

# Economic and energy outlook of Japan for FY2025

## Uncertainty casting a shadow over the path to recovery

YANAGISAWA Akira • R. Hirose • K. Ito • K. Kimura • T. Morimoto • Y. Nakano • Y. Ninomiya • C. Onda • Y. Shibata • W. Sugino

### Reference Scenario ❖ Summary

**Macro economy | Economic growth will accelerate to 1.1% above potential growth rate, with manufacturing production gradually expanding. However, weaknesses are present in places and supply constraints require attention.**

The Japanese economy, which suffers from low growth in FY2024, will clearly recover in FY2025. The willingness of companies to invest, improved wages, a slowdown in inflation, and a reduction in the negative contribution of external demand will lead to real gross domestic product (GDP) growth of 1.1% year-on-year and fifth consecutive years of growth. Production in the manufacturing sector, particularly in non-basic materials, will return, and the index of industrial production (IIP) will rise to 2.0%, the first increase in four years since FY2021, when there was a rebound from the Covid-19 disaster.

**Energy consumption | The impact of the cooler summer and the recovery in economic activity will conflict, with a slight decline of –0.2% in energy consumption, the smallest decline in recent years. CO<sub>2</sub> reductions will continue, but delays in meeting the 2030 target are a concern.**

A much cooler summer than the previous year, improved vehicle fuel efficiency and improved logistics efficiency will push down energy consumption (primary energy supply), whilst the expansion of manufacturing production will contribute to the increase. Approximately offsetting each other, the rate of decline is well below trend. Non-fossil fuels will increase due to the introduction of solar photovoltaics (PVs) and the restart of nuclear power plants, whilst oil and natural gas continue to decline. Liquefied natural gas (LNG) imports decline for nine consecutive years to 61 Mt. Improvements in energy efficiency (GDP intensity), which need to be doubled, will decelerate despite the tailwind of a cool summer.

Energy-related carbon dioxide (CO<sub>2</sub>) emissions will decline for four consecutive years to 872 Mt. However, the rate of decrease is 1.1%, the smallest since FY2013, when emissions peaked, with the exception of FY2021, when the Covid-19 disaster was reversed. Emissions will be –29.4% compared to FY2013, and there are some concerns about the progress towards the FY2030 target (–45% compared to FY2013). The self-sufficiency rate will be 17.7%, with a slightly slower improvement of just over 1 percentage point [p] for the second year in a row.

**Energy sales | Electricity will increase for the second year in a row, and city gas will increase for the first time in four years. The decrease in fuel oils will be the smallest in the last four years. The major contributors to the increase are the production side—power-use contracts of electricity, city gas for industry and naphtha.**

Electricity sales will increase by 0.7%, following 0.3% in FY2024, the first two consecutive years of growth since the full deregulation of retailing in FY2016. Increased production in the steel and machinery industries as well as increased activity in the service sector will lead to a 2.1% increase in sales for power-use contracts. On the

other hand, the cool summer will also have a significant impact, particularly in sales for lighting contracts dropping by 2.0%, slightly offsetting the increase due to the cold weather in early spring.

City gas sales will increase by 1.4%, the first increase in four years. This is driven by 3.1% of increase for industry, which is affected by the recovery in production activity, exceeding the previous year's level for the first time in four years. On the other hand, all other sales will be below the previous year's level. Due to the large impact of the decrease in FY2023, the total sales will fall far short of the previous level of 40 Bcm.

Sales of fuel oils will decline for four consecutive years and be on the verge of falling below 140 GL. Gasoline and diesel will continue to decline due to improved vehicle fuel efficiency and improved logistics efficiency. However, the rate of decline will be 1.0%, the smallest in recent years, as naphtha will increase in line with the recovery of production in the petrochemical industry, and total sales will hold up for the time being.

### **Renewable power generation | FIT power generation capacity will expand to 113 GW by the end of FY2025.**

The installed capacity of power sources subject to feed-in tariff (FIT) (including "post-FIT" and Power Purchase Agreements [PPAs] facilities) will reach 113 GW by the end of the fiscal year. Non-residential solar PVs, which account for the majority, will gradually increase in PPAs, but this will not significantly change the overall slowdown. Electricity generated by FIT+PPA facilities will be 224.6 TWh, accounting for 22% of total electricity generated (of which solar PVs: 97.8 TWh, 10%) and 26% of total renewable power generation including large-scale hydro. Whilst maintaining harmony with the environment and building consensus with local residents, it is necessary to accelerate grid development and steadily promote offshore wind and residential solar PVs, which have the potential to grow, to make renewables the main power sources.

Table 1 | Summary for the Reference Scenario

	Historical			Projection		Changes			
	FY2021	FY2022	FY2023	FY2024	FY2025	FY2023	FY2024	FY2025	
Energy	Primary energy supply (Mtoe) <sup>1</sup>	435.6	422.3	411.0	404.7	404.0	-2.7%	-1.5%	-0.2%
	Oil <sup>2</sup> (GL)	175.1	172.8	164.3	160.4	157.3	-4.9%	-2.4%	-1.9%
	Natural gas <sup>2</sup> (Mt of LNG-eq.)	73.9	70.4	67.9	65.7	64.0	-3.5%	-3.2%	-2.6%
	Coal <sup>2</sup> (Mt)	184.6	177.1	166.4	160.9	162.7	-6.1%	-3.3%	1.1%
	Nuclear (TWh)	67.8	53.5	80.3	91.8	103.6	50.0%	14.4%	12.8%
	Renewable power <sup>3</sup> (TWh)	209.3	223.1	232.6	247.0	256.8	4.3%	6.2%	4.0%
	FIT power sources (TWh)	169.3	185.9	198.0	211.9	224.6	6.5%	7.0%	6.0%
	Self-sufficiency ratio	13.3%	12.6%	15.2%	16.5%	17.7%	2.6p	1.3p	1.2p
	Electricity sales (TWh)	837.1	822.2	808.7	811.0	816.8	-1.6%	0.3%	0.7%
	City gas sales <sup>4</sup> (Bcm)	41.15	40.24	38.00	37.93	38.46	-5.6%	-0.2%	1.4%
	Fuel oil sales (GL)	153.8	150.8	144.6	142.3	140.8	-4.1%	-1.6%	-1.0%
	Energy-related CO <sub>2</sub> emissions (Mt)	987	962	916	882	872	-4.8%	-3.7%	-1.1%
	(vs. FY2013)	-20.1%	-22.2%	-25.9%	-28.6%	-29.4%	-3.7p	-2.7p	-0.8p
Import prices	Crude oil, CIF (\$/bbl)	78	103	86	80	67	-16.2%	-6.8%	-16.9%
	LNG CIF (\$/MBtu)	12.1	18.0	12.5	11.8	10.6	-30.4%	-5.8%	-10.3%
	Steam coal, CIF (\$/t)	162	360	195	154	153	-45.8%	-21.1%	-0.5%
	Coking coal, CIF (\$/t)	195	339	247	203	187	-27.2%	-17.8%	-7.8%
Economy	Real GDP (¥2015 trillion)	544.7	552.2	555.8	558.4	564.5	0.7%	0.5%	1.1%
	Indices of industrial production (CY2020=100)	105.2	104.9	102.9	102.4	104.5	-2.0%	-0.4%	2.0%
	Trade balances (¥ trillion)	-5.7	-22.1	-6.1	-8.0	-9.4	-72.6%	32.8%	17.3%
	Fossil fuel imports (¥ trillion)	19.9	35.3	26.0	24.5	20.2	-26.3%	-5.7%	-17.8%
	Exchange rates (¥/\$)	111.9	135.0	143.8	152.1	145.0	6.5%	5.7%	-4.6%
Temperature	Cooling degree-days (degree Celsius-days)	407	506	614	648	419	21.2%	5.6%	-35.4%
	Heating degree-days (degree Celsius-days)	966	850	843	941	970	-0.8%	11.6%	3.0%

Notes: 1. Mtoe stands for Mt of oil equivalent (= 10<sup>13</sup> kcal).

2. Oil is converted at 9 139 kcal/L, LNG at 13 068 kcal/kg, steam coal at 6 231 kcal/kg and coking coal at 6 866 kcal/kg.

3. Includes large-scale hydro. 4. Converted at 10 000 kcal/m<sup>3</sup>.

## Topics ❖ Summary

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### Impact on Japan of additional U.S. tariffs

There are concerns that the incoming Trump administration in the United States will raise import tariffs. Japan, which has the third largest importance of exports to the United States in its economy after Mexico and Canada, is unlikely to escape the effects of this.

If additional or retaliatory tariffs of 10% are imposed on trade among the United States, the Eurozone and China, and between the United States and the rest of the world, as shown in an analysis by the International Monetary Fund (IMF), IEEJ estimates that the Japanese economy will decelerate 0.2% of the Reference Scenario in FY2025 and 0.3% in the 1Q2026. Energy consumption also declines (FY2025: -0.3%, 1Q2026: -0.4%) as economy and production activities decline. The downside is likely to widen further into the following fiscal year. Although there are limits to how individual economic agent can respond, it is necessary to prepare for flexible responses based on uncertainties.

### Impact of exchange rate fluctuations on the economy and energy

Changes in the dollar-yen exchange rate are often collectively described as “depreciation of the yen/appreciation of the dollar” or “appreciation of the yen/depreciation of the dollar”. However, the effects of depreciation of the yen, which fluctuates solely due to factors in Japan, and appreciation of the dollar, which fluctuates in response to developments in the United States, sometimes make a significant difference. Note that in 2024, a strong dollar and a high oil price occurred simultaneously.

Even with the same weaker yen, if the yen depreciates independently due to domestic factors in Japan, the economy and production activity will expand compared to the Referenced Scenario, but real wages will not increase due to higher prices. If the dollar appreciates independently due to the situation in the United States, rising oil and LNG import prices will offset the macro-economic benefits and wages will decline.

In all cases, the fluctuations of sales of city gas and fuel oils, which have a large impact on the rise of imported fuel prices, exceed those of electricity.

### Impact of nuclear energy utilisation on the 3Es

The impact of different degrees of nuclear energy utilisation on the ‘3Es’ – economy, stable supply and environment – is assessed. In the ‘High Case’, where one nuclear power plant is restarted six months earlier than in the Reference Scenario and another is restarted in mid-FY2025, the positive impacts include a reduction of 90 billion yen in fossil fuel imports, a 0.6p increase in the self-sufficiency ratio and a 3 million tonne reduction in CO<sub>2</sub> emissions.

Expectations are increasingly being voiced for nuclear power generation as a low-carbon and stable power source. However, in order to meet expectations, it is essential to ensure safety and gain public understanding not only of nuclear power generation but also of the back end.

## Overview of the economy

Real gross domestic product (GDP) grew by 0.3% from the previous quarter in 3Q2024, increasing for the second consecutive quarter. Private consumption, which had been gradually recovering, continued to drive the GDP, but private non-residential investment made almost no contribution. Both imports and exports increased, resulting in external demand making a negative contribution for the third consecutive term. As a result, growth slowed from 0.5% in the previous quarter. There are indications that domestic supply constraints, including labour shortages, may have cast a shadow.

The trade deficit has narrowed from 22 trillion yen in FY2022, when energy prices soared, but is still likely to reach ¥6 trillion, on a par with FY2023 levels. In contrast, the largest current account surplus ever was recorded in the first half of the fiscal year due to increased earnings from foreign investment. As a result, gross national income growth has exceeded GDP growth.

