

Japan Gas Utilities – LNG exposure creates risks for bondholders

Rose Choy [(*)]

LNG is a vital part of Japan's energy policy and security. One of the largest buyers in the world, Japan has played a critical role and maintained a significant presence in this market. In 2011, after the Fukushima nuclear disaster at Fukushima, Japan turned to LNG as a replacement for its shuttered nuclear plants. LNG imports peaked for the country at 89 million tonnes in 2014.[1]

The Japanese government has highlighted LNG as one of the transition fuels essential to its net-zero by 2050 energy strategy. According to its 7th Strategic Energy Plan (SEP), Japan's generation mix by 2040 is expected to be 30-40% fossil fuels, 40-50% renewables, and 20% nuclear.[2] For context, fossil fuels accounted for 69% of the mix in FY2023. As a medium-term strategy, Japanese utilities and trading companies have conducted acquisitions overseas to secure LNG supply and LNG assets. The government has also provided financial assistance to the sector via loans, guarantees, and equity capital for select projects and takeovers. For example, state-backed Jogmec (Japan Oil and Gas, Metals National Corporation) provides equity capital to Japanese companies for oil and gas E&P projects and issues liability guarantees for their upstream and midstream projects.[3]

In this analysis, we unpack Japanese utilities' LNG strategy through the examples of Tokyo Gas ("TOKGAS"), rated A1/AA- (Moody's/S&P) and Osaka Gas ("OSAKAG"), rated A1/AA- (Moody's/S&P). We examine how over-procurement of LNG and strategy of acquiring upstream businesses could affect their credit and long-term spreads, which has implications for bond holders. The Appendix contains further information on Japan's LNG activities and reviews global LNG supply and demand.

Key takeaways:

- **Over-contraction of LNG for re-selling and trading purposes can lead to strong profitability in good times but incur large losses in bad times.**
- **Current and potential acquisitions by Japan utilities in the upstream value chain will contribute to future earnings volatility.**
- **The credit profiles of TOKGAS and OSAKAG will likely shift to the downside in the medium to long term given their strategic focus on overseas upstream assets and LNG trading.**
- **Longer-duration bonds are particularly vulnerable given stranded LNG asset risks as Japan's energy transition progresses follows its energy transition path to net zero.**

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[1] "Japan's Largest LNG Buyers Have a Surplus Problem", IEEFA, 11 Mar 2024.
[2] "Japan's 7th Strategic Energy Plan focuses on nuclear and renewables through 2040", Enerdata, 20 Feb 2025.
[3] "Japan to formalize government involvement in LNG procurement in new strategy", S&P Global, 26 Apr 2022.

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(*) Anthropocene Fixed Income Institute (www.anthropocenefii.org). Author for contacts: rco@anthropocenefii.org

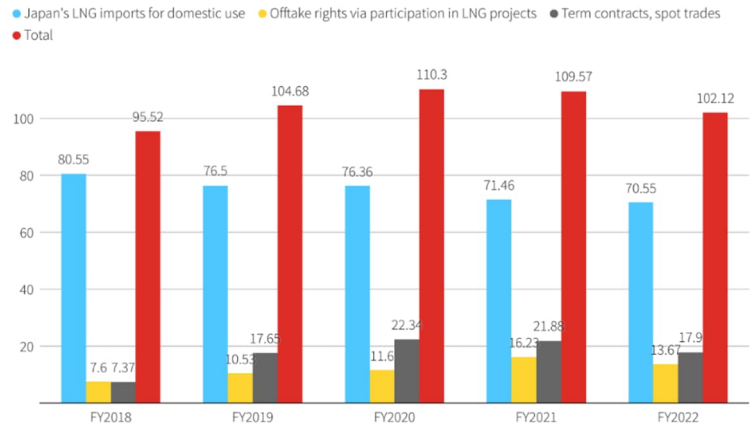
Japan utility companies and LNG contracting

Japanese gas utilities face waning demand for gas domestically due to a shrinking population and the rise of alternate fuel sources. However, encouraged by government policy, major gas companies are implementing a strategy to secure LNG procurements on a long-term basis and target overseas LNG acquisitions to entrench their position in the LNG value chain. The combination of long-term contracts and variable domestic demand means these utilities are assuming trading risk with their surplus positions. As a result, the steady, regulated revenues and cashflow that traditionally underpinned their credits are becoming a smaller part of their earnings, and the more volatile and cyclical trading activities and acquisitions a larger part.

Consequently, these utilities' credit profiles will inevitably become less stable when compared to previous decades. In the long term, the risk of stranded LNG assets is high if Japan pursues its energy transition as promised.

Four utility companies in Japan are responsible for procuring almost 75% of Japan's LNG: JERA, Tokyo Gas, Osaka Gas, and Kansai Electric.[4]

Figure 1. Handling volume of LNG in Japan (MM Tons per year). Source: Reuters, accessed 19 Feb 2025.



As shown in Figure 1, in recent years Japan has been handling, trading, and contracting LNG above what is being consumed domestically.[5] LNG over-contracting by these 4 utilities could be as much as 12 million tons per annum by the end of this decade, assuming Japan's energy transition proceeds as scheduled.[6]

Please see the Appendix for more background information on LNG, and details on LNG supply and demand.

Tokyo Gas

Tokyo Gas is Japan's largest natural gas utility company. It serves the Greater Tokyo area and has over 13 million customers. TOKGAS operates LNG terminals and pipelines and provides city gas production and LNG-fired thermal power generation. The company is also involved in upstream resource development and LNG procurement. TOKGAS has operations in 11 countries, including Thailand, Indonesia, and the US.

