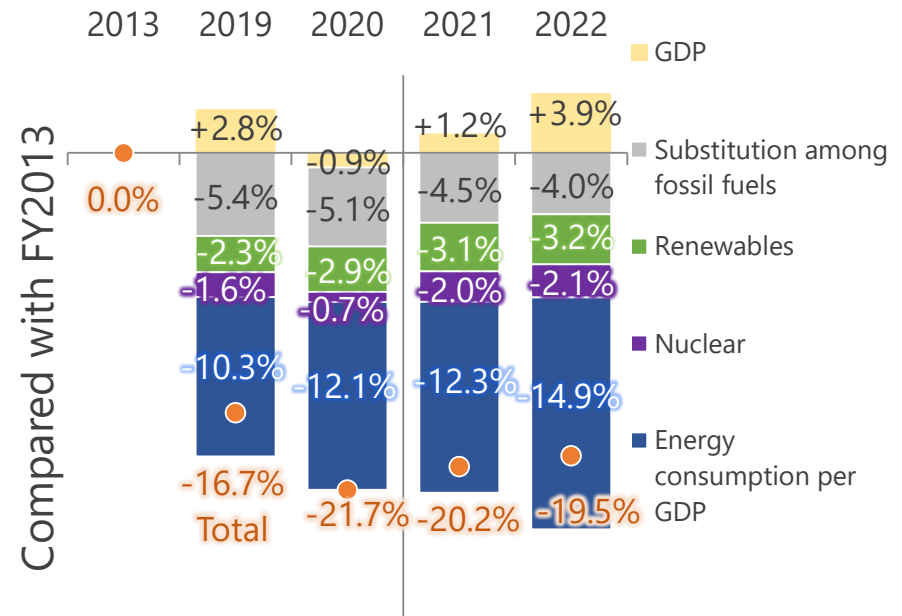
- CO₂ will increase for the second years in a row due to the coal and energy use of oil.
- The reductions will not reach the halfway point of the Paris agreement target (cut by 45% by FY2030 from FY2013).

Energy-related CO₂ emissions



- Increase contribution of GDP and substitution among fossil fuels will be larger than reduction contribution.
- It will be difficult to achieve efficient reductions with one measure while GDP growth is expected to increase in the future.