Wages have improved, but in real terms, net of the decrease in value due to rising prices, they are not encouraging. Food prices have continued to rise, although by less than the 8 percent-plus-

level of April-October 2023, and the rise in the price of rice in September-October 2024, combined with shortages on shop shelves, is causing social difficulties.

Unlike the macro economy, which showed signs of weakness in places, the stock market has been strong, with the Nikkei Stock Average reaching a record high in February for the first time in 34 years; the biggest fall on record was recorded in August, but the crash was made up for quickly. In addition to share prices, which are generally forward-looking, the earnings of listed companies have also been strong. This, combined with the effect of higher wages, is expected to yield tax revenues of ¥73 trillion for the full fiscal year, a record high for the fifth consecutive year.

The Brent crude oil price, which started at \$79/bbl in January, rose to \$89/bbl in April due to the situation in Ukraine, the circumstances in the Middle East and the strong US economy. However, the price then gradually eased as the market became aware of a slackening supply-demand balance, down to \$73/bbl in November. Although this price is not particularly low, the high price of crude oil felt in Japan is due largely to the depreciation of the yen.

**Table 2 | Main events in Japan in 2024**

<b>January 2024</b>	<b>May</b>
Noto Peninsula earthquake New small investment tax exemption programme Nippon Individual Saving Account, NISA) was launched.	Electricity and city gas subsidies end (then resumed for the amounts used in August-October).
<b>February</b>	<b>June</b>
The Nikkei Stock Average hit an all-time high after 34 years.	Fixed-amount income and resident tax reductions Vehicle certification issue Number of foreign visitors to Japan in a single month reached record high.
<b>March</b>	<b>July</b>
Lifting of negative interest rates	Largest-ever minimum wage increases proposed Additional interest rate hike
<b>April</b>	<b>August</b>
Overtime caps applied to construction, transport and other sectors Dollar-selling and yen-buying intervention (also in May)	The Nikkei Stock Average suffered the biggest fall on record.

Intensity 6 earthquake hit Miyazaki, leading to a Nankai Trough advisory over a possible Nankai Trough earthquake.

### September

Spent nuclear fuel stored in an interim storage facility for the first time

Rice price hit highest in 49 years (+44.7% in consumer-price terms)

### October

Kishida Cabinet resigned; Ishiba Cabinet formed.

Ruling party fell short of the majority in a general election.

The largest-ever current account surplus recorded in the first half of the fiscal year.

### November

Test removal of debris from the Fukushima Daiichi Nuclear Power Station

### December

The draft of the next Strategic Energy Plan presented

## Key assumptions in the Reference Scenario

### Global economy

The global economy is assumed to grow by 3.2% in 2024 and 3.2% in 2025. The overall global growth rate for 2024 is expected to be on par with the previous year as significant growth in Asian emerging economies makes up for the slower growth in advanced economies. 2025 will see a slight acceleration of the economy in advanced economies, while emerging market and developing economies will face a slight slowdown as China, the largest economy among them, sees the ongoing real estate recession continue, and India, which recorded 8.2% growth in 2023, also slows down slightly. As a result, the global growth rate will be similar to the previous year's levels, but for the second year in a row, it will be well below the 2000–2019 average of +3.8% before the pandemic.

### Import CIF prices for fossil fuels

Japan's average crude oil import price is assumed to be \$80/bbl (first half: \$87/bbl, second half: \$74/bbl) for FY2024 and \$67/bbl for FY2025. The average LNG price is assumed to trail crude oil price changes and be \$11.8/MBtu for FY2024 and \$10.6/MBtu for FY2025. The steam coal price is estimated to be \$154/t for FY2024 and \$153/t for FY2025, and the coking coal price is \$203/t for FY2024 and \$187/t for FY2025 (see Morikawa, 'International Oil Market Outlook for 2025'; Yanagisawa, 'Gas Market Outlook for 2025'; and Takahashi, 'Coal Market Outlook for 2025').

### Foreign exchange rate

The dollar-yen exchange rate is expected to average ¥152.1/\$ for FY2024 and ¥145.0/\$ for FY2025.

### Mitigation measures for rapid change (subsidies)

For fuel oil, a 100% subsidy is assumed to be provided for the portion of the regular gasoline price exceeding ¥168/L by more than ¥17/L until March 2025 and a 60% subsidy for the portion exceeding ¥168/L by ¥17/L or less until December 2024, with a gradual reduction to zero for this portion thereafter.

For city gas, a subsidy of ¥10/m<sup>3</sup> for January-February 2025 and ¥5/m<sup>3</sup> for March 2025 are

assumed to be provided for companies with an annual contract volume of less than 10 million m<sup>3</sup>, as well as homes.

For electricity, subsidies of ¥2.5/kWh for low voltage and ¥1.3/kWh for high voltage are assumed to be provided for January-February 2025, and ¥1.3/kWh for low voltage and ¥0.7/kWh for high voltage for March.

It is assumed that there will be no subsidies for fuel oil, city gas and electricity from April 2025.

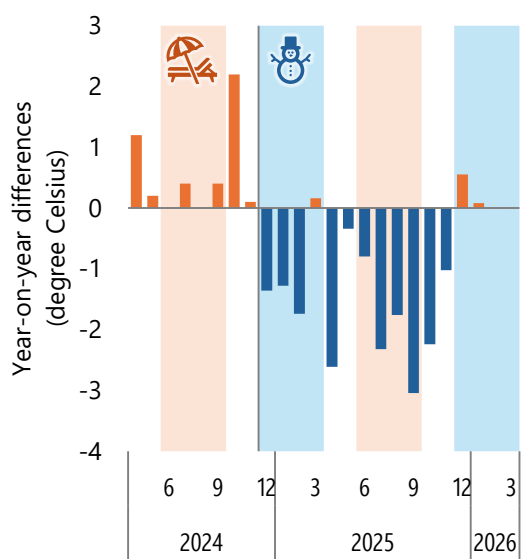
### Nuclear power generation

In FY2024, Onagawa Unit 2 and Shimane Unit 2 were newly restarted. The 14 units that have restarted are assumed to operate for an average of 8.9 months and generate 91.8 TWh of electricity in total (+14.4% compared to the previous year). Based on the progress of safety assessments in accordance with the regulation standards, one more unit is expected to be restarted in FY2025, bringing the total number of units restarted since the Great East Japan Earthquake to 15. The plants will have operated for 9.5 months on average and generated 103.6 TWh of electricity in total (+12.8%) in FY2025.

### Atmospheric temperature

The summer of 2024 was hot, but the temperature was just 0.2°C higher than the summer before, which was also extremely hot. Referring to the Japan Meteorological Agency's three-month forecast, the temperature will be almost the same as in an average year in the winter of FY2024, and the same as an average year thereafter. In other words, compared to the previous year, the winter of FY2024 will be colder (-1.0°C), the summer of FY2025 much cooler (-2.0°C) and the winter of FY2025 slightly warmer (+0.2°C), mainly in December.

Figure 1 | Temperature assumptions





## Macro economy

The Japanese economy will gradually start on the road to recovery, accelerating to +1.1% growth. Businesses are keen on capital investment, and a slower inflation rate will ease the extreme budget-consciousness of households and underpin consumption.

Figure 2 | Real GDP and contributions

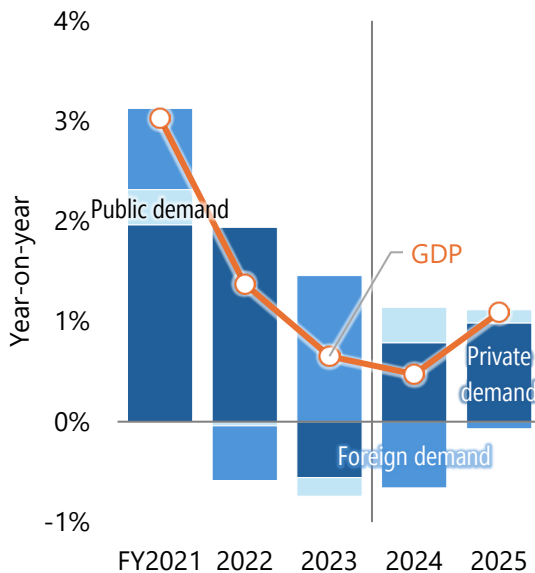
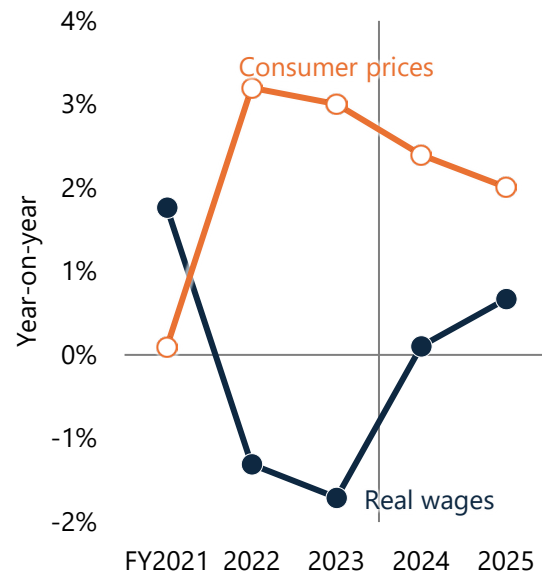


Figure 3 | Consumer prices and real wages



Real GDP for FY2024 will recover and increase slightly year-on-year by +0.5%, due mainly to domestic demand. Private demand will make a +0.8% contribution to GDP. Private consumption will increase by +0.8% as employment and real wages improve, despite the impact of high prices, as the rate of price increase slows. Private residential investment will remain weak at -1.5%, as demand falls due to rising prices of construction materials and labour pushing up construction costs. Private non-residential investment will increase (+2.2%) in the areas of business efficiency improvements to cope with labour shortages, digital transformation (DX) and green transformation (GX). Public demand will make a +0.4% contribution to GDP due to higher medical and nursing care spending associated with the ageing of the population, as well as higher defence spending and public works spending for disaster prevention and national land resilience. Foreign demand will make a negative contribution of -0.7% despite an increase in inbound tourists, due to a decrease in automobile exports and an increase in imports of pharmaceuticals and machinery.

Growth will continue in FY2025 driven mainly by domestic demand, accelerating to +1.1%. Private demand will make a +1.0% contribution to GDP. Private consumption will continue to recover mainly in face-to-face services as price increases slow and incomes continue to rise, as well as an upturn in car purchases as automobile production recovers (+1.0%). Private residential investment will remain weak (-0.8%), with construction costs remaining high and interest rates rising. Private non-residential investment will continue to increase (+2.1%) mainly in the areas of business efficiency, DX and GX, driven also by a recovery in business as well as slower price inflation. Public demand will make a positive contribution of +0.1% due to higher social security spending associated with the ageing population and strengthening measures to combat the declining birth rate. The negative contribution of foreign demand will shrink from -0.7% in the previous year to -0.1% as the sharp increase in imports eases and automobile exports recover.

