

Economic and Energy Outlook of Japan for FY2024

Despite improvements of energy consumption per GDP and progression towards decarbonization, the CO₂ reduction pace lags behind the target

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Summary of economic and energy outlook [Reference Scenario]

Macro economy | Real GDP growth rate will continue to rise, but at a slower pace Inflation will continue.

Real GDP for FY2024 will increase for the fourth year in a row but the rate of increase is decelerating (+1.0%). For the third year in a row, the consumer price index will exceed 2%; inflation will continue. Led by automobile production, the index of industrial production will rise for the first time in three years led by automobile and will reach its highest level since FY2020 (+1.2%).

Energy supply and demand | Total primary energy supply will decrease slightly for the second year in a row. LNG imports will be about 30Mt lower than the record high of 89 Mt reached ten years ago in FY2014. The CO₂ reduction will continue but it is lagging behind its target.

Total energy consumption will decrease three years in a row due to a fall in ethylene production and a rise in energy prices, the result of the subsidy program for fuel prices being phased down (-0.6%). With progress in energy savings led by higher energy prices and a continuous relatively high increase of the tertiary industries and non-energy intensive industries, the primary energy supply per GDP will decline reaching less than 80% of the FY2013 ratio (-1.5%). LNG imports will fall lower than 60Mt for the first time since FY2005. The additional LNG imports that were required after the Earthquake are no longer needed because of nuclear power plants restart, the addition of solar PVs, and the start-up of newly installed coal-fired power plants.

For the third year in a row, CO₂ emissions will decrease. The decrease from FY2023 will be of 2.0% down to 909 Mt. However, that level represents a change of only 26.4% from FY2013, compared to the 29.2% required to be in line with the Paris agreement target, which is to cut emissions cut by 45% by FY2030 from FY2013.

Energy sales | Electricity sales will slightly rise. City gas sales will increase for the first time in three years but remain lower than FY2022. Total fuel oil sales will decrease for the third year in a row and be less than 60% of the record high in FY1999.

Electricity sales will be 0.1% slightly higher than FY2023. Reflecting a production recovery in iron and steel, automobile, and service industries, and despite some energy savings resulting from higher electricity prices, overall sales for power services will grow (+0.3%). Sales for lighting services will, however, slightly decrease (-0.1%), primarily due to a penetration of higher efficiency appliances and energy-saving actions brought by higher electricity prices and a cooler summer than in the previous year, despite a colder winter.

City gas sales will increase slightly (+0.1%). While sales to the commercial sector and other sectors will decrease, slight increases in sales to the household and increases in sales to the general industry will contribute to the overall increase in city gas sales. However, gas sales except for the general industry will be lower than FY2022 due to progression of energy-savings while city gas prices are lower.

Fuel oil sales will decrease by 1.2% primarily because less will be used for power generation and as feedstock of ethylene. Other factors include fuel switching and energy savings, the result of higher oil prices brought by the removal of the fuel subsidy program. Gasoline will slightly fall with improved fuel efficiency and diffusion of HVs despite the recovery of transportation demand. Diesel oil will fall due to problems in logistics for 2024.

Renewable power generation | The FIT power generation capacity will reach 107 GW by the end of FY2024.

The installed renewable energy-based power generation capacity (including capacity subject to FIT contract expiration) will reach 107 GW by the end of FY2024. While the addition of residential solar and biomass will accelerate, the expansion pace for non-residential solar will be decelerating. Even so, non-residential solar will reach at 64.1GW in FY2024. Wind capacity will accelerate and reach 6.8 GW due to growing pressures to get FIT brought by setting operation deadline and expiration date for non-operating plants. Renewable power generation in FY2024 will total 212.1 TWh (including 98.8 TWh for solar PV, 44.5 TWh for small and medium-sized hydro plants, 51.6 TWh for biomass, 13.3 TWh for wind), accounting for 21.1% of Japan's total power generation. With the inclusion of large-scale hydro, renewable power generation will account for 24.6%.

Table 1 | Summary of Reference Scenario

	Historical				Projection		Year-over-year			
	FY2013	FY2020	FY2021	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024	
Energy	Primary energy supply (Mtoe) ¹	490.5	415.5	430.1	416.5	413.0	410.7	-3.2%	-0.8%	-0.6%
	Oil ² (GL)	234.5	170.0	175.1	172.8	169.4	166.7	-1.3%	-2.0%	-1.6%
	Natural gas ² (Mt of LNG equiv.)	90.1	78.4	73.9	70.4	66.3	60.7	-4.7%	-5.9%	-8.3%
	Coal ² (Mt)	194.6	174.6	184.6	177.1	172.6	173.7	-4.1%	-2.5%	0.6%
	Nuclear (TWh)	9.3	37.0	67.8	53.5	82.8	113.7	-21.0%	54.6%	37.5%
	Renewable electricity ³ (TWh)	118.5	196.8	208.1	221.2	237.5	247.5	6.3%	7.4%	4.2%
	FIT generation (TWh)	76.5	158.1	169.3	185.2	199.2	212.1	9.4%	7.5%	6.5%
	Self-sufficiency ratio	6.5%	11.3%	13.3%	12.6%	14.8%	17.0%	-0.7p	2.1p	2.2p
	Electricity sales ⁴ (TWh)	(871.5)	820.9	837.1	822.2	820.6	821.6	-1.8%	-0.2%	0.1%
	City gas sales ⁵ (Billion m ³)	39.82	39.51	41.15	40.24	39.83	39.86	-2.2%	-1.0%	0.1%
	Fuel oil sales (GL)	193.6	152.0	153.8	150.8	148.9	147.1	-1.9%	-1.3%	-1.2%
	Energy-related CO ₂ emissions (Mt)	1,235	967	987	958	928	909	-2.9%	-3.2%	-2.0%
(Changes from FY2013)	-	-21.7%	-20.1%	-22.5%	-24.9%	-26.4%	-2.4p	-2.5p	-1.5p	
Prices	Crude oil, import, CIF (\$/bbl)	110	43	78	103	85	91	32.6%	-17.5%	6.9%
	LNG, import, CIF (\$/MBtu)	16.2	7.5	12.1	18.0	12.2	12.2	48.8%	-32.1%	0.1%
	Steam coal, import, CIF (\$/t)	108	80	162	361	204	167	122.7%	-43.5%	-18.2%
	Coking coal, import, CIF (\$/t)	135	105	195	338	256	211	73.4%	-24.4%	-17.6%
Economy	Real GDP (JPY2015 trillion)	532.1	528.8	543.6	551.8	560.5	566.2	1.5%	1.6%	1.0%
	Industrial production (CY2020=100)	111.7	99.7	105.2	104.9	104.2	105.4	-0.3%	-0.7%	1.2%
	Balance of trade (JPY trillion)	-13.8	1.0	-5.7	-22.0	-7.7	-5.5	288.7%	-65.1%	-29.1%
	Fossil fuel imports (JPY trillion)	28.4	10.6	19.9	35.3	26.9	25.6	77.1%	-23.7%	-4.9%
	Exchange rate (JPY/\$)	100.0	106.0	111.9	135.0	144.8	140.0	20.6%	7.3%	-3.3%
	Cooling degree days	511	442	407	506	614	416	24.4%	21.2%	-32.2%
Heating degree days	1,024	863	966	850	902	971	-12.0%	6.2%	7.6%	

Notes:

1. Mtoe = 10⁹ kcal

2. Conversion factors for oil: 9,145 kcal/L; Natural gas: 13,016 kcal/kg; Steam coal: 6,203 kcal/kg; Coking coal: 6,877 kcal/kg since FY2013.

Conversion factors for oil: 9,139 kcal/L; Natural gas: 13,068 kcal/kg; Steam coal: 6,203 kcal/kg; Coking coal: 6,866 kcal/kg since FY2018.

