



Country Analysis Brief: Japan

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Overview

Table 1. Japan's energy overview, 2021

	Coal	Natural gas	Petroleum and other liquids	Nuclear	Renewables
Primary energy production (quads)	<0.1	0.1	<0.1	0.6	1.8
Primary energy production (percentage)	<1%	4%	<1%	24%	71%
Primary energy consumption (quads)	4.6	4.2	6.9	0.6	1.8
Primary energy consumption (percentage)	25%	23%	38%	3%	10%
Generation (billion kWh)	286.5	373.0	30.7	61,227.3	167.8
Generation (percentage)	32%	42%	3%	3%	19%

Data source: U.S. Energy Information Administration, International Energy Statistics and estimates

Note: Generation does not include biomass and waste. Total may not equal 100% due to independent rounding. Quads=quadrillion British thermal units, kWh=kilowatthours.

- Japan, ranked fifth-highest consumer of oil in the world, relied on imports to meet 97% of its demand in 2022 as a result of insufficient domestic resources. Because it has no international oil or natural gas pipelines, Japan relies on tanker shipments of liquefied natural gas (LNG) and crude oil to meet demand.¹
- Japan was the world's fifth-highest energy consumer in 2021. Although consumption grew by 2.3% in 2021, during the past decade, primary energy consumption has gradually declined.²
- Although renewables (10%) and nuclear (3%) accounted for the smallest portions of Japan's primary energy consumption in 2021, renewables and nuclear were the only energy sources with overall increasing shares since 2015. Fossil fuel consumption has been declining. In 2015, renewables accounted for 7% and nuclear for less than 1% of total energy consumption.³
- In 2022, Japan surpassed China to regain its status as the top LNG importer in the world despite a 3% decrease in imports from 2021.⁴
- Japan's Ministry of Economy, Trade, and Industry (METI) is planning to revise its hydrogen plan set in 2017. The revised plan calls for hydrogen production to reach 12 million metric tons by 2040 and 20 million metric tons by 2050. The plan includes \$113 billion for investment over the next 15 years in both the public and private sectors as they expect hydrogen and ammonia to have an essential role in reaching carbon neutrality by 2050.⁵

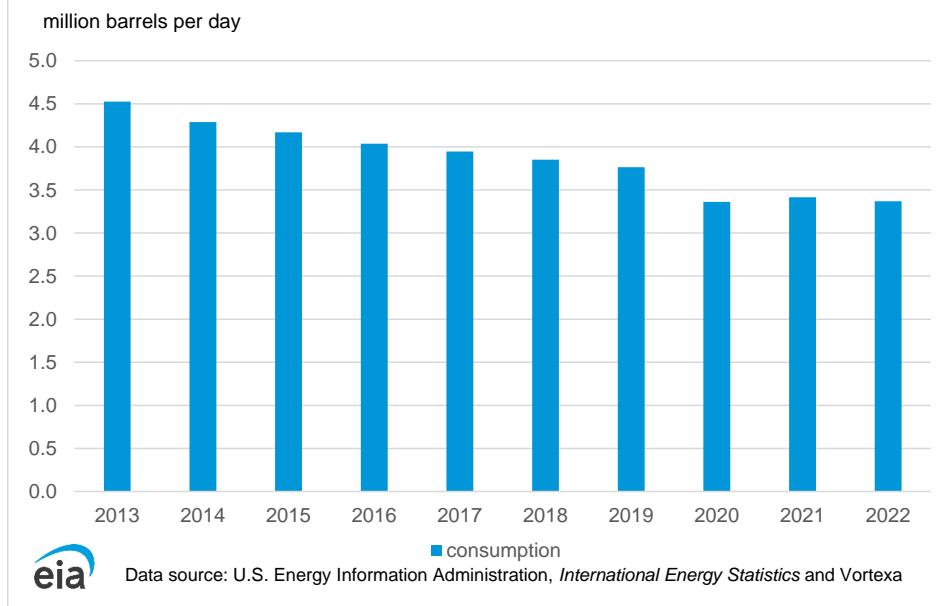
Petroleum and Other Liquids

- Japan has a small amount of domestic oil reserves, at just over 44 million barrels in 2022.⁶ The country's 101,000 barrels per day (b/d) of production in 2022 came mainly from refinery

