

Browse gas

Expensive, emissions-intensive, unnecessary

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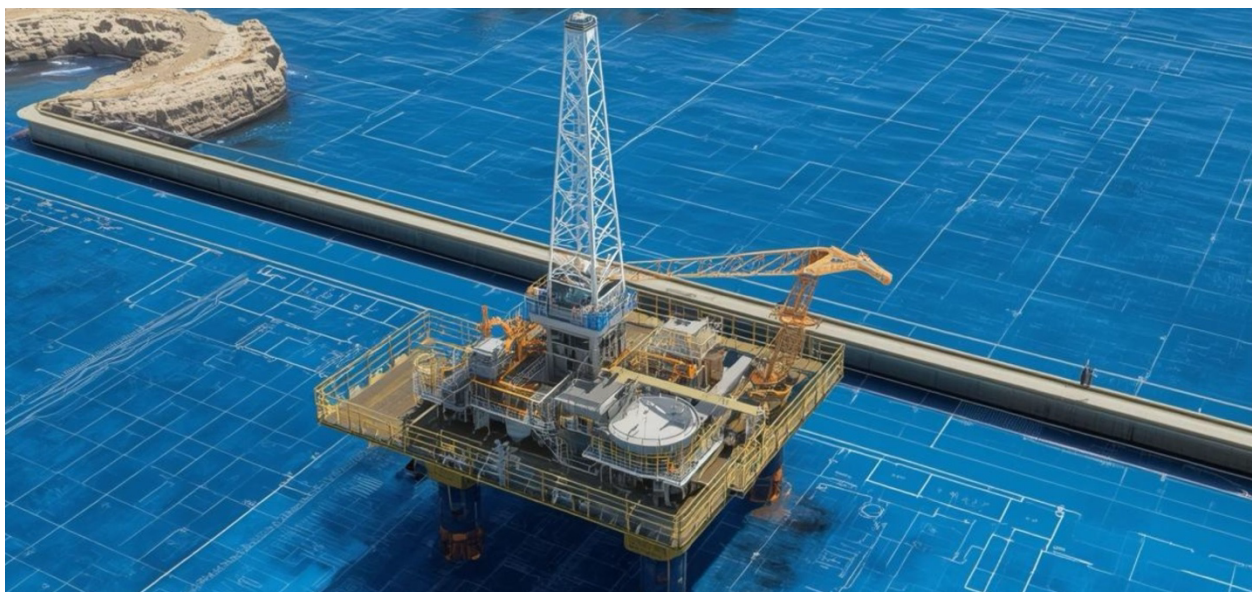
Key Findings

Woodside's Browse gas project is unlikely to be competitive either domestically or internationally, based on IEEFA cost estimates.

Browse gas is likely four times more expensive than existing domestic gas and could depress industrial demand. Diverting cheaper LNG feedgas would be a better solution for Western Australia's energy security.

Browse LNG may struggle to find buyers in an oversupplied global market. Potentially 60% more expensive than Qatar's LNG, it is likely twice the price needed to unlock new demand in Asia through coal-to-gas switching.

The project's carbon-intensive gas and reliance on costly, unreliable carbon capture could push project costs up by about 9% and drive carbon prices higher for everyone.



Executive summary

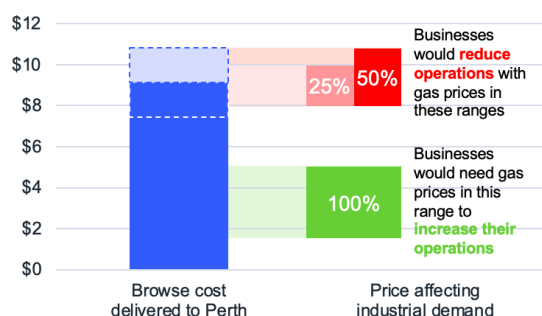
Woodside's Browse gas project, located in ecologically sensitive waters off Western Australia (WA), is intended to replace the declining legacy fields supplying the North-West Shelf (NWS) liquefied natural gas (LNG) project. Woodside and the WA government have argued that the project is needed for energy security and to support decarbonisation in Asia by displacing coal. However, less focus has been given to the risks arising from the Browse project, for investors, WA and Australia more broadly.

Despite being discovered more than 50 years ago, the Browse gas field remains undeveloped, likely reflecting the project's complexity and cost, estimated by IEEFA at more than AU\$37 billion. Based on financial modelling using data supplied by Woodside Energy and independent experts, as well as other data sources, IEEFA estimates the cost of Browse gas at AU\$7.80 per gigajoule (GJ), with a cost of more than AU\$9/GJ delivered to Perth. This is more than four times as expensive as the production costs of existing domestic gas. This means Browse is likely to either be uncompetitive or drive up WA gas prices. The Australian Energy Market Operator (AEMO) previously found that prices around AU\$8/GJ would start driving operations reductions by industrial users, underscoring the potential impacts of high gas prices.

