KIKO NETWORK 気候ネットワーク

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Kiko Network

Japan doesn't need 10 GW of new LNG-fired power plants

It needs a Strategic Energy Plan with a roadmap to phase out thermal power

Contents

1. Introduction

A transition away from fossil fuels was declared in the outcome document of the 28th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP28) in 2023. To keep the global average temperature rise below 1.5°C, global greenhouse gas (GHG) emissions must be drastically reduced by 43% by 2030 and 60% by 2035, compared to 2019 levels. This means that CO_2 emissions must be reduced by 48% by 2030 and 65% by 2035, compared to 2019 levels. To this end, the electricity sector, which accounts for about 40% of Japan's energy-derived CO_2 emissions, must drastically reduce the use of fossil fuels and dramatically expand the deployment of renewable energy. Japan's stance on LNG-fired power generation cannot be ignored in this discussion.

Previously, LNG-fired power generation has mostly escaped scrutiny, having been in the shadows of coal-fired power, which has a higher emission factor and relatively higher emissions. Meanwhile, the government has emphasized LNG for its role as a "transition fuel" and "grid balancing" to compensate for the variable output of renewable energy. Since 2013, while old facilities have been decommissioned, about 24 gigawatts (GW) of new LNG-fired generation capacity has been put into operation. In addition, utilities are making plans to build about 7.15 GW of new capacity from 2024 onward. As part of this new construction, participants in the so-called "Long-term Decarbonized Power Auction," successfully won contracts for 5.756 GW as long-term decarbonized electricity providers, and economic support is to be provided from the construction phase onward.

However, it is clear that any plans premised on the continued use of this new LNG-fired power generation would not be consistent with the 1.5°C target. According to the synthesis report of the IPCC's Sixth Assessment Report, with a 50% confidence level, the world has already used about 80% of its carbon budget that would limit global warming levels to 1.5°C or less since preindustrial times[1]. In "Net Zero by 2050: A Roadmap for the Global Energy Sector," the International Energy Agency (IEA) states that promoting the decarbonization of electricity sources is the single most important way to approach an emission pathway consistent with the 1.5°C target by 2030. It calls on developed countries to achieve net zero in the electricity sector by 2035, and in other countries by 2040[2]. To achieve the 1.5°C target, Japan should be halting any future construction plans for LNG-fired power plants and start drawing up a path to phase out LNG-fired thermal power generation. If not, this will inevitably be a repeat of the previous mistake of being overly fixated on stopgap measures to prolong the survival of coal power, with Japan having built over 10 GW of new coal power capacity during the 2010s.

This paper summarizes the current issues and makes recommendations for the phase-out of LNG-fired power generation, an imperative that Japan cannot ignore if it is to decarbonize the electricity sector.

2. Scale and outlook for excess capacity of LNG-fired power generation

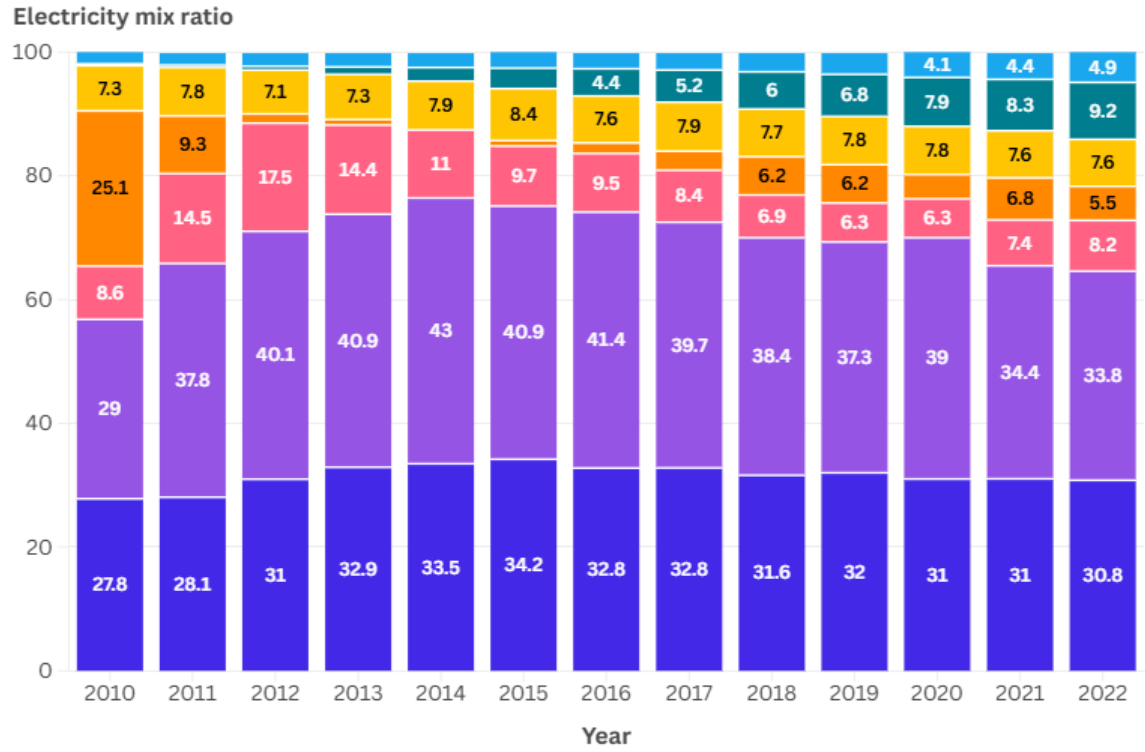
The share of electricity generated by burning fossil fuels (coal and LNG) in Japan increased sharply after the shutdown of nuclear power plants in the wake of the Tohoku earthquake and tsunami in 2011, and peaked in 2012. Besides the decrease in electricity consumption after the nuclear accident, the share of fossil fuel thermal power (coal and LNG) has been gradually decreasing due to the expansion of photo-