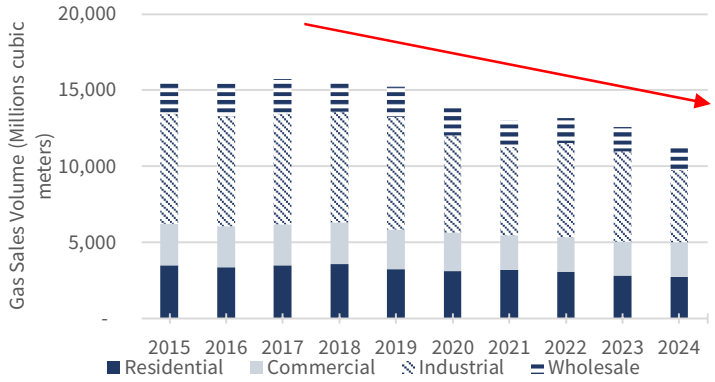
Domestic Gas Business

Tokyo Gas' market share dropped from over 40% before 2020 to 32% by 2024. Gas sales volumes dropped by 27% from 2016 to 2024, a period coinciding with Japan's market deregulation. The

[4] "Japan's Largest LNG Buyers Have a Surplus Problem", IEEFA, 11 Mar 2024.
[5] "Japan builds gas markets in Asia to boost LNG trading energy security", Reuters, 12 Jul 2024.
[6] "Japan's Largest LNG Buyers Have a Surplus Problem", IEEFA, 11 Mar 2024.

industrial segment has been the hardest hit.[7] The domestic gas business continues to see declining volumes and limited profit growth, the result of fuel substitution and an aging and shrinking population, as shown in Figure 2.

Figure 2 Tokyo Gas historical sales volume, Source: Company data.



As the domestic gas business withers, TOKGAS will have to rely more on LNG trading and its overseas segment to produce growth and profits. However, LNG trading margins are lower and can even turn negative.

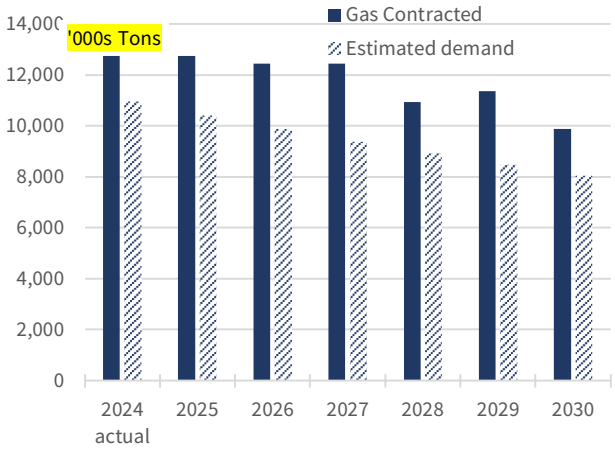
LNG Procurement

TOKGAS sources about 17% of Japan's LNG imports, a ratio that has been stable for the past decade. The company has been sourcing LNG from Australia, US, Qatar, and other countries to diversify and secure energy supply for the long term. Typically, these are multi-year contracts linked to the price of oil (or other indices).[8]

In Figure 3, we project forward TOKGAS' estimated demand versus its existing long-term contracts as disclosed on its website.[9] Our estimates suggest that gas surplus from long-term contracts could reach 2.7-3 Mtpa or greater by 2027. Furthermore, TOKGAS plans to increase transaction volumes from 3 million tons in 2024 to 5 million tons by 2030.[10]

Although TOKGAS over-contracted LNG in the period 2020-2024, the company does not disclose specific trading gains nor losses from reselling LNG. These figures are instead aggregated within its Energy Solutions segment.

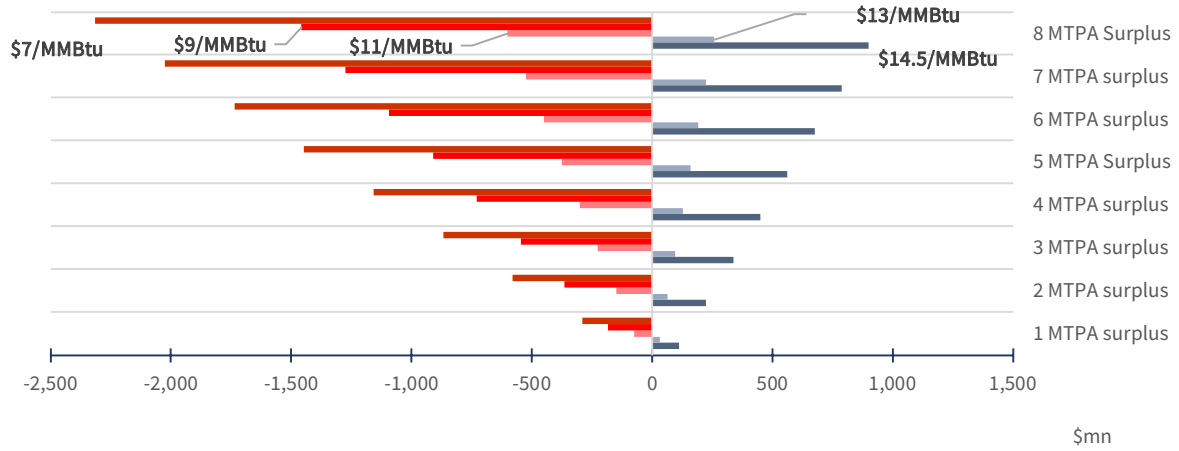
Figure 3. Tokyo Gas' contracted LNG position versus estimated demand. Source: Company Data, AFII.



In Figure 4 (overleaf), we calculate a spot price sensitivity for trading versus a hypothetical LNG contracted price. We use $12.4/MMBtu as the contracted price, which is an average of Japan's import price since 2021[11]. The purpose of this calculation is to illustrate how surplus of contracted LNG can inject volatility into the trading unit's profits. At 8Mtpa surplus, if the spot price drops to $7/MMBtu, the swings can exceed $2bn.

[7] Company Data, sourced from company website, Investor's Guide FY2023 ended March 2024.
[8] Company Data, sourced from company website, Investor's Guide FY2023 ended March 2024.
[9] Estimated demand assumes gas demand falls 5% per annum. Gas contracted does not included signed Heads of Agreements (HOA) to purchase a combined 1.4 Mtpa from LNG Canada and Energia Costa liquefaction project, which would further exacerbate over-contracted positions.
[10] "Japan builds gas markets in Asia to boost LNG trading energy security", Reuters, Jul 12 2024.
[11] "Japan's Largest LNG Buyers Have a Surplus Problem", IEEFA, 11 Mar 2024.