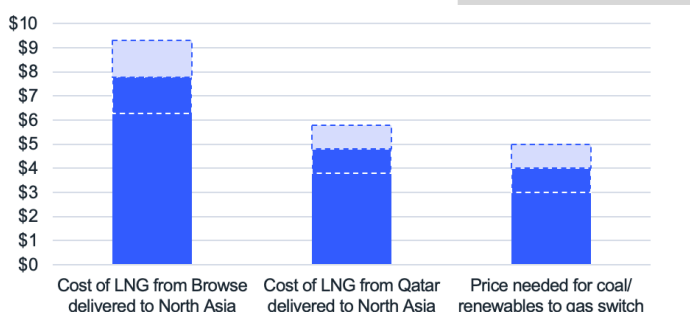
LNG from Browse is likely to be similarly uncompetitive, with IEEFA estimating a cost of US\$6.8 per million British thermal units (MMBtu), leading to a cost delivered in North Asia of about US\$7.8/MMBtu, about 60% higher than Qatar's LNG. Qatar is widely expected to have large, unsold volumes of LNG, estimated at more than WA's total LNG export capacity (including Qatari LNG contracted by portfolio players that will need to find end buyers). Browse LNG is also likely to struggle to compete with – and therefore displace – coal in Asia. The International Energy Agency (IEA) has found that LNG prices would need to fall to US\$3-5/MMBtu to trigger coal-to-gas switching, nearly half of the estimated cost of Browse LNG. More generally, IEEFA's analysis of China and India, two of the world's largest coal consumers, clearly shows LNG is not displacing coal due to its high cost compared with alternatives.

Browse gas estimated as too costly for Australia or abroad

Estimated cost delivered to Perth, AUD/GJ



Estimated cost of LNG production, USD/MMBtu



High emissions likely to increase costs by more than 9%

The government's recent approval of Woodside's proposed NWS extension includes emissions reduction requirements that are likely to make it uneconomic to keep the project's two older LNG processing trains online, or add significant costs to upgrade them. This could reduce LNG production and revenue, as well as increasing the estimated cost per unit of LNG production. IEEFA has accounted for this possibility in a "high-cost scenario", in which two of the five NWS trains are available to process gas from Browse.

The Browse fields are also carbon dioxide (CO₂)-intensive, with an average concentration of about 10% CO₂, higher than many other gas fields (for example, the Scarborough field has about 0.1% CO₂). Development of the Browse field will bring with it material emissions estimated by Woodside to be as high as 6.8 million tonnes of CO₂ equivalent (MtCO₂e) in a peak production year (assuming no abatement and a high reservoir CO₂ scenario). This would represent 2.9-3.7% of Australia's emissions in 2035.

However, Woodside has indicated it intends to abate some of the emissions through carbon capture and storage (CCS), in part to meet its obligations under the Safeguard Mechanism to have net zero reservoir CO₂ emissions from day one. In Australia, Chevron's similarly sized Gorgon CCS project has cost AU\$3.2 billion to date, and IEEFA estimates the Browse CCS facility could add about 9% to the project's costs.

While often proposed as a solution for project-related emissions, CCS has a history of failure and underperformance. The Gorgon CCS facility has captured less than half of its target since starting operations, and only stored about one-third of the CO₂ it captured in fiscal year (FY) 2023-24. This has imposed additional costs on Chevron, requiring it to surrender carbon credits on top of the already high costs of CCS. IEEFA estimates a cost of AU\$222/tCO₂ for its FY2023-24 CO₂ injections.

Woodside anticipates CCS will abate 47% of upstream emissions. Residual reservoir emissions will need to be fully offset with carbon credits, which could increase carbon credit demand and prices, driving up carbon costs across the economy.

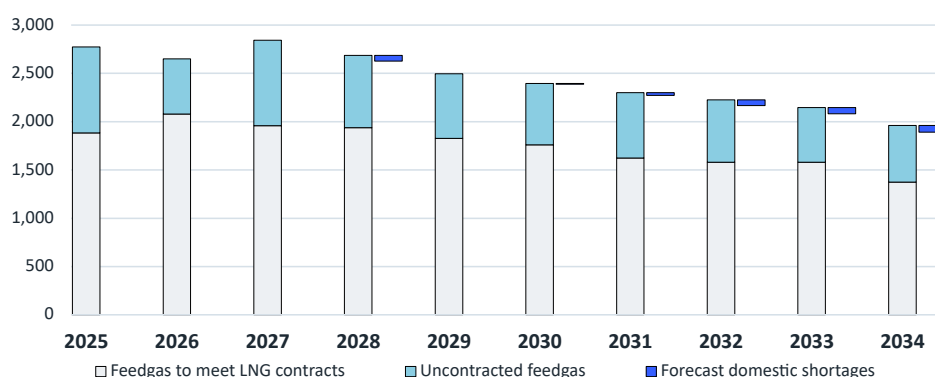
Not essential for energy security – in WA or in Asia

WA is Australia's largest gas-producing state by far. In 2024, only about 418 petajoules (PJ) of gas was supplied into the domestic market, compared with about 3,350PJ of gas production (excluding gas produced and used in upstream gas extraction).