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processing gains (93%). Therefore, Japan depends heavily on crude oil (Figure 1) and petroleum products imports.⁷

Figure 1. Japan's petroleum and other liquids consumption, 2013—2022



- Japan was the fifth-highest consumer of petroleum and other liquids in the world in 2021. Japan's petroleum and other liquids consumption fell by over 1.1 million b/d between 2013 and 2022.⁸ In 2022, consumption decreases were mainly driven by weakening demand in the

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- petrochemical sector. However, natural gas-to-oil switching and increased use of liquefied petroleum gas for power generation, which cost less than LNG, offset some of the losses.⁹
- Japan's petroleum product consumption is expected to decrease from 2023 to 2025.¹⁰ The planned restart of idled nuclear reactors, an aging population, and the country's transition to renewable energy will all contribute to lower future demand.¹¹

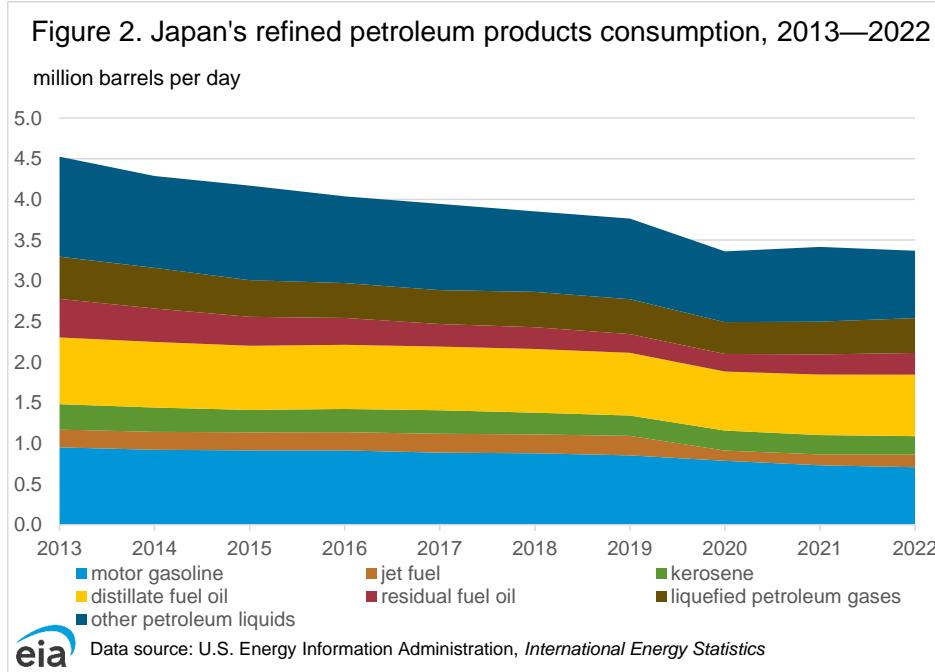


Table 2. Operating refineries in Japan

Name of site	Company	Crude refining capacity (thousand barrels per day)
Chiba	Cosmo Oil	179
Sakai	Cosmo Oil	100
Yokkaichi	Cosmo Oil	83
Chiba	ENEOS	129
Kashima	ENEOS	200
Kawasaki	ENEOS	247
Marifu	ENEOS	120
Mizushima A	ENEOS	150
Mizushima B	ENEOS	200

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Negishi	ENEOS	150
Oita	ENEOS	136
Sakai	ENEOS	141
Sendai	ENEOS	145
Wakayama	ENEOS	120
Aichi	Indemitsu	160
Chiba	Indemitsu	190
Hokkaido	Indemitsu	150
Keihin Mizue	Indemitsu	70
Sodegaura	Indemitsu	143
Yamaguchi	Indemitsu	120
Yokkaichi	Indemitsu	255
Shikoku	Taiyo Oil	138
Total		3,326