Figure 4. LNG trading P&L scenarios given spot prices and assumed long-term contract prices of $12.4/MMBtu. Source: AFII.



Tokyo Gas overseas investments in LNG value chain

TOKGAS is also focusing on overseas investments, specifically US shale assets. The company expects US shale gas and related businesses to contribute about 50% of its overseas profit by 2030.[12] It aims for overseas profits of 50 billion yen (~$333 MM) by 2030, triple the 2019 figure.[13] After acquiring shale assets in Haynesville for $2.7bn in 2024, there were talks with Chevron late that year on TOKGAS buying out its interests in the area, which are valued at $1bn.[14] (Please see list of international investments in the Appendix).

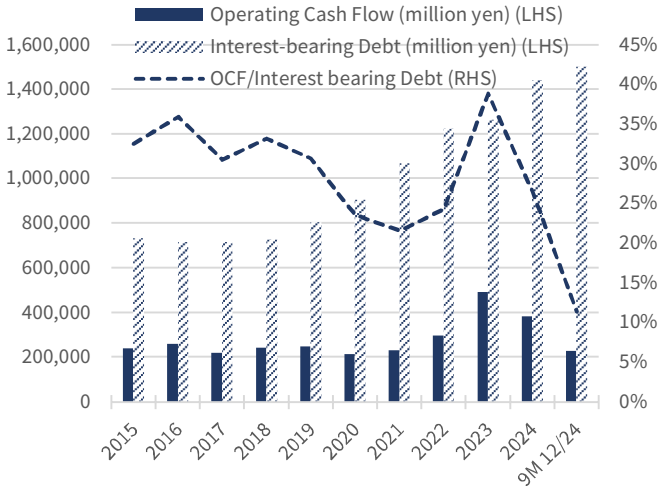
Impact of shale asset purchase on Tokyo Gas credit

TOKGAS' acquisition of the E&P asset Rockcliff in Texas last year added $1.55bn of debt to its balance sheet. At the same time, the purchase boosted its gas production and increased its proved reserves in the Haynesville region by an estimated nine years.[15] Debt/Equity hit 0.89 in December 2024, up from 0.85 in March. While profits were lower for calendar year 2024 due to low gas prices, operating cash flows from Rockcliff are not expected to contribute to Tokyo Gas until end-2026.

Rockcliff is expected to be free cash flow generative, but it will take 2-2.5 years before any dividends can be upstreamed as TOKGAS repays debt and funds capex. Operating profit from Rockcliff will depend on Henry Hub gas prices and US gas demand. Under the Trump administration, US shale is seen as an important investment and export product. In contrast, former President Biden limited approvals of shale export projects. Therefore, investments in the US LNG value chain should be considered beholden to US administration and policy changes. Long-term investors in TOKGAS should be cognisant of this risk.

[12] "Tokyo Gas expects half of overseas profit to come from US gas by 2030", Reuters, 15 Feb 2024.
[13] "Tokyo Gas Group Management Vision Compass 2030", Tokyo Gas, accessed 27 Feb 2025.
[14] "Chevron in talks to sell Texas gas assets to Tokyo Gas for up to $1bn", FT, 9 Oct 2024.
[15] "Fitch Affirms TG Natural Resources LLC's IDR at 'BB-' Outlook Stable", Fitch, 17 Dec 2024.

Figure 5. Operating cashflows vs interest-bearing debt. OCF/Debt is 9m '24 annualised. Source: Company Data.



As shown in Figure 5 operating cashflows can fluctuate given the volatility of overseas upstream LNG earnings and LNG trading. Debt has also continued to creep up from overseas acquisitions.

We note that S&P revised its outlook on TOKGAS in Nov 2024, from stable to negative, while keeping its AA- long term issuer rating on hold. Moody's rates TOKGAS A1. Notably, S&P has changed its thresholds for key cash flow metrics used as a guideline for downgrades. For funds from operations to debt (FFO/Debt) it has shifted to 27% from 25%. S&P expects the ratio for TOKGAS to be around 28% in the next two years. However, if upstream assets do not produce expected cashflows and debt is not paid down, there is a risk of this threshold being breached.

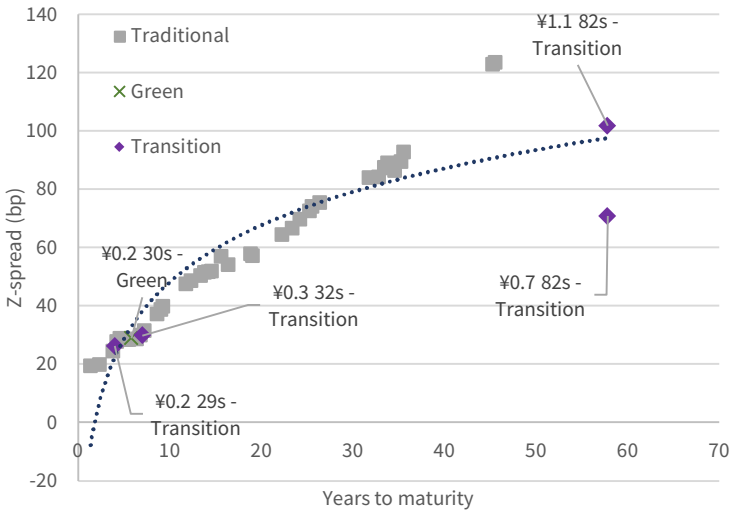
Credit impact and implications on TOKGAS bonds

Please see the Appendix for a list of all TOKGAS bonds outstanding.

The 1.182% 2082 and 0.7% 2082 are transition-labelled subordinated debt instruments, callable in 2027 and 2032, respectively. On a spread basis, spread to call is 70bps and 102bps, respectively.

TOKGAS bonds trade tighter than those of other gas companies and electric utilities, due to its higher rating – two notches above its peers. Lower-rated peers trade around 10-20bps wider. If TOKGAS were to experience cashflow pressures, this could lead to a possible downgrade, resulting in an estimated 10bps of widening on its 10yr bonds.