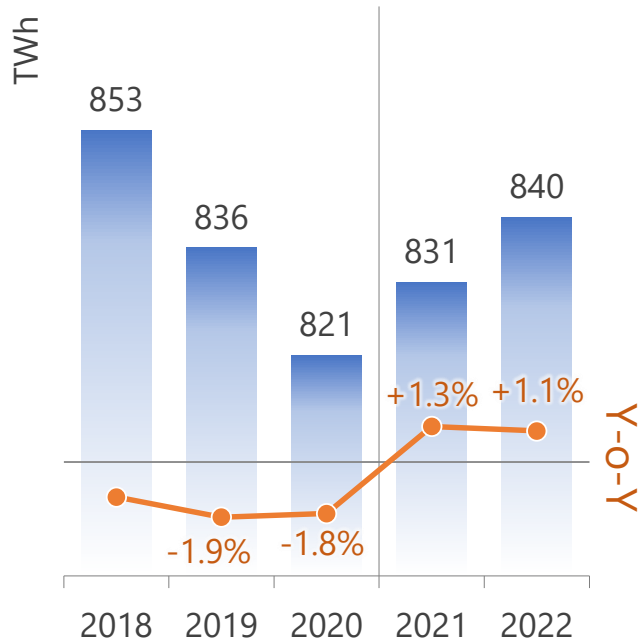
CO₂ emissions change and contribution



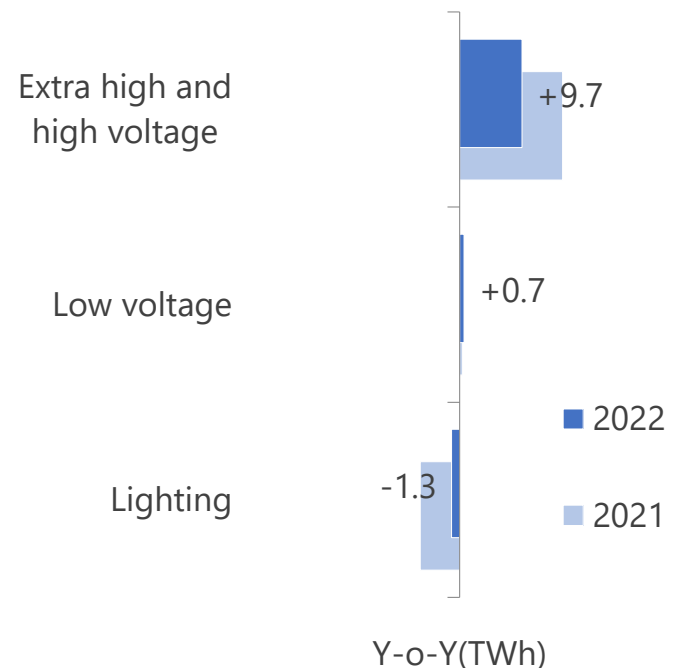
Lighting services will decrease while power services will increase

- Electricity sales will be higher than FY2019 with the recovery of economic activities in addition to temperature effect.
- While lighting services will continue to decrease, power services will continue to increase two years in a row
- Despite an increase in all-electric homes, sales for lighting services will slightly decrease primarily due to a declining rate of stay-home rate.
- Sales for power services will grow with production recovery in industries.

Electricity sales



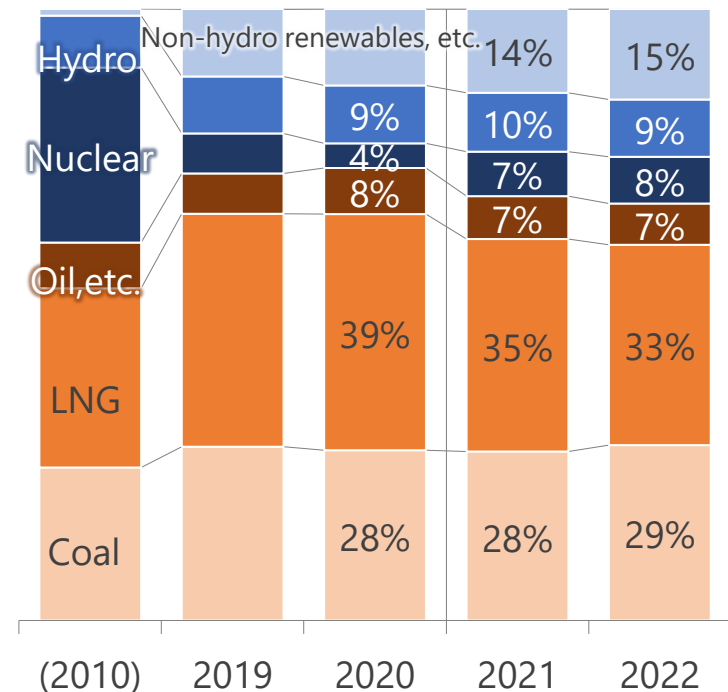
Electricity sales changes



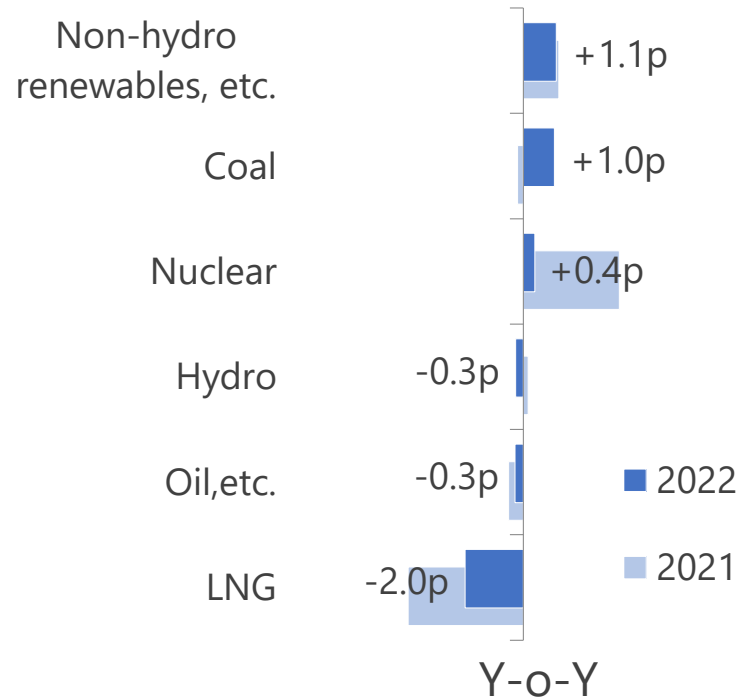
Zero-emission power sources and coal will continue to increase and LNG will fall