Table 3 | Macro economy

	Historical			Projection		Year-on-year		
	FY2021	FY2022	FY2023	FY2024	FY2025	FY2023	FY2024	FY2025
Real GDP (¥2015 trillion)	544.7	552.2	555.8	558.4	564.5	0.7%	0.5%	1.1%
Private demand	399.6	410.0	407.1	411.3	416.7	(-0.6%)	(0.8%)	(1.0%)
Private consumption	290.3	297.9	296.6	299.0	302.1	-0.4%	0.8%	1.0%
Private residential investment	19.0	18.5	18.6	18.3	18.2	0.8%	-1.5%	-0.8%
Private non-residential investment	88.1	91.3	91.2	93.2	95.2	-0.1%	2.2%	2.1%
Public demand	145.2	145.0	144.0	146.0	146.8	(-0.2%)	(0.4%)	(0.1%)
Government consumption	117.7	119.0	118.0	119.6	120.2	-0.8%	1.3%	0.5%
Public investment	27.6	26.1	26.0	26.4	26.5	-0.3%	1.6%	0.5%
Net exports of goods and services	0.4	-2.1	4.6	1.7	1.5	(1.5%)	(-0.7%)	(-0.1%)
Exports	103.9	108.9	112.0	113.7	116.7	2.8%	1.5%	2.6%
Imports	103.5	111.1	107.4	112.1	115.2	-3.3%	4.3%	2.8%
Nominal GDP (¥ trillion)	554.6	567.3	595.2	612.9	630.1	4.9%	3.0%	2.8%
Balance of trade (¥ trillion)	-5.7	-22.1	-6.1	-8.0	-9.4	-72.6%	32.8%	17.3%
Exports	85.9	99.2	102.9	110.9	117.2	3.7%	7.8%	5.7%
Imports	91.5	121.3	109.0	118.9	126.7	-10.2%	9.1%	6.5%
Imports of fossil fuels	19.9	35.3	26.0	24.5	20.2	-26.3%	-5.7%	-17.8%
Oil	11.2	17.8	14.8	14.4	11.4	-16.7%	-2.8%	-20.8%
LNG	5.0	8.9	6.1	5.8	4.9	-31.8%	-3.8%	-16.4%
Current account (¥ trillion)	20.1	9.1	26.6	31.8	28.9	192.5%	19.2%	-8.8%
Domestic corporate goods price index (2020=100)	107.0	117.2	120.0	123.3	125.0	2.4%	2.7%	1.4%
Consumer price index (2020=100)	100.0	103.2	106.3	108.8	111.0	3.0%	2.4%	2.0%
Unemployment rate (%)	2.8	2.6	2.6	2.5	2.4	[-0.0p]	[-0.0p]	[-0.1p]

Notes: GDP and breakdown totals may not match due to changes in inventory and residuals.

Figures in ( ) indicate contributions. Figures in [ ] indicate year-on-year changes.

## Production activities

Industrial production will expand for the first time in four years, led by the recovering automobile sector. In the materials sector, crude steel and ethylene production will increase, while paper and cement production will continue to decline due to structural factors and trends.

Figure 4 | Indices of industrial production

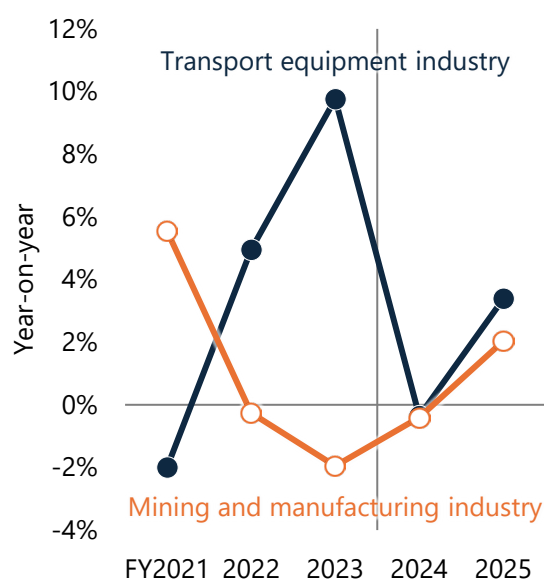
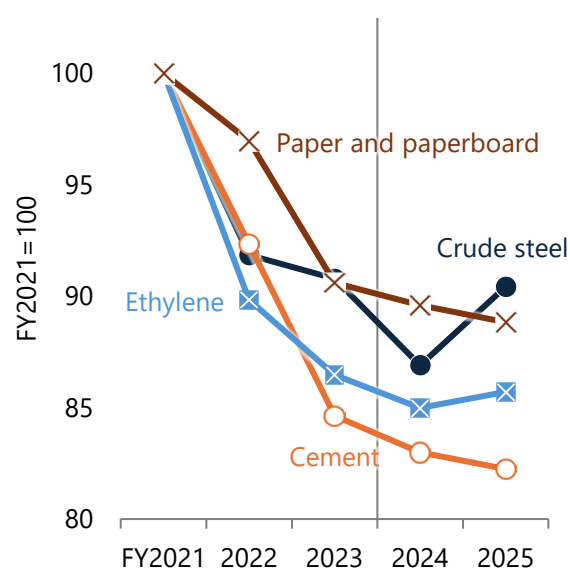


Figure 5 | Material commodity production



### Mining and manufacturing industry

The industrial production index will come in lower year-on-year for FY2024 due to the drop in automobile production caused by the certification issue and other factors, and the suspension of some plants due to typhoons (-0.4%). In FY2025, it will increase due to sustained growth in consumption and higher capital investment in DX and GX, as well as increased automobile production to make up for the drop in FY2024 (+2.0%). Production of next-generation power network equipment (e.g. transformers and control devices for power transmission and distribution) will increase for GX with the expansion of renewables power generation, while production of information and communication equipment and data centre server equipment will increase for DX.

### Crude steel

In FY2024, crude steel production for the automobile and other manufacturing sectors generally did not perform well, though domestic demand for steel products increased in

shipbuilding. Crude steel production will decline for the third consecutive year in FY2024 (-4.3%) due to the introduction of working hour caps in the construction industry, labour shortages and lower demand for building and civil engineering due to higher construction costs. In FY2025, the domestic demand for steel products will increase as more automobiles are produced to make up for the drop in FY2024, and for electrical and industrial machinery. Exports will also increase (+1.2%) in line with the expansion of global manufacturing production activities. As a result, crude steel production will also increase (+4.1%).

### Ethylene

Production of ethylene, one of the main basic petrochemical products, will come in lower year-on-year for FY2024 (-1.7%) due to sluggish domestic and foreign demand; it will increase in FY2025 (+0.8%) as domestic demand recovers. Domestic demand for ethylene will increase (+2.4%) as demand for plastics recovers as more cars are produced to make up for the drop in FY2024. Exports will continue to fall (-1.9%) as

cheaper Chinese products enter the Asian market and the demand in China itself remains weak.

### Cement

Cement production will come in lower year-on-year for FY2024 as domestic demand was affected by delays in construction work caused by the government initiative to reduce working hours and the torrential rainfall caused by typhoons and cloud-band zones (-1.9%). In FY2025, cement production will decline (-0.9%) as construction delays caused by labour shortages and working hour reduction initiatives persist, despite demand owing to the construction of semiconductor and other plants, investment in Chuo Shinkansen using superconducting maglev and areas along the line, and improved profitability of cement exports due to drops in coal prices.

### Paper and paperboard

Paper and paperboard production will come in lower year-on-year for FY2024 (-1.1%) due to structural factors such as digitalisation and a delayed recovery in demand due to higher living costs, despite an increase in domestic demand such as for business-use sanitary paper with the increase in foreign visitors. FY2025 will continue to see a decrease due to structural factors including digitalisation, and reductions in packaging to save costs and counter the high

costs in logistics and other areas (-0.8%). Specifically, paper production will decrease due to the long-term downward trend in newsprint, printing paper and other paper products because of digitalisation (-1.5%). Paperboard production will decline (-0.2%) due to the shift from corrugated board to paper bags to reduce packaging. However, the decline in FY2025 will be smaller than in FY2024 as the downward trend begins to bottom out. Exports will increase for both paper and paperboard (+3.6% and +3.8%, respectively) due to strengthened export initiatives, though more slowly than the previous year as the yen depreciation eases.

### Automobiles

Vehicle production will come in only slightly higher year-on-year for FY2024 (+0.5%) due to production stoppages caused by the certification issue and the impact of plant shutdowns due to typhoons and other natural disasters; in FY2025 it will increase (+1.8%) as production is ramped up to make up for the drop in FY2024 following resolution of the certification issue. Domestic shipments will increase (+3.6%) and the wait for delivery will be gradually resolved. Exports will remain flat (+0.0%) due to the sluggish European market, as well as flat-lining exports from Japan to the US market due to local production in the United States.

**Table 4 | Production activities**

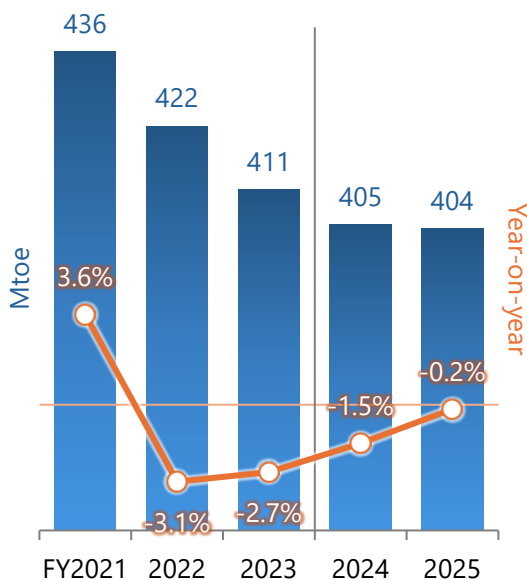
	Historical			Projection		Year-on-year			
	FY2021	FY2022	FY2023	FY2024	FY2025	FY2023	FY2024	FY2025	
Production	Crude steel (Mt)	95.6	87.8	86.8	83.1	86.5	-1.2%	-4.3%	4.1%
	Ethylene (Mt)	6.10	5.48	5.28	5.19	5.23	-3.8%	-1.7%	0.8%
	Cement (Mt)	55.7	51.5	47.2	46.3	45.8	-8.4%	-1.9%	-0.9%
	Paper and paperboard (Mt)	24.0	23.3	21.8	21.5	21.3	-6.6%	-1.1%	-0.8%
	Automobiles (million)	7.55	8.10	8.68	8.73	8.89	7.1%	0.5%	1.8%
Indices of production	Mining and manufacturing industry (2020=100)	105.2	104.9	102.9	102.4	104.5	-2.0%	-0.4%	2.0%
	Food and tobacco	99.1	98.7	98.1	98.5	101.0	-0.6%	0.4%	2.5%
	Chemicals	105.2	102.5	99.1	98.8	100.8	-3.3%	-0.3%	2.0%
	Non-ferrous metals	106.8	105.4	101.6	101.3	104.8	-3.6%	-0.3%	3.4%
	Metal products and machinery	106.7	108.6	107.4	107.5	110.0	-1.2%	0.1%	2.4%
Indices of tertiary industry activity (2015=100)	97.5	99.6	101.1	102.5	103.9	1.5%	1.4%	1.4%	

Notes: Chemicals include synthetic fibres. Metal products and machinery includes metal products, general machinery, electrical machinery, information and communication machinery, electronic components and devices, transport equipment and precision machinery.

## Energy consumption, carbon dioxide emissions

Energy consumption will decline for the fourth year in a row, but the rate of decline will slow as production activities recover; LNG imports will fall by 30% from the peak, partly due to fuel substitution. CO<sub>2</sub> emissions will decline gradually, but there are concerns over the progress in meeting the 2030 target.