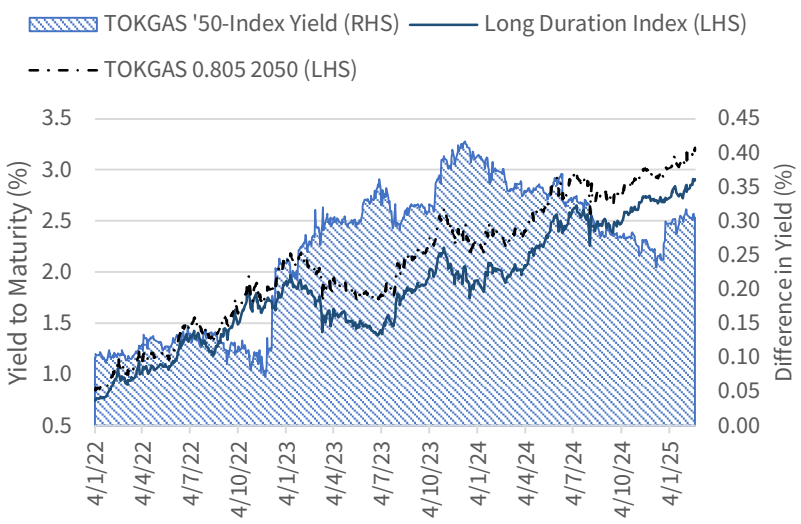
Figure 6. TOKGAS JPY Bonds. Source: Bloomberg, accessed 25 Feb 2025.



Long-duration bonds in Japan are dominated by JGBs, sovereign-linked issuers – such as Japan Expressway – and prefectures. Other utilities have not issued longer-duration bonds, aside from OSAKAG. Long-duration JGBs are illiquid, and domestic corporate bonds with maturities beyond 2050 have a limited investor base. As shown in Figure 6, the historical spread of TOKGAS 2050

versus a custom index of long-duration Japan corporates[16] has been increasing gradually since 2022, and TOKGAS bonds with maturities from 2050 onwards all exhibit a similar trend, given a lack of natural buyers.

*Figure 7. TOKGAS 2050 yield versus custom index of long duration A1-rated Japan bonds yield, Source: Bloomberg, accessed 26 Feb, 2025. *Long Duration Index please see footnote 15 below.*



Over the long term, TOKGAS long-end bond spreads could widen out even more because of the company's focus on overseas assets/LNG trading and the potential for LNG assets to become stranded under Japan's energy transition policy. Long-end bond TOKGAS holders need to be aware of these risks.

Summary

In the next 5-10 years, TOKGAS' credit rating will likely come to reflect a more volatile cash flow profile, one dominated by variable trading profits and revenues from overseas assets. The company is ramping up these LNG-related businesses while a large supply of LNG production is due to come onstream (please refer to LNG global supply and demand in Appendix). Moreover, domestic gas consumption as a share of revenues is likely to decline further as Japan carries out its net-zero pledges. Long term TOKGAS bond holders are vulnerable to this changing business profile and the decommissioning of assets prior to key maturity dates.

Osaka Gas

Osaka Gas, now Daigas Group, distributes natural gas in the Kansai region. It also operates a number of LNG terminals and invests in LNG trading and international projects. It is Japan's second-largest regulated gas utility.

[16] Custom index of long-duration Japanese corporates include the following bonds: JAPEXP 2.91% 2048, HLC 0.658% 2049, KOBE 0.517% 2050, FUKUPR 0.432% 2049, and DBJJP 0.81% 2059. Source: Bloomberg, accesssed 26 Feb 2025.

International Energy to drive profit growth and volatility

OSAKAG faces a declining domestic gas business. The company is focusing on its international energy segment to drive profit growth, although revenues from this are a small portion of its total revenues – just 5.6% in 2024. However, from 2020-2024 the international segment's share of total profits grew from 9.2% to 38.9% (as shown in Figure 8). Over the same period, OSAKAG's lower-margin domestic energy business has remained stable. Its international energy business has been more volatile due to a fire at its Freeport LNG plant and its exposure to Henry Hub gas prices.

Figure 8. OSAKAG gas sales volume (2015-2024). Source: Company Data.

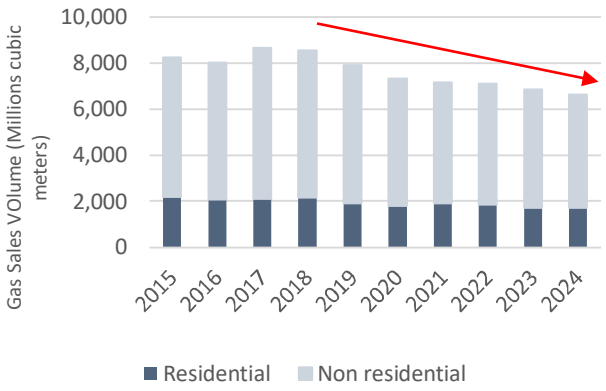
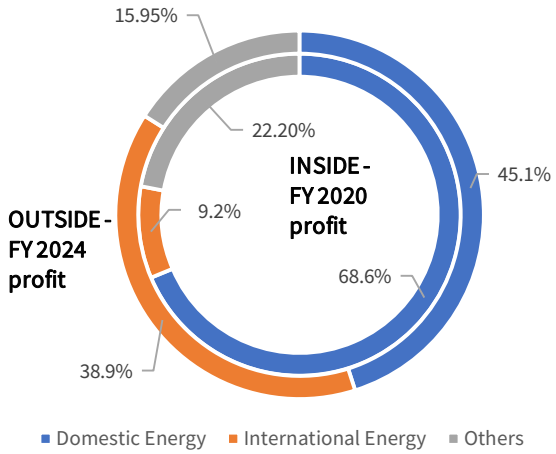


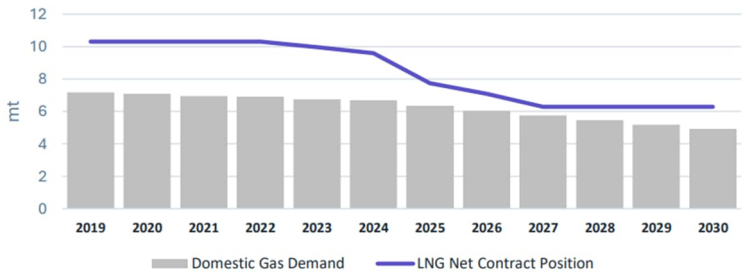
Figure 9. OSAKAG Segment profits FY2020 vs. FY2024. Source: Company Data.