- Zero-emission power sources (renewables and nuclear) will expand and exceed 30% in FY2021 for the first time after the earthquake.
- Although it will increase in FY2022, note that they are 6p lower than before the earthquake and the expansion is required to continue.
- Coal and non-hydro renewables will increase with newly installed plants.
- Nuclear will largely increase with the progression of restart.
- LNG will fall drastically with the increases of other sources but be 4p higher than FY2010.

Electric utilities' power generation mix



Power generation mix changes

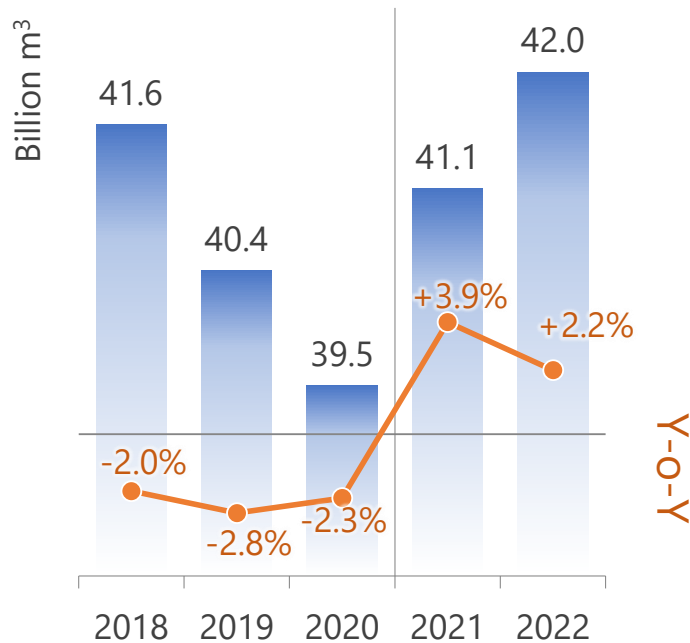


Note 1: FY2010 data are for general electric utilities under a former classification. Data lose continuity as data in FY2015 are based on old standards.
 Note 2: Hydro includes pumped storage and oil, etc. includes city gas, coal products and others.

City gas sales will be the second highest

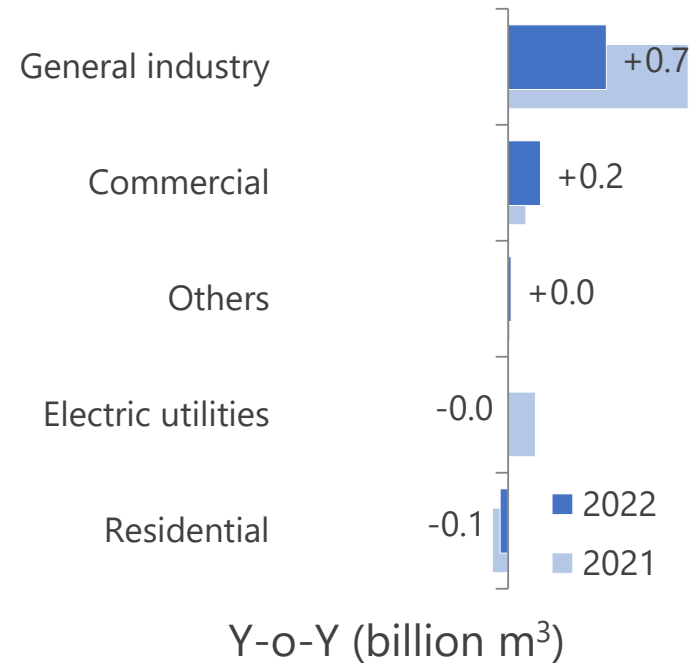
- Total gas sales will increase with a recovery of industry activities.
- FY2022 will be the second highest after FY2017 when summer was cool and winter was cold. Note that a sharp increase in sales to electric utilities after FY2020 will contribute largely.