Nonetheless, declining production at legacy fields is having an impact on domestic gas supply, with AEMO warning of potential gas shortages from 2030. However, these shortages are small relative to total LNG exports and estimated future uncontracted LNG volumes. For instance, IEEFA estimates AEMO's forecast shortage in 2034, of about 70PJ, is equivalent to just 12% of estimated uncontracted feedgas and only 4% of total feedgas for all LNG exports. Rather than relying on potentially expensive gas from Browse, there is an opportunity for governments to consider policy

measures to redirect small amounts of gas into the domestic market that would otherwise be exported as spot LNG. This would address supply concerns, likely with minimal impact on gas production costs and prices in WA.

Comparison of domestic shortages with expected volumes of uncontracted gas, PJ



IEEFA also notes that forecast shortages could be lower if AEMO were to account for gas LNG exporters might need to supply to meet their domestic market obligations. Under the state's reservation policy, LNG exporters are required to supply 15% of LNG production to the domestic market, but a WA Parliamentary Inquiry found that only 8% had been supplied. This means LNG producers are likely to have to supply more than 15% in coming years, which is more than AEMO assumes in its supply forecasts. (AEMO assumes a flat 15% of expected LNG exports.)

There are also cost-effective opportunities to reduce WA's gas consumption, particularly in electricity generation and industrial processes. This includes opportunities for a faster rollout of renewable energy in grid and off-grid electricity systems, and the electrification of alumina production (which would require initial government support).

Browse is also not needed to support energy security in Asia. Internationally, LNG markets are seeing an unprecedented tidal wave of new supply, with LNG capacity expected to surge by 60% by the early 2030s. Meanwhile, LNG demand growth remains highly uncertain. The IEA predicts that existing and under-construction LNG capacity will be more than sufficient to meet global LNG demand to 2040, even under its slowest transition scenario. In the shorter term, the IEA expects oversupply to be so material that if all that additional capacity was absorbed, prices would likely drop to well below the estimated cost of the Browse project.

The analysis in this report raises significant questions regarding the benefits of the Browse project, which IEEFA anticipates will impose higher gas prices on gas users and increase emissions, while not contributing to energy security or displacing coal in Asia.

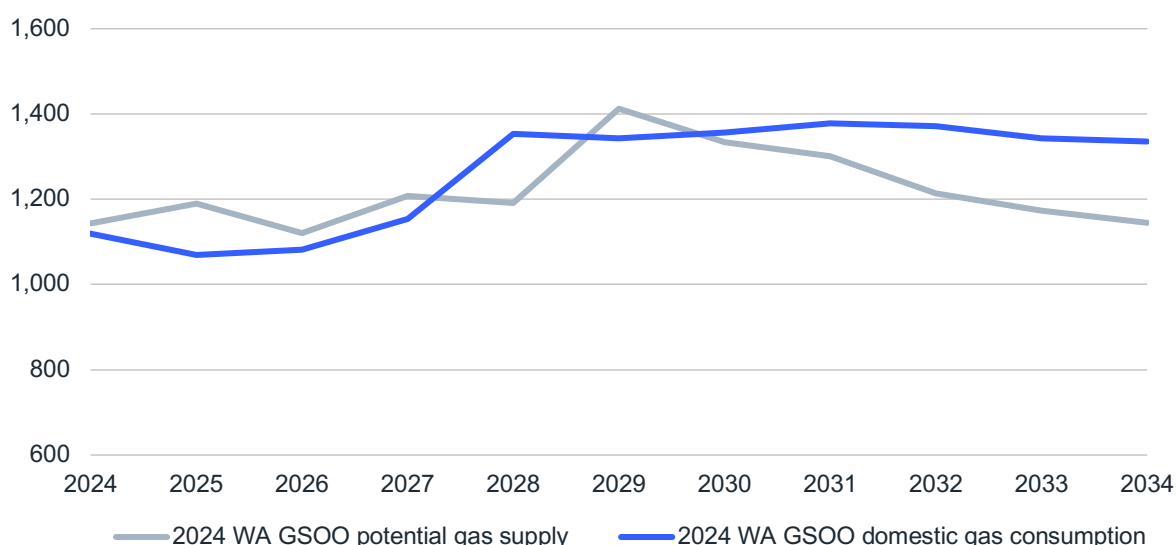
More details on the parameters and assumptions underpinning this report's findings can be found in a separate [Technical Appendix](#).

Introduction

Gas supply security has been a persistent issue in eastern Australia's gas market since 2016. Western Australia (WA) has largely avoided the issues seen in eastern Australia due to its reservation policy.

However, gas market conditions in WA are tightening. In its 2024 WA Gas Statement of Opportunities (GSOO), the Australian Energy Market Operator (AEMO) forecasts a supply gap could emerge from 2030 due to increasing domestic gas demand (from industry and mineral processing) and declining gas production from legacy fields (Figure 1).¹ In developing this forecast, AEMO assumes LNG exporters supply 15% of LNG production to the domestic market, in line with broader domestic market obligations.