OSAKAG is clearly emphasising overseas growth over domestic investments. The company has a goal to raise the ratio of overseas to domestic revenues from 1:20 in 2017 to 1:2 by 2030.[17] In its medium-term management plan, a stated aim is to step up production volume from its US upstream shale business, Sabine Oil & Gas, and improve its Australian LNG businesses while promoting city gas business in India. For FY2025, the company has forecasted 108 billion yen for overseas capex, versus 47 billion yen for domestic capex.

LNG procurement

Figure 10. Osaka Gas' demand versus LNG contracted positions. Source: IEEFA.

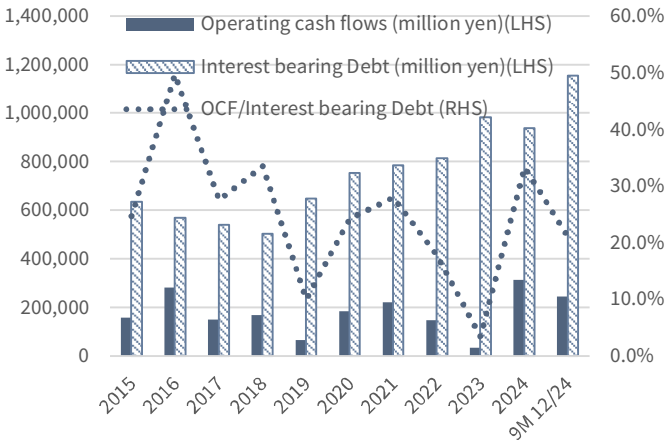


Osaka Gas also aims to handle more LNG volume, with a goal of 17 million tons by 2030 (relative to FY2023 sales of about 5 million tons).[17] This ambition to trade increasing amounts of LNG means the company will be subject to the same revenue volatility as that facing TOKGAS. It may also eat into the already thin margins of its domestic gas business margins.

[17] "Osaka Gas 2030 Long-term Management Vision 2030 and Medium-term Management Plan 2020", Osaka Gas, Mar 2017.

S&P put OSAKAG's long-term credit outlook to negative in Sept 2022, citing its greater reliance on volatile profits from its overseas energy business and unregulated domestic electricity business. S&P also changed OSAKAG's FFO/Debt threshold for a ratings downgrade to 27% from 25%. In FY2022, due to losses in its Freeport LNG project, FFO/Debt was below 5%. S&P did not downgrade the company given the one-off nature of the Freeport fire. However, in FY2025 the company again risks breaching the FFO/Debt trigger, on the back of lower operating cash flow from domestic operations.

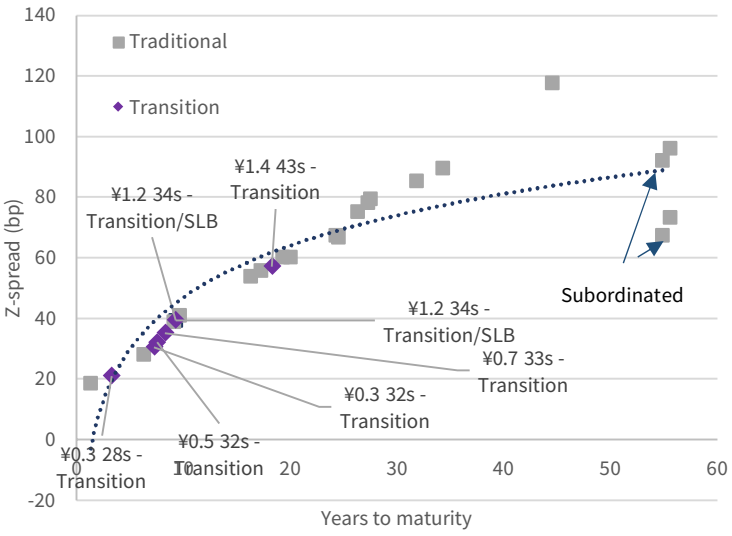
Figure 11. OSAKAG Operating cash flow vs Interest-bearing debt 2015-2024. 9M end 12/24 uses Company FY2025 estimated OCF. Source: Company Data.



Credit impact and implications for OSAKAG Bonds

Please see the Appendix for a list of all OSAKAG bonds outstanding.

Figure 12. Osaka Gas JPY bonds, sourced Bloomberg 26 Feb 2025.



OSAKAG bonds trade in line with TOKGAS bonds, despite the former's lower debt/equity ratio (0.64 vs 0.89). They trade about 10-15 bps tighter than peers rated 1-2 notches lower.

As mentioned above, OSAKAG may breach the FFO/Debt downgrade threshold if it suffers unexpected losses in overseas earnings. As with TOKGAS, this could cause spreads to widen by around 10bps, in line with its lower-rated peers. The longer-duration bonds also trade wide to the curve due to the lack of buyers on the long end. OSAKAG long-duration bonds (30-45 yr bonds) are illiquid and at risk of further widening due to low demand on the long-end in the JPY domestic market, and the risk of having stranded LNG assets as Japan pursues its zero-cabon-by-2040 policy.

Of note, the 1.251% 2034 bond is a transition bond and a sustainability-linked bond (SLB). Please see AFII's previous research on SLB usage in Japan.[18]

[18] "Sustainability-Linked Bond Usage in Japan", AFII, 16 Sep 2024.

Summary

OSAKAG's earnings have already been subject to volatility in recent years. Going forward, the credit will increasingly rely on volatile cashflow streams from upstream shale assets and LNG trading profits as its domestic gas business shrinks. OSAKAG is focused on expanding production in shale via Sabine Oil & Gas and acquiring more overseas assets. As Japan transitions to net-zero, gas usage will be reduced significantly. Therefore, long-term OSAKAG bond holders are at risk of seeing the value of their holdings fall as lowering gas demand and stranded asset threats crystalise.