City gas sales



- Sales for residential will decrease due to less stay-home rate and an increase in all-electrified houses with few effects of temperature.
- While sales to general industry and commercial will increase, they will be lower than FY2019.

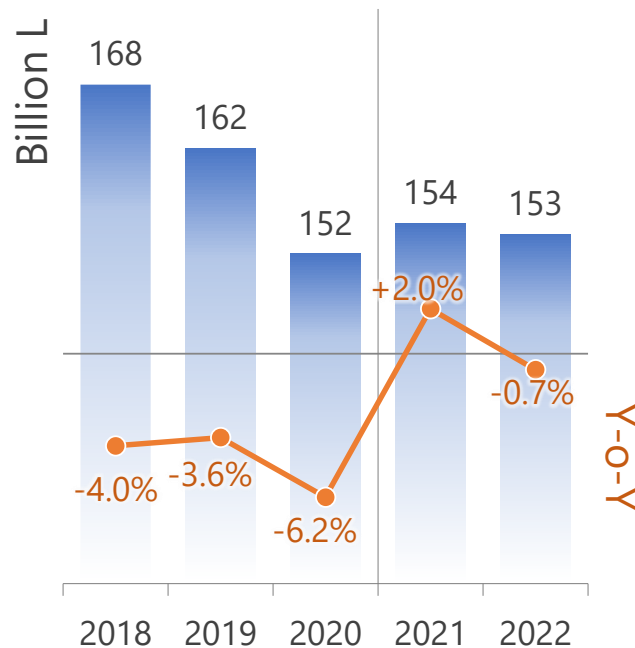
City gas sales changes



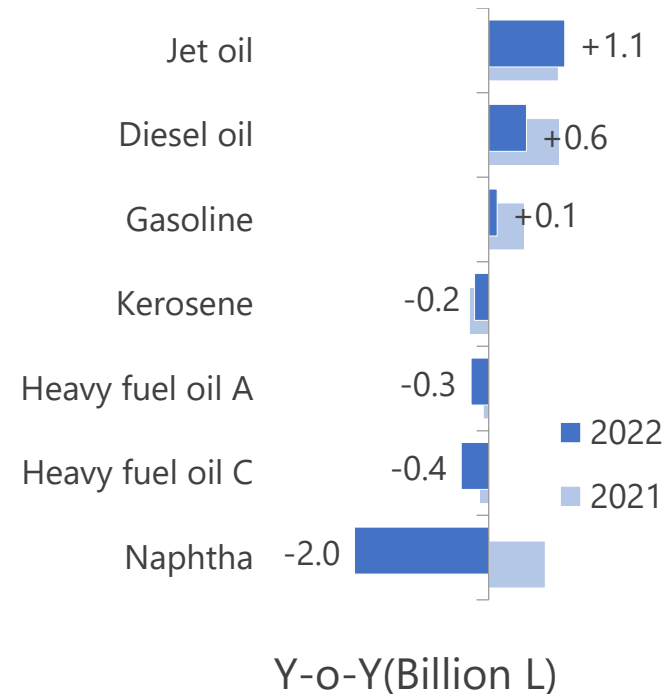
Fuel oil sales will decrease mainly due to the non-energy use

- Total fuel oil sales will decrease mainly due to fall of sales of naphtha with more regular ethylene plant repairs.
- Fuel oil sales in energy use will increase with the recovery of transportation demand.
- While fuel efficiency will be improved, sales of gasoline, diesel oil, and jet oil will increase with higher transportation demand.
- Despite an increase in industrial production, sales for heavy fuel oil A and heavy fuel oil C will fall due to fuel switching and energy saving accelerated by higher oil prices.