1 Institute for Global Environmental Strategies, "IGES experts focused on these parts of the Synthesis Report of the IPCC Sixth Assessment Report," https://doi.org/10.57405/iges-12941

2 https://www.iea.org/reports/net-zero-by-2050

voltaic power generation since 2013, and the gradual restart of nuclear plants since 2015. In recent years, the shares of coal and LNG have both been in the 30% range.

Figure 1. Trends in Japan's electricity mix



Source: Prepared by Kiko Network from "Comprehensive Energy Statistics," Agency for Natural Resources and Energy (April 12, 2024)[3].

The following table summarizes, by operator, the new gas-fired power plants that have started operating since 2013, when Japan simplified the environmental assessment process. Over the past decade or so, 47 new gas-fired power generation units have been built, with a generation capacity of about 24 GW.

According to electricity development plans for FY2033 (Summary of Supply Plans for FY2024, p. 21)[4], of the Organization for Cross-regional Coordination of Transmission Operators (OCCTO), there are plans for 6.414 GW of new LNG-fired power generation, and plans to decommission 2.295 GW. If these plans are fully implemented, the installed capacity is expected to increase by about 4 GW.

3 https://www.enecho.meti.go.jp/statistics/total_energy/xls/stte/stte_jikeiretu2022fykaku.xlsx

4 https://www.occto.or.jp/kyoukei/torimatome/files/240329_kyokei_torimatome.pdf

Figure 2. New gas-fired power plants built since 2013

Company/utility	Fuel type	Units	Total/capacity (MW)
JERA (TEPCO Fuel & Power)	LNG	8	484
JERA (Chubu Electric Power)	LNG	5	416.1
JERA Power Anegasaki	LNG	3	195
JERA (TEPCO Fuel & Power)	City gas	3	126
Kansai Electric Power	LNG	6	291.9
Tohoku Electric Power	LNG	4	196.8
Goi United Generation LLC.	LNG	1	78
Hokkaido Electric Power	LNG	1	56.94
Kyushu Electric Power	LNG	1	45.94
Hokuriku Electric Power	LNG	1	42.47
Shikoku Electric Power	LNG	1	28.9
Okinawa Electric Power	LNG	1	25.1
Okinawa Electric Power	LNG, kerosene, bioethanol	1	3.5
Total		36	1990.65

Entities not classified as electricity business operators		Units	Total/capacity (MW)
Kobelco Power Moka (Kobe Steel, KOBELCO)	City gas	2	124.8
Fukushima Gas Power	Natural gas	2	118
Ohgishima Power	LNG	1	40.7
Kashima Cooperative Thermal Power Company	By-product gases (blast furnace gas, coke oven gas)	1	30
Setouchi Joint Thermal Power	Blast furnace gas, mixed gas	1	23
Wakayama Kyodo Power	By-product gases (blast furnace gas, coke oven gas)	1	14.8
Oita Co-operative Thermal Power (merged and became Kyushu Co-operative Power)	By-product gases (blast furnace gas, coke oven gas)	1	14.7
Sumitomo Joint Electric Power	Natural gas, by-product gas (hydrogen)	1	13.5
Nippon Steel	BFG, COG, LDG	1	12.5
Total		11	392

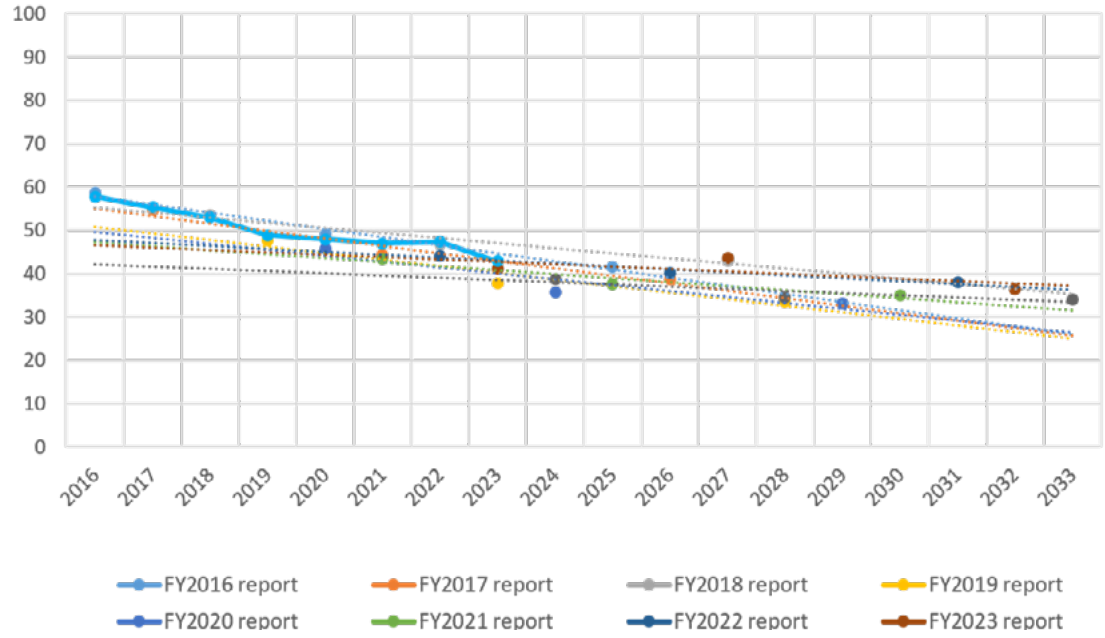
Source: Prepared by Kiko Network from company websites.