Conclusions

- **Large gas utilities in Japan are pivoting away from stable, low-margin revenues from domestic businesses and towards volatile earnings from LNG trading and overseas assets.**
- **Domestic gas businesses are on the decline and the eventual sunsetting of LNG assets under Japan's net-zero policy creates risks for holders of long-duration gas utility bonds.**
- **Current credit spreads for Tokyo Gas and Osaka Gas reflect business-as-usual, but their credits are evolving, and investors should be aware of longer-term risks.**

Appendix

LNG is still a fossil fuel

LNG is touted as a cleaner alternative to other fossil fuels such as coal. However, the product is composed mainly of methane. Methane is responsible for about one-third of current warming.[19] While burning LNG emits less CO_2 than alternate fossil fuels, the production, infrastructure, and transportation involved in the LNG trade amplifies its emissions footprint.

Natural gas is liquefied by compressing and cooling it to -160C, an energy-intensive process. Transporting the resulting fuel is also an emissions-producing activity. LNG made from shale gas is even worse for the climate. In a study conducted by Cornell University in October 2024, researchers found that over 20 years the carbon footprint for this kind of LNG is one-third larger than coal.[20] This is due to the methane that leaks out during liquefaction and the emissions produced by the transportation vessels. In the same study, methane is found to be 80 times more harmful than CO_2 to the atmosphere. Large volumes of methane can also be released during fracking, which is how gas is extracted from shale rock.

LNG global supply and demand

A large amount of LNG export capacity is expected to come online (as shown in Figure 13) between 2025 and 2030, with liquefaction capacity projected to rise from 580 billion cubic meters (bcm) per year in 2024 to 850 bcm per year by 2030. Global production capacity will grow 40% from 474 million tonnes per annum (Mtpa) in 2024 to 666.5 Mtpa five years from now. This increase in export capacity is larger than the predicted rise in demand under any scenario through 2040, according to the International Energy Agency (IEA), an NGO providing analysis on the global energy sector.

Figure 13. Global LNG Supply Additions (MTPA). Source: IEEFA, Global LNG Outlook 2024-2028.

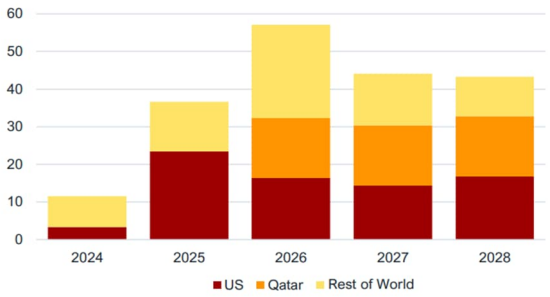
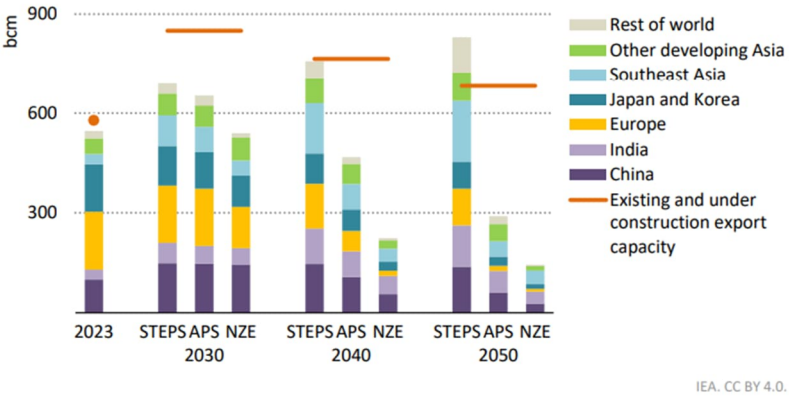


Figure 14. LNG demand by region and scenario. Source: IEA World Energy Outlook 2024.



IEA has projected demand by region for LNG under various scenarios out to 2050. In every scenario described, LNG capacity outpaces demand to 2030.

The different scenarios are as follows: NZE is the Net Zero Emissions pathway for limiting global temperature increases to 1.5 degrees developed by IEA. APS is the Announced Pledges Scenario, assuming that all national energy and climate pledges are met, aligned with 1.7 degrees C of global warming. STEPS is the

[19] "Facts about methane", UN environment programme (accessed 25 Feb 2025).
[20] "The greenhouse gas footprint of liquefied natural gas (LNG) exported from the United States", University of Cornell, 3 Oct 2024.

Stated Policies Scenario based on the current direction of policies by global governments, aligned with 2.4 degrees C of global warming, which is more conservative.

Table 1. TOKGAS outstanding JPY bonds. Source: Bloomberg, accessed 21 Feb 2025.