Fuel oil sales



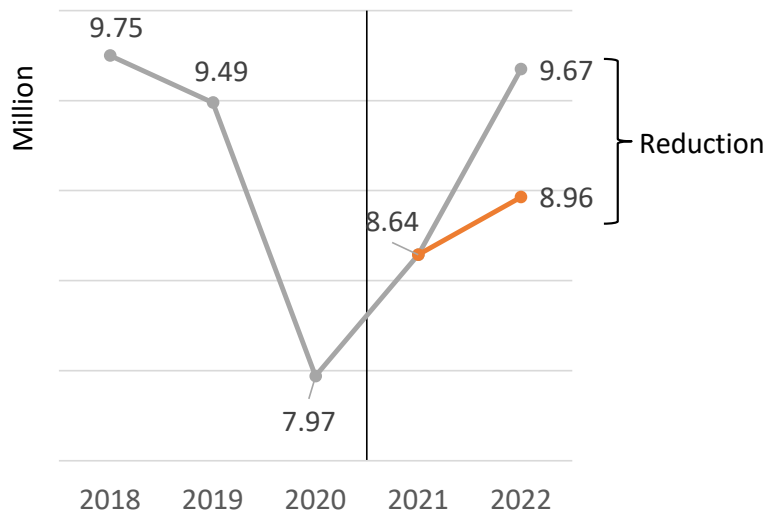
Fuel oil sales change



Impacts of decreased production of automobiles on economy and energy situation

- Automobile production decreased after August 2021 due to parts shortage.
- Catch-up production is expected by the end of FY2021 but the prospected is highly uncertain.
- If the 710 thousand*1, decrease from August to October is not caught up through FY2022, production will be lower by 7.3% from the reference scenario.

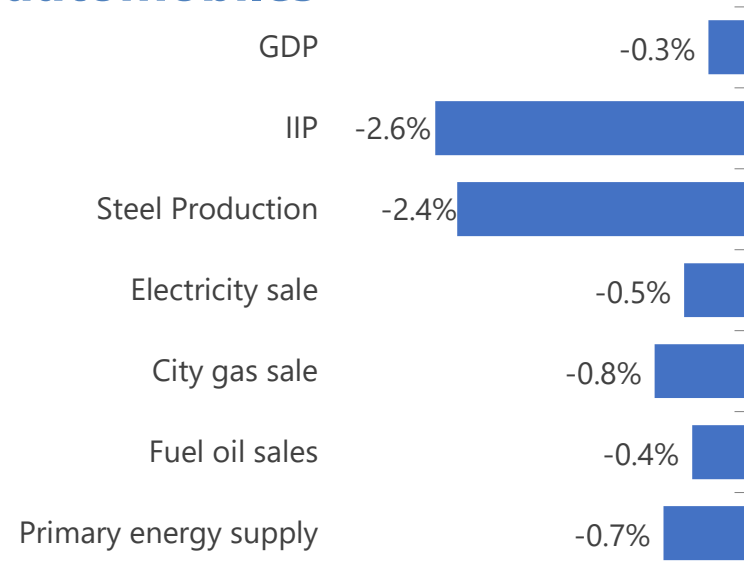
Automobile production



*1:Nomura Research Institute

- Decreased rate of IIP will be high because automobiles have high value added.
- City gas sale will fall the most with high share of industries.
- Primary energy supply will fall more than GDP with the fall of manufactures such as iron and steel as a material of automobiles.

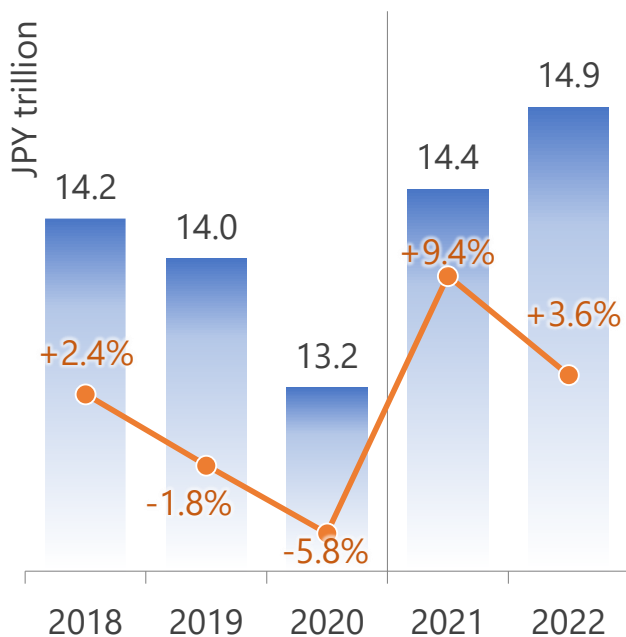
Impacts of decreased production of automobiles



