JAPAN NRG WEEKLY

DECEMBER 23, 2024

CONTACT US: info@japan-nrg.com

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- LNG stocks up from previous week, but down 17% YoY
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ANALYSIS

JAPAN ENERGY 2024 – A YEAR IN REVIEW

With the release of the draft Basic Energy Plan last week, most eyes are on the future. Where does the government and experts see the nation's energy sector developing? Is the country still on course for net-zero by 2050, as mandated by law? Our overview of Japan's energy sector has a simpler task: recording some of the advancements and the near-term events that are driving development for each form of power generation. As our analysis shows, it was far from a quiet year.

ASIA PACIFIC REVIEW

This column gives a brief overview of last week's top energy stories from across the region

NEW YEAR'S PUBLISHING SCHEDULE

This marks the last issue of this calendar year.

We restart with a short issue on Jan 8 (Wed), followed by another on Jan 14 (Tue).

The Weekly will return to its regular Monday slot from Jan 20.

JAPAN NRG WEEKLY

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OFTEN-USED ACRONYMS

METI	The Ministry of Economy, Trade and Industry		mmbtu	Million British Thermal Units
MoE	Ministry of Environment		mb/d	Million barrels per day
ANRE	Agency for Natural Resources and Energy		mtoe	Million Tons of Oil Equivalent
NEDO	New Energy and Industrial Technology Development Organization		kWh	Kilowatt hours (electricity generation volume)
TEPCO	Tokyo Electric Power Company		FIT	Feed-in Tariff
KEPCO	Kansai Electric Power Company		FIP	Feed-in Premium
EPCO	Electric Power Company		SAF	Sustainable Aviation Fuel
JCC	Japan Crude Cocktail		NPP	Nuclear power plant
JKM	Japan Korea Market, the Platt's LNG benchmark		JOGMEC	Japan Organization for Metals and Energy Security
CCUS	Carbon Capture, Utilization and Storage			
OCCTO	Organization for Cross-regional Coordination of Transmission Operators			
NRA	Nuclear Regulation Authority			
GX	Green Transformation			

NEWS: ENERGY TRANSITION & POLICY

Govt seeks to increase share of renewables up to 50% in new Basic Energy Plan

(Government statement, Dec 17)

- On Dec 17, METI unveiled a draft of the updated Basic Energy Plan outlining the main direction for the nation's energy policy.

Renewables

- The govt set an ambitious goal to at least double, or ideally, triple the share of renewables in the national energy mix. In 2021, the target share for renewables for 2030 was set at 36-38%; but the new Plan envisions a 40-50% share of the total by 2040.
- The main focus is on expanding renewables as the primary power source and diversifying the national energy mix to avoid over-reliance on a specific source, while phasing down fossil fuels and minimizing costs associated with decarbonization.
- With this revision, the govt changed the target time-frame from 2030 in the 6th Plan to 2040, allowing more flexible ranges for new targets.

Energy consumption

- METI estimates the volume of electricity consumption in 2040 at 1,100-1,200 TWh. In FY2023 it stood at 985.4 TWh. The Plan estimates the volume of electricity generated from renewables to increase from the current 225.6 TWh to 480-600 TWh.
- The govt wants to at least double Japan's energy self-sufficiency from the current 15.2%, expecting it to increase to 30-40%.
- METI expects total energy consumption to decrease to around 260-280 million kiloliters of oil equivalent (2040) from 300 million kiloliters of oil equivalent (2023) due to energy conservation, despite the increase in electricity generation.
- CONTEXT: *If converted into kilowatt-hours of electricity, total energy consumption would be forecast at 2,800-3,000 TWh in 2040, compared to 3,200 kWh in 2023.*

Emissions

- One major change included the target for reducing GHGs over FY2013 levels, set in the new 2040 plan at 73%; a significant increase from the target for 2030, set at 46%.

Nuclear

- The govt set the 2040 target share for nuclear power at around 20%, slightly lower than the 2030 target of 20-22%. The govt eyes the use and restart of idle NPPs on the premise of ensuring safety and building next-gen reactors. These "replacement" units will be allowed on sites that are different from those where existing units will be decommissioned.

Solar and wind

- METI expects an increase in solar power, seeking to enhance use of surfaces like building rooftops and walls with perovskite solar cells (PSCs). The govt seeks to commercialize PSCs, aiming for 20 GW in installed capacity by 2040. The govt will further promote offshore wind power, especially floating wind power tech that can reach out into the EEZ.

Biomass

- The new Plan also focuses on local production, distribution and consumption of biomass power. The govt plans to work more closely with local agriculture and forestry businesses amid challenges such as rising fuel costs, which has been a main reason for delays in moving forward with a number of commissioned projects.
- The govt will also promote the practical application of closed-loop, supercritical geothermal, and enhanced geothermal systems (EGS) as a way to expand locations where this type of energy can be deployed.

Hydrogen and carbon capture

- The Plan stresses that next-gen fuels — hydrogen, ammonia, synthetic fuels, biofuels — will be key for achieving carbon neutrality.
- Solutions like CCUS are essential for achieving energy security, economic growth, and decarbonization in the hard to abate sectors; CDR (Carbon Dioxide Removal) is essential for offsetting residual emissions.

Raw materials

- The draft Plan says that critical minerals such as copper and rare earth metals will play a pivotal role in developing tech aimed at decarbonization and digitalization. Addressing supply risks will require diversifying sources, securing stockpiles, and exploring domestic marine mineral resources.
- CONTEXT: *By the end of December, the govt plans to present drafts of its global crisis countermeasures plan and the 2040 vision for energy transition (GX). These, along with the Basic Energy Plan, will form the "three documents" subject to public consultation.*
- CONTEXT: *The GX 2040 Vision has been developed through discussions at the GX Executive Council and working groups at the PM's Office. It will draw up a picture of the industrial structure and industrial locations that will encourage decarbonization investment. It will also present specific measures for carbon pricing.*
- The Cabinet is expected to give approval in February, after which the govt will submit its 2035 GHG reduction targets (NDC) to the UN, also in February.
- The revised Plan reflects changes in the past few years in both the domestic and international political landscape. Since the formulation of the 6th Plan in 2021, the demand for economic security has increased due to war in Ukraine and in the Middle East. Japan, like other regions, is expecting greater demand for electricity in line with the proliferation of AI, data centers, and progress in decarbonization.

- TAKEAWAY: Media attention in the past week has gravitated to the Plan's outlook for nuclear. But the big winner in this draft is surely the renewables sector, which looks set to be Japan's main source of power; nuclear is seen as a crutch to offer system stability. The nuclear angle appeals to the global audience and those with either strong pro or anti-nuclear views. It is merited in part due to wording changes from the 6th Plan, which talked down the need for leaning on nuclear beyond what is absolutely necessary. However, from a business perspective, the opportunities offered by this strategy are much clearer in renewables. In terms of electricity volumes, the Plan suggests the possibility of a quadrupling from today's levels. Meanwhile, nuclear's big headline numbers lack details on where, with what financial means and support, liability definitions, and who will put the ideas into practice. After all, there are only two or three EPCOs in Japan that can be described as nuclear power players of any size. TEPCO has yet to join the ranks of nuclear operators with an actual operating station. Another cloud of uncertainty hangs over sources like hydrogen and ammonia, with specific targets missing. That may be simply an issue of timing, with the hydrogen CfD program only just starting. Still,

Japan's hydrogen economy vision needs a more concrete pathway if it is to challenge existing power fuels like coal and LNG.

Energy mix goals (Source: METI)

Energy source	FY2023	Target share for 2030	Target share for 2040
Nuclear	8.5%	20-22%	20%
Renewables (total)	22.9%	36-38%	40-50%
Solar	9.8%	14-16%	22-29%
Wind	1.1%	5%	4-8%
Hydrogen/ammonia		1%	
Geothermal	0.3%	1%	1-2%
Hydropower	7.6%	11%	8-10%
Biomass	4.1%	5%	5-6%
Thermal power	68.6%	41%	30-40%
LNG		20%	
Coal		19%	
Oil, etc.		2%	

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KEPCO president calls for Basic Energy Plan to include nuclear energy details

(Nikkei, Dec 16)

- In an interview, KEPCO President Mori Nozomi discussed the next Basic Energy Plan, saying it should include details and forecasts about nuclear power to facilitate decisions on new NPP construction or replacements; adding that the timetable for new nuclear projects depends on factors such as local support.
- He doesn't see the completion of the Rokkasho spent nuclear fuel reprocessing plant as a prerequisite for new NPPs.
- Also, KEPCO will invest ¥380 billion to upgrade LNG power generation at its Nanko plant. And the utility is considering hydrogen production in India. Yet, it withdrew from a hydrogen project in Queensland, Australia, due to unprofitability.
- SIDE DEVELOPMENT:
  Heads of FEPC and JGA welcome new draft of Basic Energy Plan
  (Nikkei, Dec 20)
    - Hayashi Kingo, chairman of the Federation of Electric Power Companies of Japan (FEPC), praised the draft of the Basic Energy Plan. He is also head of Chubu Electric, and welcomed the support of nuclear power alongside renewable energy. Hayashi

emphasized the need for clearer guidelines on nuclear power development and for easing restrictions on new NPPs.