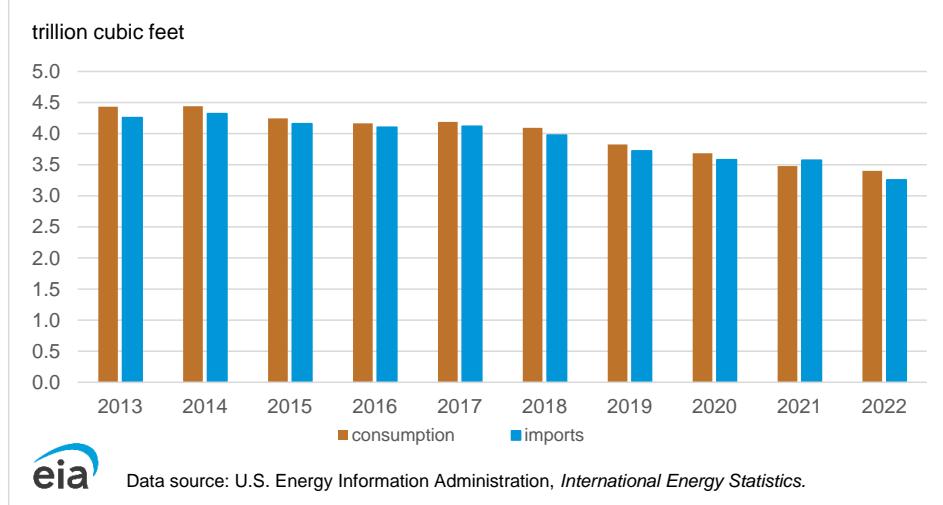
Data source: FACTS Global Energy, Asia Pacific Databook 2: Refinery Configuration, Spring 2023

- Japan's total refinery capacity in 2022 was 3.3 million b/d. However, after reducing production at its Nigeshi facility by 120,000 b/d at the end of 2022, ENEOS will be shutting down it's Wakayama facility (120,000 b/d) in 2023. Indemitsu Kosan has announced the closure of its 120,000 Yamaguchi facility in 2024 because of declining gasoline demand. These closures will reduce capacity to just over 3 million b/d by the end of 2024.

Natural Gas

- Japan has limited natural gas resources and its annual production has declined since reaching a high of 108 Bcf in 2017 to 78 Bcf in 2022. Japan relies on imports to meet demand and was the second-largest importer of natural gas in the world, after China, in 2021.¹²

Figure 3. Japan's natural gas consumption and imports, 2013—2022



- At 10.3 trillion cubic feet per year (Tcf/y), Japan had the world's largest regassification capacity in 2021. Even with decreased demand for natural gas, the annual utilization rate of Japan's regassification facilities rose from 35% in 2020 to 37% in 2021.¹³

Table 3. Japan's regasification terminals, 2022

Project name	Owners	Peak output (billion cubic feet per year)	Start year
LNG import terminals			
Negishi	JERA (50%), Tokyo Gas (50%)	576	1969
Senboku	Osaka Gas	735	1972
Sodegaura	JERA (50%), Tokyo Gas (50%)	1,412	1973
Tobata	Kitakyushu LNG	327	1977
Himeji	Osaka Gas	672	1979
Chita LNG	JERA (50%), Toho Gas (50%)	884	1983
Higashi-Niigata	Nohonkai LNG (58%), Tohoku Electric (42%)	427	1984
Higashi-Ogishima	JERA	706	1984