Energy expenditures in the household will rise two years in a row

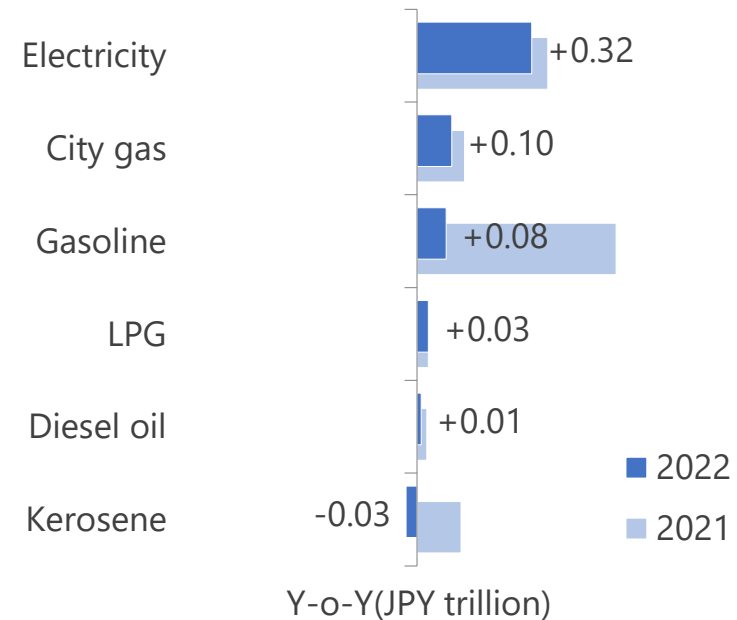
- Household energy expenditures are affected by prices and temperature fluctuation in the short term.
- With a very little temperature impacts and lower stay-home rates, energy purchase will decrease while expenditures will rise due to the higher energy prices.
- Electricity which account for the half of household energy expenditures will increase due to higher electricity price.
- Gasoline purchase will increase with more frequent going out but expenditures will not rise as high as the previous year.

Household energy expenditures



Note: Small Scale Community Gas and District Heat Supply are excluded

Changes of household energy expenditures



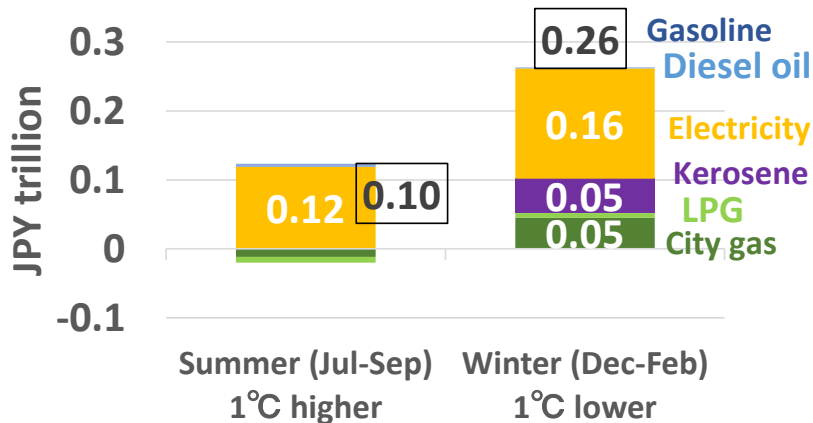
Y-o-Y(JPY trillion)