3. Including large hydro 30 MW or more. 4. Figures in parentheses are old statistical figures. 5. Conversion factor: 1 m³ = 10,000 kcal

Topic |

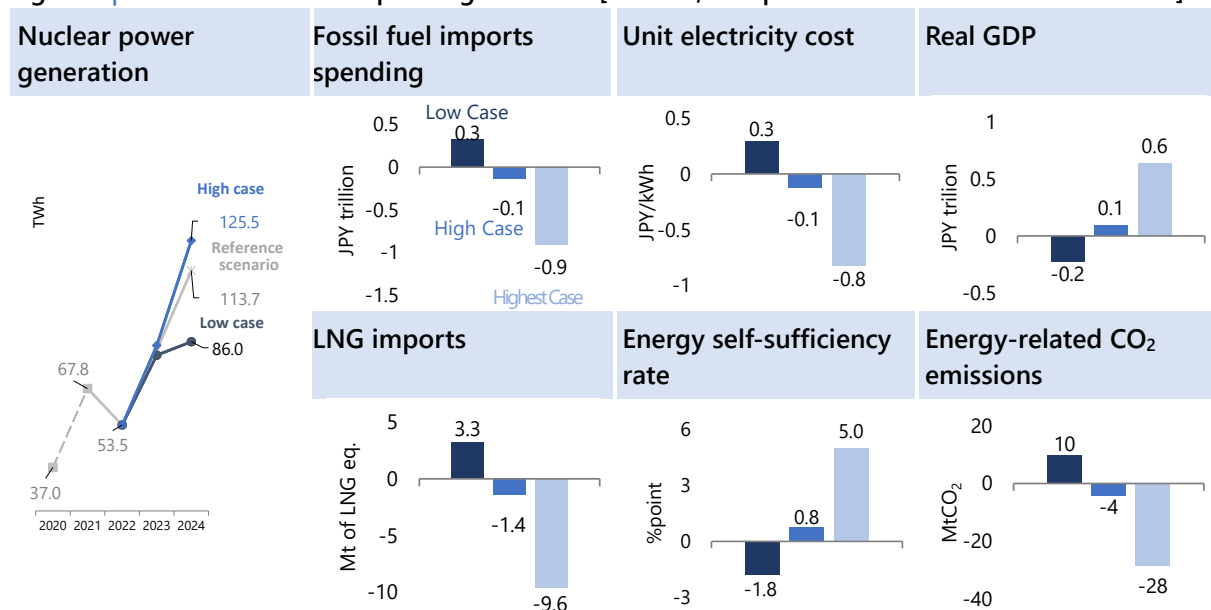
1 Impacts of the subsidy program for fuel prices

The subsidy program to lower fuel prices will be extended until April 2024 and will be phased down after May. If the subsidy program for fuel prices was extended to the end of FY2024, energy prices would lead to lower commodity prices, drive up economic growth and spur industrial production. On the other hand, the subsidy program would have pushed upward energy consumption and CO₂ emissions. As such, the program could be interpreted as temporarily delaying energy savings and postponing reductions in CO₂ emissions. An extension of the subsidy program for fuel prices would also have substantially increase government spendings. The challenge will be to introduce appropriate phase-out measures to minimize the negative effects of the subsidy while recognizing there will be, as in the past, fluctuations in fossil fuel prices. In addition, it is important to reduce energy expenditures by enhancing efficiencies through assistance programs for energy savings in the short term and supply energy through domestic energy such as restart of nuclear power generation and acceleration of install of renewable energy in the middle to long term. Combining and implementing such short, middle and long-term measures are essential in the development of an exit strategy for the subsidy program.

2 Impacts of the progresses of nuclear plant restarts

We assessed the impacts of nuclear power generation on 3Es – economy efficiency, energy security and environment. In the High Case compared to the reference scenario, one more plant would return to operation in FY2024. In such Case, the cost of fossil fuel imports would be reduced by JPY100 billion, the self-sufficiency rate would be improved by 0.8 points, and CO₂ emissions would be reduced by 4 Mt. Considering what each nuclear power plant can contribute to the 3Es, a smooth restart of the plants would be benefits.

Figure 1 | Effect of the nuclear power generation [FY2024, compared with the Reference Scenario]



Overview

In the third quarter (July-September) of 2023, Japan posted a negative GDP growth (-0.7%) for the first time in four quarters. In addition to private consumption and capital investment, inventories made a negative contribution, and the contribution of private demand was -0.6%. Private consumption was at the same level as the previous year as face-to-face services such as restaurants and accommodation, etc. increased due to the recovery after the COVID-19 pandemic, while consumers were saving-oriented due to consumer price rises. Moreover, capital investment in machinery is sluggish due to sluggish global demand, and the decline in demand as a consequence of global inflation is weighing on economic growth. Exports of cars were solid, so product inventories centered on cars decreased.

The factors behind rises in oil import prices from January 2023 onward included Europe's shift from natural gas to oil and the continued reduction of production of crude oil by 2Mb/d by OPEC+, etc. while the factors behind falls included concerns about the slowdown of the world economy and emerging countries and developing countries taking over purchases of Russia-produced crude oil, etc., so the price was fluctuating in the \$80-\$90/bbl range. However, due to concerns that the attack on Israel by the Palestinian Islamic organization Hamas in October

could obstruct the crude oil supply, the price rose to the \$90-\$100/bbl range for the first time in ten months. Moreover, the foreign exchange rate is also weighing heavily on the Japanese economy still recovering from the pandemic.

Regarding the consumer price index (CPI), the subsidy program to curb excessive price increases was introduced for electricity and city gas in addition to fuel oil from January 2023 and from February 2023 onward, energy has continued to contribute to the decrease in the CPI compared to the same period in the previous year. However, in addition to the entrenchment of the depreciation of the yen, higher prices are continuing to be passed on to consumers, so rises of 3.0% or more compared to the same period in the previous year were seen for 15 consecutive months from August 2022 onward.

As for nuclear power, 27 plants have applied for the safety assessment in accordance with the new regulation standards: 17 have passed the assessment based on the installation permit standard and 12 have restarted. However, three out of those 12 reactors remained shut down for extended periods in FY2022 for not completing the construction of their specialized safety facilities (SSFs) in time.

Major Assumptions for the Reference Scenario

World economy

The global economic growth rate is estimated at +3.0% for 2023 and +2.9% for 2024. In 2023, growth slowed down due to the war in Ukraine, inflation, and interest rate rises implemented by the US and Europe to combat inflation. In 2024, growth will slow down due to the escalation of the real estate crisis in China in addition to the prolonged monetary tightening by the US and Europe. For the second year in a row, it will be much lower than +3.8%, the average from 2000 to 2019, before the COVID-19 pandemic.

Import CIF prices of fossil fuels

Japan's average oil import price is assumed at \$85/bbl for FY2023 (\$84/bbl in the first half, \$86/bbl in the second half) and at \$91/bbl for FY2024. The LNG price tracks the crude oil price with a delay and is assumed at \$12.2/MBtu for FY2023 and \$12.2/MBtu for FY2024. The price of steam coal is assumed at \$204/t for FY2023 and \$167/t for FY2024, and that of coking coal is estimated at \$256/t for FY2023 and \$211/t for FY2024 ("International Oil Market Outlook for 2024" by Morikawa, "Gas Market Outlook for 2024" by

Hashimoto, and "Coal Market Outlook for 2024" by Takahashi, IEEJ).

Foreign exchange rate

The average USD/JPY exchange rate is assumed at JPY144.8/USD for FY2023 and at JPY140.0/USD for FY2024.

Subsidy program to curb excessive price increases

Until April 2024, the subsidy program to curb excessive price increases will subsidize fuel oil 100% when more than 17 yen higher than 168 yen and 60% when less than 17 yen higher than 168 yen, and it is assumed that city gas will be 15 yen/m³ for households and for companies with annual contract amounts less than 10 million m³ and electricity will be subsidized at 3.5 yen/kWh for low voltage and 1.8 yen/kWh for high voltage. It is assumed that from May 2024 onward, the subsidy rate for fuel oil will be phased out by three-tenths each month. It is assumed that city gas and electricity will be half price from May to September.

Nuclear power

Power plant restarts are expected to move forward with the progress in safety assessments in accordance with the new regulatory standards. In FY2023, three new nuclear plants restarted in turn and the average operating period is estimated at 9 months. The total estimated power output is 82.8 TWh (up 54.6% year-on-year). In FY2024, three plants are expected to restart in turn, bringing the total number of plants that have restarted since the Great East Japan Earthquake to 16. A total of 113.7 TWh of electricity will be produced (up 37.5% year-on-year) with an average operating period of 11 months.