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Futtsu LNG	JERA	768	1985
Yokkaichi LNG Center	JERA	341	1987
Oita LNG	Kyushu Electric	245	1990
Yanai	Chugoku LNG	115	1990
Yokkaichi Works	Toho Gas	101	1991
Hatsukaichi	Hiroshima Gas	43	1996
Sodeshi	Shizuoka Gas (65%), TennenGeneral (35%)	77	1996
Kawagoe	JERA	370	1997
Shin-Minato	Gas Bureau (100%), Sendai Gas (<1%)	14	1997
Ohgishima	Tokyo Gas	475	1998
Chita Midorihama Works	Toho Gas	399	2001
Mizushima	Chugoku Electric (50%), JX Nippon Oil & Energy (50%)	207	2006
Sakai LNG	Kansai Electric (70%), Cosmo Oil (12.5%), Iwatani (12.5%), Ube Industries (5%)	307	2006
Sakaide LNG	Shikoku Electric Power (70%), Cosmo Oil (20%), Shikoku Gas (10%)	58	2010
Ishikari LNG	Hokkaido Gas	130	2012
Joetsu	JERA	110	2012
Naoetsu LNG	INPEX	101	2013
Hibiki LNG	Saibu Gas (90%), Kyushu Electric (10%)	115	2014
Akita LNG	Tobu Gas	28	2015
Hachinohe	JX Nippon Oil & Energy	72	2015
Kushiro LNG	Nippon Oil	24	2015
Shin-Sendai	Tohoku Electric	72	2015
Hitachi LNG	Tokyo Gas	307	2016
Soma LNG	JAPEX	72	2018
Niihama LNG	Tokyo Gas (50%), Shikoku Electric Power (30%), other (20%)	48	2022
Total		10,339	

Data source: International Gas Union, 2022 *World LNG Report* and International Group of Liquefied Natural Gas Importers, *GIGNL Annual Report 2022*

Note: LNG=liquefied natural gas

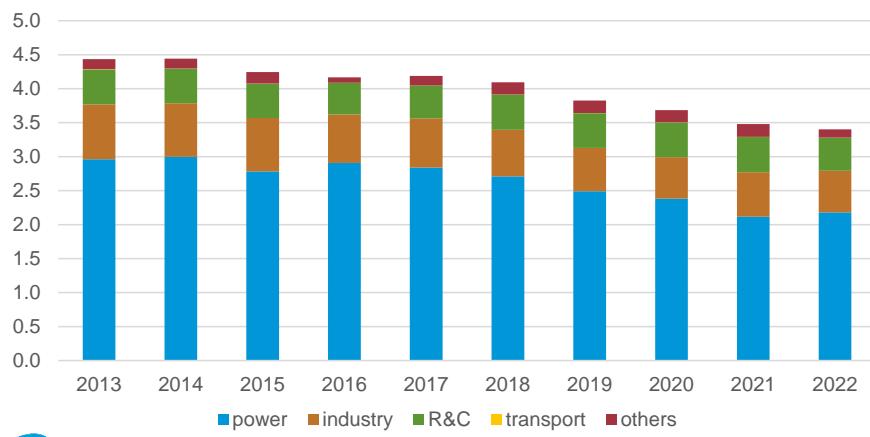
- Japan's natural gas demand has decreased every year since 2014, aside from 2017 when it slightly increased. Natural gas consumption decreased by over 1 Tcf between 2014 (4.4 Tcf) and 2022 (3.4 Tcf). The main driver behind the decline was the electric power sector (Figure 4).

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Increases in electricity generation from solar and nuclear, as well as better energy efficiency, has resulted in lower demand.¹⁴

Figure 4. Japan's natural gas consumption by sector, 2013—2022

trillion cubic feet



Data source: U.S. Energy Information Administration, *International Energy Statistics*; FACTS Global Energy, *Gas Databook 2022 - Japan*
Note: R&C = residential and commercial