The impacts of the temperature changes on household energy expenditures

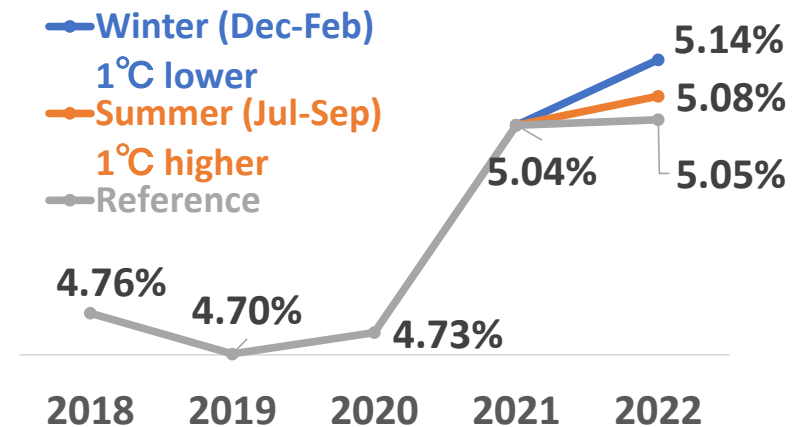
- If the summer (Jul-Sep) is hotter by 1°C and the winter (Dec-Feb), colder by 1°C, energy expenditures will reach to FY2013, the highest year.
- Energy Engel's coefficient will rise in both cases and if the summer (Jul-Sep) is hotter by 1°C and the winter (Dec-Feb), colder by 1°C, energy expenditures will reach to FY2013, the highest year.

- Energy expenditures show a few disparity among different income level. Higher-income household has excess savings while COVID-19 pandemic.
- To reduce energy expenditures at the normal condition, additional expenditures brought by hotter summer and colder winter for lower-income household, mixing energy and environmental policies such as enhancing energy efficiencies and redistribution policies is expected.

Changes in household expenditures with temperature changes



Changes of energy Engel's coefficient with temperature changes



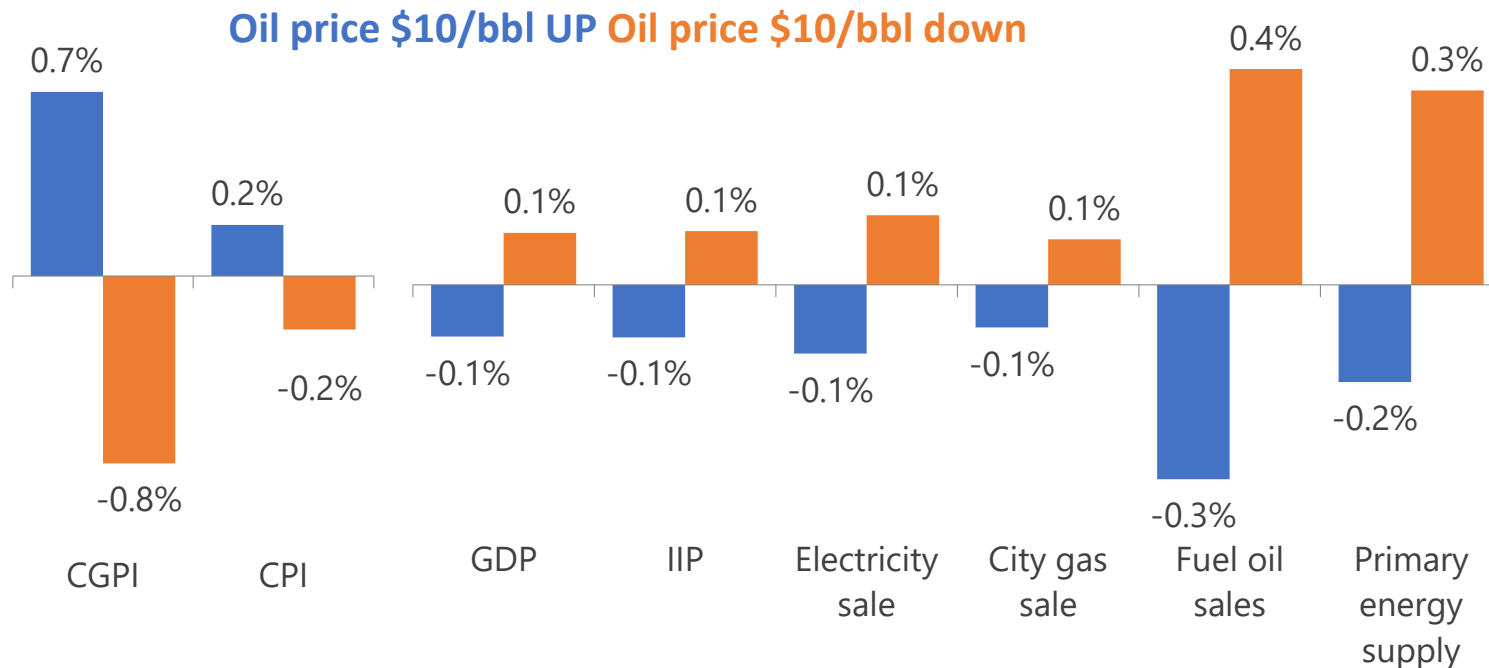
The impacts of the oil price changes on Japan's economy and energy situation

If the average crude oil price is \$10/bbl higher (lower) than in the Reference Scenario, , GDP and IIP will be pushed down(up).