Security	ISIN	Issue Date	Currency	Amount Outstanding	ESG Label
TOKGAS 0.971 03/13/34	JP357300BQ32	7/3/2024	JPY	10,000,000,000	
TOKGAS 1.647 03/11/44	JP357300AQ33	7/3/2024	JPY	10,000,000,000	
TOKGAS 1.149 12/18/2082	JP357300BNC4	14/12/2022	JPY	9,700,000,000	Transition
TOKGAS 0.735 12/18/2082	JP357300ANC6	14/12/2022	JPY	10,100,000,000	Transition
TOKGAS 0.26 03/01/29	JP357300BN35	22/2/2022	JPY	10,000,000,000	Transition
TOKGAS 0.359 03/01/32	JP357300AN36	22/2/2022	JPY	10,000,000,000	Transition
TOKGAS 0.09 07/13/26	JP357300DM75	7/7/2021	JPY	10,000,000,000	
TOKGAS 0.17 07/11/31	JP357300CM76	7/7/2021	JPY	15,000,000,000	
TOKGAS 0.523 07/12/41	JP357300BM77	7/7/2021	JPY	15,000,000,000	
TOKGAS 0.822 07/13/51	JP357300AM78	7/7/2021	JPY	10,000,000,000	
TOKGAS 0.21 12/10/30	JP357300ALC0	4/12/2020	JPY	10,000,000,000	Green
TOKGAS 0.225 09/10/30	JP357300DL92	4/9/2020	JPY	10,000,000,000	
TOKGAS 0.805 09/09/50	JP357300CL93	4/9/2020	JPY	10,000,000,000	
TOKGAS 0.923 09/10/60	JP357300BL94	4/9/2020	JPY	10,000,000,000	
TOKGAS 1.086 09/10/70	JP357300AL95	4/9/2020	JPY	10,000,000,000	
TOKGAS 0.241 05/28/30	JP357300DL50	22/5/2020	JPY	10,000,000,000	
TOKGAS 0.682 05/27/50	JP357300CL51	22/5/2020	JPY	10,000,000,000	
TOKGAS 0.827 05/28/60	JP357300BL52	22/5/2020	JPY	10,000,000,000	
TOKGAS 0.988 05/28/70	JP357300AL53	22/5/2020	JPY	10,000,000,000	
TOKGAS 0.693 12/25/57	JP357300AKC2	18/12/2019	JPY	10,000,000,000	
TOKGAS 0.1 09/13/29	JP357300CK94	6/9/2019	JPY	10,000,000,000	
TOKGAS 0.28 09/13/39	JP357300BK95	6/9/2019	JPY	10,000,000,000	
TOKGAS 0.53 09/12/59	JP357300AK96	6/9/2019	JPY	10,000,000,000	
TOKGAS 0.15 05/23/29	JP357300DK51	17/5/2019	JPY	10,000,000,000	
TOKGAS 0.486 05/23/39	JP357300CK52	17/5/2019	JPY	10,000,000,000	
TOKGAS 0.693 05/21/49	JP357300BK53	17/5/2019	JPY	20,000,000,000	
TOKGAS 0 7/8 05/23/59	JP357300AK54	17/5/2019	JPY	10,000,000,000	
TOKGAS 0.27 11/29/28	JP357300CJB2	22/11/2018	JPY	10,000,000,000	
TOKGAS 0.704 11/29/38	JP357300BJB4	22/11/2018	JPY	10,000,000,000	
TOKGAS 1.251 11/29/58	JP357300AJB6	22/11/2018	JPY	10,000,000,000	
TOKGAS 0.58 07/20/38	JP357300CJ71	13/7/2018	JPY	10,000,000,000	
TOKGAS 0.876 07/17/48	JP357300BJ72	13/7/2018	JPY	20,000,000,000	
TOKGAS 1.095 07/19/58	JP357300AJ73	13/7/2018	JPY	10,000,000,000	
TOKGAS 0.67 06/09/37	JP357300BH66	2/6/2017	JPY	10,000,000,000	
TOKGAS 1.053 06/07/47	JP357300AH67	2/6/2017	JPY	10,000,000,000	
TOKGAS 0.57 11/28/36	JP357300BGB0	22/11/2016	JPY	10,000,000,000	
TOKGAS 1.011 11/29/56	JP357300AGB2	22/11/2016	JPY	20,000,000,000	
TOKGAS 1.554 05/26/34	JP357300AE52	16/5/2014	JPY	20,000,000,000	
TOKGAS 1.984 12/17/43	JP357300ADC7	6/12/2013	JPY	15,000,000,000	
TOKGAS 1.764 09/26/33	JP357300AD95	13/9/2013	JPY	20,000,000,000	
TOKGAS 1.737 05/25/32	JP357300AC54	16/5/2012	JPY	20,000,000,000	
TOKGAS 1.852 12/26/31	JP357300ABC1	16/12/2011	JPY	20,000,000,000	
TOKGAS 2.135 09/24/40	JP357300AA98	3/9/2010	JPY	20,000,000,000	
TOKGAS 2.29 06/15/27	JP357300A769	1/6/2007	JPY	20,000,000,000	
TOKGAS 2.14 03/03/25	JP357300A538	18/2/2005	JPY	10,000,000,000	

Table 2. OSAKAG JPY bonds outstanding, Source: Bloomberg, accessed Feb 25, 2025.

Security	ISIN	Issue Date	Currency	Amount Outstanding	ESG Label
OSAKAG 1.251 05/30/34	JP318040BQ54	24/5/2024	JPY	25,000,000,000	Transition
OSAKAG 2.371 05/29/54	JP318040CQ53	24/5/2024	JPY	6,000,000,000	
OSAKAG 2.028 05/30/44	JP318040AQ55	24/5/2024	JPY	10,000,000,000	
OSAKAG 0.39 06/02/28	JP318040AP64	26/5/2023	JPY	10,000,000,000	Transition
OSAKAG 1.417 06/02/43	JP318040BP63	26/5/2023	JPY	10,000,000,000	Transition
OSAKAG 0.785 06/02/33	JP318040CP62	26/5/2023	JPY	15,000,000,000	Transition
OSAKAG 1.058 09/01/42	JP318040BN99	25/8/2022	JPY	4,000,000,000	
OSAKAG 1.399 08/30/52	JP318040CN98	25/8/2022	JPY	8,000,000,000	
OSAKAG 0.529 09/01/32	JP318040AN90	25/8/2022	JPY	27,000,000,000	Transition
OSAKAG 0.369 06/02/32	JP318040AN66	27/5/2022	JPY	10,000,000,000	Transition
OSAKAG 0.942 06/02/42	JP318040BN65	27/5/2022	JPY	11,000,000,000	
OSAKAG 1.203 05/31/52	JP318040CN64	27/5/2022	JPY	10,000,000,000	
OSAKAG 0.22 06/03/31	JP318040AM67	28/5/2021	JPY	20,000,000,000	
OSAKAG 0.851 06/02/51	JP318040CM65	28/5/2021	JPY	10,000,000,000	
OSAKAG 0.576 06/03/41	JP318040BM66	28/5/2021	JPY	10,000,000,000	
OSAKAG 0.63 09/10/2080	JP318040BL91	4/9/2020	JPY	48,000,000,000	
OSAKAG 0.49 09/10/2080	JP318040AL92	4/9/2020	JPY	27,000,000,000	
OSAKAG 0.6 12/12/2079	JP318040BKC0	6/12/2019	JPY	50,000,000,000	
OSAKAG 0.44 12/12/2079	JP318040AKC2	6/12/2019	JPY	50,000,000,000	
OSAKAG 0.4 09/03/49	JP318040AK93	30/8/2019	JPY	20,000,000,000	
OSAKAG 0.7 09/05/69	JP318040CK91	30/8/2019	JPY	10,000,000,000	
OSAKAG 0.545 09/05/58	JP318040BK92	30/8/2019	JPY	5,000,000,000	
OSAKAG 0.818 06/06/59	JP318040BK68	31/5/2019	JPY	20,000,000,000	
OSAKAG 0.642 06/04/49	JP318040AK69	31/5/2019	JPY	20,000,000,000	
OSAKAG 0.986 12/08/56	JP318040AGC0	2/12/2016	JPY	10,000,000,000	
OSAKAG 1.685 03/03/45	JP318040AF33	26/2/2015	JPY	10,000,000,000	
OSAKAG 1.402 10/24/34	JP318040AEA9	17/10/2014	JPY	20,000,000,000	
OSAKAG 1.606 03/24/34	JP318040AE34	14/3/2014	JPY	15,000,000,000	
OSAKAG 2.33 06/23/26	JP318040A660	14/6/2006	JPY	10,000,000,000	