Next, the actual capacity utilization rate of LNG-fired power plants based on summary reports of OCCTO supply plans for the years FY2016 to 2024 shows a decline from about 58% to 43% in that period. Projections for a gradual decline based on those results suggest that the capacity utilization rate could be roughly 33% in FY2033.

These plans and estimates include expectations that installed capacity will increase, but because the capacity utilization rate is projected to decline, this suggests that in the absence of a huge increase in elec-

tricity demand, there will be a surplus of LNG-fired power generation capacity. (The topic of a possible increase in electricity demand for semiconductor plants and data centers is discussed below in the section on "Proposed expansion of LNG-fired power generation based on assumptions of excessive electricity demand.")

Figure 3. Actual and projected utilization rates of LNG-fired power plants



* Solid right blue line represents estimated results based on actual values for each fiscal year to 2023.

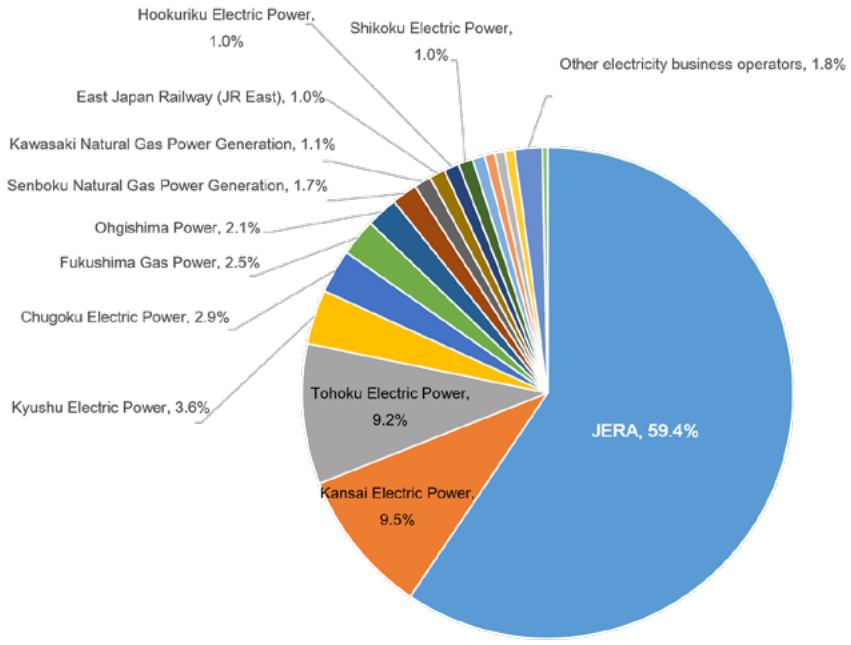
Source: Prepared by Kiko Network based on "Supply Plan Summary (FY2016-2024)," published by Organization for Cross-regional Coordination of Transmission Operators (OCCTO).

3. Current status of LNG power generation in Japan

The current status of LNG power generation in Japan is shown in the following pie chart (Fig. 4), with the share of actual power generation by each entity in FY2023. This pie chart shows that three companies account for about 80% of Japan's LNG power generation, with JERA at about 60%, and Kansai Electric Power and Tohoku Electric Power at about 10% each. The trends of these three companies would appear to be decisively important for the future phase-out of LNG-fired power generation in Japan.