Temperature

Based on the three-month forecast of the Japan Meteorological Agency, for the winter of FY2023, the temperature is likely to be higher than the average year, and is then expected to be similar to the average year thereafter. In FY2023, the summer was hotter than the previous year (+1.4°C) and the winter was colder (-0.6°C) compared to the previous year. For FY2024, the summer is forecast to be cooler than the previous year (-2.1°C) and the winter colder (-0.3°C).

Macroeconomy

In FY2024, real GDP will rise for a fourth year, though only at a moderate pace. The consumer price index will rise at more than 2% for the third year in a row and inflation will be entrenched

Real GDP will grow 1.6% yoy in FY2023 as it recovers centered on foreign demand. Private consumption will increase, centered on face-to-face services, but the consumption of food products and daily goods, etc. will decrease due to people holding back on purchasing as a consequence of consumer price rises, so it will be only a slight increase (+0.2%). Capital investment will increase slightly (+0.1%). Although the willingness of companies to invest will recover, construction costs will rise and the semiconductor market conditions will be sluggish. Private demand will contribute a decrease of 0.1%, partly because there was a decline in inventories. Public demand will contribute a 0.3% increase due to the increase in medical expenses and foreign demand will contribute a 1.3% increase due to the increase in automobile exports and inbound business demand and the decrease in imports due to sluggish domestic demand.

In FY2024, real GDP will increase driven by domestic demand but at a slower pace of +1.0% yoy. Private consumption will increase (+1.1%) because, although consumer prices will continue to rise, a demand recovery centered on face-to-face services will continue and in addition, the shortage of semiconductor components will ease for automobiles. Capital investment will increase (+2.3%) despite price rises for investment goods such as personnel expenses,

buildings, software, etc. as corporate revenue picks up with the economic recovery. In addition to informatization investment and research and development investment for streamlining and digitalizing business operations, climate investment for decarbonization will accelerate. Private demand will contribute to an increase of 0.9%, though the demand will be smaller than the record high in FY2018. Public demand will contribute an increase of 0.2%, marking a record high with an increase in public investment such as for the Action Plan for National Resilience, and for the government spending on healthcare and nursing care costs which are increasing due to the ageing of the population and on increased defence expenditure, and so on. Despite the continuing increase of inbound business demand and auto exports, foreign demand will post a negative contribution of 0.1% caused by an increase in imports due to the recovery of domestic demand.

Regarding the consumer price index in FY2024, due to the rise in personnel expenses and logistics costs brought by a tight supply, among other factors, higher prices will continue to be passed on to consumers, particularly for food products, and the rate of the rise will be higher than 2% for the third year in a row. The subsidy program to curb excessive price increases will be reduced and energy will contribute to the rise.

Table 1 | Macroeconomy

	Historical				Projection		Year-over-year		
	FY2013	FY2020	FY2021	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024
Real GDP (JPY2015 trillion)	532.1	528.8	543.6	551.8	560.5	566.2	1.5%	1.6%	1.0%
Private demand	408.1	389.3	398.5	409.3	409.2	414.2	(2.0%)	(-0.1%)	(0.9%)
Private consumption	306.0	285.3	290.4	298.1	298.6	302.0	2.7%	0.2%	1.1%
Private residential investment	21.5	18.9	18.9	18.3	18.6	18.6	-3.4%	1.9%	-0.4%
Private non-residential investment	82.0	85.5	86.9	89.9	90.0	92.1	3.4%	0.1%	2.3%
Public demand	131.2	143.3	145.2	145.2	146.7	147.8	(-0.0%)	(0.3%)	(0.2%)
Government consumption	103.1	114.0	117.7	119.3	120.1	120.8	1.4%	0.7%	0.6%
Public investment	28.1	29.4	27.5	25.9	26.6	26.9	-6.1%	2.9%	1.3%
Net exports of goods and services	-7.4	-4.1	0.5	-1.9	4.3	3.9	(-0.5%)	(1.3%)	(-0.1%)
Exports of goods and services	85.1	92.4	103.9	108.8	112.1	114.4	4.7%	3.1%	2.0%
Imports of goods and services	92.5	96.5	103.4	110.7	107.9	110.5	7.1%	-2.6%	2.4%
Nominal GDP (JPY trillion)	512.7	539.0	553.6	566.5	597.0	614.8	2.3%	5.4%	3.0%
Balance of trade (JPY trillion)	-13.8	1.0	-5.7	-22.0	-7.7	-5.5	288.7%	-65.1%	-29.1%
Exports	70.9	69.5	85.9	99.2	105.0	107.8	15.5%	5.9%	2.6%
Imports	84.6	68.5	91.5	121.3	112.7	113.3	32.5%	-7.0%	0.5%
Fossil fuels	28.4	10.6	19.9	35.3	26.9	25.6	77.1%	-23.7%	-4.9%
Oil	18.7	5.8	11.2	17.8	15.5	15.9	58.3%	-13.0%	2.9%
LNG	7.3	3.2	5.0	8.9	5.9	5.2	77.6%	-34.0%	-11.4%
Current account (JPY trillion)	2.4	16.9	20.1	8.3	24.9	28.7	-58.9%	201.2%	15.4%
Domestic corporate goods price index (2020=100)	99.4	99.9	107.0	117.2	119.6	120.1	9.5%	2.1%	0.4%
Consumer price index (2020=100)	95.2	99.9	100.0	103.2	106.1	108.5	3.2%	2.8%	2.3%
Unemployment rate (%)	3.9	2.9	2.8	2.6	2.6	2.4	[-0.2p]	[+0.0p]	[-0.2p]

Notes: GDP components may not add up to the total GDP due to stock changes and minor data deviations.

() stands for contributions. [] stands for changes from the previous year.

Production Activity

In FY2024, industrial production will increase for the first time in three years and reach its highest level since FY2020 as production increases mainly in the automobile sector which has been slow to recover. On the other hand, the three energy-intensive materials industries, except for iron and steel, will be lower than in FY2022

The industrial production index for FY2023 will fall yoy (-0.7%) as, despite the increased production of automobiles, demand for consumer electronic equipment will decrease due to people holding back on purchasing caused by rising product prices and due to the shift to the consumption of services, and in addition demand for industrial equipment will decrease, centered on electronic components and devices, including semiconductor memory. In FY2024, in addition to the increased production of automobiles, capital investment for digitalization and greening will progress, so the industrial production index will rise (+1.2%), centered on heavy electrical equipment.

In FY2023, crude steel production will increase slightly (+0.2%) as exports recover centered on the United States and South Korea, even though domestic demand for construction and electric machinery will fall. In FY2024, crude steel production will increase (+0.5%) due to increased production of automobiles. Domestic demand will decrease slightly even though demand centered on electric machinery and automobiles will increase, because regulations on the upper limits to working hours have been applied under laws related to workstyle reforms in the construction industry, so the construction periods have been prolonged and construction materials will decrease. Exports will increase as a consequence of the recovery in exports for China and ASEAN.

In FY2023, ethylene production will decrease slightly yoy due to sluggish domestic demand (-0.3%). Exports will increase due to the rebound after the excess production of China was sold cheaply to the Asian market in the previous fiscal year. Domestic demand will decrease centered on demand for food packaging containers due to rising consumer prices. In FY2024, in the Asian market, ethylene production will decrease (-2.8%) as cheap ethylene with ethane derived from natural gas as the raw material becomes available from the United States in addition to China and exports fall. Even though demand will be stagnant due to rising consumer prices, demand for synthetic resin will increase due to increased production of automobiles and domestic demand will increase.

In FY2023, cement production will decline and fall below 50 Mt for the first time since FY1968 (-5.3%). Domestic demand will decrease as a consequence of labor shortages on construction sites, heavy rainfalls, and record-breaking extreme heat. Exports will decrease due to rises in raw material costs. In FY2024, cement production will decrease very slightly (-0.2%) as domestic demand will decrease, despite the increase in exports. Even though there will be construction projects, domestic demand will decrease as the construction period becomes more prolonged because regulations on the upper limits to working hours have been applied under laws related to workstyle reforms in the construction industry. Exports will increase centered on Australia as raw material costs fall.