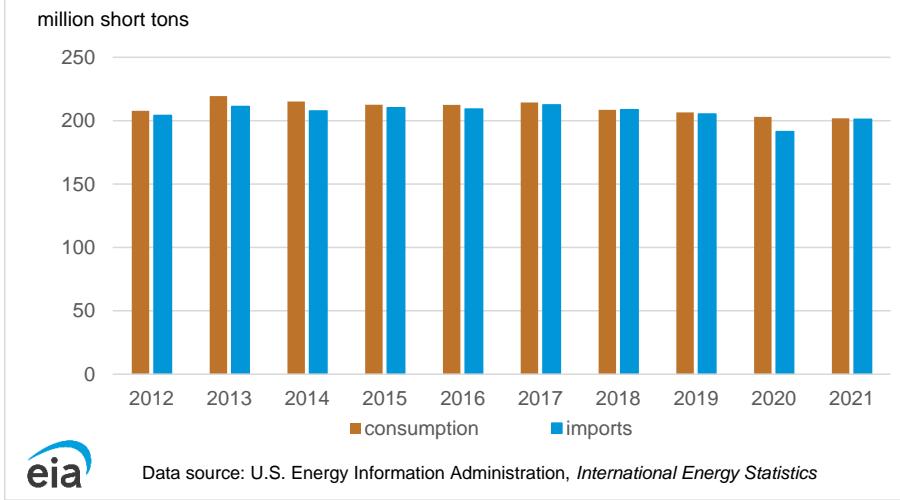
Coal

- Japan's coal production has nearly been halved from a previous high of 1.4 million short tons in 2017 to 740,000 short tons of coal 2021, the lowest amount of production in over four decades. This amount was only a fraction of its coal consumption in 2021 of 201 million short tons. Japan relies mainly on imports to meet domestic demand (Figure 5).¹⁵
- Japan considers coal an important energy source, according to its Sixth Strategic Energy Plan released in 2021. Japan's government plans to use it as a stable and economical energy source while renewable energy is added to the power grid. However, Japan's government still plans to

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phase out older, inefficient coal power plants by 2030, and in 2021 they committed to no longer funding overseas coal projects.¹⁶

Figure 5. Japan's coal consumption and imports, 2012—2021



1.

- Two new coal power plants come online in 2022: Takeyoto No.5, with a capacity slightly over 1 gigawatt (GW), and Misumi Power Station Unit 2, with a capacity of 1 GW.¹⁷ The country has an additional 3 GW of coal capacity either under construction or planned to come online by 2026 (Table 4).¹⁸

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Table 4. Japan's coal power plants currently under construction or planned

Project name	Owners	Capacity (MW)	Start year
Yokosuka New Unit 1	JERA	650	2023
Kobe Power Station	Kobelco Power Kobe-2	650	2023
Saijo Power Station Unit 1	Shikoku Power Station	500	2023
Yokosuka New Unit 2	JERA	650	2024
GENESIS Matsushima	J-Power	500	2026
Total		2,950	

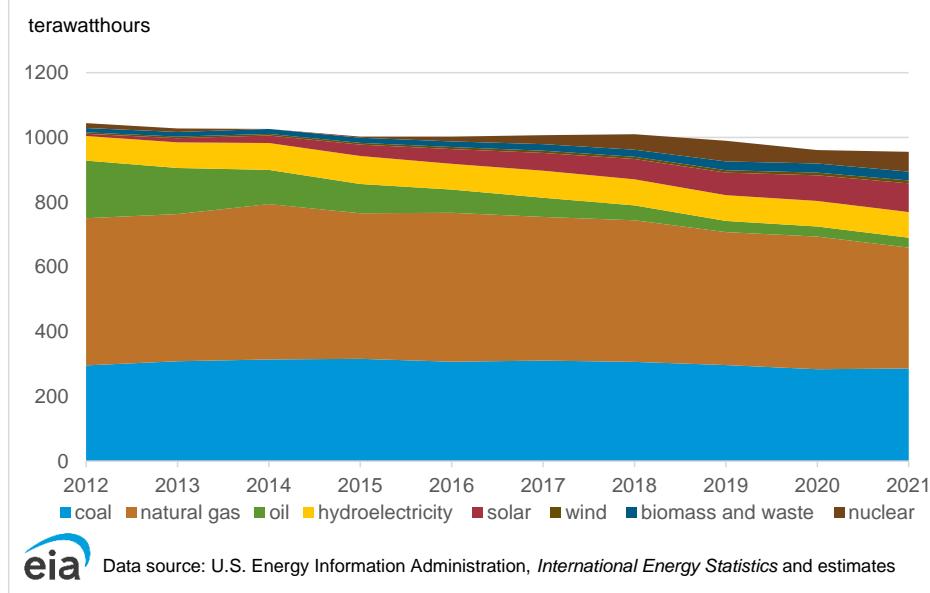
Data Source: Japan Beyond Coal

Note: MW = megawatt.