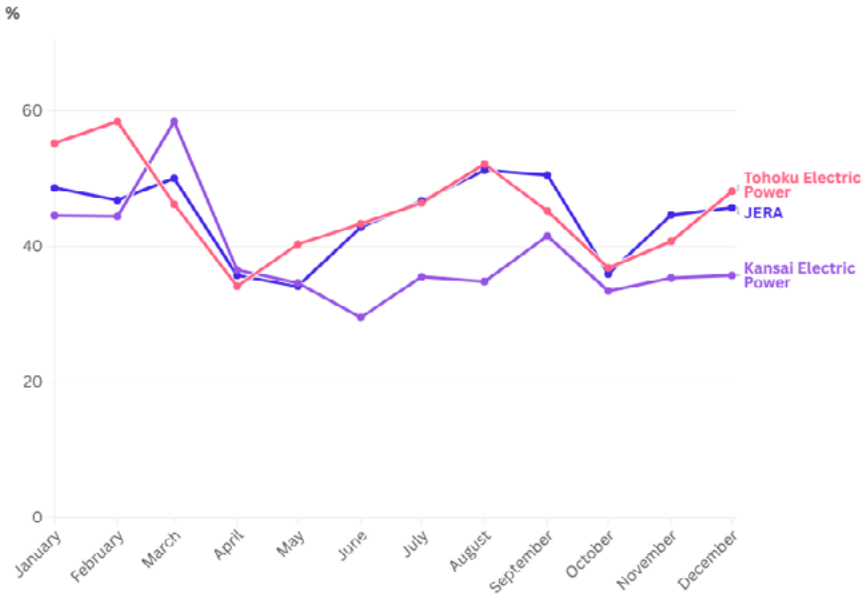
Next, looking at the capacity utilization rates of JERA, Kansai Electric Power, and Tohoku Electric Power in FY2023, the annual averages are 44.3%, 38.8%, and 45.7%, respectively, all below 50% (see table in references). As shown in the graph below (Fig.5), the capacity utilization rates of the three companies were about 30% to 35% in the lowest month, and about 50% to 60% in the highest month. Capacity utilization rates depend on various factors, such as power supply and demand and the amount of power generated from other power sources in the service area where the facility is located, the cost of power generation from other fuel types in facilities owned by the operator, equipment breakdowns, and periodic inspections. However, at least it seems clear that based on current capacity utilization rates, the situation is not so critical as to justify new construction or expansion.

Figure 4. Actual LNG power generation in FY2023 (by entity)



Source: Prepared by Kiko Network based on “Electric Power Survey Statistics” (FY2023), published by Agency for Natural Resources and Energy[5].

Figure 5. Capacity utilization rates of three major LNG power producers (FY2023)



Source: Prepared by Kiko Network based on “Electric Power Survey Statistics” (FY2023), published by Agency for Natural Resources and Energy.[6]

5 https://www.enecho.meti.go.jp/statistics/electric_power/ep002/results.html

6 See above.

Therefore, as with Japan's entire power sector, it can be said that the three companies that account for 80% of LNG power generation in Japan already have the facilities needed to meet the demand for LNG power generation year round, even with existing facilities. In addition, even if demand for LNG-fired power generation increases, the average capacity utilization rate of LNG-fired power plants for several years since the 2011 earthquake was less than 70% nationwide[7], and although this is a simple comparison, it appears feasible to increase the annual average capacity utilization rate by a little under 25%. This suggests that existing facilities could handle a considerable amount of future increases in electricity demand.

4. Policy stance on LNG-fired power generation

(1) Continuation of 6th Strategic Energy Plan policies

The government's stance on LNG-fired power generation in the 6th Strategic Energy Plan (released October 2021)[8], could be broadly summarized in three points. First, it is an important electricity source that has supported Japan's power supply. Second, it is important for grid balancing for renewable energy. Third, the transition from coal and gas to LNG can contribute to decarbonization, as well as the use of synthetic methane, co-firing with hydrogen and ammonia, and carbon capture, utilization and storage (CCUS). In addition, given the experience of tight supply-demand conditions (winter 2020), to secure LNG supply, Japan places a great priority on promoting its own development, and the creation and expansion of Asian LNG markets. On the other hand, regarding the necessity of reducing LNG-fired power generation in the future, the document only states that the "ratio in the power generation mix will be reduced based on the main premise of securing a stable supply" (6th Strategic Energy Plan[9], p. 36), but the specific timing, targets, and methods for realizing this are not described at all.

In a paper entitled "About future thermal power policy"[10] presented in May 2024 in the lead up to formulation of Japan's 7th Strategic Energy Plan, the Agency for Natural Resources and Energy (ANRE) referred to OCCTO's forecast for future electricity demand and indicated that after a declining trend to date, "Overall electricity demand is on an upward trend due to a significant increase in demand in the industrial sector due to the building or expansion of data centers and semiconductor factories" (p. 14). With regard to thermal power overall, the paper states that "the relative importance of thermal power will decline in the future" (p. 34), and makes the following points regarding the stance on LNG-fired power generation (p. 34-38). First, LNG is needed to provide electricity during periods and hours when fluctuating renewable energy power generation is low, such as during inclement weather in winter. Second, it is needed as a source to provide what the Ministry of Economy, Trade and Industry (METI) expects will be a shortage of thermal power supply capacity. Third, it is needed as a long-term decarbonized power source (to support zero emissions) to respond to short-term supply shortages. Fourth, LNG-fired power generation involves fuel procurement risks, so it is necessary to consider additional government support.