- The draft sets a target for the 2040 national energy mix. Hayashi said hitting the targets will require "every possible measure" and stressed the responsibility of utilities.
- The Plan also proposes relaxing conditions for replacing aging nuclear reactors, but, without new facilities, maintaining the 2040 level of nuclear output by 2050 would be difficult, said Hayashi.
- Uchida Takashi, head of the Japan Gas Association (and head of Tokyo Gas), also commented, highlighting the importance of securing long-term LNG contracts.

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METI publishes results of power generation cost comparison study

(Government statement, Dec 16)

- METI's working group on Power Generation Cost Verification presented its findings as part of a review for the Basic Energy Plan. The main focus was the per-kWh costs of building and operating new power generation facilities in 2023 and 2040.
- It compared and tested different power generation: LNG, nuclear, solar, wind, hydro, geothermal, biomass, hydrogen, ammonia, and coal. It projects a cost of ¥12.5/ kWh for nuclear, assuming a 40-year reactor lifespan with a 70% operational rate.
- Solar would be ¥7-8.9/ kWh; offshore wind would be ¥14.4-15.1/ kWh; LNG would be ¥16-21/ kWh; hydrogen would be ¥24.6-33/ kWh; and coal (with 20% ammonia co-firing) would be ¥20.9-33/ kWh.
- CONTEXT: *The figures include so-called "policy costs" linked to domestic power generation, such as safety measures, technology development, and compliance.*
- There are also costs related to CO2 measures that apply to LNG, oil, coal, and gas cogeneration. Other costs are fuel, operation and maintenance costs and capital expenses. For nuclear, accident risk response costs were also taken into account.
- The study also looks at three scenarios, in which the amount of electricity derived from variable renewable sources, such as solar and wind, is at 40%, 50% and 60%.
- The results of the study show that a higher introduction of variable renewables leads to higher costs of operating thermal power generation, and there are increased energy losses due to charging and discharging using pumped storage and storage batteries, as well as rising curtailment of renewable energy output.
- The experts behind the report also commented on the use of demand response (DR), saying it should be promoted in order to reduce the costs of incorporating each power source into the system.

- TAKEAWAY: While these figures are useful for building a comprehensive energy plan, the results are part of an ongoing process. We have to take into account extra factors such as location-specific impacts and system integration costs. In any case, LNG was considered the cheapest energy source in 2021; but, having added the expenses of CO2 emission reduction, costs have increased. Now, solar and nuclear power are considered the cheapest. But solar is forecasted to be cheaper in 2040 than nuclear only when the penetration of variable renewables is at 40% of capacity. With high renewable integration (e.g., 60% of the power mix), solar costs rise significantly (¥36.9/ kWh), making nuclear (¥18.9/ kWh) more cost-effective. This shows how important system-level costs and grid stability are to overall calculations, but it also forecasts prices based on existing

infrastructure (and its constraints). Developers may add that such forecasts are out of sync with the revenue levels they need to turn a profit in a landscape of rising materials, labor and EPC costs.

Accurate forecasting of pricing for power sources more than a decade from now is nearly impossible. So many factors can entirely change the calculus. Massive investment in the grid could revamp the way the system works. So, what is the goal of these numbers? They help the govt to build a case for further support of nuclear power, and show how investment in solar and wind should be ample but measured. That won't satisfy everyone, but it does give the govt a platform to defend its GX strategy.

- SIDE DEVELOPMENT:
  Japan approves supplementary budget with energy subsidies
  (Nikkei, Dec 17)
  - The govt approved a ¥13.94 trillion supplementary budget for FY2024, surpassing the previous year's ¥13.2 trillion; ¥6.69 trillion will be financed through new state bonds.
  - Electricity and gas subsidies will resume in January 2025 and run through March to ease winter household burdens.
  - Gasoline subsidies will also continue in 2025, capping prices at around ¥185/ liter.

METI/ ANRE eye new categories to support adoption of PSC

(Government statement, Dec 17)

- METI and ANRE plan a new classification of power generation facilities under the FIT and FIP schemes to support the adoption of perovskite solar cells (PSC).
- ANRE proposed starting support for PSCs facilities when their production costs fall below electricity charges.
- METI wants to focus on a next-gen solar cell strategy to foster market independence through public-private collaboration and monitoring budgetary support for adoption.
- CONTEXT: *The govt seeks to have 20 GW of PSCs installed by 2040 and is working on measures to support expansion. ANRE aims for a generation cost of ¥10–14/ kWh for PSCs, with some domestic firms planning to commercialize the tech in FY2025.*

Carbon credits trading for large emitters to kick off in autumn 2027

(Government statement, Dec 19)

- Japan's GX Promotion Office announced the framework for a carbon emissions trading system to begin in FY2026, targeting companies emitting over 100,000 tons of CO_2 annually, including their subsidiaries.
- Companies must calculate their direct emissions each year and retire emission credits equivalent to this amount. They'll face third-party verification and report to the govt annually. Failure to offset emissions by the deadline will incur penalties.
- To reduce red tape, the system integrates with existing reporting mechanisms under the Energy Conservation Act and Global Warming Countermeasures Act. Subsidiaries meeting the 100,000-ton threshold can consolidate reporting with parent companies.
- Excess or shortfall in emissions allowances will be traded on a state-licensed market operated by the GX Promotion Organization, set to start in autumn 2027.

- CCUS and forest absorption under the scheme will be considered in the future.

- TAKEAWAY: This topic has had a steady drip of news recently, yet it has passed under the radar amid the national energy strategy discussions. Caps on carbon emissions will cost oil refiners and chemical companies, as well as steel and ceramic manufacturers, a significant amount. Next year, the details of the accounting and trading mechanisms will be clearer, but firms have just two years to set up full-on reporting mechanisms and another year to understand how to trade credits. *Japan NRG's* parent company's GxxD reports recently examined the role that carbon accounting firms will play in the economy. See https://www.yuri-group.co.jp/gxxd for more information.

Onagawa Town to introduce spent nuclear fuel tax

(NHK, Dec 13)

- Onagawa mayor Suda Yoshiaki wants a spent nuclear fuel tax targeting Tohoku Electric, hoping to take effect in FY2026.
- The Onagawa NPP's Unit 2 will add two new storage facilities for housing spent fuel. The first will begin operations in 2029.
- In response, Onagawa hopes that the tax will encourage the early removal of spent fuel from the town. Details, such as the tax rate, will be finalized within the current fiscal year and discussed with Tohoku Electric.
- Ishinomaki City, which hosts Onagawa NPP, is considering a similar tax.

- TAKEAWAY: Currently, Onagawa NPP's storage pool is 80% full and could reach full capacity by 2029. The national plan envisions a nuclear fuel recycling program, but repeated delays building the reprocessing facility at Rokkasho has led utilities to explore alternatives. Now, they are resorting to on-site, dry storage facilities for spent nuclear fuel. But this causes friction with locals, who want the spent fuel to be stored far from the NPPs.

Aomori Pref outlines draft plan for renewables tax

(Government statement, Dec 19)

- Aomori Pref outlined a draft for an ordinance for a renewable energy coexistence tax; it will be classified as a non-statutory ordinary tax.
- The tax will apply to solar and onshore wind power operators. Rates will vary based on the type of energy and zoning categories:
    - Solar: Adjustment areas: ¥110/ kW; Conservation/ protection areas: ¥410/ kW;
    - Wind: Adjustment areas: ¥300/ kW; Conservation/ protection areas: ¥1,990/ kW.
- Exempted will be existing facilities and those that began public notification of environmental impact statements or filed construction plans.
- New facilities located in designated "coexistence zones" under the prefecture's zoning plan will also be tax-exempt. Installations on building roofs and facilities owned by national or local govts will also be tax-exempt.
- CONTEXT: *Aomori is the latest prefecture to push forward with new local taxes on renewables, following the example of Miyagi, whose tax ordinance came into effect in April 2024. At least one other region had considered taking similar steps.*

- TAKEAWAY: Local officials say the aim of the taxes is to steer developers away from areas that are ecologically at risk or troublesome for communities. But there is a sense also that regional governments are seizing on opportunities to supplement shrinking budgets with payments from a growing industry. The short-term impact will be the cancellation of most projects in the high-tax areas. Officials have said, however, that they will allow new developments without tax should developers secure local buy-in for a project. Perhaps, then, the tax can also be seen as a smart way to improve the community-developer relationships.