Figure 1: Forecast WA domestic gas supply adequacy, terajoules (TJ)/day



Source: AEMO.² Note: Represents the Step Change or most likely scenario.

Meanwhile, gas prices in WA have more than doubled over the past five years, raising questions about whether forecasts of stronger industrial activity will be realised.³ In 2024, WA spot gas prices were generally above AU\$8.50 per gigajoule (GJ) and the weighted average of domestic contract prices was above AU\$7/GJ.⁴

Reflecting concerns about the potential for gas shortages, in September 2025, the WA and Australian governments approved an extension of Woodside's North-West Shelf (NWS) LNG project,

¹ AEMO. [2024 WA Gas Statement of Opportunities](#). December 2024. Page 4.

² Ibid. Page 59.

³ IEEFA. [Australian Gas and LNG Tracker](#).

⁴ AEMO. [2024 WA Gas Statement of Opportunities](#). December 2024. Page 89.

which also supplies the WA gas market, to 2070. With the legacy gas fields supplying the NWS project in decline, Woodside is also seeking to develop the offshore Browse gas field. In its submission to a WA Parliamentary Inquiry into WA's Domestic Gas Policy, Woodside argued that Browse "is critical to resolving the forecast post-2030 gas supply shortage and supporting the state's long-term energy security".⁵

Development of the Browse gas field would undoubtedly lead to more domestic supply, assuming it doesn't displace other potential onshore gas projects, but in IEEFA's view it also carries with it material risks. There are other, better options to address gas supply concerns.

Beyond domestic supply, the WA Premier pointed to the importance of the state's LNG exports more generally, asserting that Australian LNG is vital for Japan's energy security and to support the energy transition in Asia by displacing coal.^{6,7} However, IEEFA's analysis raises serious questions about these claims and the rationale for the Browse project itself.

Woodside's Browse project estimated to be expensive

IEEFA built a financial model to estimate the cost of the domestic gas and LNG from Browse, based on the project costs supplied by Woodside for Browse and the NWS extension as well as detailed information from an independent expert report by KPMG and data from other sources. The estimated costs for the Browse project reflect the assumptions used in the financial model, which are explained in the [Technical Appendix](#) to this report. Cost estimates are provided as a low to high range, with the midpoint used as a likely estimate, and IEEFA notes that different assumptions will lead to different cost estimates.

The cost of developing Browse could drive up domestic prices

The project potentially faces price risks due to its high capital costs, estimated by IEEFA at AU\$37-48 billion (accounting for the possibility of cost overruns).⁸ This would translate into an estimated production cost range of AU\$6.1-9.4/GJ, with a central estimate of AU\$7.80/GJ.

The high costs, based on our estimates, would likely make Browse gas a relatively expensive source of gas in WA, with Browse production costs of AU\$7.80/GJ well above average WA production costs for domestic gas. Adding pipeline costs of AU\$1.37/GJ would lead to an estimated cost delivered to Perth users of more than AU\$9/GJ.

AEMO data shows the weighted production average cost for domestic gas in WA was just AU\$1.80/GJ in 2024 and is forecast at AU\$2.19/GJ in 2034, meaning Browse gas could be costly to

⁵ Woodside. [Submission: Inquiry into the WA Domestic Gas Policy](#). August 2023. Page 1.

⁶ The Australian. [WA Premier Roger Cook promises Japan he will step on the gas](#). July 2025.

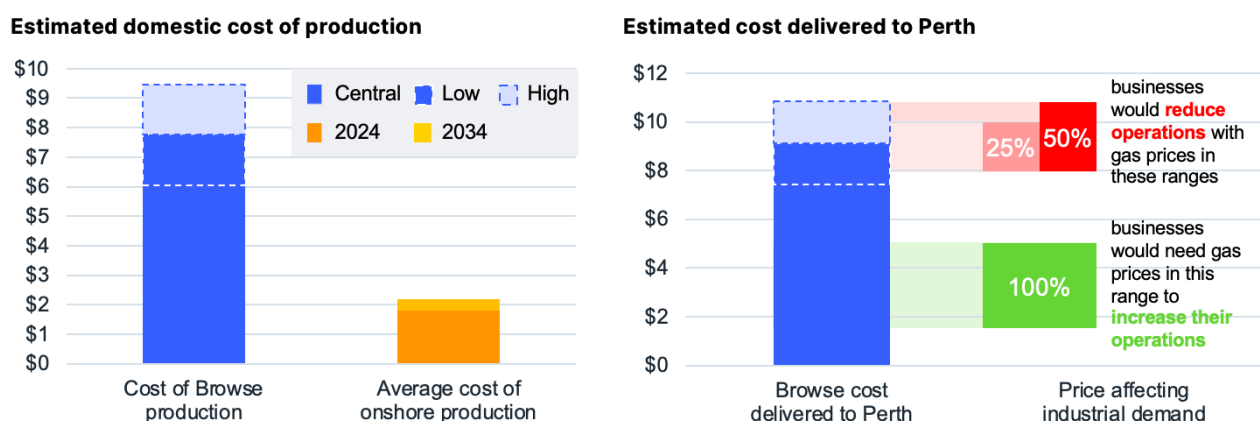
⁷ Australian Financial Review (AFR). [Gas is good, like it or not: WA Labor leader](#). July 2025.