In FY2023, paper and paperboard production will decrease (-4.4%) because of people holding back on purchasing daily goods due to rising consumer prices in addition to decreases in demand for newspapers, paper for events and publishing due to the structural factor of digitalization, and in addition because paperboard for electronic commerce applications will also decrease. Production will decrease (-1.2%) in FY2024 as well due to the long-term decline of newspapers, office paper, etc. amid a structural change toward digitalization, even though the use of paperboard for electronic commerce applications will increase slightly.

In FY2023, automobile production will recover as a consequence of the easing of the impact of the shortages of on-vehicle semiconductors, etc. (+9.9%). However, the semiconductors shortages will continue, so automobile production will be slightly higher than FY2009 levels (8,865 thousand units), when the bankruptcy of Lehman Brothers occurred. In FY2024, automobile production will continue to increase as the impact of shortages of on-vehicle semiconductors will be further eased (+4.3%). However, it will not return to the level of FY2019 (9,489 thousand units). The rate of increase in domestic shipments will slow down as the waiting time for vehicle delivery eases. Exports will increase on the back of demand in North America.

Table 2 | Production Activity

	Historical				Projection		Year-over-year			
	FY2013	FY2020	FY2021	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024	
Production	Crude steel (Mt)	111.5	82.8	95.6	87.8	88.0	88.5	-8.2%	0.2%	0.5%
	Ethylene (Mt)	6.76	6.04	6.10	5.48	5.47	5.32	-10.2%	-0.3%	-2.8%
	Cement (Mt)	62.4	56.1	55.7	51.5	48.7	48.7	-7.6%	-5.3%	-0.2%
	Paper and paperboard (Mt)	26.7	22.7	24.0	23.3	22.3	22.0	-3.0%	-4.4%	-1.2%
	Automobiles (Million units)	9.91	7.97	7.55	8.10	8.90	9.29	7.4%	9.9%	4.3%
Production indices	Mining and manufacturing (2020=100)	111.7	99.7	105.2	104.9	104.2	105.4	-0.3%	-0.7%	1.2%
	Food and tobacco	103.6	99.6	99.2	98.5	97.7	97.6	-0.6%	-0.8%	-0.1%
	Chemicals	107.2	99.3	105.2	102.6	100.1	101.4	-2.5%	-2.4%	1.3%
	Non-ferrous metals	110.9	100.0	106.8	105.5	103.7	104.2	-1.2%	-1.7%	0.5%
	Machinery	111.3	100.0	106.7	108.6	109.1	111.5	1.8%	0.5%	2.2%
Tertiary industry activity index (2015=100)		100.8	95.3	97.5	99.6	101.8	103.1	2.2%	2.2%	1.3%

Notes: Chemicals include chemical fibers.

Machinery includes general machinery, electrical machinery, information and telecommunications equipment, electronic parts and devices, precision machinery and metal products.

Domestic Primary Energy Supply

In FY2024, slight decreases in energy demand will continue. LNG imports will be 30 Mt lower than the record high of 89 Mt reached ten years ago in FY2014. CO₂ emissions will continue to fall but progress toward the achievement of the FY2030 target is lagging behind

In FY2023, the domestic primary energy supply will decrease yoy due to declining production in energy-intensive industries (-0.8%). In FY2024, the supply will decrease for the third year in a row, with the declining production of ethylene and the rises in energy wholesale and retail prices due to the ending of the subsidies to curb excessive price increases contributing to this result (-0.6%). In addition to improving energy efficiency, the increases in activity by non-energy-intensive industries and tertiary industries will grow relatively, so energy intensity per unit of GDP will improve and decrease for the third year in a row (FY2023: -2.4%, FY2024: -1.5%). It will go lower than 80% of the FY2013 ratio.

New energy, etc. including solar PV, wind power and biomass will grow yoy mainly among non-residential solar PV and biomass using FIT (FY2023: +4.9%, FY2024: +3.3%). In FY2024, it will account for 7% of the domestic primary energy supply.

Nuclear power will increase yoy as three plants restarted in FY2023 and a further three plants will restart in turn in FY2024 (FY2023: +53.1%, FY2024: +36.0%).

In FY2023, oil supply will decrease despite the recovery in transportation demand and the increased production of ethylene, as the availability factor of oil-fired thermal plants falls, energy efficiency improves, and fuel conversion encouragements (-2.0%). In FY2024, the oil supply will decrease due to the decrease in naphtha with the decrease in ethylene production and progress in energy savings due to the rise in oil product prices as a consequence of the subsidies to curb excessive price increases ending (-1.6%).

In FY2023, coal supply will decrease due to a decrease in the use of coal in industry as a consequence of the decrease in cement production (-2.6%). Supply of coal for electricity uses will increase because three coal-fired thermal plants (1,800 MW) will start operations, while only one plant (175 MW) will be closed and biomass combustion is making progress at the existing coal-fired thermal plants. In FY2024, coal supply will increase due to higher crude steel production and the coal-fired thermal plants which started operations in FY2023 will be operating during the fiscal year (+0.5%).

Natural gas supply will decrease yoy (FY2023: -5.9%, FY2024: -8.3%) chiefly for power generation, as coal-fired thermal plants and solar PV power plants start operations and the restarts of nuclear power plants proceed in FY2023 and FY2024. In FY2024, LNG imports will decrease to 50-60 Mt for the first time since FY2005 and the significant increase since the Great East Japan Earthquake will be largely erased (-8.6%).

The self-sufficiency rate will rise for the second year in a row as the supply of new energy, etc. and nuclear power increases (FY2023: +2.1p, FY2024: +2.2p). In FY2024, it will be 17.0%, but progress toward achievement of the FY2030 target (about 30%) is lagging.

Energy-related CO₂ emissions will decrease for three years in a row to 909 Mt in FY2024 (FY2023: -3.2%, FY2024: -2.0%). However, at a 26.4% decrease compared with FY2013, there is more CO₂ than the FY2024 target value (29.2% reduction) shown on the straight line to the FY2030 reduction target (45% reduction compared to FY2013), so the progress of reduction continues to lag behind the target.

Table 3 | Domestic Primary Energy Supply

	Historical				Projection		Year-over-year		
	FY2013	FY2020	FY2021	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024
Primary energy supply (Mtoe)	490.5	415.5	430.1	416.5	413.0	410.7	-3.2%	-0.8%	-0.6%
Coal	126.1	110.7	118.9	114.0	111.0	111.6	-4.1%	-2.6%	0.5%
Oil	214.4	155.4	160.0	157.9	154.8	152.4	-1.3%	-2.0%	-1.6%
Natural gas	117.3	102.5	96.6	92.0	86.6	79.4	-4.7%	-5.9%	-8.3%
LNG imports (Mt)	87.7	76.4	71.5	70.5	64.0	58.5	-1.3%	-9.2%	-8.6%
Hydro	16.6	16.2	16.3	16.0	16.7	16.3	-2.1%	4.5%	-2.3%
Nuclear	1.9	7.9	14.5	11.5	17.6	23.9	-20.8%	53.1%	36.0%
New energy, etc.	14.1	22.7	23.9	25.1	26.3	27.2	5.2%	4.9%	3.3%
Self-sufficiency rate	6.5%	11.3%	13.3%	12.6%	14.8%	17.0%	-0.7p	+2.1p	+2.2p
Primary energy supply per GDP (FY2013=100)	100.0	85.2	85.8	81.9	79.9	78.7	-4.6%	-2.4%	-1.5%
Energy-related CO ₂ emissions (MtCO ₂)	1,235	967	987	958	928	909	-2.9%	-3.2%	-2.0%
Change from FY2013	-	-21.7%	-20.1%	-22.5%	-24.9%	-26.4%	2.4p	2.5p	1.5p

Notes: New energy, etc includes solar photovoltaics, wind, biomass, solar heat, and geothermal, etc.

Self-sufficiency rate is based on IEA standard.

Electricity Sales, Power Mix (for electricity businesses), and Prices for Electric Power and Lighting

In FY2024, electricity sales will only increase slightly even though demand for electricity will turn to increase. Due to nuclear power plant restarts and the continued growth of renewable energy, the ratio of non-fossil power sources will go above FY2010 for the first time since the Great East Japan Earthquake

In FY2023, overall electricity sales will decrease slightly yoy (-0.2%). The sales for power service will slightly decrease because of the decrease in the production of machinery and devices and ethylene, etc., even in the context of an increase in the production of automobiles and increased activity in the service business (-0.1%). The sales for lighting services will decrease (-0.5%) due to the fall in the stay-at-home rate and the progress in energy saving due to growing awareness of power saving, even though the winter will be colder. In FY2024, electricity sales will increase only slightly (+0.1%). The sales for power service will increase (+0.3%) due to increased production of iron and steel and automobiles and increased activity in the service business, despite the progress of energy saving. The sales of lighting service will decrease slightly (-0.1%) due to the progress in energy saving and the continued awareness of power saving due to electricity price rises and in addition because the summer will be cooler, even though the winter will be colder.