MLIT discusses construction plans for floating offshore wind

(Government statement, Dec 13)

- The MLIT began discussions on developing offshore construction scenarios for floating offshore wind power projects. The first meeting will be Dec 17.
- These talks will take place in a public-private working group for maritime and port organizations, academics, construction firms, shipbuilders, and shipping companies.
- The panel aims to create multiple construction scenarios based on different types of floating foundations.
- CONTEXT: *While the meetings will generally remain private, some summaries and materials will be published on the public-private forum's website.*

Idemitsu Kosan to join CCS project in Norway

(Company statement, Dec 12)

- Idemitsu Kosan's subsidiary, INPEX Idemitsu Norge, will buy 75% of Sval Energi's 40% stake in the Trudvang CCS project (EXL007 license) as a non-operating partner; this will give INPEX Idemitsu Norge a 30% stake.
- If the deal is approved, then Vår Energi ASA (the operator) will hold a 40% stake, as it takes Sval Energi's remaining 10% stake; Storegga Norge will have 30%.
- CONTEXT: *This large-scale CCS project in the upper North Sea near the Sleipner CCS project aims to store over 200 million tons of CO2. The project leverages a reservoir with a proven 20-year CO2 storage record.*

ANRE revises cybersecurity guidelines for small-scale distributed energy sources

(Government statement, Dec 18)

- ANRE is working on revising cybersecurity guidelines for Energy Resource Aggregation Business (ERAB).
- This revision includes measures that aggregators should take by identifying possible cyber-attacks and assessing the risks involved.
- Aggregators are required to select IoT products that meet security standards of the Information-technology Promotion Agency's (IPA) "JC-STAR" labeling system.
- CONTEXT: *ERAB involves aggregating and controlling small-scale distributed energy resources – such as household solar panels, storage batteries, and heat pump water heaters – to optimize electricity use. There are an increasing number of threats targeting the vulnerabilities of IoT*

devices, as well as threats related to highly private information and DR services that communicate and control without going through a physical gateway.

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NYK and ENEOS agree on marine fuel with credits using DACCS

(Company statement, Dec 18)

- Nippon Yusen Kabushiki Kaisha (NYK) and ENEOS inked a deal on the sale and purchase for marine fuel bundled with CO2 removal (CDR) credits. They will be generated through Direct Air Capture with Carbon Storage (DACCS).
- ENEOS will get CDR credits from 1PointFive's Stratos DAC plant in Texas that launches in 2025.
- ENEOS will supply credits with marine fuel to NYK for five years starting in 2028.

1PointFive's STRATOS Direct Air Capture plant in Texas

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Yamanashi Gov to promote green hydrogen, stronger ties with India

(Nikkei, Dec 19)

- Governor Kotaro Nagasaki of Yamanashi Pref will visit India on Dec 21-28 to sign an MoU with Uttar Pradesh, the most populous state.
- The agreement aims to introduce Yamanashi's advanced green hydrogen technology.
- Nagasaki will propose using green hydrogen to address air pollution issues around the Taj Mahal in Agra.

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Asahi Kasei expands manufacturing for green hydrogen electrolyzers

(Company statement, Dec 18)

- Asahi Kasei will invest ¥35 billion, utilizing up to ¥11.4 billion in state subsidies, to build new plants for cell frames and membranes for alkaline water electrolyzers at its Kawasaki site. This will boost manufacturing capacity to at least 2 GW annually by 2028, raising the company's total for electrolysis components to over 3 GW annually.
- CONTEXT: *Supported by Japan's "GX Supply Chain Construction Support Project", Asahi Kasei plans to capture 20% of the global water electrolysis equipment market by 2030, focusing on Europe, North America, and India.*

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Nippon Steel and Honda cooperate on hydrogen in Thailand

(Company statement, Dec 20)

- Nippon Steel Trading Corp and Honda are conducting a feasibility study to establish a local hydrogen utilization model in Thailand's Rojana Industrial Park.
- This initiative, supported by METI's FY2023 Global South Future-Oriented Co-Creation Subsidy Program, aims to produce green hydrogen via solar power and use it in stationary fuel cell (FC) systems.

NEWS: ELECTRICITY MARKETS

Hokkaido offering tax cuts to lure green energy, finance as AI power needs surge

(Japan NRG, Dec 17)

- The Hokkaido governor pledged to cut local taxes and other subsidies to woo more clean energy firms to build facilities.
- Governor Suzuki Naomichi said the tax incentives will be offered within the so-called Financial and Asset Management Special Zone being created in Sapporo as part of the national GX strategy.
- Corporate tax cuts will be available for prefectural, municipal, and fixed asset levies. The tax breaks will go for up to10 years and target new businesses from outside Hokkaido, as well as local startups.
- Hokkaido needs to secure more renewable energy to support the buildout of AI and big energy users such as the Rapidus semiconductor plant now under construction.
- CONTEXT: *Suzuki spoke at the Nikkei's GX/Financial Conference in Sapporo, which ran Dec 16-17. A summary of some of the comments from the event:*
    - Air Water's head Matsubayashi Ryosuke wants regulatory easing through special economic zones to align with Europe and the U.S. Air Water is producing and selling biogas-derived hydrogen in Hokkaido.
    - Suwabe Tetsuya, head of Eurus Energy, said that weak connections to Japan's mainland grid are a challenge for wind power in Hokkaido. Eurus seeks to attract data center projects to northern Hokkaido.
    - Hironobu Tsuyama, head of North Pacific Bank, said his bank has made ¥210 billion in GX-related loans and is considering another ¥60 billion in lending to support the influx of data centers in Hokkaido.
    - Sawa Masahiko, vice president of Idemitsu Kosan, expressed plans to build a global supply network for synthetic fuels. He mentioned the hydrogen production hub in Tomakomai, using renewable energy.
    - ENEOS Holdings' senior VP/CTO Fujiyama Yuichiro highlighted the high costs of domestic renewable energy and emphasized the importance of local synthetic fuel production for energy security.
- Climate Bonds Initiative (CBI), Sapporo City, and Hokkaido made a joint statement. CBI will provide expertise to expand financial capabilities in the region, and will counsel on the creation of certification systems to meet global standards. This marks the first such statement by the CBI and a Japanese municipality.
- SIDE DEVELOPMENT:
  Hokkaido Electric CEO says renewables need nuclear to balance; will shut small generators
  (Nikkei, Dec 17)
    - Hokkaido Electric's CEO Saito said the utility will shutter smaller power generation plants with high repair costs and push on with efforts to restart Tomari NPP, as part of measures to lower electricity prices in the region.

  - Hokkaido's snowfall and freezing weather makes thermal power generation less cost-effective due to logistics and fuel demand. While pushing for more renewables to be developed locally, Saito said it was unrealistic to support heavy industry and big power users like Rapidus and data centers without baseload sources like NPPs.
  - In 2027, Hokkaido expects a surplus from existing power plants, just as the Rapidus semiconductor plant starts mass production. However, as the semiconductor industry ramps up locally, Saito expects a need for more power volumes.
  - In 2030, Hokkaido Electric will start operating a second LNG-fired unit at the Ishikari Bay Shinko power station.
  - CONTEXT: *Upon the restart of Tomari NPP, the percentage of CO2-free electricity in Hokkaido is expected to rise to nearly 60% from about 40% today.*
- TAKEAWAY: Hokkaido was one of the key regions for kickstarting the solar and wind sectors, and most recently the battery industry. Today, it seeks to become a magnet for green financing, hoping that the high renewables component will attract industry keen to tap into these volumes. What may underpin the renewables boom is the restart of not just Tomari NPP but also Oma and Higashidori NPPs on the north tip of Aomori that borders Hokkaido. There are many challenges before this could be a reality, but the possibility of Hokkaido becoming an industrial engine of growth in Japan thanks to clean energy is there.

JERA reports measures to prevent market manipulation

(Company statement, Dec 12)

- JERA submitted prevention measures for market manipulation to the Electricity and Gas Market Surveillance Commission (EGC), acknowledging prior mismanagement of surplus electricity supply.
- JERA said weak internal governance and unclear rules led to poor practices in terms of bidding at the time TEPCO Fuel & Power ran business operations.
- CONTEXT: *In April 2019, JERA took over the thermal power generation business from TEPCO Fuel & Power. Between then and Oct 2023, JERA was found to have withheld some surplus electricity from the wholesale market. The company was judged by the regulator to have made "inadequate market submissions" over its surplus power volumes.*
- An internal investigation, with the help of outside experts, confirmed there was no intention to manipulate the market for profiting, although staff were aware of the issue, JERA said.
- JERA's improvement plans include a "three-line management" framework involving trading oversight and internal audits, as well as fostering a culture where employees can raise concerns.
- SIDE DEVELOPMENT:
  JERA to solicit wholesale electricity buyers
  (Company statement, Dec 13)
  - JERA will begin soliciting wholesale electricity buyers for FY2016-FY2027, after the end of its long-term PPAs with TEPCO Energy Partner and Chubu Electric Miraiz.
  - Electricity delivery will be available on a 24-hour-baseload schedule. The pricing structure will be volumetric, meaning it will charge based on usage.
  - The seller will be JERA's electricity trading subsidiary JERA Power Trading.