Regarding achieving zero emissions, a May 2024 document by ANRE entitled "About future thermal

7 Ministry of the Environment, FY2013 Greenhouse gas emissions, section 2.3, energy conversion sector (p. 9) https://www.env.go.jp/content/900445342.pdf

8 https://www.meti.go.jp/press/2021/10/20211022005/20211022005-1.pdf

9 https://www.enecho.meti.go.jp/category/others/basic_plan/pdf/20211022_01.pdf

10 https://www.meti.go.jp/shingikai/enecho/denryoku_gas/denryoku_gas/pdf/074_10_00.pdf

power policy"[11] states that policy measures being prepared included the Long-term Decarbonized Power Auction, support to cover price differentials for hydrogen and ammonia, legislation related to CCS, and proposed international agreements for ratification to enable CO_2 exports. Meanwhile, ANRE acknowledges that "there is a high degree of uncertainty" (p. 35 in "About future thermal power policy"), based on future cost projections and the fact that some of the crucial technologies are still being developed.

In current discussions, changes from the 6th Strategic Energy Plan include: (1) an emphasis on a potential future increase in electricity demand due to the building/expansion of data centers and semiconductor plants; (2) while the importance of thermal power in the overall power mix will be relatively less in the move toward carbon neutrality by 2050, there is still an emphasis on LNG-fired power generation as grid balancing for renewable energy, and (3) a recognition of the high level of uncertainty regarding achieving zero emissions from thermal power.

(2) Further locking in thermal power by building/expanding LNG-fired power plants

Although the government is aware that thermal power generation is declining in importance, it is increasing the reliance on LNG-fired power generation for grid balancing for renewable energy and as a source of thermal power. One could say that together with projecting increases in electricity demand, the government is actually strengthening its stance on the role of LNG to generate electricity. In concert with the strengthening of this stance, the government has built up policy support such as the Long-term Decarbonized Power Auction, support to cover price differentials of hydrogen and ammonia, legislation related to CCS projects, and support to secure LNG fuel supplies. Taking this policy support into account, operators as well appear to be making plans to increase installed capacity for LNG-fired power generation.

The desire of operators to continue with LNG is also evident from the contracts resulting from the first bidding on the Long-term Decarbonized Power Auction that was launched in April 2024[12]. It is problematic that in the Long-term Decarbonized Power Auction, for LNG-only combustion, bid requirements were "to start decarbonization within 10 years from the start of supply capacity and be decarbonized by 2050," but this means that the bid requirements are not aligned with the necessary timing of climate actions. Moreover, almost the entire 6 GW tender for LNG-only power generation in that round for the three years from FY2023 to FY2025 was successfully awarded (specifically, 5.756 GW). Starting with the second round, the government has decided on a policy to add an additional 4 GW (two rounds of 2 GW each), which together means 10 GW of new construction of LNG-only power generation. But this is almost completely the opposite of the decarbonization of electricity sources.

While offering a great deal of policy support and funding for innovative technologies, the Japanese government has acknowledged that there is a "high degree of uncertainty" regarding development of zero-emission technologies. Despite this, as described above, the government is strengthening its policy stance on LNG-fired power generation, so it is certain that we will see LNG being further entrenched or locked into the power supply as a result. It can be said that by creating a situation where there is no choice but to adhere to the highly uncertain prospect of achieving zero emissions of all power sources, including LNG, the government is making it even more difficult to achieve the ultimate goal of decarbonization of

11 See above.

12 Organization for Cross-regional Coordination of Transmission Operators (OCCTO), "Capacity market long-term decarbonized power auction contract results (auction year FY2023)", https://www.occto.or.jp/market-board/market/oshirase/2024/files/240426_longauction_youryouyakujokekka_kouhyou_ousatsu2023.pdf

the power sector.

5. Proposed expansion of LNG-fired power generation based on assumptions of excessive electricity demand

The government's main argument for the need for LNG-fired power generation has traditionally been its role in grid balancing for renewable energy. However, capacity utilization rates of existing facilities still have room to increase, as mentioned above, and scenarios such as those developed by WWF Japan[13] and the Lawrence Berkeley National Laboratory[14] in the United States also showed that electricity demand during the transition to net zero by 2050 can be satisfied by using Japan's existing installed capacity of thermal power generation.

Perhaps in response to this situation, in deliberations that began in FY2024 for the 7th Strategic Energy Plan, the government has been emphasizing the need to supply electricity for thermal power generation at peak demand times, and the building/expansion of data centers and semiconductor plants, in order to justify projections of major increases in future electricity demand to maintain and extend the life of LNG-fired power plants while trying to make them zero-emission sources. In committee deliberations, METI officials, members representing industry, pro-nuclear researchers, and members of METI-affiliated research institutes are strongly advocating for the need to secure supply capacity based on these factors.

Regarding response to peak-hour demand for thermal power generation[15], citing the Tokyo area as an example, the government states, "The amount of power generated during days of maximum operation during the year has not decreased significantly, and the required power generation capacity for thermal power generation has not changed significantly." Also, based on calculations of actual hourly power generation by area, published by general transmission and distribution utilities (local power grid operators), the paper states, "As the deployment of renewable energy expands, the amount of power generated by thermal power (kWh) is decreasing, but the amount of consumed electricity (kW) required for thermal power generation remains unchanged. The fluctuations in the amount of power generated are increasing." However, such demand occurs during a limited number of days and time periods, so it is clearly excessive and neither practical nor economical to continue to secure thermal power plant capacity to meet the entire amount of such peak-hour demand.