Electricity

- Fossil fuels accounted for 72% of Japan's electricity generation in 2021, a significant decrease from 89% share it accounted for in 2012. Nuclear and non-hydro renewables, specifically solar, have been the main sources replacing fossil fuels in Japan's generation mix. The share of non-hydro renewables was the fastest-growing generation source, growing from under 3% in 2012 to 13% in 2021. Nuclear power's share increased from under 2% to 6% over the same period.¹⁹

Figure 6. Japan's generation by source, 2012—2021

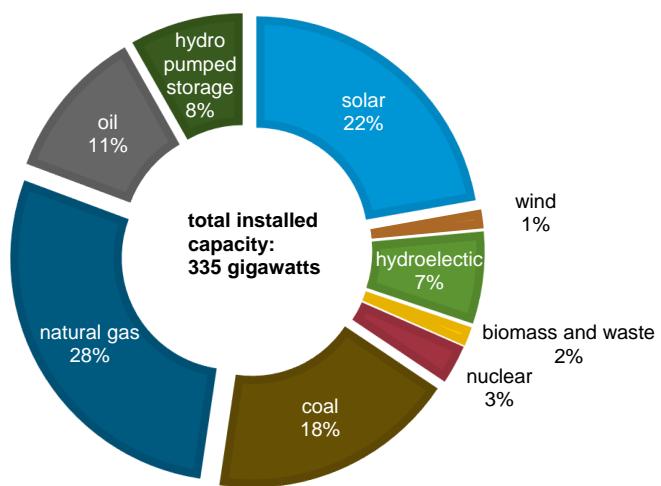


- Japan's installed generation capacity increased 2% to 335 GW in 2021 (Figure 7). Despite installed capacity increasing since 2015, generation has either been flat or decreasing during the same period (Figure 6).²⁰
- Japan aims to increase the nuclear share of electricity generation to 20%–22% by 2030. The government's plan includes extending the lifespan of some nuclear reactors beyond 60 years and maximizing existing reactors by restarting as many idled reactors as possible. As of 2023, 17 reactors are waiting for approval to restart. In addition, the country plans to build new reactors and develop next generation reactors. These plans mark a significant shift in sentiment since

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- 2011, when the Fukushima incident occurred that resulted in plans to phase out nuclear power.²¹
- Japan has committed to reach carbon neutrality by 2050. The government has set a goal for renewable energy to account for 36%–38% of power generation by 2030.²² Japan aims to add 10 GW of offshore wind power by 2030 and up to 45 GW by 2040.²³

Figure 7. Japan's installed electricity generating capacity by type,



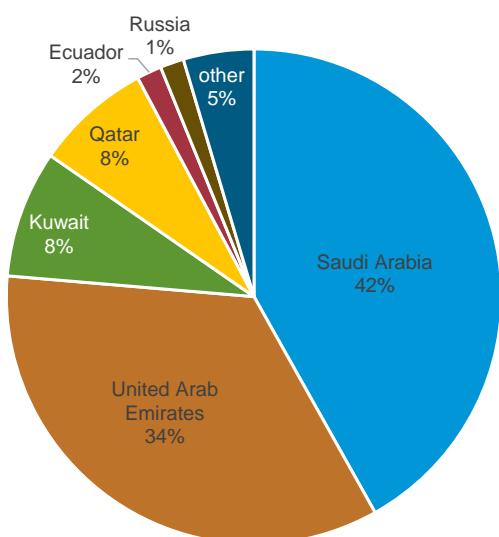
Data source: U.S. Energy Information Administration, *International Energy Statistics* and estimates
Note: Numbers may not equal 100% due to independent rounding.