⁸ ACIL Allen Consulting. [Browse and North West Shelf Extension: Economic Impact Assessment](#). June 2019. Page 2.

produce, and therefore expensive, relative to existing production (Figure 2). Depending on Woodside's domestic pricing strategy, high production costs may flow through to WA's domestic market pricing (particularly if gas from Browse is the marginal source of supply).

Browse gas thus may not lower gas prices in WA from their contemporary high levels, and could potentially push prices even higher, undermining the competitiveness of WA's gas-using industries and possibly inducing demand destruction. As part of its WA Gas Statement of Opportunities (WA GSOO), AEMO assessed the price sensitivity of major gas users, finding that prices between AU\$7.93/GJ and AU\$9.93/GJ would cause 25% of industrial gas users to reduce operations, and prices between AU\$9.93/GJ and AU\$10.75/GJ an additional 25%.⁹

Figure 2: Estimated cost of domestic gas from Browse vs benchmarks, AU\$/GJ



Sources: AEMO, IEEFA

Browse likely to be uncompetitive amid global oversupply

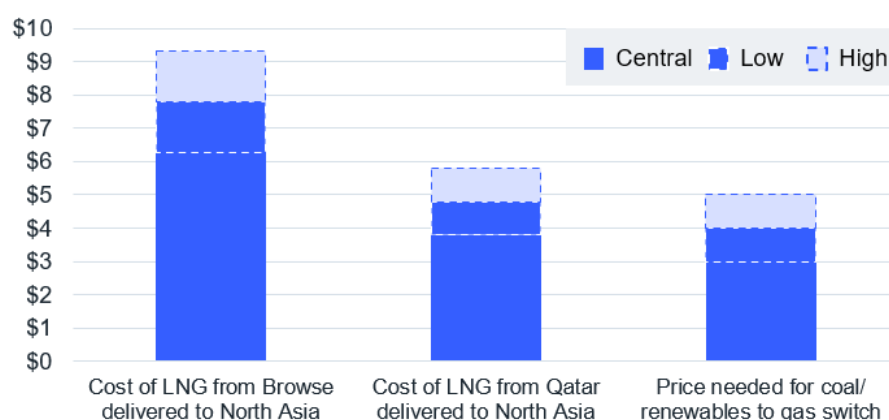
Woodside also faces price risks in LNG markets, particularly if assumed demand growth does not eventuate, or requires low prices. A looming supply glut is likely to depress prices and persist well into the 2030s, with the IEA forecasting new LNG supply will not be required until 2040 under its slowest transition scenario, and not at all under more ambitious scenarios. The IEA notes that for new LNG supply to be fully absorbed, LNG prices would need to fall to US\$3-5 per million British thermal units (MMBtu),¹⁰ lower than IEEFA's estimated Browse LNG production costs of US\$6.80/MMBtu. IEEFA's estimated LNG production costs reflect the costs of Browse gas, as well as additional capital and operating costs at the NWS project (see [Technical Appendix](#) for more information).

⁹ AEMO. [2024 WA Gas Statement of Opportunities](#). December 2024. Page 73.

¹⁰ IEA. [World Energy Outlook 2024](#). October 2024. Page 19.

Woodside will also need to compete with QatarEnergy, which the Columbia Centre on Global Energy Policy has noted could have as much as 78 billion cubic metres – equivalent to almost 60 million tonnes (Mt) of LNG – that is either uncontracted, or contracted with a portfolio trader that will need to on-sell it.¹¹ Adding in shipping costs, Browse LNG would have an estimated cost of about US\$7.80/MMBtu delivered to North Asia (noting shipping costs can vary significantly). This will likely be more than 60% more expensive than LNG from Qatar, which has an estimated delivered cost of US\$3.8-5.8/MMBtu (Figure 3).¹² More generally, Browse is estimated to be more expensive than 70% of the world's undeveloped gas reserves, based on analysis of Rystad Energy data.¹³

Figure 3: Estimated cost comparison of LNG from Browse vs benchmarks, US\$/MMBtu



Sources: IEEFA, IEA, Columbia Centre on Global Energy Policy, ACCC, sea-distances.org

LNG is too expensive to displace coal in Asia's energy mix

While proponents of the Browse gas project assert that Australian LNG will help to displace coal generation in Asia, thereby reducing emissions, the relatively high cost of LNG means this is unlikely to occur.

The IEA found that in emerging markets, LNG prices “would need to be around US\$3-5/MMBtu to compete with coal, and prices in that range are likely to be below the delivered cost of LNG for many export projects around the world”.¹⁴ Browse LNG is likely to be nearly twice as expensive as these price points.