As for data centers, according to analyses[16] and reports[17] by several environmental NGOs and institutes, the amount of electricity consumed by computing varies greatly depending on the AI models being used, and even if the amount of traffic and computing load increases dramatically, a significant increase in electricity demand is not expected, based on improved performance and efficiency actually having limited

13 WWF Japan, "2050 zero scenario for a decarbonized Society, 2024 edition" (in Japanese), https://www.wwf.or.jp/activities/data/20240531climate01.pdf

14 Lawrence Berkeley National Laboratory, "The 2035 Japan Report: Strategies for decarbonization of electricity" https://emp.lbl.gov/publications/2035-japan-report-plummeting-costs

15 Agency for Natural Resources and Energy, "Current status and challenges of stable supply and decarbonization of thermal power" (in Japanese), https://www.enecho.meti.go.jp/committee/council/basic_policy_subcommittee/2024/059/059_004.pdf

16 For example, WWF Japan, "2050 zero scenario for a decarbonized Society, 2024 edition" (in Japanese), Institute for Global Environmental Strategies, "1.5°C Roadmap" (in Japanese and English), and Energy Transition for the Future Research Group, "Green Transition 2035" (in Japanese) .

17 Nikkei Energy Next, "Will the surge in AI data centers drastically reduce electricity demand?" (in Japanese), https://project.nikkeibp.co.jp/energy/atcl/19/feature/00021/090200004/?ST=print

increases in energy consumption. Thus, there is no need to increase installed capacity of LNG-fired power generation. In addition, because the building/expansion of semiconductor plants will be greatly influenced by internal corporate decision-making, it is not something that can be regarded as certain. To begin with, in data center operations and semiconductor manufacturing, companies are expected to support the introduction of renewable energy[18], so if a decarbonized power source cannot be secured in Japan, it will be difficult to attract IT-related companies and semiconductor manufacturers. Electricity demand from data centers and semiconductor plants is difficult to predict, and even if demand did materialize, it would still not be a justification for decarbonization efforts, new construction or expansion of LNG-fired power plants.

6. International perspective on LNG-fired power generation

So far, we have looked at LNG-fired power generation from the perspective of domestic electricity demand and operators, but here we will examine the issue from an international angle. First of all, Japan relies on imports of LNG from overseas. Looking at trends since 2014, although LNG prices were moving downward prior to the economic slump caused by the COVID-19 pandemic, they have been fluctuating rapidly and wildly since the resumption of economic activity in many countries in 2021 and the Russian invasion of Ukraine in February 2022. Price instability has increased, having a factor of about seven between the lowest and highest prices.

Figure 6. Natural gas price trend factoring in exchange rates (yen/MMBtu)

Source: Prepared by Kiko Network from World Bank data[19] posted on the Shindenryoku Net (Energy Information Center) website.

18 Bloomberg, "Kioxia president Hayasaka says measures needed to support renewable energy: Strengthening semiconductor manufacturing" (June 6, 2024) (in Japanese), https://www.bloomberg.co.jp/news/articles/2024-06-06/SENC4KT0G1KW00

19 Shindenryoku Net (Energy Information Center), "Data related to natural gas prices" (Excel, in Japanese), https://pps-net.org/statistics/gas2

In response to this situation, in order to secure a stable LNG supply the government is currently making an effort to expand LNG markets, especially in Southeast Asia. To that end, Japan is supporting investments and loans in related infrastructure and attempting to secure LNG interests worldwide through Japan Organization for Metals and Energy Security (JOGMEC), Japan Bank for International Cooperation (JBIC) and Nippon Export and Investment Insurance (NEXI). Frameworks such as the Asia Zero Emission Community (AZEC) and the Asia Energy Transition Initiative (AETI) have been launched to expand LNG markets, aiming for the development of technologies in the region, such as gas, ammonia, hydrogen and biomass co-firing, and carbon capture and storage (CCS). In addition, as a part of global efforts to secure LNG interests, JOGMEC, JBIC, NEXI and the Japan International Cooperation Agency (JICA) have already been providing or are considering support for CCS projects and LNG projects such as gas field development and expansion by Japanese companies in Malaysia, Mozambique, Australia, the United States and Canada[20].

While the government is working to expand the LNG market in Southeast Asia, the development of renewable energy is already progressing in the region, which has abundant potential for renewable energy. In addition, since most of the renewable energy in the region is cost-competitive with fossil fuel-fired thermal power such as coal and LNG, these efforts by Japan not only lack economic rationality, but will also lock in LNG-fired power generation and hinder the transition away from fossil fuels and toward renewable energy in the region[21]. Also, there could be stranded assets and an excess of LNG-fired generation capacity if the LNG market does not develop according to expectations as a result of future expansion of renewable energy in the region.

7. Summary and recommendations

(1) No need to build/expand LNG-fired power generation (it will delay the phase-out of fossil fuels)

It has been shown that electricity demand during Japan's energy transition can be met with the LNG-fired power generation installed capacity that already exists in Japan. Government committee deliberations are currently proceeding based on the assumption that electricity demand will increase significantly in the response to peak-hour demand and the building/expansion of data centers and semiconductor plants. However, several studies have concluded that such a large increase in demand will not occur, and it is highly likely that the assumed demand is excessive.