The electricity price will fall yoy in FY2023 (-16.1%) due to a decline in fuel prices, the fall in renewable energy surcharges as a consequence of the rising fuel prices in the previous fiscal year, and the effect of the subsidies to curb excessive price increases. In FY2024, the price will rise (+7.9%) due to rises in fuel prices, rises in the renewable surcharges based on the fall in fuel prices in the previous fiscal year and the fact that

the subsidies under the subsidy program to curb excessive price increases will be removed during the fiscal year, but it will be below the record high in FY2022.

As for the power mix, in FY2023, nuclear power will increase as the restarts of three plants proceed (+3.2p). In FY2024, restarts of a further three plants will proceed, so nuclear power will increase (+3.4p). Renewables (excluding hydropower) will increase mainly for non-residential solar PV, rising 1.3p yoy in FY2023 and 1.4p yoy in FY2024. Non-fossil power sources will increase by 4.7p in FY2024 to 39.5%, going above FY2010 (38.2%) for the first time since the Great East Japan Earthquake. However, continued expansion is necessary for the achievement of FY2030 NDC (non-fossil ratio of about 59%).

In FY2024, the share of coal will increase (+0.3p) as the three coal-fired power plants which started operations during FY2023 (Yokosuka 1, Saijo 1, and Yokosuka 2; 1,800 MW in total) will be operating during the fiscal year. The share of oil, etc. will decrease in FY2024 (-0.4p) mainly as oil-fired thermal power (burning Bunker C and crude oil) will decrease. The share of LNG will be 24.4% (-4.5p) in FY2024 due to the increase in non-fossil power sources and lower costs of coal-fired power, falling below the share of coal for the first time since the Great East Japan Earthquake.

Table 4 | Electricity Sales, Power Mix, and Prices for Power Service and Lighting Service (for electricity businesses)

	Historical				Projection		Year-over-year		
	FY2013	FY2020	FY2021	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024
Electricity sales (TWh)	(871.5)	820.9	837.1	822.2	820.6	821.6	-1.8%	-0.2%	0.1%
Lighting service	284.3	278.0	278.1	270.3	268.9	268.5	-2.8%	-0.5%	-0.1%
Power service	(587.2)	543.0	559.0	552.0	551.7	553.1	-1.2%	-0.1%	0.3%
Extra-high and High voltage	(545.8)	506.7	523.3	516.9	516.5	518.2	-1.2%	-0.1%	0.3%
Low voltage	(41.3)	36.2	35.7	35.1	35.2	34.9	-1.8%	0.4%	-0.9%
Electricity generated and purchased (TWh)	(963.5)	920.3	945.5	916.7	914.8	915.9	-3.0%	-0.2%	0.1%
Hydro	(8%)	9.5%	9.5%	9.6%	10.0%	9.8%	0.1p	0.4p	-0.2p
Fossil fuels	(89%)	74.0%	70.1%	70.0%	65.1%	60.5%	-0.1p	-4.8p	-4.7p
Coal	(30%)	27.8%	27.7%	28.0%	27.7%	27.9%	0.2p	-0.3p	0.3p
LNG	(44%)	38.6%	33.8%	33.0%	29.0%	24.4%	-0.8p	-4.0p	-4.5p
Oil, etc.	(15%)	7.5%	8.6%	9.0%	8.5%	8.1%	0.5p	-0.5p	-0.4p
Nuclear	(1%)	4.0%	7.2%	5.8%	9.0%	12.4%	-1.3p	3.2p	3.4p
Renewables (excluding hydro), etc.	(2%)	12.5%	13.2%	14.6%	15.8%	17.3%	1.3p	1.3p	1.4p
Electricity prices (JPY/kWh)	(20.8)	20.5	22.2	29.5	24.7	26.7	32.6%	-16.1%	7.9%
Lighting service	18.1	26.0	27.9	33.9	24.4	27.7	21.6%	-27.9%	13.2%
Power service	(20.5)	17.5	19.0	27.3	24.9	26.2	43.9%	-8.9%	5.4%

Notes: Figures in brackets are based on old statistical definitions, and discontinuous with other values.

"Electricity sales" is for electricity utility use, and does not include own use and specified supply.

"Electricity generated and purchased" is only for general electric utilities in FY2013, and its figures since FY2016 are estimated values.

Hydro includes pumped, and LNG includes city gas.

City Gas Sales and Price for City Gas (for gas businesses)

In FY2024, city gas sales for commercial use and for other uses will decrease, but overall sales will increase for the first time in three years, mainly due to the increase in sales for manufacturing uses. However, they will be lower than FY2022

City gas sales¹ will decrease yoy in FY2023 (-1.0%) mainly due to a decrease in industrial uses, despite an increase in commercial uses. They will increase slightly in FY2024 (+0.1%) due to the slight increase in residential uses and an increase in manufacturing uses, despite the decrease in commercial uses and other uses. Even though prices will be lower than FY2022, due to progress in energy saving, etc. all uses except manufacturing uses will be below FY2022 levels.

The sales of city gas for residents will continue to decline structurally due to the progress of electrification including the spread of full electrification, etc. and due to the progress in energy saving including the spread of energy-efficient water heaters, etc. They will decrease slightly yoy in FY2023 (-0.2%) due to a decline in the stay-at-home rate and the progress in energy saving, even though the winter will be colder. They will increase slightly in FY2024 (+0.1%), even in the context of the progress in energy saving and the effect of rising awareness of gas saving due to city gas price rises, because the winter will be colder.

The sales for manufacturing will decrease yoy in FY2023 (-0.6%) due to a decreased production of machinery and devices, despite the increased production of automobiles. They will increase in FY2024 (+0.6%) due to the continued increased production of automobiles and recovery of the production of machinery and devices, but they will be lower than in FY2021 when there was a demand increase due to the rebound after the COVID-19 pandemic. In FY2023, the sales of city gas for power

generation (electricity utility) decreased (-6.1%) as the operation of relatively high-cost gas-fired power generation plants decreased in the context of falling market prices for electricity. In FY2024, they will remain mostly flat (+0.0%). As a result, total sales for industrial use will decrease in FY2023 (-1.9%) and increase in FY2024 (+0.4%).

The sales of city gas for commercial use will increase yoy in FY2023 (+1.1%) due to increased activity and increased demand for hot water supply and heating from the previous year, particularly in the face-to-face activities such as accommodations, eating and drinking services sector and the living-related services and amusement services sectors, and due to the increase in demand for cooling because it was extremely hotter. In FY2024, they will decrease (-1.4%) because of energy saving progress due to upgrades to highly efficient GHPs, etc. and because cooling demand will decrease due to the cooler summer. The sales for other uses will increase in FY2023 (+0.4%) mainly because the winter will be colder. They will decrease in FY2024 (-0.9%) due to the progress in energy saving and the cooler summer even though the winter will be colder.

The city gas price will fall yoy in FY2023 (-16.9%) due to the decline in raw material prices and the effect of the subsidies to curb excessive price increases. In FY2024, it will rise (+10.7%) due to rises in raw material prices, the depreciation of the yen, and the removal of the subsidies under the subsidy program to curb excessive price increases during the fiscal year, but it will be below the record high in FY2022.