The relative lack of LNG price competitiveness is already being seen in major emerging markets.

¹¹ Columbia Centre on Global Energy Policy. [How Qatar's LNG Decisions Will Impact an Oversupplied Global Market](#). 8 September 2025.

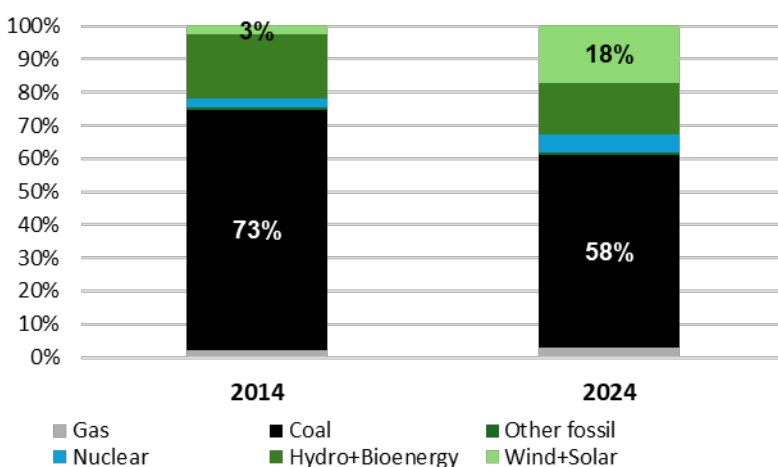
¹² IOP Conference Series: Earth and Environmental Science. [Global LNG market: supply-demand and economic analysis](#). 2022. Page 5. Qian Zou et al.

¹³ ACCR. [What's next for Woodside](#). 1 August 2024. Page 6.

¹⁴ IEA. [World Energy Outlook 2024](#). 16 October 2024. Page 52.

In China, the share of coal in the electricity mix has fallen drastically since 2014, coinciding with a quadrupling of renewable energy generation. During this period, the share of gas has remained capped at about 3%, reflecting the relatively high cost of LNG (Figure 4). Coal generation is estimated to be US\$30-40/megawatt hour cheaper than gas generation, with solar and wind cheaper again.¹⁵

Figure 4: Change in China's electricity generation by fuel, 2014-24



Source: IEEFA.¹⁶

Similarly, in India, LNG is unlikely to displace coal in the energy mix, with the share of gas actually falling from FY2013 to FY2024 (from 10% to 7%).¹⁷ In the electricity sector, which accounts for about 70% of coal use in India, the share of gas generation fell to less than 2% in FY2025 due to high LNG prices and declining supplies of cheaper domestic gas.¹⁸ This has, in turn, led to the underutilisation of gas infrastructure.

While India's steelmaking sector has, in contrast, increased gas demand since FY2016, the increase has been marginal – broadly equivalent to about 25 petajoules (PJ) annually – and the majority has been met with domestic gas production rather than LNG.¹⁹

More broadly, IEEFA is not aware of any firm evidence base supporting the argument that LNG will displace coal in Asia. While it is the case that gas has displaced coal in the US, this reflects the much lower costs of domestic gas in that region.²⁰

¹⁵ IEEFA. [LNG is not displacing coal in China's power mix](#). October 2024. Page 3.

¹⁶ IEEFA. [Australian Gas and LNG Tracker](#).

¹⁷ IEEFA. [Can LNG displace coal demand in India?](#) 11 June 2025. Page 5

¹⁸ Ibid. Page 4.

¹⁹ IEEFA. [Can LNG displace coal demand in India?](#) 11 June 2025. Page 7.

²⁰ S&P Global Platts. [Study on Global Natural Gas Prices to End-Users](#). June 2019. Page 9.

Browse's high emissions likely to add costs and risks

A significant emissions and environmental issue for Australia

The proposed Browse gas project consists of three gas fields (Calliance, Brecknock and Torosa), about 425km north of Broome in WA waters, adjacent to the ecologically important Scott reef.

Development of the project will require significant new gas infrastructure, including two new floating, production, storage and offloading (FPSO) vessels and 900km of new undersea gas pipelines to connect to the NWS project.²¹

The need for significant infrastructure and offshore drilling raises obvious physical risks to the marine environment. In 2024, the Environmental Protection Authority of Western Australia (WA EPA) formed a preliminary view that the project carried unacceptable environmental risks, including the risk of spills.²² Woodside has since applied to revise its proposal, which the WA EPA is considering.

The Browse gas fields are also carbon dioxide (CO₂)-intensive, with an average content of about 10%, much higher than many other new gas fields.^{23,24} For example, Woodside's Scarborough gas field has a CO₂ content of about 0.1%, 100 times lower.²⁵

This means the project's emissions are likely to be high. Specifically, Woodside Energy has estimated Scope 1 upstream emissions as high as 6.8MtCO₂e in peak year production in a scenario where CCS is not used and where reservoir CO₂ concentrations are high (Table 1).