Figure 6 | Energy consumption

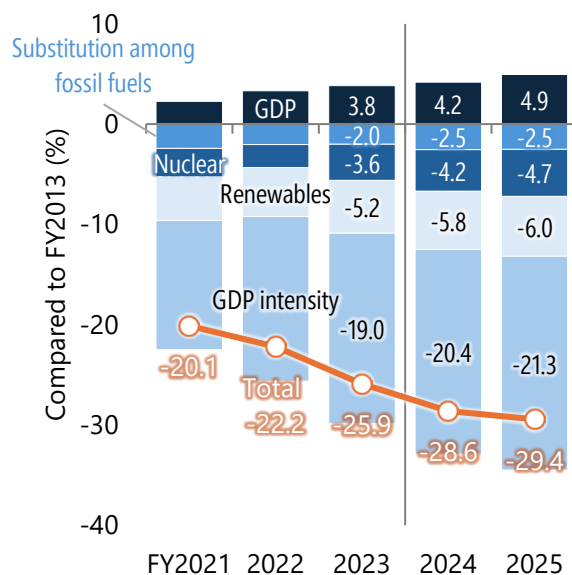


### Energy consumption

Energy consumption (primary energy supply) will come in lower year-on-year for FY2024 (-1.5%) due to a slump in production in energy-intensive industries, mainly crude steel; in FY2025 it will decrease for the fourth consecutive year (-0.2%), despite a production recovery in crude steel and other industries, mainly due to the strong impact of progress in energy conservation in oil. GDP intensity, which refers to the energy consumption per unit of real GDP, will improve for the fourth consecutive year (FY2024: -2.0%, FY2025: -1.3%). This is because, in addition to progress in energy conservation, the share of non-energy-intensive industries such as automobiles and electrical equipment in the economy increased

in FY2024, mainly due to sluggish production in energy-intensive industries. In FY2025, GDP intensity will continue to improve but more slowly as production recovers in energy-intensive industries, mainly in crude steel,

Figure 7 | CO<sub>2</sub> emissions and contributions



resulting in a relative decline in the share of non-energy-intensive industries in the economy.

### New energies

New energies such as solar photovoltaics, wind and biomass will grow, particularly non-residential solar photovoltaics driven by the feed-in tariff programme, etc. (FY2024: +4.1%, FY2025: +3.5%), and will account for 8.5% of primary energy consumption in FY2025.

### Nuclear

Two nuclear power plants, Onagawa Unit 2 and Shimane Unit 2, newly restarted in FY2024, and one more unit will restart in FY2025, increasing the nuclear energy supply for the third consecutive year (FY2024: +13.5%, FY2025: +12.7%). This will push up the share of nuclear in primary energy consumption above 5% for the first time since the Great East Japan Earthquake.

### Oil

Oil consumption will come in lower year-on-year for FY2024 (-2.4%) due to the impact of reduced

ethylene production, in addition to improved energy efficiency, progress in fuel switching and lower utilisation rates of oil-fired power plants. However, the decrease will be partially offset by a colder winter and increased heating demand; in FY2025, despite the recovery of ethylene production, the decrease will continue, driven mainly by petroleum products for cars and heavy fuel oil, due to the large impact of the ongoing fuel switching and energy efficiency (-1.9%).

### Coal

Coal consumption will come in lower year-on-year for FY2024 due to a decrease in use for power generation as biomass co-firing in existing coal-fired power plants makes progress, as well as a decrease in crude steel and cement production (-3.4%). However, the rate of decrease will be smaller than in FY2023 as the decline in coal consumption eases mainly for power generation, and FY2025 will see an increase for the first time in four years (+1.0%) driven mainly by an increase in industrial use as crude steel production recovers.

### Natural gas

Natural gas consumption will decline, mainly for power generation due to the continued growth of new energies, particularly solar photovoltaics,

and the restart of nuclear power plants (FY2024: -3.2%, FY2025: -2.6%). Accordingly, LNG imports will decline for the ninth consecutive year (FY2024: -3.4%, FY2025: -2.1%). Consumption will be 61 Mt in FY2025, a decrease of 30% from the peak in FY2014; LNG imports will fall below ¥5 trillion, owing partly to the decrease in dollar-based prices and the easing of the yen depreciation. As with oil, this decrease will make a major contribution to improving the trade balance.

### Energy self-sufficiency rate

The self-sufficiency rate will increase for the third year in a row (FY2024: +1.3 percentage points [p], FY2025: +1.2p), with contributions from increases in new energies and nuclear. The rate will be 17.7% for FY2025, but this falls short of the level before the Great East Japan Earthquake, let alone the FY2030 target (around 30%).

### CO<sub>2</sub> emissions

Energy-related CO<sub>2</sub> emissions will decrease for the fourth consecutive year (FY2024: -3.7%, FY2025: -1.1%), to 872 Mt in FY2025. However, this is only a 29.4% reduction from FY2013 levels, raising concerns about delays in meeting the FY2030 reduction target (45% reduction from FY2013 levels).

**Table 5 | Primary energy supply**

	Historical			Projection		Year-on-year		
	FY2021	FY2022	FY2023	FY2024	FY2025	FY2023	FY2024	FY2025
Primary energy supply (Mtoe)	435.6	422.3	411.0	404.7	404.0	-2.7%	-1.5%	-0.2%
Coal	118.9	114.0	107.4	103.8	104.8	-5.8%	-3.4%	1.0%
Oil	160.0	157.9	150.2	146.6	143.8	-4.9%	-2.4%	-1.9%
Natural gas	96.6	92.0	88.8	85.9	83.7	-3.5%	-3.2%	-2.6%
LNG imports (Mt)	71.5	70.5	64.9	62.7	61.4	-8.0%	-3.4%	-2.1%
Hydro	16.3	16.0	15.7	16.0	15.6	-2.1%	2.0%	-2.3%
Nuclear	14.5	11.5	17.2	19.5	22.0	49.9%	13.5%	12.7%
New energies, etc.	29.4	30.9	31.7	33.0	34.2	2.6%	4.1%	3.5%
Self-sufficiency rate	13.3%	12.6%	15.2%	16.5%	17.7%	2.6p	1.3p	1.2p
GDP intensity (FY2013=100)	86.8	83.0	80.2	78.6	77.6	-3.3%	-2.0%	-1.3%
Energy-related CO <sub>2</sub> emissions (Mt)	987	962	916	882	872	-4.8%	-3.7%	-1.1%
(vs. FY2013)	-20.1%	-22.2%	-25.9%	-28.6%	-29.4%	-3.7p	-2.7p	-0.8p

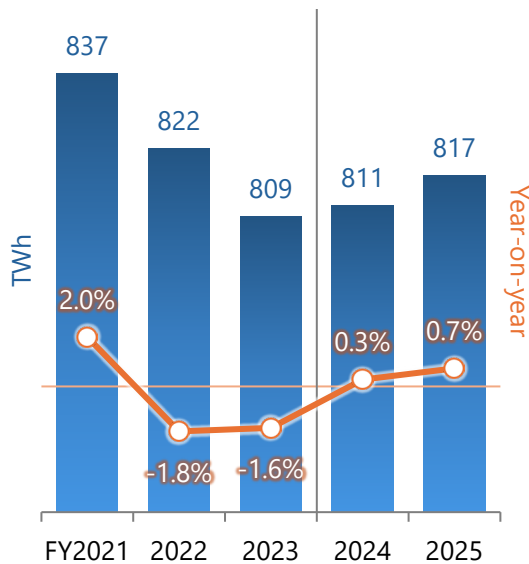
Notes: Renewables include solar photovoltaics, wind, biomass, solar heat and geothermal. Self-sufficiency rate is based on IEA standards.



## Electricity sales, mix of electricity generated/purchased (electric utilities)

Electricity sales will increase with the recovery of production activities. The ratio of non-fossil power sources is approaching 40% due to the restart of nuclear power plants and the continued growth of renewable energy.

Figure 8 | Electricity sales

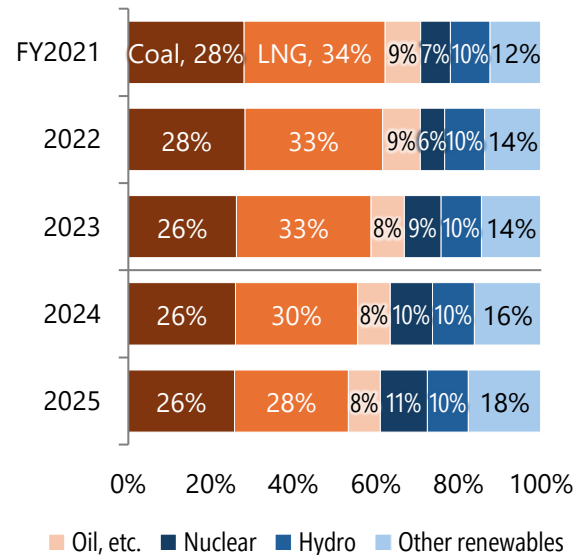


### Electricity sales

Total electricity sales volume will increase slightly year-on-year for FY2024 (+0.3%) as the increase in lighting-use contracts (mainly for residential) offsets the decline in power-use contracts (mainly for businesses). Power-use contracts will decline for the third year in a row (-0.3%) due to sluggish crude steel production, even though automobile production will increase and electrical equipment production will recover. Lighting-use contracts, on the other hand, will increase for the first time in three years (+1.5%) due to a colder winter. As a result, sales for lighting-use contracts will exceed half of those for power-use contracts for the first time since 2020, the first year of the Covid-19 pandemic.

Total electricity sales volume in FY2025 will increase for the second year in a row (+0.7%). Power-use contracts will increase for the first time in four years (+2.1%) due to the sustained increase in automobile and electrical machinery production, as well as the significant impact of the recovery in crude steel production. Lighting-use contracts, on the other hand, will decline

Figure 9 | Mix of electricity generated/purchased



(-2.0%) due to a significantly cooler summer and continued energy conservation efforts. A cold early spring will not be enough for the increase to offset the decrease. Note that if temperatures are similar to the previous year, the increase will be +1.2%.

### Mix of electricity generated/purchased

The mix of electricity generated/purchased will see nuclear, with two power plants newly restarting in FY2024, rise to over 10% (+1.3p), surpassing hydro; in FY2025, one more unit will restart, pushing up the share of nuclear for the third year in a row (+1.2p). Renewables (excluding hydro), etc. will increase, mainly non-residential solar photovoltaics, rising by 1.7p and 1.4p for FY2024 and FY2025, respectively, while non-fossil power sources will rise by 2.4p to 38.9% in FY2025, bringing the 40% mark within sight. However, yet more expansion will be necessary to reach a non-fossil share of around 59% in FY2030, which underpins Japan's Nationally Determined Contributions (NDCs).

In FY2025, coal-fired power generation will remain flat, mainly due to the absence of new power stations to start operations, and its share will decline as the total electricity generated/purchased increases (-0.2p). For oil, etc., there is almost no room for further reductions of oil-fired (heavy fuel oil C- and crude oil-fired) in view of the seasonal and

regional supply capacity. Its share will not decline as sharply as in the past but will not expand either unless troubles occur in other power sources (-0.1p). LNG will continue to hold the largest share but will fall below 30% in FY2024 and then to 27.5% in FY2025 (-2.0p) as non-fossil power sources increase.