Overseas Investments by Tokyo Gas

Table 3. Tokyo Gas overseas investments as of Dec 2024, Source: Company Data.

As of Dec 31, 2024

Project Name	Country	Upstream /Midstream- and Downstream	Main Business	Year of Participation	Tokyo Gas Group's Shareholding Ratio
Rockcliff Energy II LLC	U.S.A	Upstream	Production and sales of shale gas project	2023	100%
Eagle Ford	U.S.A	Upstream	Production and sales of shale gas project	2016	25%
TG Natural Resources	U.S.A	Upstream	Production and sales of shale gas project	2017	93.15%
TGES America	U.S.A	Midstream- and Downstream	Energy service project	2015	100%
Birdsboro	U.S.A	Midstream- and Downstream	Natural gas power project	2017	33.33%
ARM Energy Holdings	U.S.A	Midstream- and Downstream	Natural gas marketing and trading	2023	49%
Bajio	Mexico	Midstream- and Downstream	Natural gas power project	2004	49%
Darwin	Australia	Upstream	Production, liquefaction and sales of LNG project	2003	3.07%
Super energy	Indonesia	Midstream- and Downstream	Gas supply project	2020	*2
PRA	Indonesia	Midstream- and Downstream	Gas supply project	2017	33%
Gas Malaysia Bhd.	Malaysia	Midstream- and Downstream	Gas supply project	1992	14.8%
GAS MALAYSIA ENERGY	Malaysia	Midstream- and Downstream	Energy service project	2014	34%
Bang Bo	Thailand	Midstream- and Downstream	Natural gas power project	2016	28%
GWHAMT	Thailand	Midstream- and Downstream	Gas supply project	2018	30%
One Bangkok	Thailand	Midstream- and Downstream	District cooling solutions and power distribution project	2020	33.3%
PVGD	Vietnam	Midstream- and Downstream	Gas supply project	2017	25.0%
Qunag Ninh LNG to Power	Vietnam	Midstream- and Downstream	Construction and operation of LNG receiving terminal and natural gas-fired power plant	2022	20.0%
Thai Binh LNG to Power	Vietnam	Midstream- and Downstream	Construction and operation of LNG receiving terminal and natural gas-fired power plant	2024	40.0%
FGEN LNG	Philippine	Midstream- and Downstream	Pre-commercial operations of the LNG terminal project	2020	*3

*1 1.25% of the gas field, 2.5% of the second liquefaction train
*2 33.4% of Super Energy, 18% of Super Energy's Subsidiary
*3 Based on a Joint Cooperation Agreement with First Gen Corporation (October 7th 2020),Tokyo Gas has taken a 20% participating interest in the construction and operation of the project.
*4 For both Quang Ninh and Thai Binh project, joint stock company is established for the project development, which includes initially conducting feasibility study.

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Overseas Investments by Osaka Gas

Table 4. Osaka Gas overseas investments as of March 2024, Source: Company Data.

International upstream business (As of March 31, 2024)

Project name	Location	Main business	Shareholding Ratio	Year of participation
Sunrise LNG Project	Australia, East	LNG	10%	2000
Qalhat LNG	Oman	LNG	3%	2006
Gorgon LNG Project	Australia	LNG	1.25%	2009
Ichthys LNG Project	Australia	LNG, Condensate	1.20%	2012
Sabine Oil & Gas Corporation	USA	Natural gas, Condensate, Natural	100%	2018

International mid & downstream business (As of March 31, 2024)

Project name	Location	Main business	Shareholding Ratio	Year of participation
Freeport LNG Project	USA	LNG terminal	10.81%	2008
EII	Australia	Infrastructure business (Portfolio)	30.20%	2008
Sagunto LNG Terminal	Spain	LNG receiving terminal	20%	2010
Sumisho Osaka Gas Water UK Limited	U.K.	Water supply business	50%	2013
City-OG Gas Energy Services	Singapore	Sale of gas business	49%	2013
Osaka Gas (Thailand) Co., Ltd.	Thailand	Energy utility related business	49%	2013
Freeport LNG Project Train 1	USA	Liquefication business	25%	2014
NS-OG Energy Solutions (Thailand)	Thailand	Cogeneration business	30%	2014
OGP Energy Solutions	Thailand	Fuel conversion, Energy services	29.4%	2015
PT OSAKA GAS INDONESIA	Indonesia	Sale of gas, Energy services related	100%	2018
Sojitz Osaka Gas Energy	Vietnam	Natural gas supply business	49%	2019
AGP	Singapore	Medium- and small-scale LNG	-	2019
Starfire Energy	USA	Green ammonia manufacturing	-	2021
JEDLIX B.V.	Netherlands	Electricity balancing services	-	2021
AG&P CGD HoldCo SPV3（Singapore）Pte.	Singapore	City gas business in India	-	2021
Australian Integrated Carbon Pty Ltd	Australia	Carbon credit development and	16.7%	2022
DAIGAS SJ CGD PTE. LTD.	Singapore	City gas business in India	63%	2023
Summit Ridge Energy	USA	Battery energy storage system	-	2023

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