The construction of new LNG-fired power plants based on the assumption of excessive demand follows the same pattern as the construction of over 10 GW of capacity in new coal-fired power plants in the 2010s. At present, the government and operators are fixated on measures to prolong the survival of coal-fired power plants in order to avoid a blight of stranded assets, and they are about to repeat the same errors with the construction of new LNG-fired power plants. If progress is made with energy efficiency and the deployment of renewable energy, there will be no need to build/expand LNG-fired power plants. But

20 Natural Resources and Fuel Department, Agency for Natural Resources and Energy "Current situation regarding resource and fuel policy," https://www.meti.go.jp/shingikai/enecho/shigen_nenryo/pdf/041_03_00.pdf (in Japanese, p.22), and "Innovative efforts toward commercialization of CCS" (in Japanese), https://www.meti.go.jp/press/2024/06/20240628011/20240628011.html

21 Renewable Energy Institute, "Renewable Energy opens up the future of Southeast Asia" (in Japanese), https://www.renewable-ei.org/pdfdownload/activities/REI_SEA2023_JP.pdf

if the funds that should be directed toward those measures are instead spent on LNG, they will actually delay the transition away from thermal power generation.

(2) Building/expanding LNG-fired power generation will increase the burden on consumers and public finances

Excessive construction of new facilities will reduce the utilization rate of existing plants and lead to stranded assets. Assets that become stranded increase the financial burden not only on operators but also on government finances by wasting taxes invested in policy support. This would also hamper the deployment of renewable energy, which otherwise would be expected to reduce future power generation costs, so the continuation of thermal (combustion) power generation will increase the cost of efforts to achieve zero emissions, and increase the burden of electricity costs on consumers. If more taxes are injected to prevent investments from becoming stranded assets, vested interests will be created, as has been the case with coal and nuclear power.

(3) The focus should be on full-scale introduction of renewable energy, recognizing the poor prospects for realizing "zero-emission thermal power"

In the past, Kiko Network has pointed out the problems involved in switching to electricity generation using fossil fuel-derived gray/blue hydrogen and ammonia in order to achieve "zero-emission thermal power," as well as the problems with CCS[22]. Even though it has been shown that those approaches involve a high degree of uncertainty, in current deliberations, the government is trying to expand support measures even further. These technologies will not decarbonize the energy sector in the near term and will not lead to net zero by 2050. The problems are not only with technological development. There is no prospect of being able to supply green hydrogen or ammonia derived from renewable energy in the quantities that would be needed to fuel large-scale power generation facilities. The technology and fuel supply problems both mean that the decarbonization of LNG-only power generation—which has been awarded in huge contracts in the long-term decarbonization power auctions— will not be feasible.

The government should not place great expectations on such technologies. Instead, it should put a much greater emphasis on promoting energy efficiency, and at the same time exclude LNG-only power generation from the Long-term Decarbonized Power Auctions and increase support for electricity generation technologies and infrastructure that will truly contribute to decarbonization, such as by expanding rooftop photovoltaics; onshore wind, offshore wind, and geothermal; upgrading infrastructure such as transmission networks, including grid storage batteries and inter-regional interconnections; and expanding and upgrading demand-response solutions.

8. Conclusion

So far, Japan has been delaying opportunities to transition to renewable energy to decarbonize the power sector, while working to preserve fossil fuel fired power generation. The formulation of the 7th Strategic Energy Plan is the last opportunity to pursue an energy policy consistent with the 1.5°C target in line with other developed countries, in light of the decisive importance of measures to reduce emissions

22 Kiko Network position papers: (1) "Hydrogen and ammonia co-firing in the power sector" https://kikonet.org/en/content/31125, and (2) "Position paper on fuel ammonia", and https://kikonet.org/en/content/29899

over the next decade. We strongly urge the Japanese government not to miss this opportunity, and to shift to energy policies with an eye to phase out coal-fired power generation by 2030, together with the early phase-out of existing LNG-fired power plants, in order to achieve this goal.