Energy Trade

Petroleum and other liquids

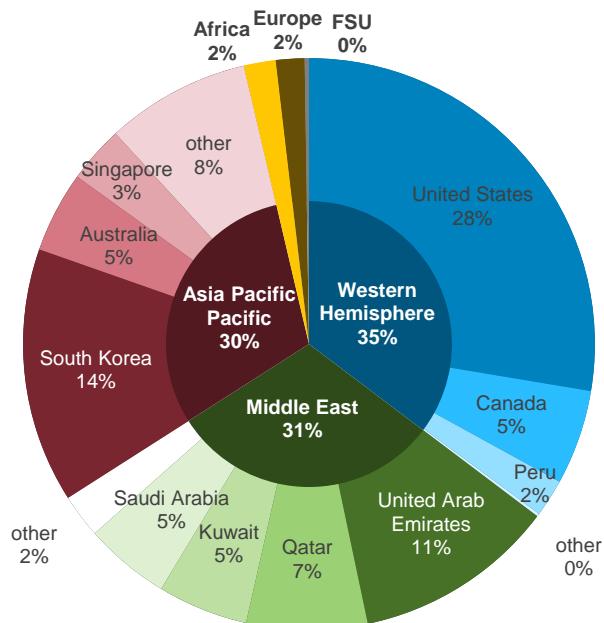
- Japan's crude oil imports increased to 2.5 million b/d in 2022, up from 2.3 million b/d in 2021. However, crude oil imports have been declining over the past decade and are almost 900,000 b/d lower than in 2013 (Figure 1).²⁴
- The vast majority of Japan's crude oil in 2022 came from the Middle East, accounting for 93% of imports. After Russia's full-scale invasion of Ukraine, Japan decreased crude oil purchases from Russia, which accounted for only 1% of total imports in 2022, down from 4% in 2021.²⁵
- Japan's petroleum products imports decreased to 1 million b/d in 2022, down 7% from 2021. Naphtha (39%) and liquid petroleum gases (37%) comprised the majority of the imports.²⁶

Figure 8. Japan's crude oil and condensate imports by source, 2022



Data source: Vortexa

Figure 9. Japan's petroleum products imports by source,



Data source: Vortexa

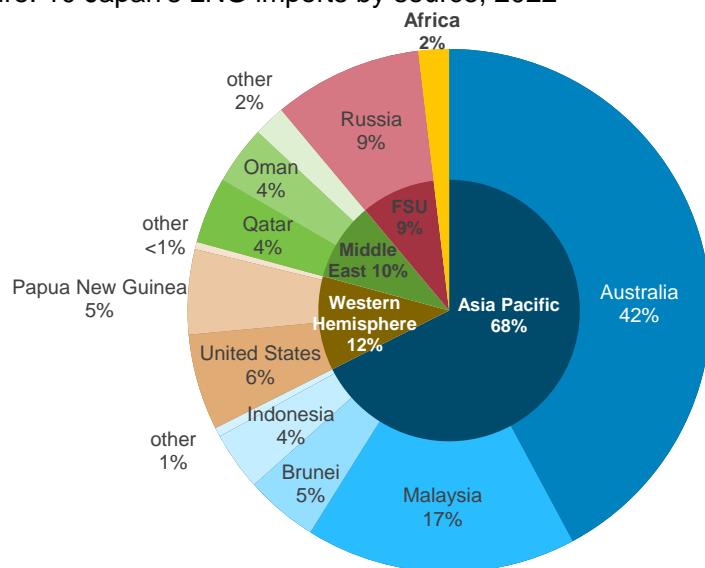
Note: Total may not equal 100% due to independent rounding. FSU=former Soviet Union

Natural gas

- Japan's LNG imports decreased from 3.6 Tcf in 2021 to 3.3 Tcf in 2022. However, even with the year-on-year decrease, Japan's imports surpassed China's, making Japan the top importer of LNG in the world in 2022. The two most significant changes in percentage share of LNG imports from the previous year were in Australia and Qatar. Australia, Japan's primary source of LNG imports, increased its share from 36% in 2021 to 42% in 2022. Qatar, Japan's third-highest source of LNG imports in 2021, decreased its share from 13% to 4% in 2022 (Figure 10).²⁷
- LNG imports from Russia remained unchanged in 2022. Although Japan committed to reducing crude oil and coal imports from Russia when it joined the G7 price cap on Russia's crude oil, it

obtained an exemption for LNG imports from the Sakhalin-2 project, the source for most of its LNG imports from Russia.²⁸

Figure. 10 Japan's LNG imports by source, 2022



Data source: Vortexa

Note: Numbers may not equal 100% due to independent rounding. LNG=liquefied natural gas.