Table 1: Estimated upstream emissions from the Browse project, MtCO₂e

Emissions scenario	Average year	Peak year
Base case	3.6	6.2
High CO₂ scenario	4	6.8
Base case with CCS	1.9	Not disclosed

Source: Woodside.^{26,27}

²¹ Woodside. [Developments and Exploration: Browse](#).

²² WA Today. ['Unacceptable': Red flag for Woodside's Browse gas project poses problem for federal government](#). 5 August 2024.

²³ Upstream. [Carbon solution imperative or Woodside's giant Browse gas reserves stay in the ground](#). May 2022.

²⁴ ABC News. [Woodside's North West Shelf approval just a stepping stone to enable Browse project](#). May 2025.

²⁵ Woodside. [Scarborough Energy Project](#). Accessed 18 September 2025.

²⁶ Woodside. [Proposed Browse to North West Shelf Project: Supplement Report to the Draft Environment Impact Statement](#). July 2022. Page 29.

²⁷ Woodside. [Proposed Browse to NWS Project EPBC 2018/2319](#). June 2023. Page 82.

These emissions are material and likely to make up a significant share of WA's total emissions. For instance, if the Browse project had achieved peak production in FY2022-23, its (unabated) emissions would have accounted for 7-8% of WA's total emissions.

On a national level, IEEFA estimates unabated emissions from the Browse project could account for 2.9-3.7% of Australia's total emissions in 2035 (assuming peak production and a high CO₂ scenario), based on the country's revised emissions reduction target.²⁸

In practice, the project's high emissions (even with CCS) will, in IEEFA's view, likely require either greater decarbonisation elsewhere in the Australian economy or add to demand for carbon credits. This, in turn, is likely to increase decarbonisation costs for other businesses and industries, including other LNG export projects.

NWS emissions reduction requirements could limit production

The Australian government's NWS approval includes additional, specific requirements for Woodside to reduce NWS emissions by 60% to 2030, and to net zero by 2050, as well as obligations to reduce or eliminate emissions of certain gases (such as nitrous oxide).²⁹ The NWS requirements may make it uneconomic to keep the two older trains online or at a minimum add significant costs to upgrade them. This could leave only two newer trains, as one train is already offline, thereby reducing LNG production and revenue, potentially weakening the economic case for the Browse project.

IEEFA has accounted for this potential impact when estimating the project's "high cost scenario". Specifically, IEEFA has assumed that only the two most recent trains continue operation, driving an 8% curtailment in LNG production from Browse (assuming Browse gas would be prioritised for liquefaction compared with other supply sources). IEEFA assumed that the totality of Browse gas is still developed, with the curtailed feedgas instead supplied domestically. While this is a simplifying assumption, it may overstate the ability of the WA gas market to absorb material new supply, and so likely underestimates the financial impact on the project. This reflects that many of the project's costs are likely to be fixed regardless of the project's production levels, and lower production would likely increase the cost per unit of production.

Nonetheless, IEEFA's analysis indicates a relatively small impact on production costs from the closure of two trains at the NWS. That said, IEEFA has not specifically modelled any additional costs to upgrade the remaining two trains to comply with the new emissions requirements or any additional domestic plant upgrades to increase domestic supply.

²⁸ Department of Climate Change, Energy, the Environment and Water. [Net Zero](#). Accessed 3 October 2025.

²⁹ The Australian. [North West Shelf rules may kill Browse gas plan](#). 25 September 2025.

CCS could add about 9% to costs

Under Australia's Safeguard Mechanism, new gas projects are required to have zero reservoir carbon emissions.³⁰ Further, the mechanism also outlines a "benchmark expectation that no more than 30% of emissions reductions be achieved through offsetting, [which] suggests that carbon capture and storage is likely to be a significant element of the abatement solution for those [new] oil and gas projects that do proceed".³¹

This may be one reason why Woodside intends to develop the Browse carbon capture and storage (CCS) facility to sequester some emissions from the Browse field.³² Woodside notes that the CCS facility "may deliver a significant reduction in potential Scope 1 GHG emissions from Browse by approximately 53 million tonnes" (equivalent to about 47% of total Scope 1 emissions from the project).³³ Assuming it works as intended, the CCS project would also capture about 1.7MtCO₂e of the project's anticipated 2.3-2.6MtCO₂e annual reservoir emissions. The remainder of reservoir emissions between 0.6-0.9MtCO₂e would need be offset through the surrender of Australian Carbon Credit Units (ACCUs).

The development of the CCS facility is estimated by IEEFA to add significantly to Browse's costs. In Australia, Chevron's Gorgon facility, the world's largest by injection target, has cost AU\$3.2 billion since its inception. It is of a similar scale to the proposed Browse project (with Browse potentially facing additional costs as the facility is located offshore). Based on IEEFA's calculations, and using Gorgon CCS as an indicative guide, IEEFA estimates CCS costs could increase the costs of Browse feedgas by about 9%.