JERA and bp tap Oosterlinck as CEO of new offshore wind JV

(Nikkei, Dec 20)

- JERA and bp will appoint Nathalie Oosterlinck as CEO of their new offshore wind JV — JERA Nex bp. She was chosen for her experience in offshore wind projects across Asia and Europe.
- She now serves as the CEO of JERA Nex, the global renewable energy company.

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NRA approves plan for Takahama NPP operation beyond 40 years

(Company statement, Dec 16)

- The NRA approved KEPCO's long-term facility management plan for Takahama NPP Unit 2. It addresses the aging of the site.
- The plan seeks to comply with the revised Reactor Regulation Act (effective June 2025). For facilities operating over 30 years, equipment degradation evaluation is needed every 10 years.
- CONTEXT: *In 2016, Takahama Unit 2 was approved for operation beyond 40 years, but to continue beyond June 2025, KEPCO needed to check equipment under the new regulations. It obtained approval for operations exceeding 30 years at Ooi NPP Units 3 and 4. This is the first approval for over 40 years of operation for a KEPCO NPP.*
- SIDE DEVELOPMENT:
  Chugoku Electric's Shimane NPP Unit 2, moves closer to launching commercial operations
  (Company statement, Dec 20)
  - Chugoku Electric said it changed the planned synchronization date of Shimane NPP Unit 2 (BWR, rated output: 820 MW).
  - Originally scheduled for Dec 25, the synchronization date is now set for Dec 23.
  - CONTEXT: *Synchronization refers to using steam from the reactor to spin turbines and sending electricity to the grid. After the reactor restart on Dec 7, inspections and checks of various facilities confirmed their sound condition. Preparations ended earlier than expected. The restart of commercial operations remains for Jan 10.*
- SIDE DEVELOPMENT:
  Kyushu Electric to upgrade steam turbines at Genkai NPP
  (Company statement, Dec 13)
  - Kyushu Electric will upgrade the steam turbines of Genkai NPP Units 3 and 4.
  - The utility submitted the design and construction plan to the NRA.

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Global solar rollout accelerated this year, but will moderate in 2025

(Company document, Dec 20)

- CONTEXT: *Solar sector specialist RTS Corp has published its latest industry overview report: "Global PV Report 2024". Below are extracts.*
- In 2023, global PV installations reached 456 GW (DC basis), driven by growth in China and the EU. Projections for 2024 estimate installations of between 450 GW and 531 GW, with continued expansion in China, Europe, the U.S., and India.
- While China's growth is expected to moderate, accelerated adoption is anticipated in Europe and the ASEAN region, propelled by energy transition initiatives. The recent decline in PV product prices is also likely to boost installations in emerging markets.

- Trade frictions continue to alter global supply chains, including U.S. sanctions under Section 301 against China, anti-dumping and countervailing duties on Chinese and other Asian PV products, and import restrictions. The U.S. is shifting its PV sourcing to Southeast Asia, where Chinese manufacturers have established production facilities, while the EU and India are also looking for new sources of panels.

Tokyo Gas develops new method for solar panels on slate roofs

(Denki Shimbun, Dec 18)

- Tokyo Gas has developed a new method for installing thin, lightweight solar panels on slate roofs using adhesives.
- This expands their corporate PPA service, Hinata Solar, from conventional folded-plate and flat roofs to slate roofs, which are difficult for panel installation.
- The company expects about 10 out of its 30–40 annual projects to involve slate roofs.
- CONTEXT: *Slate is a lightweight, earthquake-resistant roofing material commonly used in factories. However, challenges with load-bearing capacity and installation safety have limited its use for solar panels. The new application method makes solar installations more feasible on slate roofs.*

Spot electricity transactions rise despite mild temperatures

(Denki Shimbun, Dec 18)

- JEPX's November daily average spot market volume rose 4.8% MoM to 688 GWh, marking a three-month high. However, warm weather suppressed demand and prices.
- The system price dropped across all metrics: 24-hour average fell to ¥12.41 (-¥0.27), daytime average to ¥12.52 (-¥0.72), and peak average to ¥11.30 (-¥1.94).
- Tokyo's area price declined ¥1.17 to ¥14.16 as East-West market separation decreased sharply by 39.7 percentage points.
- November saw no forward market transactions, highlighting a restrained market.

MoE urges Eurus Energy to revise plans for wind farm in Aomori

(Government statement, Dec 20)

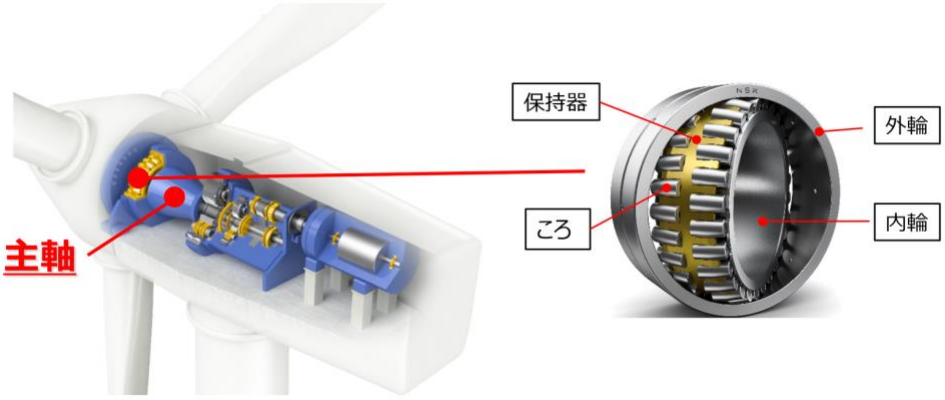
- The MoE minister issued an official opinion on an onshore wind project by Eurus Energy, calling to revise plans and address concerns on environmental impact.

- The wind farm has a maximum installed capacity of 160 MW with an estimated 30 turbines (4-6 MW capacity each). The site selected for the project spans Higashidori Village and Mutsu City in Aomori Pref.
- The MoE's opinion includes calls for protecting natural water sources and taking measures to prevent bird collisions and protect.

NSK develops roller bearings for wind turbine shafts that significantly reduces wear

(Company statement, Dec 16)

- NSK, a producer of industrial machinery bearings, has developed a self-aligning roller bearing for main shafts in wind turbines, and launched global sales.
- According to NSK, the product reduces wear by over 90% compared to the standard type, incorporating the following advanced tech that improves resistance on raceway surfaces of the bearing:
    - Super-TF Material: An original material that enhances surface strength by dispersing micro carbides;
    - DLC Coating: A hard diamond-like carbon coating that prevents surface degradation of rollers;
    - ECA-Type Cage: A newly developed cage design that enables larger rollers and increased roller count, allowing for optimizing the internal structure for higher load capacity.
- CONTEXT: *Wind turbine main shaft bearings often suffer early damage due to wear on raceway surfaces caused by heavy loads or debris contamination especially in harsh environments. Improved wear resistance is crucial for reliability, as component failure can result in prolonged downtime, costly repairs, and logistical challenges in remote locations. The new product has already been adopted by wind power operators in North America.*



Sojitz enters electricity retail market in Ireland

(Company statement, Dec 13)

- Trading house Sojitz, partnering with Nexus Energia, will acquire 98% of New Measured Power (Pinergy), an Irish renewable energy-focused electricity retailer, making it a consolidated subsidiary.
- This is Sojitz's second entry into the EU electricity retail market after Spain in 2021.
- Pinergy, founded in 2013, specializes in procuring 100% renewable energy (mainly onshore wind) and primarily serves corporate clients. In 2023, its sales increased 38% YoY to €215 million, with an annual electricity sales volume of 840 GWh.
- CONTEXT: *The initiative aligns with Ireland's renewable energy goals and Sojitz's strategy to enhance its decarbonization-focused energy business across Europe through M&A and new service offers. By 2030, Ireland aims to achieve an 80% renewables share of the national power mix.*

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Hitachi Energy strengthens Jeju Island's grid with South Korea's VSC tech

(Company statement, Dec 12)

- South Korea's main utility, Korea Electric Power, and Hitachi Energy cooperated in strengthening the grid on South Korea's Jeju Island.
- The Korean utility launched a high-voltage direct current (HVDC) converter station on Jeju Island, providing 200 MW of power.
- This project – Wando-Dongjeju #3 HVDC converter station – is South Korea's first Voltage Source Converter (VSC) installation, developed with Hitachi Energy.