¹ Gas businesses excluding former community gas utility

businesses

Table 5 | City Gas Sales and Price (for gas businesses)

	Historical				Projection		Year-over-year		
	FY2013	FY2020	FY2021	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024
City gas sales (Billion m ³)	39.82	39.51	41.15	40.24	39.83	39.86	-2.2%	-1.0%	0.1%
Residential	9.55	10.02	9.91	9.34	9.32	9.33	-5.8%	-0.2%	0.1%
Commercial	4.49	3.65	3.70	3.82	3.86	3.81	3.2%	1.1%	-1.4%
Industrial	22.73	22.76	24.37	23.92	23.47	23.57	-1.9%	-1.9%	0.4%
Manufacturing	20.90	17.43	18.91	18.28	19.85	18.28	-3.3%	8.5%	-7.9%
Electric utilities	1.83	5.33	5.46	5.63	5.29	5.29	3.2%	-6.1%	0.0%
Others	3.04	3.08	3.16	3.16	3.17	3.14	0.0%	0.4%	-0.9%
City gas prices(JPY/m ²)	115.2	83.3	96.0	143.8	119.4	132.3	49.7%	-16.9%	10.7%
Residential	193.8	165.4	175.0	222.0	204.7	217.6	26.9%	-7.8%	6.3%
Commercial	112.0	85.75	95.55	143.4	118.1	130.9	50.1%	-17.7%	10.9%
Industrial	81.71	52.23	65.18	114.9	88.04	101.0	76.2%	-23.3%	14.7%
Others	106.7	78.05	88.01	133.6	104.2	117.1	51.8%	-22.0%	12.3%

Notes: Converted at 1 m³ = 41.8605 MJ (10,000 kcal). Figures in brackets are earlier statistical definitions.

Fuel Oil and LPG Sales, and Crude Oil Throughput

In FY2024, fuel oil sales will decrease overall due to large decreases in the sales of fuel oil for automobiles, as feedstock for ethylene and for power generation. This will be a decrease for the third year in a row and sales will be less than 60% of the record high in FY1999

The sales of fuel oil will decrease yoy in FY2023 (-1.3%) mainly due to the large impact of the decline in sales for automobiles and power generation. In FY2024, they will decrease (-1.2%) due to fuel conversion and energy saving resulting from rising prices caused by the ending of the subsidies to curb excessive price increases and in addition due to the decline in sales for automobiles, feedstock for ethylene, and power generation.

The sales of gasoline will decrease in FY2023 (-0.5%) due to improvements in fuel efficiency and the spread of HVs, despite the recovery in transportation demand after the COVID-19 pandemic. They will continue to decrease in FY2024 as well (-0.7%) as the improvements in fuel efficiency and spread of HVs continue, despite the fact that the recovery of transportation demand will also continue.

The sales of naphtha will decrease slightly yoy in FY2023 (-0.3%), impacted mainly by the decrease in domestic demand caused by rising consumer prices, etc. They will decrease in FY2024 (-1.3%) mainly due to a fall in ethylene exports for Asia.

The sales of jet fuel oil will increase in FY2023 and FY2024 (+6.1%, +5.6%) due to the recovery in aviation demand.

The sales of kerosene will decrease yoy in FY2023 (-2.1%), even in the context of a colder winter, as fuel conversion progresses. In FY2024, they will continue to decrease due to fuel conversion (-1.1%), even though the winter will be colder.

The sales of light oil will decrease slightly in FY2023 (-0.3%), even though the activity in the service business will increase, the impact of the reduction in transportation focused on the preparation for the workstyle reforms in the logistics industry in 2024 (logistics problems in 2024) will occur. In FY2024, they will decrease (-0.9%) as the impact of the logistics problems in 2024 will emerge, reducing freight transportation.

The sales of Bunker A will decrease yoy in FY2023 (-2.2%) as fuel conversion for industrial use makes progress, despite a recovery in activity in the service sector and fuel conversion from Bunker C for ships. They will decrease in FY2024 as well (-1.9%) as the decrease due to fuel conversion for industrial use continues, even though the increase in activity in the service sector and the fuel conversion from Bunker C for ships will continue also.

The sales of Bunker B and C will decrease overall in FY2023 (-13.1%) due to the fact that energy efficiency and fuel conversion have made progress in sales for industrial use and ships and in addition due to the large rebound decline in sales for power generation which increased due to the electricity crunch in FY2022. In FY2024, sales will decrease (-7.1%) due to the progress of energy efficiency and fuel conversion and in addition due to the reduction in sales for power generation as a result of nuclear power plant restarts and coal-fired power plants starting operations.

The sales of LPG will decrease yoy in FY2023 (-5.1%) due to the rebound decline of the sales of LPG for calorific value adjustment of city gas, which soared in the previous fiscal year, even though sales for use as chemical feedstock will increase due to the rising availability factor of ethylene plants. In FY2024, although household use will grow due to the colder winter, sales of LPG will decrease (-3.6%) due to the declining availability factor of ethylene plants in use as a chemical feedstock, fuel conversion in industrial and business use, and the progress in energy saving.

Crude oil throughput will decrease in FY2023 by even more than fuel oil sales (-3.2%), impacted by shutdowns of refineries due to regular repair increases and breakdowns, etc. In FY2024, crude oil throughput will decrease slightly (-0.1%) in the context of fuel oil sales decreasing due to transportation fuel exports increasing.

Table 6 | Fuel Oil and LPG Sales, and Crude Oil Throughput

	Historical				Projection		Year-over-year		
	FY2013	FY2020	FY2021	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024
Fuel oil sales (GL)	193.6	152.0	153.8	150.8	148.9	147.1	-1.9%	-1.3%	-1.2%
Gasoline	55.5	45.5	44.5	44.8	44.5	44.2	0.6%	-0.5%	-0.7%
Naphtha	45.7	40.3	41.7	38.2	38.1	37.6	-8.2%	-0.3%	-1.3%
Jet fuel	5.1	2.7	3.3	4.0	4.3	4.5	21.6%	6.1%	5.6%
Kerosene	17.9	14.5	13.5	12.2	12.0	11.9	-9.4%	-2.1%	-1.1%
Diesel oil	34.1	32.0	32.1	31.7	31.6	31.3	-1.3%	-0.3%	-0.9%
Heavy fuel oil A	13.4	10.2	10.1	10.4	10.2	10.0	2.8%	-2.2%	-1.9%
Heavy fuel oils B and C	21.9	6.6	8.5	9.5	8.2	7.6	10.7%	-13.1%	-7.1%
For electric utilities	14.4	2.8	4.4	5.1	4.1	3.6	14.3%	-19.6%	-12.3%
For other users	7.5	3.9	4.1	4.4	4.2	4.1	6.8%	-5.5%	-2.1%
LPG sales (Mt)	15.5	12.9	13.4	14.0	13.3	12.8	4.4%	-5.1%	-3.6%
Crude oil throughput (GL)	200.4	139.3	147.5	156.2	151.3	151.1	5.9%	-3.2%	-0.1%

Renewable Power Generation (FIT power sources)

Installed renewable capacity to reach 107GW

The licensed FIT power capacity is 101.8 GW as of the end of June 2023. If all of this licensed capacity, including both approved and operating capacities², were to enter operation, the cumulative burden on consumers would be 59 trillion yen³. This is equivalent to a rise in rates of 2.2 yen/kWh—a 10% raise for households and 14% for industry.

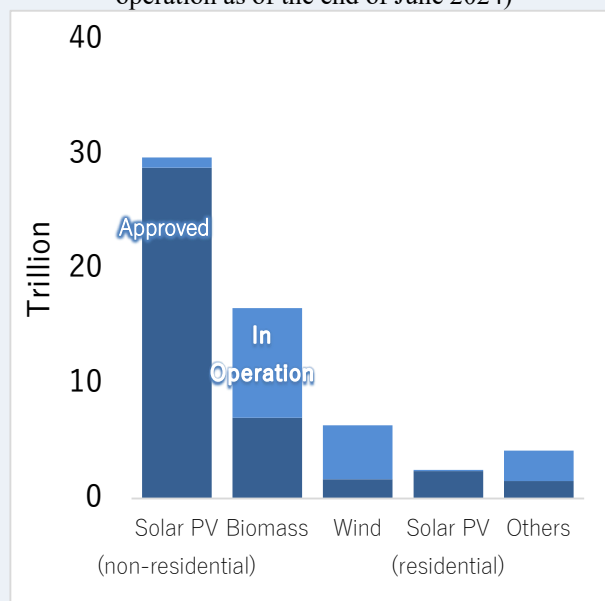
The installed capacity (including those whose purchase period has expired) will reach 107 GW at the end of FY2024. Residential solar PV and biomass are growing while the growth in non-residential solar PV is slowing down. Despite that, non-residential solar PV will expand to 64.1 GW at the end of FY2024. Furthermore, onshore wind power will expand to 6.8 GW as the introduction of a deadline to commence operation and a license expiry date will push non-operating projects to start operating earlier. In FY2024, the FIT power output will reach 212.1 TWh (including 98.8 TWh of solar PV, 51.6 TWh of biomass power, 44.5 TWh of medium- and small-sized hydropower,

and 13.3 TWh of wind power), accounting for 21.1% of the total power generation; renewable energy as a whole, including large-scale hydropower, will account for 24.6%.