**Table 6 | Electricity sales, mix of electricity generated/purchased**

	Historical			Projection		Year-on-year		
	FY2021	FY2022	FY2023	FY2024	FY2025	FY2023	FY2024	FY2025
Electricity sales (TWh)	837.1	822.2	808.7	811.0	816.8	-1.6%	0.3%	0.7%
Lighting-use contracts	278.1	270.2	266.5	270.5	265.0	-1.4%	1.5%	-2.0%
Power-use contracts	559.0	552.0	542.2	540.4	551.8	-1.8%	-0.3%	2.1%
Electricity generated/purchased (TWh)	936.0	908.3	899.5	904.4	910.6	-1.0%	0.5%	0.7%
Hydro	9.6%	9.7%	9.8%	10.1%	9.9%	0.1p	0.4p	-0.2p
Thermal	70.8%	70.7%	66.8%	63.5%	61.1%	-3.9p	-3.3p	-2.4p
Coal	28.0%	28.2%	26.2%	26.0%	25.7%	-2.0p	-0.2p	-0.2p
LNG	34.2%	33.4%	32.6%	29.6%	27.5%	-0.8p	-3.0p	-2.0p
Oil, etc.	8.6%	9.2%	8.1%	8.0%	7.8%	-1.1p	-0.1p	-0.1p
Nuclear	7.2%	5.9%	8.9%	10.2%	11.4%	3.0p	1.3p	1.2p
Renewables (non-hydro), etc.	12.3%	13.6%	14.4%	16.2%	17.6%	0.8p	1.7p	1.4p

Notes: Electricity sales are for electric utility use and do not include own use and specified supply.

Electricity generated/purchased is the actual estimate. Hydro includes pumped storage, and oil, etc. includes city gas, coal products and others.



## City gas sales (gas utilities)

Total city gas sales volume will increase for the first time in four years, driven by gas for general industrial use against the backdrop of a recovery in production activity. However, other uses will not perform well and the 40 Bcm mark will not be reached as a whole.

Figure 10 | City gas sales volume

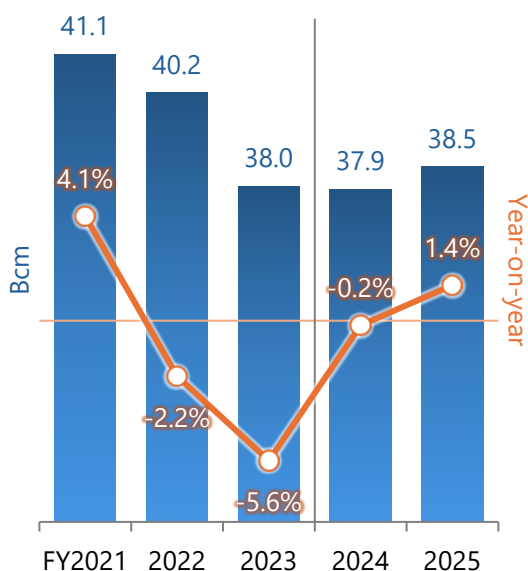
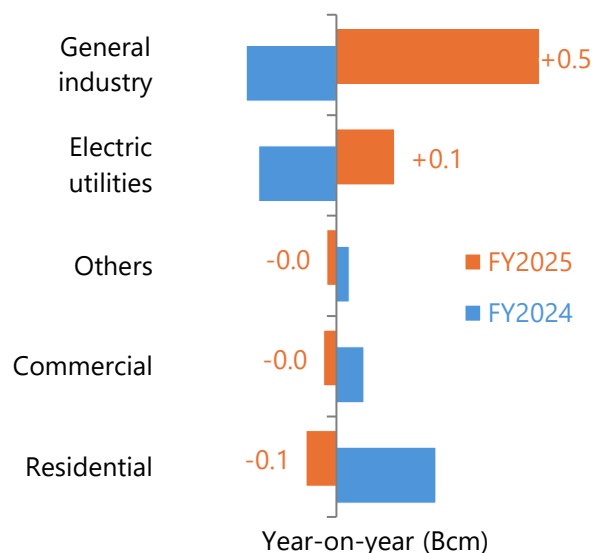


Figure 11 | City gas sales volume (year-on-year difference)



The total city gas sales<sup>1</sup> volume will increase year-on-year for residential, commercial and other uses for FY2024, but decrease slightly as a whole as general industrial-use gas declines significantly (-0.2%). In FY2025, contrary to FY2024, residential, commercial and other uses will decrease due to temperature effects, while industrial use will drive sales with the recovery of industrial production activities and the impact of increased production. The total sales volume will increase for the first time in four years (+1.4%). However, the impact of the huge drop in FY2023 is so significant that sales will be far short of 40 Bcm, the level maintained till FY2022.

For FY2024, sales for residential use will come in higher year-on-year for the first time in four years (+2.9%), as the winter will be colder than the previous year and demand for water and space heating will increase; in FY2025, demand will decrease (-0.9%) due to a slightly warmer winter, mainly in December as well as further progress in

electrification and energy conservation, although early spring is cold. If temperatures remain at the previous year's levels and the summer is extremely hot, the decline will grow to -4.5%.

Sales for industrial use will increase in FY2025 (+3.1%) after a drop in FY2024 (-1.9%). Specifically, those for general industrial-use for FY2024 will be significantly lower year-on-year mainly due to reduced crude steel production (-1.3%), falling below the levels of FY2023 when the largest fall since the onset of the pandemic was recorded. FY2025 will see the first increase in four years (+3.1%) due to increased production of automobiles and electrical equipment as well as a recovery in crude steel production, which slumped in the previous year.

Sales for commercial-use will increase year-on-year for FY2024 (+1.8%) due to an increase in activity in the living-related and personal service and amusement service sectors, and a colder winter than the previous year, which will boost

<sup>1</sup> Gas utilities excluding former community gas utilities; 1 m<sup>3</sup> = 41.8605 MJ (10 000 kcal) equivalent.

demand for water and space heating. In FY2025, sales will decrease (-0.8%) because although the early spring will be cold, the summer will be significantly cooler than the previous year, causing space cooling demand to drop significantly, and the winter will be slightly warmer leading to lower demand for water and space heating.

Sales for other uses will increase year-on-year for FY2024 as demand for space cooling rose in hospitals and other institutions due to an extremely hot summer (+1.1%). In FY2025, sales will decrease as a significantly cooler summer than the previous year will outweigh the impact of increased space and water heating demand due to a cooler spring (-0.8%).

**Table 7 | City gas sales**

	Historical			Projection		Year-on-year		
	FY2021	FY2022	FY2023	FY2024	FY2025	FY2023	FY2024	FY2025
City gas sales (Bcm)	41.15	40.24	38.00	37.93	38.46	-5.6%	-0.2%	1.4%
Residential use	9.91	9.34	8.89	9.15	9.07	-4.8%	2.9%	-0.9%
Commercial use	3.70	3.82	3.85	3.92	3.89	0.8%	1.8%	-0.8%
Industrial use	24.37	23.92	22.15	21.72	22.39	-7.4%	-1.9%	3.1%
General industry	18.91	18.32	17.24	17.01	17.53	-5.9%	-1.3%	3.1%
Power generation (electric utilities)	5.46	5.60	4.91	4.72	4.86	-12.3%	-4.0%	3.2%
Other use	3.16	3.16	3.10	3.13	3.11	-1.8%	1.1%	-0.8%

Note: 1 m<sup>3</sup> = 41.8605 MJ (10 000 kcal) equivalent.

## Fuel oil and LPG sales, crude oil throughput

Fuel oil sales volume will decline for the fourth year in a row, exceeding the increase in naphtha for petrochemical feedstocks, due largely to the decline in fuel sales for automobiles and in heavy fuel oil owing to fuel switching, on track to fall below 140 GL.

Figure 12 | Fuel oil sales volume

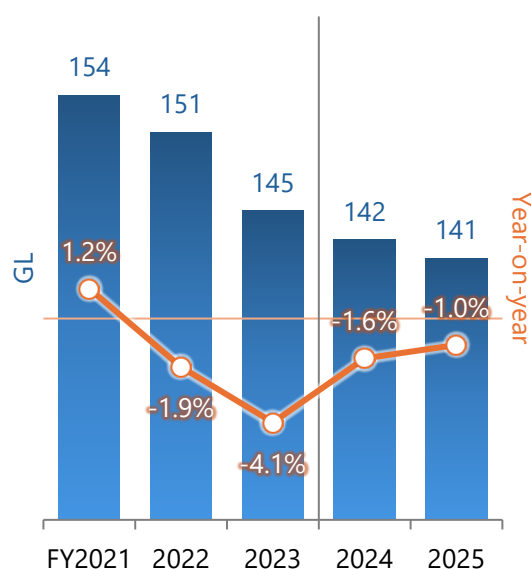
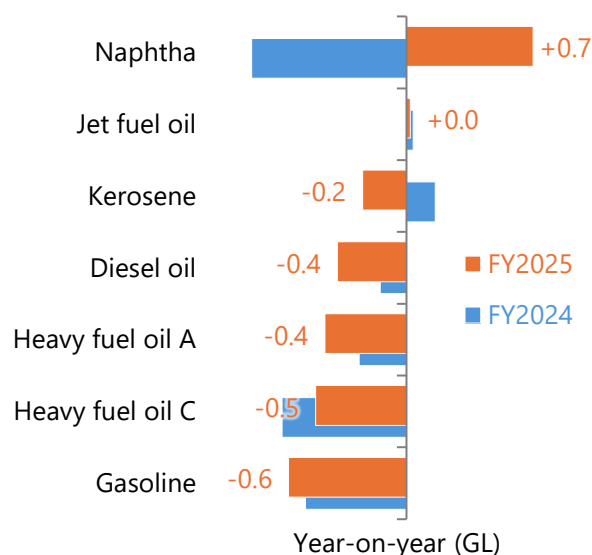


Figure 13 | Fuel oil sales volume (year-on-year difference)



### Fuel oil and LPG sales volume

Fuel oil sales volume will decline year-on-year for FY2024, mainly due to a drop in sales for chemical feedstocks, automobiles and power generation (-1.6%). Sales of fuel oil for power generation will fall by more than 10%, but this is not as steep as the nearly 40% decline recorded in FY2023. FY2025 will see a decline, mainly in fuels for cars and heavy fuel oil due to the progress in energy conservation and fuel switching (-1.0%). Naphtha for petrochemical feedstocks will increase substantially, but not enough to offset the decline of other fuel oils.

The decrease in gasoline sales remained below 1% in FY2023 due to the residual effects of the post-pandemic logistics recovery and an increase in mileage, mainly for freight vehicles, but sales will decrease by more than 1% for FY2024 due to improved fuel efficiency and the spread of hybrid vehicles (-1.2%). In FY2025, the rate of decrease will gradually accelerate due to continued improvements in fuel efficiency and the increased adoption of hybrid vehicles (-1.5%).

The sales volume of naphtha will decrease year-on-year for FY2024 largely due to a drop in domestic demand for ethylene and the impact of sluggish exports of ethylene derivatives, mainly to Asia (-2.3%); in FY2025, the sales will increase as ethylene production rebounds mainly due to a recovery in domestic demand and a decrease in periodic inspection and repair at ethylene plants (+2.0%).