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Chubu Electric Mirai is first utility to launch banking services for households

(Company statement, Dec 19)

- Chubu Electric Mirai introduced "Katené Bank," offering financial services for households, powered by SBI Sumishin Net Bank.
- Customers paying utility bills via direct debit can earn up to 5% in points redeemable for utility payments. Loans for home equipment and SME lending based on utility data might also be developed.

- TAKEAWAY: Power retailers have direct access to homes and the retailers of the former regional power monopolies, (EPCOs), have access to roughly 80% of homes on average in their respective areas. That gives the opportunity to provide additional services to consumers – provided the utility has a good reputation. Chubu Electric is the most active of the EPCOs in harnessing this opportunity. Small communities are already well served by the country's three 'mega' banks and the plethora of local lenders.

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Tohoku Univ and others to accelerate geothermal development

(Nikkei, Dec 17)

- A research group led by Tohoku University's Institute of Fluid Science has developed a new method for measuring crustal stress and tracking underground flows of hot water and steam in geothermal power generation.

- This "double-bit coring method" enables measurements at depths of 2.5 km and temperatures of up to 250°C, surpassing conventional methods of 1 km and 100°C.
- The research, commissioned by NEDO, seeks further validation to integrate the tech into geothermal development projects.

Enewill established Shikaoi Energy in Hokkaido

(Company statement, Dec 16)

- In September, Enewill, an operator of infrastructure construction business, in partnership with Shikaoi Town, Hokkaido, set up the JV – Shikaoi Mirai Energy – to promote regional decarbonization.
- Starting in November, Shikaoi Mirai Energy began supplying carbon-free electricity to public facilities in Shikaoi Town, covering around 95% of their electricity needs.
- Shikaoi Mirai Energy will engage in renewables generation, electricity retail, energy-saving equipment operation, storage battery deployment, and consulting.

NEWS: OIL, GAS & MINING

LNG stocks up 5.7% from previous week, down 17% YoY

(Government data, Dec 18)

- As of Dec 15, the LNG stocks of 10 power utilities were 2.24 million tons (Mt), up 5.7% from the previous week (2.12 Mt), down 17% from end Dec 2023 (2.7 Mt), and 3.7% up from the 5-year average of 2.16 Mt.

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November Oil/ Gas/ Coal trade statistics

(Government data, Dec 18)

Imports	Volume	YoY	Value	YoY
Crude oil	10.1 million kiloliters (63.8 million barrels)	-17%	¥761.7 billion	-29.7%
LNG	5.1 million tons	-5.3%	¥483.1 billion	-2.5%
Thermal coal	8.5 million tons	2.2%	¥200.2 billion	-10.2%

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Tokyo Gas, Mitsubishi among founders of international e-methane alliance

(Company statement, Dec 16)

- The e-NG Coalition, an international alliance for e-methane, has launched operations. The eight founding companies are Tokyo Gas, Osaka Gas, Toho Gas, Mitsubishi Corp, Engie, RWE, Tree Energy Solutions Belgium, and TotalEnergies.
- The goal is to promote e-methane, creating a global market by standardizing GHG emissions calculation and certification, strengthening cooperation among stakeholders in the e-methane value chain, promoting innovative technologies, etc.
- CONTEXT: *This alliance was incorporated in Brussels, Belgium and is led by TES chief commercial officer Yves Vercammen and Tokyo Gas e-methane promotion director Kobayashi Yuji.*

- TAKEAWAY: E-methane, a synthetic methane produced from hydrogen and CO2, could possibly replace fossil fuels. But boosting its production and widespread use faces a number of obstacles such as the lack of international accounting for GHG emissions during combustion.

ANALYSIS

BY JAPAN NRG TEAM

A Look Back at the Year in Energy – 2024

With the release of the draft Basic Energy Plan last week, most eyes are on the future. Where does Japan's government and experts see the nation developing over the next decades? Is the country still on course for net-zero by 2050, as mandated by law?

These questions of strategy are important and fascinating, but energy is a sector that relies on small, ongoing progress – the little victories – to evolve. The change that actually occurs is rarely prophesied in 100-page presentations. The IEA's infamous record of failing to predict the speed of solar PV development in almost every one of its reports over the past 15 years can attest to how difficult it is to divine the course of the energy sector.

This overview of Japan's energy sector takes on a simpler task: to record some of these tiny victories and include the near-term events that drive each form of power generation. As the below shows, it was far from a quiet year.

Hydrogen and Ammonia

If 2017 is the year that Japan published the world's first national strategy for hydrogen, then 2024 is the year that hydrogen and its gaseous brethren (ammonia, methanol, synth gas, etc.) finally stepped into the mainstream. To be sure, this was a first step and, some might say a misstep, but it was a definitive change of phase in development, from pilot projects and paper plans to the beginning of mass usage.

JERA successfully completed the world's first trial of commercial-scale use of ammonia as a second fuel at its Hekinan thermal power plant. Soon after, Idemitsu did the same in a commercial naphtha cracking furnace (i.e. a facility that makes the raw materials for plastics).

Godzilla movie-maker Toho studios signed Japan's first commercial supply of electricity from a hydrogen-fired power plant. Construction of Japan's largest green hydrogen plant began at Suntory's whiskey distillery in Yamanashi Pref (16 MW power-2-gas), with commissioning due in 2025.

Government support has been crucial to this development of what is dubbed the Hydrogen Society. In May, the Diet passed the Hydrogen Society Promotion Act, which went into effect in October. The Act put in place a clear definition of what constitutes a 'low-carbon' hydrogen fuel and the same for its related compounds. It also created the conditions for a state subsidies scheme known as the Contract for Difference (CfD), which started to accept applications in late November. The CfD will compensate the end-users of hydrogen of the additional expense of switching to the clean-burning fuel compared with fossil fuels. CfD applications will close by April 2025, with officials claiming that the scheme targets hard-to-abate sectors and not only power generation.

The CfD was, in fact, the second subsidy scheme for those looking to get weaned off hydrocarbons. The first, targeted at power utilities, was the long-term decarbonization

power source auction (LTDA), which started in January and by late spring awarded support to 0.83 GW of hydrogen and ammonia co-firing capacity for power stations that will adapt to utilize those fuels.

Meanwhile, METI is also accepting applications from hydrogen and ammonia supply chain makers. The ministry selected 10 projects in the first round and will conduct a second round before the end of FY2024. The end goal is to create eight hydrogen hubs around the country, with only three in the big cities and the rest in smaller cities and the regions.

For domestic engineering firms, this is a happy time. For example, Kawasaki Heavy Industries has unveiled a 7.5 MW gas engine that can run on 30% hydrogen and a 500-kW gas engine that uses only this fuel. IHI and MHI have similarly signaled the potential to create turbines and engines that run exclusively on hydrogen or ammonia – if there's demand.

The issue, as always, is the price. For now, Japan is hoping that costs can be lowered through scale and international cooperation. In June 2024, the Japan-EU Hydrogen Business Forum was held in Tokyo, and the Japan-ROK Hydrogen and Derivatives Cooperation Dialogue was held in Seoul.

Solar Power

Electricity derived from solar panels now supplies about 10% of the national power mix. But there has been a notable increase in slowdown in the rollout of new utility-scale solar capacity in the last two years. The government has sought to revive that growth through promoting next-gen technologies and grid integration incentives.

Perhaps this year's most outstanding achievement was advancing the commercialization of flexible, lightweight Perovskite Solar Cells (PSCs). This innovative tech can be installed on unconventional surfaces such as building walls and curved structures, thereby harnessing underutilized surfaces.

Companies like Sekisui Chemical and Panasonic are pioneering PSCs, with large-scale demonstrations already underway, including installations on walls of data centers and public facilities. Panasonic has advanced scalable PSC production, aligning with government targets to reduce manufacturing costs to ¥20/ W by 2025, and ¥14/ W by 2030. Japan aims to deploy at least 20 GW of perovskite by 2040 both as stand-alone PSC panels and as additional PSC layers added to conventional polysilicon solar panels.

Floating solar installations also gained traction this year as a means to address a dearth of available land for energy projects, particularly focusing on coastal areas and reservoirs. These efforts were pioneered by real estate developer Tokyu Land and Dutch offshore solar power firm SolarDuck, which in May installed Japan's first offshore floating solar PV power plant on the surface in the Central Breakwater Area of Tokyo Bay.

Japan also advanced plans to beam solar energy from space back to Earth using microwave transmission. This tech, developed by Kyoto University and supported by

JAXA (Japan Aerospace Exploration Agency), aims to tackle issues of limited sunlight on Earth. Tests are progressing, with an eye toward a launch in FY2025.

BESS

One of the standout energy sectors of 2024 was undoubtedly power storage. There were significant strides in Battery Energy Storage Systems (BESS), driven by both private sector initiatives and government policies. Japan held the first major long-term decarbonized power auction (LTDA), with BESS projects securing competitive bids. OCCTO assigned 1.09 GW of BESS capacity across 30 projects. Among the most successful bidders were companies like Renova, which positions itself as Japan's only listed fully-fledged renewables developer. Renova won three contracts for projects totalling 215 MW.