Among energy sales, fuel oil sales would post the largest change

It is important for Japan to cut renewable energy costs and facilitate the restart of nuclear power plants to prepare for risks.

Impacts of a \$10/bbl change oil price change [FY2022]

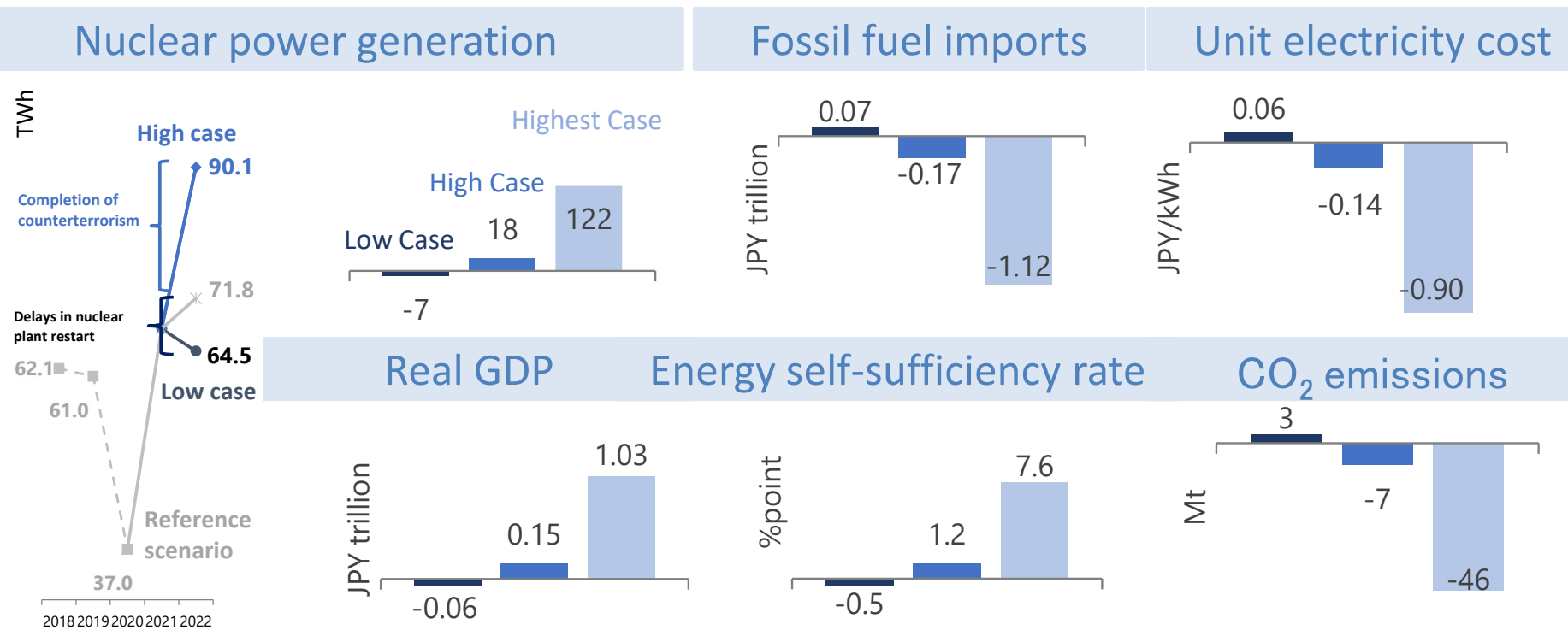


Impacts of the completion of counterterrorism facilities and delays in nuclear plant restart

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 FY2022 will increase. Smoothing the restart of the nuclear power generation with the consideration of each power plant contributes to achieving 3Es.

Effects of nuclear power generation changes (compared with Reference Scenario) [FY2022]



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.