Due to the FIP (Feed-in Premium) system launched in FY2022, the weighted average successful bidding price of commercial solar PV went below approximately 8 yen/kWh and the minimum successful bid price went below 8 yen/kWh, but further cost reductions are required to reach international levels.

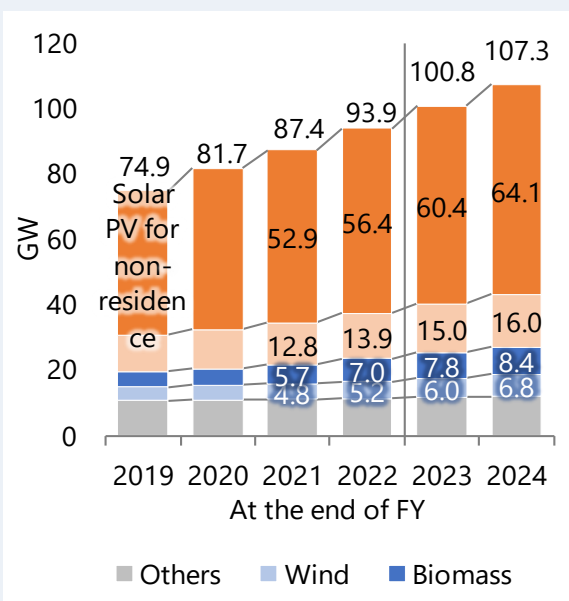
The steady expansion of installation is required to meet the target share of renewables of 36–38% in the 2030 power mix, but harmony with the environment and consensus-building with residents are crucial. At the same time, it is important to put into practice measures to expand installation at new frontiers, such as offshore wind power and perovskite solar PV, etc.

Figure 1 | Cumulative Cost Burden throughout the FIT Purchase Period (for capacities licensed or in operation as of the end of June 2024)



(Note) The purchase period is 10 years for residential solar PV, 15 years for geothermal, and 20 years for other sources

Figure 2 | Installed Renewable Energy Capacity (in operation)



(Note) Includes capacities whose FIT purchase period has expired.

² A capacity that was installed before the start of the FIT system and was transferred to the system after it began.

³ The remaining purchase periods of the transferred systems are taken into account. Avoidable costs were calculated from various materials. Due to the rise in fuel prices the actual value for avoidable costs in 2022 rose to 22.5 yen/kWh, but the actual value for 2023 (until the middle of November)

settled down to 11.7 yen/kWh and this level is anticipated going forward as well. However, this is a higher level than the previous anticipated value of 7.7 yen/kWh, so the consumer burden has significantly reduced. The utilization factor is estimated to be 24.8% for wind power, 13.7% for solar PV, 70% for geothermal, 45% for hydropower, and 70% for biomass.

Topic 1: Impacts of the subsidy program on fuel prices

The impact of the subsidy program on fuel prices will be positive in the short term but could also be increasingly negative in the medium to long term. Strengthening the resistance of economic society to energy cost rises is essential for the exit strategy

It has been decided to continue the subsidy program to curb excessive price increases until April 2024 and although the down of the subsidy has partially begun, the issue is the exit strategy

It has been decided to continue the subsidy program to curb excessive price increases (subsidy program of fuel prices) for fuel oil, electricity and city gas until April 2024. Regarding fuel oil, the lowering of the subsidy rate with a focus on the exit plan was implemented from June 2023, but due to fuel oil prices rising again, the re-expansion of subsidies under a new program to curb prices was carried out from September 7. The situation with a lack of progress toward ending the program continues. The subsidies for electricity and city gas were reduced by half from September 2023 partly due to the fall in fossil fuel import prices. Initially, the plan was to end the program in October 2023, but then a decision was made to continue the program and the end of the program was postponed to April 2024 or later.

In the Comprehensive Economic Measures for Completely Overcoming Deflation (November 2, 2023, Cabinet Decision), the government announced the continuation of the subsidy program to curb excessive price increases for fuel oil, electricity, and city gas as one of its countermeasures against rising consumer prices. Due to this, a program under which fuel oil keeps the gasoline price to about 175 yen/L will be continued until April 2024. For electricity, subsidies of 3.5 yen/kWh for the low voltage contracts of households, etc. and 1.8 yen/kWh for the high voltage contracts of companies, etc. and city gas subsidies of 15 yen/m³ for households and companies,

etc. with annual contract amount less than 10 million m³ will continue until April 2024. Furthermore, the goal of phasing out all of the programs from May 2024 was incorporated in the decision.

Under the Reference Scenario, based on the government announcement, it is assumed that for fuel oil the subsidy rate will be phased out by three-tenths each month from May 2024. For electricity and city gas, it is assumed that a subsidy of half the April level will be continued from May until September, and the subsidies will be removed entirely in October. In this section, the analysis systematically compared the “subsidy program through FY2024” case in which the subsidies as of April 2024 will continue during FY2024, and calculated the impacts on the economy and energy in the case that the subsidies are increased.

If the subsidy program to curb excessive price increases is continued until the end of the fiscal year, consumer prices will fall and the economy will be boosted

As a vast range of industries consume energy, in the case that the government subsidy program to curb excessive price increases is continued during the fiscal year, the beneficiaries will be diverse, encompassing households, manufacturers, service businesses, agriculture, and transportation businesses. In the subsidy program through the FY2024 case, the consumer price index will be lower than in the Reference Scenario (-0.5%) as energy prices will remain lower. The domestic corporate goods price index, which has a larger percentage of energy, will fall even more than the consumer price index (-0.6%) while real GDP and the industrial production index

Table 7 | Impact of the Subsidy Program to Curb Excessive Price Increases [FY2024]

		Reference	Subsidy	
			program through FY2024	Changes from Ref
Price	Domestic corporate goods price index (2020=100)	120.1	119.4	-0.6%
	Consumer price index (2020=100)	108.5	107.9	-0.5%
Economy	Real GDP (JPY2015 trillion)	566.2	566.4	+0.0%
	Trade balance (JPY trillion)	-5.5	-6.0	(-0.5)
	Index of Industrial production (2020=100)	105.4	105.5	+0.0%
	Fossil fuel imports (JPY trillion)	25.43	25.47	+0.2%
Energy	Primary energy supply (Mtoe)	410.7	411.3	+0.1%
	Oil (GL)	166.7	166.9	+0.1%
	Natural gas (Mt of LNG equiv.)	60.7	61.0	+0.5%
	Electricity sales (TWh)	821.6	823.3	+0.2%
	City gas sales (Billion m ³)	39.9	40.0	+0.3%
	Fuel oil sales (GL)	147.1	147.4	+0.1%
Environment	Energy-related CO ₂ emissions (Mt)	909	911	+0.1%

will be pushed up (+0.0%, +0.0%). However, in the context of no change to fossil fuel import prices, energy consumption will increase, so fossil fuel imports will increase and the balance of trade will deteriorate (-0.5 trillion yen). In other words, the subsidy program will strengthen the dependence on energy imports and act against energy security.

Subsidy program drives up energy consumption, CO₂ emissions and spending on fiscal stimulus

An extension of the subsidy program boosts energy sales by lowering the price. In terms of buyers, this will affect industry more than households or transportation because the industry will see a change in production with fluctuations in domestic demand, and the progress of its energy conservation efforts will also be affected by changes in production costs. Among the types of energy sold, the rate of increase will be the greatest for city gas sales. This is because city gas has a higher share of industrial use than fuel oil or electricity, and since in the subsidy program through the FY2024 case, the subsidy has just one standard rate of 15 yen/m³, its effect will be comparatively large for industrial city gas whose unit price is low.