Japanese firms and global players launched dozens of GWs of large-scale battery storage projects nationwide. Developer Gurin Energy started work on a 500 MW, 4-hour duration (2 GWh) project to provide 2 GWh of electricity. Demand drivers for BESS include the increasing power needs of generative AI and data centers, and the ever-rising levels of renewable energy curtailments.

Meanwhile, financial services company Orix, which won the single biggest BESS contract awarded under the LTDA, commissioned its first grid-scale facility in early December. The 48 MW / 113 MWh Kinokawa BESS is a JV with Kansai Electric. By late 2026 or early 2027, Orix hopes to have online a much larger 134 MW / 548 MWh BESS in Maibara City, Shiga Pref, which is sponsored by the LTDA.

Other sector trends include innovation in multi-use storage systems, where BESS technologies provide services such as frequency regulation and capacity market participation. This reflects a shift toward a multi-service model to optimize the value of energy storage.

Both central and local governments continue to refine their BESS policy frameworks. METI allocated ¥9 billion to incentivize energy storage projects, focusing on grid balancing and virtual power plant (VPP) technologies.

One area where many market participants hope to see progress in 2025 is in financing. Banks remain reluctant to offer financing of any size for commercial battery projects, unless it's backed by the parent company's balance sheet.

Wind Power

While the slow pace at which the government offers new tenders is a source of frustration for many, overall, Japan's wind power sector can finally be said to be taking off. The year began with JERA announcing the start of operations at the Ishikari Bay New Port Offshore Wind Farm, the biggest commercial scale wind power facility in Japan at 112 MW and the first to install 8 MW turbines (Siemens Gamesa).

Even before the completion of the Round 2 tender in spring, the next round of tenders was already launched. A January announcement offered developers to bid for just over 1 GW of capacity at Aomori South (Aomori Pref) and Yuza Town (Yamagata Pref). Results are expected shortly.

In the previous tender round, four projects with a cumulative capacity of 1.81 GW were awarded to consortiums led by Japan Renewable Energy, JERA, Mitsui, and the Sumitomo and TEPCO Renewable Energy partnership, respectively. Among the winning bids was Spanish renewables firm Iberdrola, reinforcing the trend of an increasing presence of non-Japanese firms in the sector.

Meanwhile, the government switched its focus to mapping out the sector's longer-term future via floating wind technology, which can be utilized in deeper waters and is critical given Japan's coastal geography. In March, the government approved a draft amendment that will allow building offshore wind power capacity in the exclusive economic zone (EEZ).

Seeking to achieve large-scale commercialization of floating wind power generation and creating a domestic industry, a group of companies launched the Floating Offshore Wind Technology Research Association (FLOWRA). It's based on a partnership with local companies and focuses on developing technologies to reduce the costs and risks of commercializing the tech in Japan. Members include J-Power, KEPCO, JERA, Chubu Electric, Tokyo Gas, TEPCO Renewable Power, and Eurus Energy.

With the push towards the expansion of offshore wind power, Japan has seen some economic ripples in coastal regions, particularly with job creation in shipbuilding, turbine manufacturing, and maintenance sectors. The sector's rapid growth has led to significant labor shortages, however, prompting industry members to scramble to introduce courses that will retrain workers for technical and safety skills.

Carbon Capture, CCS, CCUS

After selecting seven projects (five in Japan, two overseas) as the starting point of the CCS sector in 2023, the government made a number of key updates to the development timeline. Most importantly, it confirmed the regulatory and some of the legal framework. The CCS Business Act came into force in May 2024, providing the basis for regulations around safety and sector economics. The Diet also agreed to accept an amended London Protocol, which allows for the future export of CO2. In autumn, technical parameters pertaining to the shipping of liquid CO2 were publicized.

The outline of the sector's development remains largely unchanged from the initial announcements in the summer of 2023: Japan aims to store 6–12 million tons of CO2 per year by 2030, and expand that to 120–240 million tons by 2050. The government hopes that projects such as the first pilot facility at Tomakomai, Hokkaido, will switch to a commercial basis by 2030. Until then, testing is focused on the shipping of liquid CO2 by Kansai Electric to the Tomakomai hub, which is operated by Japan CCS Co.

The biggest problem for the sector remains the high cost of the CCS supply chain. To address this, the government started compiling a preliminary framework for financial support in December 2024. Detailed discussions are slated to begin in early 2025 and an interim report expected by summer 2025.

LNG

In 2023, gas-fired power generation comprised 29% of Japan's total, but overall LNG consumption is declining. This owes in large part to the restart of nuclear reactors,

measures to foster energy conservation, as well as the increased use of renewables. Without a reverse of the national energy strategy, which will be based on the draft of the new Basic Energy Plan, Japan's current LNG contracts would leave the country over-supplied.

The current national energy strategy calls for gas-fired plants to shrink their contribution to the total mix to about 20%, half that of prior years. However, the new energy strategy, which is expected to pass by the end of this fiscal year (March 31, 2025), sees fossil fuel-fired thermal generation making up 30-40% of the national mix in 2040 (compared to almost 70% in 2023). The draft does not specify if the fuel would be coal or LNG (or oil), but METI has also asked utilities to keep faith in long-term LNG contracts.

The above suggests that LNG's fortunes will remain strong over the course of this decade and possibly in the 2030s. Japanese buyers have been quietly strengthening ties with existing suppliers such as the U.S. and Australia in recent months, and also testing options elsewhere.

Japan's investments in Australia helped develop the North West Shelf LNG industry; and JERA recently acquired a 15.1% stake in Woodside Energy's Scarborough project, with the JBIC approving a $1 billion loan for its development. Yet, Australia's new gas emission regulations and the U.S. moratorium on new LNG export approvals have posed challenges.

In the Middle East, Oman LNG inked a 10-year supply deal with JERA. Osaka Gas signed a long-term agreement with ADNOC for Ruwais LNG, commencing in 2028. The key to maintaining a strong LNG component will be how to mitigate the risk of price hikes and volatility in short-term demand. To address this, METI has redoubled efforts to establish a meaningful domestic strategic gas reserve.

The other focus point will be bringing down LNG's carbon footprint, as much as it is possible for a hydrocarbon. This is where the Coalition for LNG Emission Abatement Toward Net Zero (CLEAN) initiative comes in. Launched last year by JERA, Korea Gas and JOGMEC, it expanded this year to include 22 Japanese utilities and trading houses Mitsubishi Corp and Mitsui & Co. The Coalition seeks to reduce methane emissions through data collection and project-level monitoring, thanks to Japan and Korea's influence on the LNG market.

Finally, what will happen to the soon-to-expire contracts to buy LNG from Russia's Sakhalin II? Economics and logistics say that Japanese buyers will renew the contracts. But politics and net-zeronomics suggest they won't. How PM Ishiba sides on the issue will be crucial.

Nuclear

Despite PM Ishiba holding a cool stance on nuclear power before the election that brought him to power, his government seems willing to continue with the nuclear course. METI plans to maintain nuclear's share of the national electricity mix at 20% in its 2040 energy target, the same ratio as for the 2030 target. It emphasizes rebuilding nuclear plants on existing sites, but said it will allow utilities leeway to select other locations. Either way, reaching the 2030 target implies at least doubling the number of reactors that Japan has online.

After almost a decade of efforts to restart reactors, Japan has 14 units online out of a total of 33. Recent months have seen notable progress. Initially, the only reactors that managed to secure both regulatory and local government approvals were in West Japan and that utilized the pressurized water reactor (PWR) technology. Many of the NPPs in East Japan, however, utilize boiling water reactors (BWRs), the same type deployed at the Fukushima Daiichi NPP.

Finally, in 2024, two BWRs restarted operations: at Onagawa NPP, and Shimane NPP. The latter is also in West Japan, while the Onagawa station is in the Tohoku region, marking the first restart in East Japan.

For most nuclear utilities there's another ongoing battle – prolonging the operation of aging reactors. In October, Kansai Electric received NRA approval to continue operation at Takahama NPP, Japan's oldest working unit at 50 years in service. Approvals for renewed permits to operate now have to be secured every decade for reactors of 30 years and older.

Meanwhile, the gargantuan task of decommissioning Fukushima Daiichi NPP remains as complex and difficult as ever. TEPCO began work on the experimental removal of debris, but faced a setback in September. Work resumed in October.