Regarding jet fuel oil sales, the recovery from the pandemic will slow rapidly (FY2024: +0.8%, FY2025: +0.5%) as aviation passenger capacity (available seat kilometres, scheduled flights) falls year-on-year for some months. Transport volumes (person-kilometres) will continue to recover slowly, but the increase in energy consumption will mostly peak before transport volumes do.

Kerosene sales will increase for the first time in four years for FY2024 (+1.3%) due to a colder winter and an increase in space heating demand offsetting the effects of fuel switching; in FY2025 the sales will return to a downward trend (-2.0%)

due to slightly warmer winter temperatures than the previous year and the ongoing fuel switching.

Diesel oil sales will decline because of more efficient logistics such as larger freight vehicles and higher loading rates, and improved fuel efficiency (FY2024: -0.5%, FY2025: -1.2%). While weakening for most other uses, the consumption by passenger vehicles will remain firm because of a moderate increase in diesel oil-fuelled passenger cars.

Sales for heavy fuel oil A will decrease year-on-year for FY2024 due to lower demand in agriculture, forestry and fisheries and progress in fuel switching for industrial use (-2.6%); in FY2025, the decrease will accelerate (-4.7%) due to lower demand in agriculture, forestry and fisheries, as well as continued fuel switching for industrial use.

For FY2024, heavy fuel oil B/C sales will see a double-digit decline (-10.2%) due to energy efficiency efforts and fuel switching in industry, weak ship freight transport volumes, and the significant impact of the subsequent decline in oil for power generation. In FY2025, although energy conservation and fuel switching will progress, the sharp decline in the previous year

for power generation will ease, and the decline in total sales for heavy fuel oil B/C will be slightly smaller (-8.3%).

Liquefied petroleum gas (LPG) sales will decrease year-on-year for FY2024 due to a decline in sales for industrial and chemical feedstock uses because of sluggish production activities not being counterbalanced by increases in residential and commercial uses due to the cold winter (-2.4%). FY2025 will see a recovery in sales for chemical feedstock use, but the decline will accelerate due to fuel switching for industrial, residential and commercial uses, as well as progress in energy conservation (-3.0%).

### Crude oil throughput

Crude oil throughput will decrease more than fuel oil sales in FY2024 due to a decline in domestic demand for fuel oil as well as the impact of prolonged periodic inspection and repairs of facilities (-4.3%). FY2025 will also see a decrease as prolonged periodic inspections and repairs continue and as demand increases for naphtha, a product which accounts for a high proportion of imports. However, the decline will be -1.6%, which is not as steep as in FY2023–FY2024.

**Table 8 | Fuel oil and LPG sales, crude oil throughput**

	Historical			Projection		Year-on-year		
	FY2021	FY2022	FY2023	FY2024	FY2025	FY2023	FY2024	FY2025
Fuel oil sales (GL)	153.8	150.8	144.6	142.3	140.8	-4.1%	-1.6%	-1.0%
Gasoline	44.5	44.8	44.5	44.0	43.3	-0.6%	-1.2%	-1.5%
Naphtha	41.7	38.2	36.2	35.3	36.0	-5.4%	-2.3%	2.0%
Jet fuel oil	3.3	4.0	4.4	4.4	4.4	8.8%	0.8%	0.5%
Kerosene	13.5	12.2	11.8	12.0	11.7	-3.7%	1.3%	-2.0%
Diesel oil	32.1	31.7	31.2	31.1	30.7	-1.4%	-0.5%	-1.2%
Heavy fuel oil A	10.1	10.4	9.8	9.6	9.1	-5.5%	-2.6%	-4.7%
Heavy fuel oil B/C	8.5	9.5	6.7	6.0	5.5	-29.6%	-10.2%	-8.3%
For electric utilities	4.4	5.1	3.1	2.7	2.6	-39.4%	-12.8%	-3.8%
For others	4.1	4.4	3.6	3.3	2.9	-18.1%	-8.0%	-12.0%
LPG (Mt)	13.4	13.9	13.3	13.0	12.6	-4.6%	-2.4%	-3.0%
Crude oil throughput (GL)	147.5	156.2	145.1	138.8	136.6	-7.2%	-4.3%	-1.6%

## Renewables power generation (FIT+PPA power sources)

The installed capacity of renewables power generation will increase to 113 GW by the end of FY2025.

Figure 14 | Cumulative purchase amount under the FIT programme (for capacities certified or in operation as of the end of March 2024)

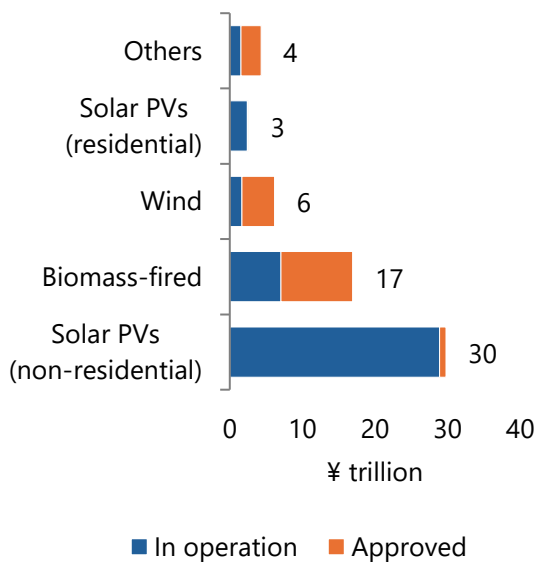
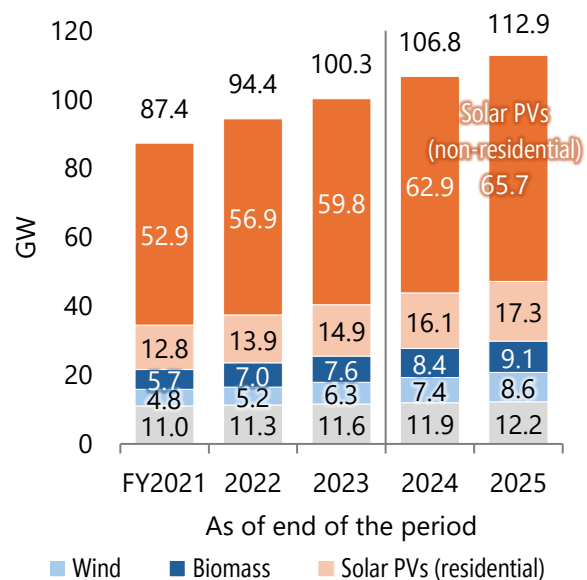


Figure 15 | Installed renewables power generation capacity (based on the start of operation)



Note: Includes capacities for which the FIT purchase period has ended.

Note: The purchase period is 10 years for residential solar photovoltaics, 15 years for geothermal and 20 years for other power sources.

As of the end of March 2024, the amount of capacity certified under the feed-in tariff (FIT) programme<sup>2</sup> was 102.1 GW. If all of this certified capacity enters operation, the cumulative cost paid by consumers, for both operating and transitional facilities<sup>3</sup>, would amount to ¥60 trillion<sup>4</sup>. This is equivalent to an increase in electricity prices of ¥2.2/kWh, or 9% for residential and 13% for industrial and other contracts.

Installed capacity (including “post-FIT” capacities and power purchase agreement [PPA]

capacities) will reach 113 GW by the end of FY2025. For non-residential solar photovoltaics, which accounts for the lion’s share of total renewables power generation, the PPA will gradually expand to compensate for the slowdown in the FIT and feed-in premium (FIP) but will not significantly change the overall slowing trend. Combined with residential solar photovoltaics, the overall installed capacity of solar photovoltaics will be 65.7 GW at the end of FY2025. Onshore wind will expand to as much as 8.6 GW by the end of FY2025, as non-operating projects come out of environmental assessments

<sup>2</sup> Large hydro power plants of 30 MW or more are not covered by the scheme.

<sup>3</sup> Facilities installed before the FIT programme started and enrolled in it after it started.

<sup>4</sup> The remaining purchase period of transitional facilities is also taken into account. Avoidable costs are estimated based on various data. The avoided cost in 2022 soared to ¥22.5/kWh due to high fuel prices, but in 2024 (by mid-October) it had settled down to ¥11.5/kWh and is assumed to remain at this level. However, this value is higher than the previously assumed value of ¥7.7/kWh, which means that the cost paid by consumers is significantly reduced. Assumed plant capacity factors are 24.8% for wind, 13.7% for solar photovoltaics, 70% for geothermal, 45% for hydro and 70% for biomass.

and gradually enter operation. For offshore wind, bidding for 5.1 GW has already been completed under the Act on Promoting the Utilization of Sea Areas for the Development of Marine Renewable Energy Power Generation Facilities. However, the start of their full-scale operation is still three to four years away, and their impact will not be visible in FY2025. In FY2025, FIT+PPA power sources will generate 224.6 TWh of electricity (solar photovoltaics: 97.8 TWh, biomass: 55.5 TWh, small and medium hydro: 45.5 TWh, wind: 17.2 TWh, etc.), accounting for 22% of the total electricity generated, and 26% of the total

when including large hydro, representing renewables power generation as a whole.

For renewables power generation to achieve the target share of 36%–38% of total electricity generated in 2030, the current pace of introduction must be accelerated. To make renewable energy a main power source, on the basis of harmony with the environment and consensus building with the local residents, it is necessary to accelerate grid development and steadily promote offshore wind and residential photovoltaics power generation, which have room for growth.

## Topic 1 | Impacts of US tariff policy on the economy and energy

There is much uncertainty over the scope and rate of additional tariffs, necessitating greater preparedness and flexibility.

### Growing alarm over the new Trump tariffs

There is concern that the incoming US Trump administration will increase import tariffs. During the presidential campaign, the president declared that he would impose a 10%–20% tariff on imports overall, and a 60% tariff on imports from China; on 25 November, he mentioned slapping a 25% tariff on Canada and Mexico citing an influx of drugs and illegal immigration, and an additional 10% tariff on China on his first day as president; on 30 November, he announced plans to impose a 100% tariff on the BRICS countries if they support the creation of a new currency or an alternative to the US dollar. The situation of the US tariff policy is changing daily, inevitably causing a growing sense of alarm.

Figure 16 | Composition of US goods imports [2023]



Source: U.S. Census Bureau

Total United States imports are in the order of \$4 trillion as of 2024. The goods with the largest imports are fossil fuels, passenger cars and pharmaceuticals, each valued at over \$200 billion in 2023 (Figure 16). Some of these goods cannot be substituted quickly by domestic products, and a significant burden is therefore expected to be incurred.

On the other hand, Mexico and Canada account for a particularly high share of goods exports to the United States in their domestic economies at 27% and 21%, respectively (in 2023), as signatories to the US-Mexico-Canada Agreement (USMCA). These two North American countries are expected to be the most affected by the primary impact of the US tariff increase. Following these countries in terms of the significance of US exports are Japan and the European Union (3%). The United States is also Japan's largest export partner. Japan is also unlikely to escape the impact of additional tariffs.