The subsidy program through the FY2024 case will generate more CO₂ emissions (+0.1%) because its energy consumption will be larger (+0.1%) than in the Reference Scenario. In other words, the subsidy program will temporarily reverse the progress in energy efficiency and CO₂ reduction. Furthermore, regarding spending on fiscal stimulus, the total amount of subsidies in FY2024 in the subsidy program through FY2024 case on top of the Reference Scenario will be 2.3 trillion yen (1.1 trillion yen for electricity, 0.8 trillion yen for fuel oil, and 0.4 trillion yen for city gas).

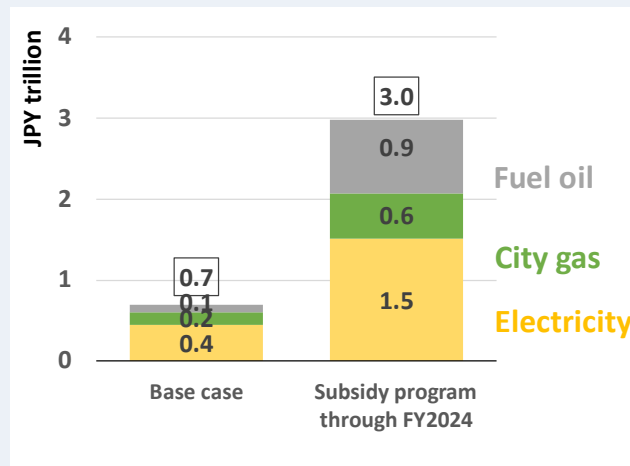
Short term and medium to long term responses assuming expanded fluctuations in fuel prices are essential for the exit strategy

The subsidy program to curb excessive price increases is positive in that it definitely curbs price increases in the short term, but it also has negative aspects in the medium to long term, such as reversing the progress in energy security, energy conservation, and CO₂ reduction, and increasing spending on fiscal stimulus.

On the other hand, there is still a risk of rising fossil fuel import prices due to the Russia/Ukraine problem, the destabilization of the Middle East situation, the continuing depreciation of the yen, etc., making the future highly uncertain. The issue going forward is to secure an exit strategy while monitoring the increasing fluctuations in the fossil fuel import prices which have emerged recently.

The Comprehensive Economic Measures for Completely Overcoming Deflation presented the encouragement of energy efficiency and the strengthening and promotion of subsidies for renewable energy and nuclear power as “strengthening the resilience of economic society with respect to energy cost rises.” In the short term, the encouragement of energy efficiency is effective. If the trends of the GX (Green Transformation) Implementation Council and the amended Act on Rationalizing Energy Use are taken into account, acceleration of the installation of energy-saving equipment such as heat pumps and cogeneration systems for industrial use and heat pumps and fuel cells for household use and in addition, subsidies for the installation of secondary batteries and control systems for expansion of the demand response are necessary. It will perhaps be necessary to consider allocating the funds being utilized in the present subsidy program to curb excessive price increases to these fields contributing to energy security. When doing so, probably it will be necessary to devise ways to expand installation; for example, changing the subsidy rate based on the income status of each household. Furthermore, in the medium to long term, it is important to develop domestic production of energy. In addition to maximizing existing technologies such as renewable energy and nuclear power, it is necessary to accelerate investment into innovative technologies such as hydrogen and ammonia which are based on hydrogen, synthetic methane, and synthetic fuel. On the assumption that the fluctuations of fossil fuel import prices will expand going forward, steadily executing a well-balanced combination of short term and medium to long term measures will be essential for the exit strategy from the subsidy program to curb excessive price increases.

Figure 3 | Difference in Subsidies with the Reference Scenario [FY2024]



Topic 2: Impact of the progress of nuclear plant restarts

Significant contribution of nuclear power to the 3E principle

This section assesses the impact of varying amounts of nuclear power on energy security, the environment, and economic efficiency—collectively the 3Es principle.

The Reference Scenario assumes that the number of operating plants will increase from 10 currently with six plants restarting according to the operating plan by the end of FY2024, meaning that 16 plants will be operating by then. Furthermore, the analysis systematically compares a High Case, in which the assessment of the remaining plant finishes earlier than

the Reference Scenario and the plant will be restarted in FY2024. Another case is the Low Case, in which the risks of delays in assessment and construction materialize before the end of FY2024 and the four plants will not be able to be restarted. Furthermore, based on the Long-term Energy Supply-Demand Outlook of the Ministry of Economy, Trade and Industry, a third case, the Highest Case, is simulated assuming that 80% of the 27 plants that have applied for assessment based on the new regulation standards will be restarted.⁴

Table 7 | Impact of Different Amounts of Nuclear Power Output [FY2024]

		Low Case	Reference Scenario	High Case	Highest Case	Changes from Reference		
						Low	High	Highest
Nuclear assumptions	Restarted nuclear reactors	12	16	17	27	-4	+1	+11
	Power generation (TWh)	86.0	113.7	125.5	193.4	-27.7	+11.8	+79.6
	Share in generation and purchases	8.7%	11.5%	12.6%	19.5%	-2.8p	+1.2p	+8p
Economy	Electricity unit cost ¹ (JPY/kWh)	10.86	10.59	10.48	9.83	+0.27	-0.11	-0.76
	Fuel cost	6.81	6.55	6.43	5.78	+0.27	-0.11	-0.76
	FIT purchasing cost	4.05	4.05	4.05	4.05	-	-	-
	Total fossil fuel imports (JPY trillion)	25.95	25.63	25.50	24.73	+0.32	-0.13	-0.91
	Oil	15.95	15.91	15.90	15.85	+0.03	-0.01	-0.06
	LNG	5.49	5.20	5.08	4.35	+0.29	-0.12	-0.85
	Trade balances (JPY trillion)	-5.70	-5.45	-5.35	-4.76	-0.25	+0.10	+0.70
	Real GDP (JPY2011 trillion)	565.98	566.19	566.29	566.82	-0.22	+0.09	+0.62
Energy and environment	Primary energy supply							
	Oil (GL)	167.1	166.7	166.6	166.0	+0.4	-0.1	-0.8
	Natural gas (Mt of LNG eq.)	64.0	60.7	59.3	51.1	+3.3	-1.4	-9.6
	Self-sufficiency rate	15.2%	17.0%	17.7%	22.0%	-1.8p	+0.8p	+5.0p
	Energy-related CO ₂ (Mt)	919	909	905	881	+10	-4	-28
Changes from FY2013	-25.6%	-26.4%	-26.7%	-28.7%	+0.8p	-0.3p	-2.3p	

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

In terms of economic efficiency, the value of fossil fuel imports will be lower than the Reference Scenario by 130 billion yen in the High Case and by 910 billion yen in the Highest Case. If oil and LNG prices rise due to changes in the international situation, the saving effect would be even greater as Japan would depend less on thermal power. As a result of reducing fuel import payments to other countries, disposable income will increase, pushing up real GDP by 90 billion yen

in the High Case and 620 billion yen in the Highest Case.

The unit cost of electricity will decrease by 0.11 yen/kWh in the High Case and 0.76 yen/kWh in the Highest Case.

Amid mounting geopolitical risks due to the Ukraine situation, there is heightened interest in energy security. LNG imports will be lower than the Reference Scenario by 1.4 Mt in the High Case and 9.6 Mt in the Highest Case. The self-sufficiency rate, which is a

⁴ Japan aims for a share of around 20-22% for nuclear power in the FY2030 power mix, and considers that this is

achievable as energy conservation will make progress and electricity demand will decrease.

major indicator of energy security, will be 0.8p higher for High Case and 5.0p higher for the Highest Case than the Reference Scenario.

CO₂ emissions, an environmental indicator, will be 4 Mt lower in the High case and 28 Mt lower in the Highest Case than the Reference Scenario. Compared to FY2013 levels, which is the base year for Japan's targets in the Paris Agreement, the emissions will be

lower by 26.7% in the High Case and by 28.7% in the Highest Case.⁵

In May 2023 the GX (Green Transformation) and Decarbonized Power Sources Act was established and the government confirmed a policy of utilizing the existing nuclear power plants as decarbonized power sources as much as possible. Smooth restarts through appropriate reviews based on the situations of individual plants will contribute to the 3Es of Japan.

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⁵ Japan's target is to reduce greenhouse gases by 46% by FY2030 from FY2013 levels, including a 45% reduction in energy-related CO₂. Japan expects that it will be able to

meet the target through energy efficiency and the introduction of renewables, in addition to nuclear power.