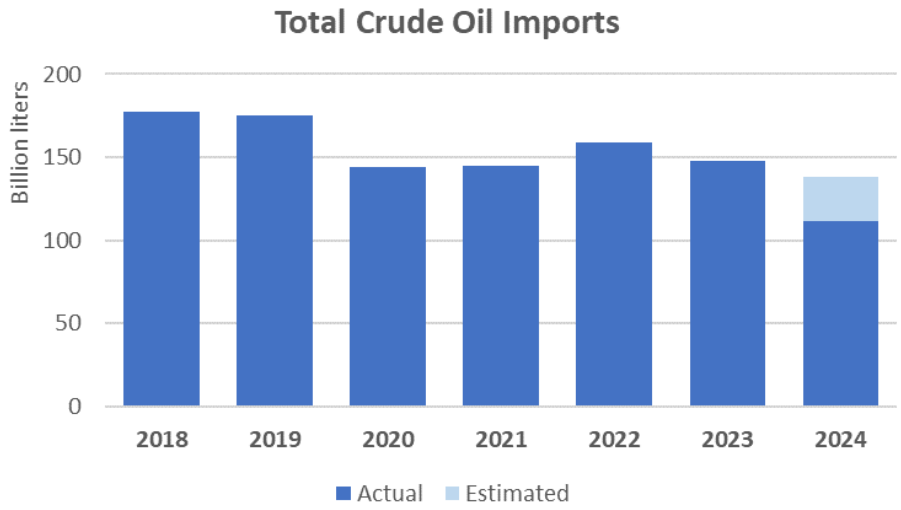
Oil

Japan's oil sector is in a gradual, structural decline. In March 2024, Idemitsu Kosan shuttered yet another refinery, just six months after ENEOS had stopped operations at its Wakayama plant. Together, the two facilities accounted for about 250,000 barrels (per day) of refining capacity. As of May, there were about 20 refineries still in operation nationwide, but the biggest one – ENEOS's Mizushima plant – can only process 350,000 barrels a day.

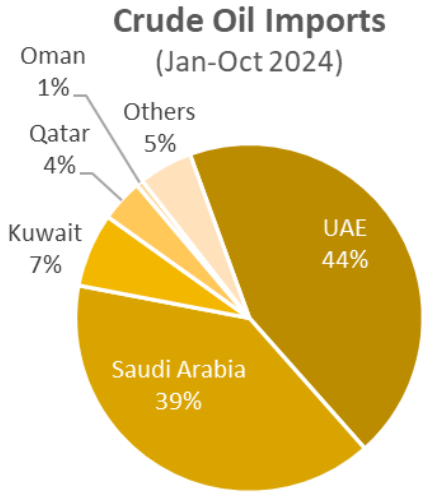
One of the unexpected side-effects of this idling of refineries has been a shortage of industrial-grade CO2 in Japan. Carbon dioxide is captured as a byproduct at oil refineries. Today, imports of CO2 for the chemical sector and other applications are rising and so are the prices for a gas that, ironically, most companies and countries want to get rid of.

While oil refiners adapt their shuttered sites to clean energy facilities to reduce their carbon footprint, imports of crude oil remain little changed since 2020. In the first 10 months of 2024, Japan imported 111.2 billion liters (about 23 Mbpd) of crude oil.

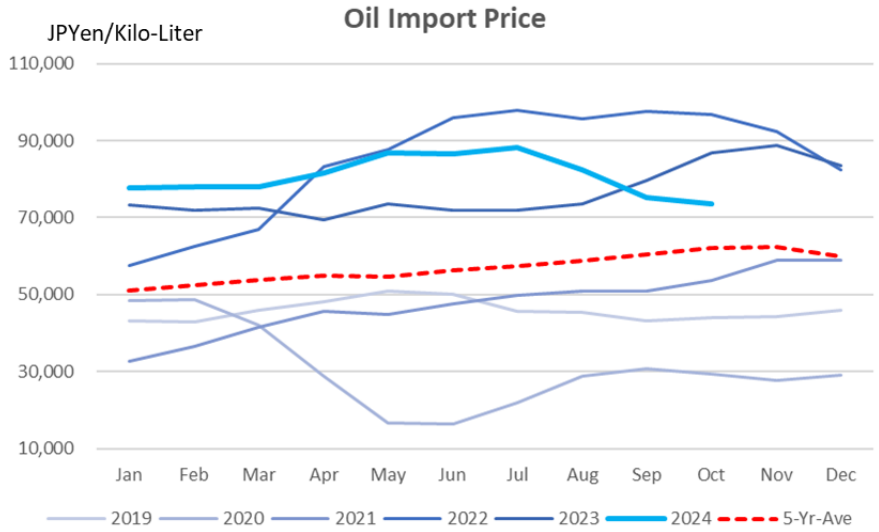
Annual imports don't look likely to exceed the 2023 total. However, a demand decline is likely to accelerate later this decade. The government has finally agreed to promote a higher blending of biofuels with gasoline. Ethanol or similar biofuels currently make up 3% or less of the gasoline blend sold at service stations around Japan. In November, METI said it wants the percentage to rise to 10% by FY2030 and up to 20% in the early 2030s.



In terms of security of supply, Japan continues to rely on the Middle East for 95% of its crude. In 2024, the UAE took over Saudi Arabia as the top supplier. Small quantities also come from Mexico and Canada, while imports from Russia, Bahrain, and Malaysia have dried up. Calls to diversify Japan's crude imports continue, but there is little tangible movement on that front.



The high prices that Japan pays for oil reflect yen weakness. So far, the average USD-JPY rate for 2024 is ¥151.7 (ranging ¥142.73~156.9), which is 7.5% higher than the ¥141.15 average in 2023. Partly because of this higher cost to Japanese consumers, the previous administration of PM Kishida kept fossil fuel subsidies in place for so long. State support for gasoline kept the price flat for most of the year, ranging from ¥174.4 to ¥175.6 per liter. Without subsidies, the price would have exceeded ¥190. Even with the subsidies, it was ¥10-¥20 higher than the average for the past four years.



The year's big story in petroleum products was a shortage of jet fuel. Narita Airport was one of the most affected with dozens of flights canceled. To allay the panic, Japanese oil refineries increased output, but it turned out that the volumes were not the problem. Bottlenecks in logistics, such as a lack of drivers for trucks and pipeline connections, were the main cause of the shortage, as well as a quick surge in international flight volumes as foreign tourists flocked to Japan to take advantage of the weak yen.

How the logistics will survive Japan's move to Sustainable Aviation Fuel (SAF) is another uncertainty for the coming years. The national target is to have all domestic flights source at least 10% of their fuel as SAF. Cosmo Oil is among the domestic firms preparing for SAF commercial production at its Sakai Refinery from 2025. The issue of the higher SAF price, however, has yet to come to the public's attention.

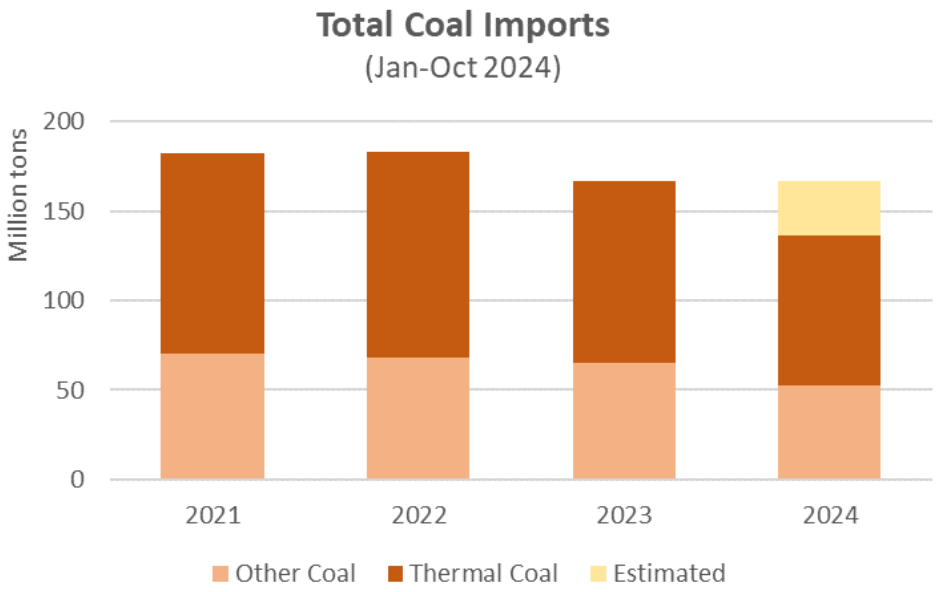
Coal

In the first 10 months of 2024, Japan imported a total of 136.7 million tons (Mt) of coal, of which 83.8 Mt was thermal. Based on Japan NRG calculations and short-term forecasts, the totals for this year are likely to be little changed or down over 2023. That makes sense given the pressure on power utilities and industrial firms to decarbonize.