### Japan's economy and production activity to slow and energy sales to decline as international friction mounts

However, not all election campaign promises will necessarily be implemented as is. Not all promises made during the first Donald Trump presidency materialised. It is crucial to monitor the situation. Here, we refer to the International Monetary Fund's analysis<sup>5</sup> in which the United States, the eurozone and China mutually impose a 10% tariff on each other, and the United States also mutually imposes a 10% tariff on other countries<sup>6</sup>, as a base for setting an 'Additional Tariff Case' and use it to analyse how the rise in

<sup>5</sup> International Monetary Fund, "World Economic Outlook, October 2024: Policy Pivot, Rising Threats", <https://www.imf.org/en/Publications/WEO/Issues/2024/10/22/world-economic-outlook-october-2024>

<sup>6</sup> The IMF study states that global GDP would decline by 0.3% in 2026. Other organisations have also conducted analyses on tariffs, but the assumptions, timing and sectors covered vary. For example, the Institute of Developing Economies, Japan External Trade Organization states that imposing a 60% tariff on China and a minimum tariff of 20% on the rest of the world would shrink global GDP by 0.8% in 2027. Ernst & Young states that a 10% tariff on China and a 25% tariff on Mexico and Canada, with retaliatory tariffs, would push global GDP down by 0.6% in 2025.



international friction could affect Japan's economy, and energy supply and demand.

Additional tariffs will slow the Japanese economy by 0.2% in full-year FY2025 and 0.3% in 1Q2026 compared to the Reference Scenario. The industrial production index will fall sharply relative to GDP due to a drop in production of automobiles, which has high value added and numerous related industries, and production of crude steel, a basic material, will decline by 0.7% in full-year FY2025 and by 0.9% in 1Q2026. The trade deficit will increase by ¥900 billion in full-year FY2025 as exports decline faster than the decline in imports. Due to the economic slowdown, real wages will fall by 0.1% in 1Q2026. The car production in full-year FY2025 will be 8.89 million units in the Reference Scenario and 8.74 million units in the Additional Tariff Case, with production declining by as many as 140 thousand due to the additional tariffs.

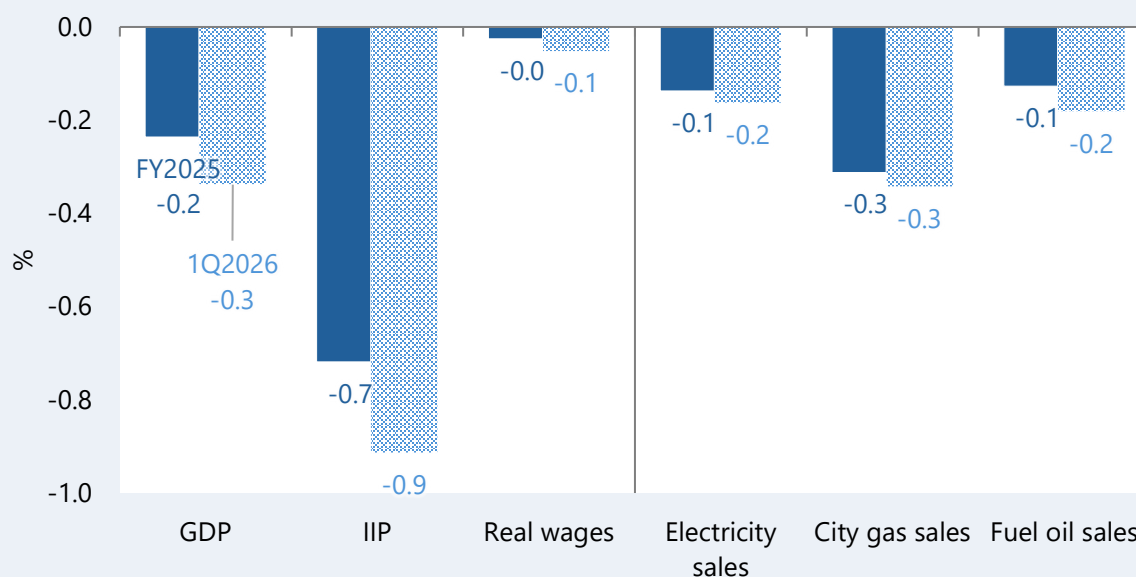
In the Chubu Region, the transport machinery manufacturing sector accounts for 10% of the regional economy (2021). The sector's presence in the Chugoku Region is second only to Chubu,

and further, the primary metal manufacturing industry is more important to the regional economy than anywhere else in the country. The Chubu and Chugoku regions are home to the nation's most active manufacturing industries, including sectors other than the abovementioned two, and are assumed to be more susceptible to the impact of additional tariffs.

Energy sales will decline as economic and production activities wane. City gas sales volume will fall by 0.3% in 1Q2026, with a marked decline of 0.6% in industrial use due to reduced vehicle and crude steel production. Fuel oil sales volume will decrease somewhat for all fuel oils, falling 0.2% as a whole. Electricity sales will fall by 0.2% due to a decrease in power-use contracts.

The primary energy supply is expected to fall by 0.3% in FY2025, with a marked decline in coal, down 0.7%, due to lower production of crude steel and other products. This is followed by natural gas, down 0.3%, and LNG imports, down 0.4%. Oil will shrink by 0.1%, and the decline in consumption of these fossil fuels will cause energy-related CO<sub>2</sub> emissions to decrease by 0.4%.

**Figure 17 | Impacts of additional tariffs [Additional Tariff Case] (compared to Reference Scenario)**



Tariffs have a larger impact on the economy and energy in 1Q2026 than in the whole of FY2025, suggesting that the impact may expand further in FY2026. There is also concern over even heavier downward pressure on the economy and energy. While this report assumed a 10% tariff, the

possibility of up to 20% had been suggested during the presidential campaign. Moreover, if additional tariffs on Mexico and Canada become a reality, they could have a serious impact on the local production of Japanese automobile manufacturers, for example. There are limits to



what individual actors can do, but it is important to consider the risk of policy changes in the United States and other advanced economies and

enhance our preparedness and flexibility to deal with them.

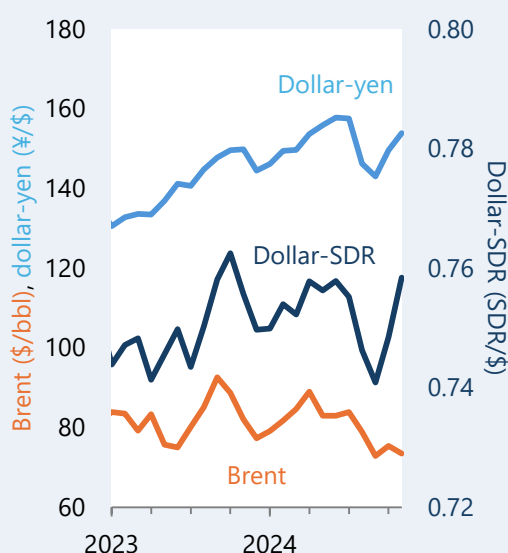
## Topic 2 | Impacts of foreign exchange rate fluctuations on the economy and energy

### Weaker yen due to the dollar's independent appreciation is a headwind for Japan.

#### Wild swings in the yen

Foreign exchange rates are fluctuating wildly. As expectations for Japan's monetary tightening waned, the dollar-yen rate passed the ¥160/\$ mark at the end of June 2024, the weakest for the yen in 38 years (Figure 18). Less than three months later, in September, the yen skyrocketed to ¥140/\$ following a US interest rate cut. However, the US dollar climbed by more than ¥10/\$ in the month since the end of September with the rise in US interest rates, the biggest monthly rise in 38 years since October 1986.

Figure 18 | Brent crude oil price, dollar-yen rate and dollar-SDR rate



Sources: International Monetary Fund, Intercontinental Exchange

Fluctuations in the dollar-yen exchange rate are often expressed as a pair such as 'weaker yen/stronger dollar' or 'stronger yen/weaker dollar'. However, there are differences between a weaker (stronger) yen resulting primarily from

Japan's domestic factors, as in the case above, and a stronger (weaker) dollar caused by developments in the United States, and their impacts sometimes yield very different results.

#### Positive correlation between the weaker yen/stronger dollar and higher oil prices

Traditionally, a strong dollar has been seen as a source of downward pressure on the oil price, which is traded in dollars. A common explanation was that oil felt overpriced when valued in currencies other than the dollar, and this weighed heavily on prices.

However, recently, the strong dollar has not always led to lower oil prices. If we look at the correlation coefficient between the Brent crude oil price and the dollar-Special Drawing Right<sup>7, 8</sup> (SDR) rate, which reflects the dollar's value in SDRs, it was as high as 0.88 from January to October 2024, suggesting that a strong dollar and strong oil prices occurred simultaneously—the situation, however, has seemingly been changing slightly after the US presidential election. The positive correlation between a strong dollar and expensive oil will cause problems for Japan, a crude oil importing country.

#### A stronger dollar, not a weaker yen, as a cause of higher oil prices

The dollar's strength against the yen has two possible causes: the dollar's appreciation and the yen's depreciation. In terms of the relationship with oil prices, it is difficult to conclude that a weaker yen is triggering higher oil prices, given that Japan's oil demand has shrunk to 3% of global demand whilst growing in emerging and developing economies, and that the yen carry

<sup>7</sup> Calculated based on a currency basket of renminbi, euro, yen, sterling and dollar.

<sup>8</sup> The euro-dollar rate or the effective exchange rate of the dollar is sometimes used to measure the dollar's value. However, the euro-dollar rate becomes inappropriate for valuation when the euro appreciates (depreciates) for reasons of its own. The effective exchange rates published by the US Board of Governors of the Federal Reserve System and the Bank for International Settlements is affected heavily by the US dollar's exchange rates against the Canadian dollar and Mexican peso, which are heavily traded with the United States, and therefore may not be appropriate for use as the world dollar.

trades<sup>9</sup> driven by Japan's low interest rates generally target high-interest rate bonds.

Indeed, since the beginning of 2024, a 1% decline in the dollar-yen rate has had only a negligible effect on oil prices (0.03% decrease). On the contrary, a 1% rise in the dollar against the major currencies—the currency basket for the SDR, excluding the US dollar—is estimated to have pushed oil prices up by 5.6%. In other words, it is assumed that it is the dollar's appreciation, rather than the yen's depreciation, which has a stronger correlation with higher oil prices.

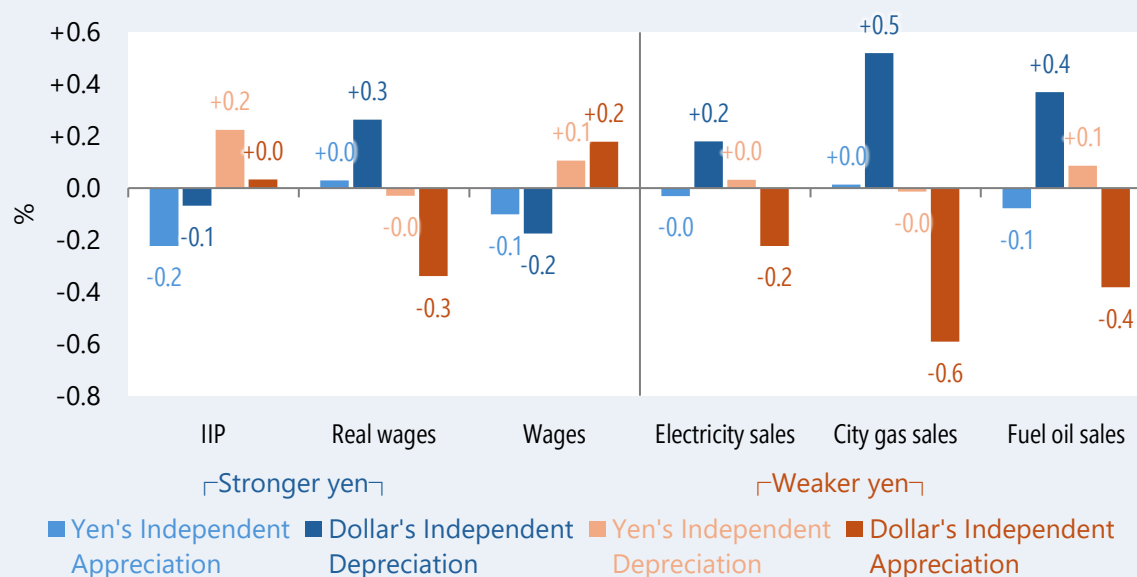
#### A 5% dollar independent appreciation raises fossil fuel imports by ¥3.8 trillion

Exchange rates, like stock prices, are extremely difficult to predict. The Reference Scenario assumes the dollar-yen rate for FY2025 at ¥145/\$. However, the outlook is uncertain, as shown by

the incorrect forecast that the yen would reverse course and rise in 2024.