Tables

Data on LNG power producers in Japan

Company/Operator	Annual power generation (MWh)	Peak output (annual peak) (kW)	Utilization rate (%)	CO_2 emissions* (t)
JERA	174,194,478	44,884,100	44.3	72,290,708
Kansai Electric Power	27,939,707	8,226,400	38.8	11,594,979
Tohoku Electric Power	27,087,881	6,771,000	45.7	11,241,471
Kyushu Electric Power	10,521,531	4,075,000	29.5	4,366,435
Chugoku Electric Power	8,448,974	2,514,000	38.4	3,506,324
Fukushima Gas Power	7,187,335	1,180,000	69.5	2,982,744
Ohgishima Power	6,093,694	1,221,300	57	2,528,883
Senboku Natural Gas Power Generation	4,933,783	1,109,000	50.8	2,047,520
Kawasaki Natural Gas Power Generation (KNGPG)	3,306,556	847,400	44.5	1,372,221
East Japan Railway (JR East)	3,052,355	621,600	56.1	1,266,727
Hokuriku Electric Power	2,912,443	924,700	36	1,208,664
Shikoku Electric Power	2,854,020	935,000	34.8	1,184,418
Hokkaido Electric Power	2,357,037	569,400	47.3	978,170
Okinawa Electric Power	1,980,706	582,000	38.9	821,993
JFE Steel	1,933,803	466,100	47.4	802,528
Tobata Co-operative Thermal Power (name changed to Kyushu Co-operative Power)	1,907,010	625,000	34.8	791,409
Mitsubishi Heavy Industries	1,350,806	566,000	27.2	560,584
Daigas G & P Solution	669,302	207,000	36.9	277,760
Goi Coast Energy	512,536	112,200	52.1	212,702
Hokkaido Gas	470,868	91,000	59.1	195,410
Hitachi Zosen	384,859	225,880	19.5	159,716
Naoetsu Energy Center	313,070	113,700	31.4	129,924
Shinnakasode Power	310,653	112,400	31.6	128,921
Nagaoka Power Generation	281,517	85,800	37.5	116,830
Ichihara Power	198,050	110,000	20.6	82,191
Nakayama Kyodo Power	153,602	144,000	12.2	63,745
Oji Materia	150,257	30,700	55.9	62,357
Naka Green Power	145,817	109,200	15.2	60,514
Roppongi Energy Service	119,292	28,750	47.4	49,506
MCKB Energy Service	89,677	17,250	59.3	37,216
Tokyo Gas Colza Power	84,267	107,700	8.9	34,971
Zero Watt Power	44,334	201,350	2.5	18,399
Itami Sangyo	33,130	15,000	25.2	13,749
Osaka Gas	13,705	82,550	1.9	5,688
Toho Gas	10,152	16,500	7	4,213
Kobe City	235	1,800	1.5	98
Asahi Kasei	23	7,820	0	10

* (Emissions intensity = 0.415 kg-CO_2/kWh)

Source: Prepared by Kiko Network based on “Electric Power Survey Statistics” (FY2023).

List of environmental assessments of LNG-fired power plants that are yet not in operation

Company/Operator	Fuel type	Capacity (MW)	Operation start (planned)	Environmental assessment stage
Yumeshima Natural Gas Power Plant	Natural gas	0/300/1,000	2019	Document on Primary Environment Impact Consideration
Chita Thermal Power Station, Unit 7-8 construction plan (Unit 7)	LNG	Approx. 650	1-Aug-2027	Scoping Document on Environmental Impact Assessment
Chita Thermal Power Station, Unit 7-8 construction plan (Unit 8)	LNG	Approx. 650	1-Dec-2027	Scoping Document on Environmental Impact Assessment
Nanko Power Station, Replacement Plan (New Unit 1)	LNG	600	FY2029	Scoping Document on Environmental Impact Assessment
Kawasaki Plant (Ogimachi) Thermal Power Plant Replacement Plan	City gas Hydrogen	Approx. 170	2030	Document on Primary Environment Impact Consideration
Tentative) Shin Kokura Thermal Power Station, Unit 6	LNG	1,200 (600 x 2 units)	2030	Document on Primary Environment Impact Consideration
Yanai Power Station, Unit 2, Replacement Plan	LNG	Approx. 500	March 2030	Scoping Document on Environmental Impact Assessment
Higashi-Niigata Thermal Power Station Unit 1 and 2 Replacement Plan Unit 6)	Natural gas	650	FY2030	Scoping Document on Environmental Impact Assessment
Nanko Power Station, Replacement Plan (New Unit 2,3)	LNG	1,200 (600 x 2 units)	FY2030	Scoping Document on Environmental Impact Assessment
Tentative) Chiba-Sodegaura Natural Gas Power Station (reprocessing)	Natural gas	1,950 (650 x 3 units)	FY2029–2030	Scoping Document on Environmental Impact Assessment
Higashi-Niigata Thermal Power Station Unit 1 and 2 Replacement Plan Unit 7)	Natural gas	650	FY2035	Scoping Document on Environmental Impact Assessment
Nayoro Natural Gas Power Plant	Natural gas	315 (105 x 3 units)	Not known	Scoping Document on Environmental Impact Assessment
Total		Approx. 8,430 to 18,430		

Long-term Decarbonized Power Auction contract results (LNG-only power generation)

Bidder	Plant/project awarded	Capacity awarded (kW)
Hokkaido Electric Power	Ishikariwan Shinko Power Plant	551,217
Tohoku Electric Power	Higashi-Niigata Thermal Power Station, Unit6	615,849
Kansai Electric Power	Nanko Power Station, Renewal plan, Unit1	591,812
Kansai Electric Power	Nanko Power Station, Renewal plan, Unit2	591,812
Kansai Electric Power	Nanko Power Station, Renewal plan, Unit3	591,812
Chugoku Electric Power	Yanai Power Station, Unit2	463,535
Tokyo Gas	Chiba-Sodegaura. Power Station	604,831
Osaka Gas	Himeji Natural Gas Power Plant, Unit3	565,780
JERA	Chita Thermal Power Station, Unit7	589,836
JERA	Chita Thermal Power Station, Unit8	589,836
Total		5,756,320

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