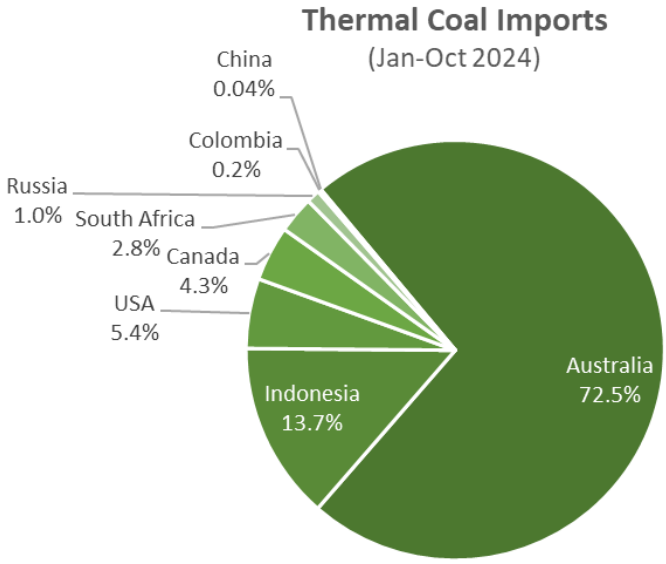
Japan, however, has also added at least 15 new coal-fired generation units in the last two decades. JERA brought online a new unit at its Yokosuka Power Station in Kanagawa Pref as recently as December 2023. Kobe Steel opened Unit 4 at its coal-fired Kobe Power Station in February 2023. Shikoku Electric started the Saijo Power Station in June 2023.

The new facilities were planned years in advance and the trend today is for companies to cancel coal power plant projects rather than build them. Still, utilities and industries are not eager to shutter their thermal fleets just yet. There is an eagerness to test the approach, led by JERA, of co-firing fossil fuels with hydrogen or ammonia that do not emit CO2 when burned.

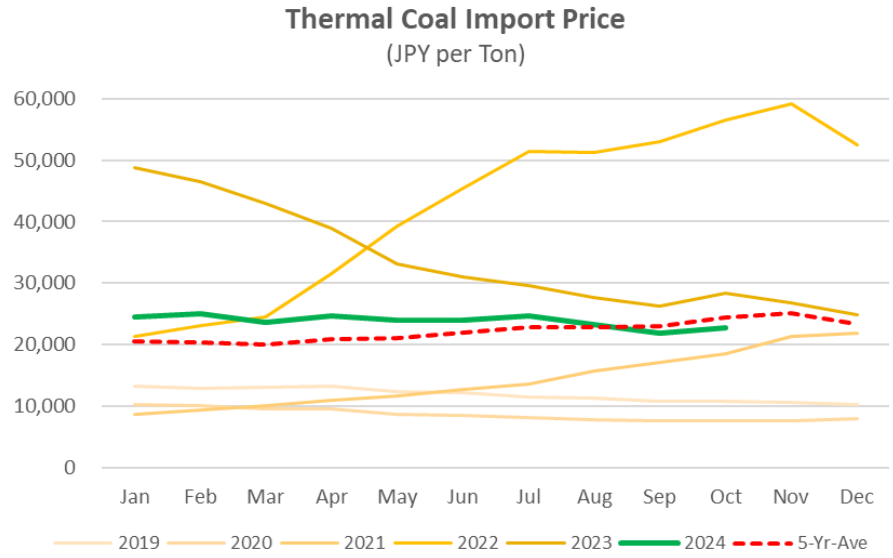
Several government tender schemes, including the LTDA and the CfD, are helping power generators to access subsidies for co-firing projects. The worry is, however, that the economics of supporting two fuels will not be kind. Last week, a pricing committee under METI published a report on its forecasts for the 2040 power generation cost estimates. The forecast painted ammonia co-firing with coal as more expensive than ammonia single-firing. Similar conclusions could be drawn from the numbers for hydrogen co-firing. And while the range of the numbers offered by METI experts was broad and the 2040 target distant, the cost estimates should give officials and utility companies reason for thought.



In terms of sourcing, over 70% of Japan's thermal coal imports came from Australia, followed by Indonesia. Unlike in 2023, no imports came from Pakistan and the Philippines.



Despite the weak yen, coal prices were depressed. Japan's import price for thermal coal averaged ¥23,850 per ton this year (ranging from ¥21,822 to ¥25,100).



As of Dec 1, there are 181 coal thermal power generating units with a capacity of 30 MW or more in Japan; of these, 162 are in operation and have a combined 56 GW of capacity, according to Japan Beyond Coal.

Status	No. of Plants
In Operation	162
Planning & Under Construction	1
Mothballed	5
Cancelled Planning	4
Retired	9
Total	181

The top three coal generators are JERA, J-Power, and Tohoku Electric, with nearly 50% of the total coal-fired power capacity.

Electricity Markets

This year marked a shift in Japan's electricity market with new mechanisms like capacity market charges and expanded balancing market operations. However, challenges such as bid shortages, price surges, and strained supply-demand balances persist, prompting emergency measures during peak demand periods.

The long-term decarbonization auctions revealed a preference for storage systems, with battery projects dominating, while LNG-fired power plants nearly filled their quotas. Rules reclaiming 90% of market revenues continue to impact investment strategies.

The biggest story was the surge in power futures, with EEX volumes up 3.6 times YoY; ICE joining the market at the end of the year; and TOCOM improving its liquidity through a market-maker system. Further expectations lie in the direction of initiatives like JJ-Link, which integrates spot and futures trading.

ASIA ENERGY REVIEW

BY JOHN VAROLI

This column provides a brief overview of the region's main energy events from the past week

Australia / EVs

The govt is funding cheap loans to help people buy EVs in a bid to kickstart slumping sales. Clean Energy Finance Corp is providing A$150 million in such discounted loans aimed at low-income and essential workers.

Cambodia / LNG

Cambodia should reconsider plans to build a 900 MW LNG-fired power plant by 2030, when fuel costs will have risen compared with other clean energy sources, said the Institute for Energy Economics and Financial Analysis.

China / Critical minerals

Critical minerals will be China's weapon in its escalating trade war with the U.S. Every time the U.S. imposes new restrictions on exports of advanced semiconductor chips, Beijing responds by tightening controls on exports of the critical inputs for chip manufacturers.

China / Peak Oil

In 2023, China's refined oil consumption peaked at 399 Mt (7.98 mbpd) and is expected to fall 1.3% to 394 Mt in 2024, said CNPC Research Institute. Driven by the shift towards EVs and trucks fuelled by LNG, China's rapid move toward peak oil is surprising, with crude imports on track to peak in 2025. Total oil consumption is set to peak by 2027, said refining giant Sinopec.

Climate finance

The World Resources Institute said that between 2013 and 2022 China contributed or mobilized $45 billion to support developing countries in reducing emissions. This accounted for about 6% of all climate finance provided by developed nations over that time.

India / Offshore wind

Amidst plans to build offshore wind capacity, the International Institute for Sustainable Development said it may take India at least 12 years to reach grid parity. Achieving India's target of 37 GW of offshore wind energy capacity by 2030 requires significant financing.

India / Oil

India is now the leading source of growth in global oil consumption, overtaking China this year, said the EIA. China's oil consumption grew by more than India's in almost every year from 1998 through 2023, with China's oil consumption growing more than any other country during those years. In 2024, India accounted for 25% of total oil consumption growth globally.

India / Solar power

Trump could derail India's solar power export ambition as the U.S. intends to increase tariffs and limit demand for eco-friendly imports. Trump seeks a global tariff on solar imports and is exploring duties on Southeast Asian suppliers.

Philippines / Coal

Coal still fuels 57% of the Philippines' energy needs. The country operates 28 coal-fired plants with a combined capacity of 9.88 GW. Meanwhile, the contribution of renewables to the country's power mix remains at just 22%.

South Korea / Offshore wind

The govt awarded a total of 1.89 GW in generation capacity across four fixed-bottom offshore wind projects and one floating wind project. The projects are the 532 MW Anma Offshore Wind (both phases); the 500 MW Taean (Vena Energy); the 104 MW Yeonggwang Yawol (Daehan Green Power); and the 750 MW Firefly/ Bandibuli floating wind farm (Equinor).

2025 EVENTS CALENDAR

A selection of domestic and international events we believe will have an impact on Japanese energy

Month	Date	Event
January	6	First market trading
	6-24	FIT/FIP solar auction #23
	21-22	World Forum Offshore Wind (WFO) Global Summit 2025, Barcelona, Spain
	29-31	ENEX 2025 / DER Microgrid Japan 2025 / Renewable Energy 2025 / Offshore Tech Japan 2025 / InterAqua 2025 / Green Infrastructure Industry @ Tokyo Big Sight
February	19-21	Smart Energy Week 2025 / H2 & FC Expo / PV Expo / Battery Japan / Smart Grid Expo / Wind Expo / Biomass Expo / Zero-E Thermal Expo / GX Management Week / Decarbonization Expo / Circular Economy Expo @ Tokyo Big Sight

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