Consider the situation where the dollar-yen rate changes by about 5% from the Reference Scenario to ¥138/\$ and ¥152/\$. There are two situations for each case: one in which the yen appreciates (depreciates) independently for reasons of its own, and the other in which the dollar appreciates (depreciates) independently against all other major currencies. In the case of the dollar's independent appreciation (depreciation) above, the dollar-based import prices for oil and LNG will change in line with the changes in the dollar exchange rate, reflecting the trends. Specifically, when the dollar rate rises (falls) independently, we assume that oil prices will rise (fall) by 13% and LNG by 21% (with a lag), based on the sensitivity mentioned earlier.

Figure 19 | Impact of changes in the dollar-yen rate (relative to Reference Scenario) [FY2025]



Note: The dollar-yen rate is ¥145/\$ for the Reference Scenario, ¥138/\$ for the 'Yen's Independent Appreciation Case', 'Dollar's Independent Depreciation Case', and ¥152/\$ for the 'Yen's Independent Depreciation Case', 'Dollar's Independent Appreciation Case'.

The adverse effects of an excessively weak yen are a concern, but the impact differs depending on whether the cause is an independently weaker yen or the dollar's rise against all other currencies. In the case of the yen's independent depreciation due to Japan's domestic factors, the economy and production will expand relative to the Reference

Scenario, but real wages will not increase, offset by higher prices. In the case of dollar independent appreciation due to reasons in the United States, rises in oil and LNG import prices will offset the macroeconomic benefits and wages will move downwards.

<sup>9</sup> Yen carry trade is said to weaken the yen as the yen funds raised in Japan, where interest rates are relatively low, are exchanged into foreign currencies for investment abroad.

In all cases, sales of city gas and fuel oil will fluctuate more than electricity as the former are more heavily affected by higher imported fuel prices.

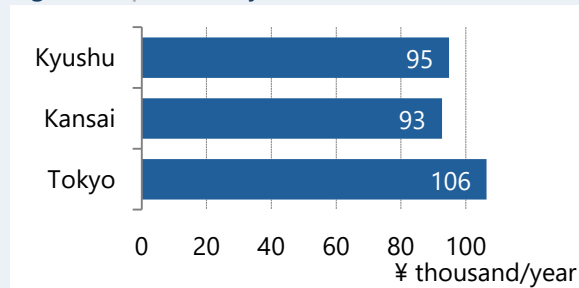
## Topic 3 | Impacts on 3Es based on varying levels of nuclear utilisation

### Nuclear contributing to the '3Es'

Of the 27 nuclear power plants that have applied for a safety assessment in accordance with the new regulation standards, 17 have passed the installation and modification permit criteria; in FY2024, two new plants, Onagawa Unit 2 and Shimane Unit 2, restarted, bringing the total number of plants restarted to 14. On the other hand, the Nuclear Regulation Authority (NRA) recently decided not to allow Tsuruga Unit 2 to restart, stating that the possibility that the plant may be located directly above an active fault cannot be rejected.

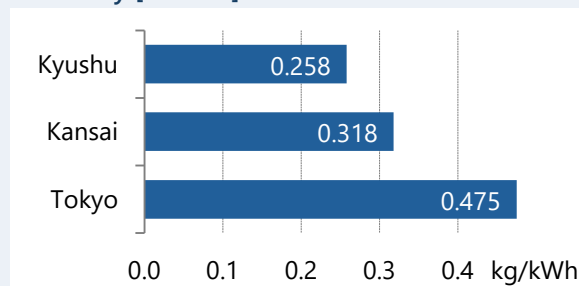
Currently, western Japan is leading the way in restarting nuclear power plants, which is said to be a reason for the differences between East and West Japan regarding electricity. This chapter assesses how the different levels of nuclear utilisation affect Japan's '3Es', i.e. energy security, economic efficiency and environmental compatibility.

**Figure 20 | Electricity bills of model households**



Notes: Metre rate lighting contract, 260 kWh/month, 30 amperes. Based on rates in December 2024. Source: Calculated from each company's tariffs.

**Figure 21 | Base CO<sub>2</sub> emission factor for electricity [FY2023]**



Source: The electric utilities' websites

### Case setup

The Reference Scenario assumes that one more unit will be restarted in FY2025. In this chapter, the following three cases were mechanistically established: 1/ the 'High Case', in which one unit is restarted six months earlier than scheduled in the Reference Scenario and an additional unit is restarted in mid-FY2025, 2/ the 'Low Case', in which no plants are restarted in FY2025 because of lack of local consent, and 3/ the 'Highest Case', in which all 27 units that applied for assessment are restarted and operate at a capacity factor of 80%.

### Economic efficiency

An increase in the use of nuclear power generation reduces fossil fuel import spendings and lowers the unit cost of electricity. Reduced fuel import spendings and cost-push inflation will increase real income and hence real GDP. These benefits will be even greater if oil and LNG prices rise due to the international situation and other factors.

### Energy security

The risk of energy supply disruptions is increasing due to the invasion of Ukraine and the worsening situation in the Middle East. Increased use of nuclear as a domestic energy source will simultaneously reduce LNG imports and boost energy self-sufficiency. A stockpiling effect can also be expected because uranium fuel remains in use for several years.

### Environmental compatibility

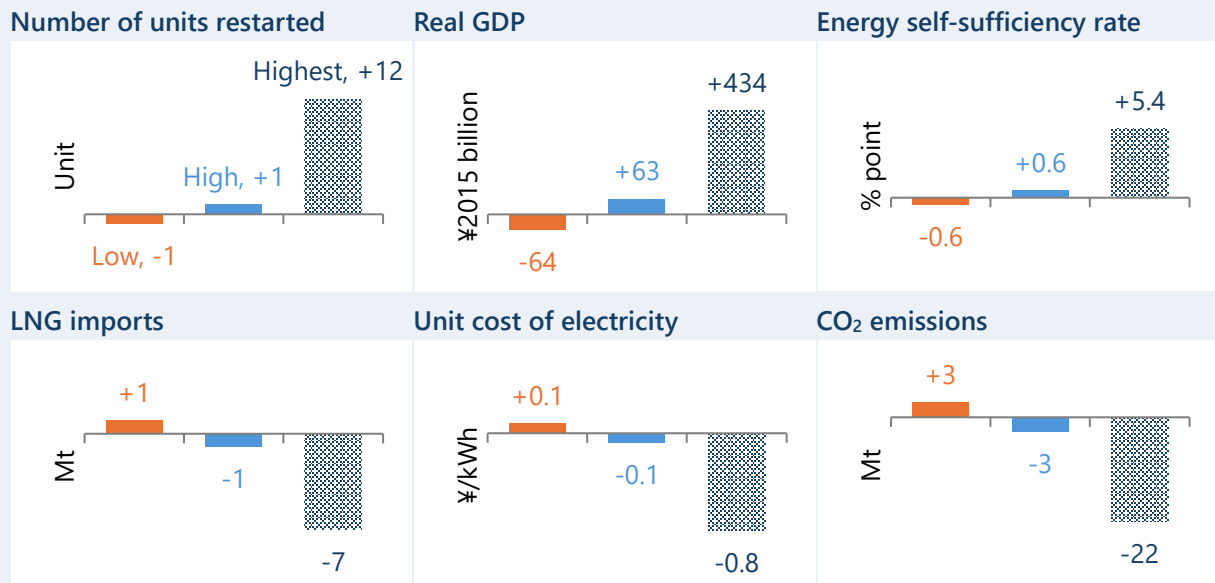
CO<sub>2</sub> emissions will decrease even with the additional emissions from the economic upturn associated with the use of nuclear power generation. In the Highest Case, the emissions would be 31.2% lower compared to FY2013 levels.

### Smooth plant restart while avoiding hasty action

Some nuclear power plants are still undergoing safety assessments while some have finished them but are waiting to restart. Facilitating the restart of nuclear power plants through appropriate assessments that consider the

situation of individual plants and cooperation with the plant-hosting communities will contribute to strengthening the 3Es.

Figure 22 | Impacts based on varying levels of nuclear utilisation (relative to Reference Scenario) [FY2025]



The government intends to utilise nuclear power generation in order to radically increase energy self-sufficiency while promoting decarbonisation. In addition, more people are starting to express expectations for using nuclear power generation as a stable, low-carbon power source to prepare

for future rises in power demand. However, to meet those expectations, it is vital to ensure safety and gain public understanding not only of nuclear power generation but also of the nuclear back end.

**Table 9 | Impacts of using more or less nuclear power generation [FY2025]**

		Low	Reference	High	Highest	Changes from Reference		
		Case	Scenario	Case	Case	Low	High	Highest
Nuclear	Restarted nuclear reactors	14	15	16	27	-1	+1	+12
	Power generation (TWh)	94.8	103.6	112.5	193.4	-8.8	+8.9	+89.8
	Share in total electricity generated	9.2%	10.1%	11.0%	18.8%	-0.9p	+0.9p	+9p
Economy	Real GDP (¥2015 trillion)	564.4	564.5	564.6	564.9	-0.06	+0.06	+0.43
	Trade balances (JPY trillion)	-9.49	-9.43	-9.37	-9.10	-0.06	+0.06	+0.33
	Total fossil fuel imports (JPY trillion)	20.26	20.18	20.09	19.56	+0.09	-0.09	-0.61
	LNG	4.95	4.87	4.79	4.28	+0.08	-0.08	-0.59
	Electricity unit cost <sup>1</sup> (¥/kWh)	10.27	10.20	10.12	9.44	+0.08	-0.08	-0.76
Energy	Primary energy supply							
	Nuclear (Mtoe)	20.2	22.0	23.8	40.4	-1.8	+1.8	+18.4
	Natural gas (Mt of LNG eq.)	85.0	83.7	82.3	73.9	+1.3	-1.3	-9.7
	LNG imports (Mt)	62.4	61.4	60.4	54.0	+1.0	-1.0	-7.4
	Self-sufficiency rate	17.2%	17.7%	18.3%	23.2%	-0.6p	+0.6p	+5.4p
Environ- ment	CO <sub>2</sub> emissions (Mt)	875	872	869	850	+3	-3	-22
	Changes from FY2013	-29.2%	-29.4%	-29.7%	-31.2%	+0.2p	-0.2p	-1.8p

Note: 1. Fuel and FIT purchasing costs divided by total electricity generated.

Contact: [report@tky.iej.or.jp](mailto:report@tky.iej.or.jp)