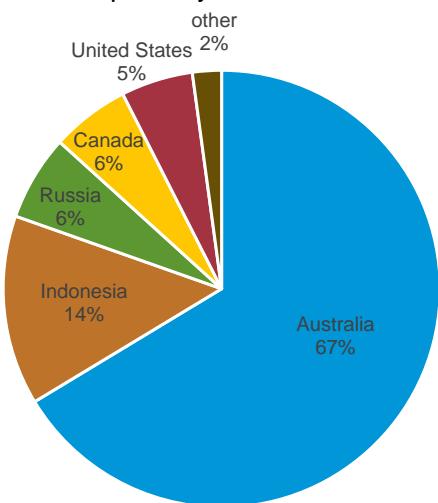
Coal

- In 2022, coal imports were relatively unchanged compared with the previous year, at 202 million short tons. Coal imports from Russia dropped by almost half from the previous year from 22 million short tons in 2021 to 13 million short tons in 2022. Increases in imports from Indonesia, Canada, and Australia offset the drop in coal from Russia.
- Utilities in Japan are looking to diversify their coal import sources to increase energy security because the majority of their imports come from only a few countries. Japan traditionally imports high-grade coal. Bituminous coal accounted for 89% of all steam coal imports in 2022,

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down 1% from 2021. Australia, Indonesia, Russia, and the United States accounted for 94% of steam coal imports in 2022, down 3% from 2021 (Figure 12).²⁹

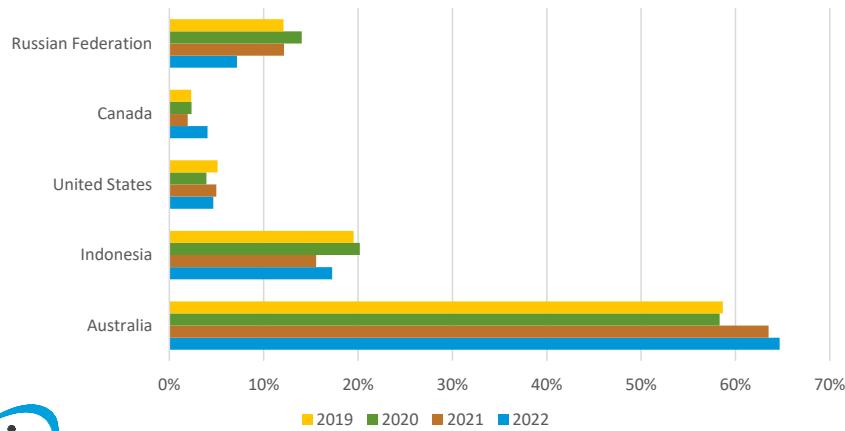
Figure 11. Japan coal imports by source, 2022



Data source: Global Trade Tracker

Note: Numbers may not equal 100% due to independent rounding.

Figure 12 Japan's steam coal market share changes, 2019—2022



Data source: Global Trade Tracker (accessed June 2023)

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- ⁵ Yuka Obayashi, Miho Uranaka, and Yoshifumi Takemoto, "[Japan aims to boost hydrogen supply to 12 million T by 2040](#)," Reuters, last modified April 4, 2023.
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- ¹⁰ U.S. Energy Information Administration, *Short-Term Energy Outlook*, June 2023.
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- ¹² U.S. Energy Information Administration, *International Energy Statistics*.
- ¹³ International Gas Union, 2022 World LNG Report, page 81.
- ¹⁴ U.S. Energy Information Administration, *International Energy Statistics*; APERC Gas Report 2022 (Tokyo, Japan: Asia Pacific Energy Research Centre (APERC), 2022), Pages 22, 37.
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