The use of CCS may also present a key risk for Woodside, given the technology's long history of failure and underperformance, particularly CCS projects focused solely on sequestration (noting CCS was historically used to maintain reservoir pressure and drive enhanced oil/gas recovery). IEEFA's analysis of 13 flagship CCS projects found the majority either underperformed their injection targets, or failed completely.³⁴

Only three of the projects were found to have performed close to their capture capacity, but two of these projects, the Sleipner and Snøhvit projects in Norway, experienced issues.³⁵ At Sleipner, injected CO₂ migrated faster than anticipated and moved into a previously unidentified area (the boundaries of which remain unknown, introducing the risk of CO₂ leakage in the future). Snøhvit's performance issues have been more serious – despite expectations the project would have 18 years of injection capacity, it required costly remedial work after only 18 months in operation. In 2024,

³⁰ Allens. [Government's Safeguard Mechanism reforms get the green light](#). 5 April 2023.

³¹ Ibid. April 2023.

³² Woodside. [Browse Carbon Capture and Storage](#). March 2024. Page 1.

³³ Ibid. Page 1.

³⁴ IEEFA. [Fact Sheet: Carbon Capture and Storage \(CCS\) has a poor track record](#). 8 February 2024. Page 1.

³⁵ IEEFA. [Fact Sheet: Carbon Capture and Storage \(CCS\) has a poor track record](#). 8 February 2024. Page 2.

operator Equinor also admitted it had overstated CO₂ injections between 2017-2021 by 28%, underscoring the technical challenges associated with operating CCS facilities.³⁶

Gorgon's CCS facility has massively underperformed, with its annual injection volumes falling since it commenced operations.³⁷ The project was intended to capture 60% of the CO₂ from the Gorgon LNG plant, but captured less than half of the plant's CO₂ between FY2019-20 and FY2023-24. In FY2023-24, it captured only 30%, well below its target. Remedial work to fix the underperformance, along with the requirement to surrender carbon credits, have contributed to spiralling costs for the project, and IEEFA estimates a cost of AU\$222/tCO₂ for the carbon captured in FY2023-24.

Any underperformance at the Browse CCS facility will pose risks for WA and Australia, because it may:

- Increase project costs, which may in turn be passed through to the domestic market in the form of higher gas prices.
- Cause overall emissions to rise, potentially requiring abatement elsewhere in the country to meet carbon reduction targets.
- Further push up demand for carbon credits, and therefore carbon prices, potentially affecting the decarbonisation costs for all other companies that rely on carbon offsets.

A large carbon offset bill

As mentioned above, the Browse project will possibly rely on carbon offsets for a significant proportion of its emissions reduction requirements, which could increase if the CCS facility underperforms.

The Commonwealth Bank of Australia (CBA) published forecasts of ACCU demand due to new LNG projects (excluding Browse), with new committed projects estimated to increase ACCU demand by 5.7MtCO₂e by 2030 (in their base scenario) to as much as 7.4MtCO₂e by 2030 in their high-demand scenario. CBA further estimated carbon costs could account for as much as 9-18% of LNG revenue by 2030 (for their base and high-demand scenarios).

Emissions from Browse, even if the associated CCS project is implemented and performs at 100% of its target, would further add to ACCU demand. This, along with demand from other LNG backfill projects, could push up ACCU prices with a significant associated financial impact on the rest of Australia's LNG sector.

³⁶ DeSmog. [Norway's Equinor admits it 'over-reported' amount of carbon capture at flagship project for years](#). 28 October 2024.

³⁷ IEEFA. [Gorgon CCS underperformance hits new low in 2023-24](#). 28 November 2024.

Crucially, higher ACCU prices would have much broader implications for decarbonisation costs in Australia as it would have an impact on all companies that rely on ACCUs to meet their decarbonisation requirements.

Better options exist to address WA's energy security

In its 2024 WA GSOO, AEMO identified options available to address supply concerns, including:

- Accelerated development of onshore gas projects.
- Higher domestic supply, including from LNG exporters, through expanding and addressing constraints at existing domestic gas processing plants.
- Large gas users accelerating electrification and industrial decarbonisation.
- A more rapid build-out of renewable energy, which would reduce gas consumption for electricity generation.³⁸

In IEEFA's view, diverting some feedgas from existing LNG projects to the domestic market and implementing cost-effective gas demand reduction opportunities are likely the least cost solutions for WA.

WA is Australia's largest gas producing region by a large margin, and the scale of its LNG export sector means the vast majority of the state's gas production is exported as LNG.

A significant portion of WA's LNG exports are spot sales (sales on the spot market, beyond the level required to meet long-term LNG contracts). The expiry of some long-term LNG contracts in coming years means WA's LNG spot export volumes are likely to remain a significant portion of total LNG exports, providing an opportunity to consider policy measures to divert small amounts of gas that would otherwise be exported as spot sales to ensure domestic supply security.

Even without policy measures, WA LNG exporters will need to continue to supply the domestic market until at least the mid-2030s to meet their reservation obligations.

Redirecting LNG exports to secure WA domestic supply

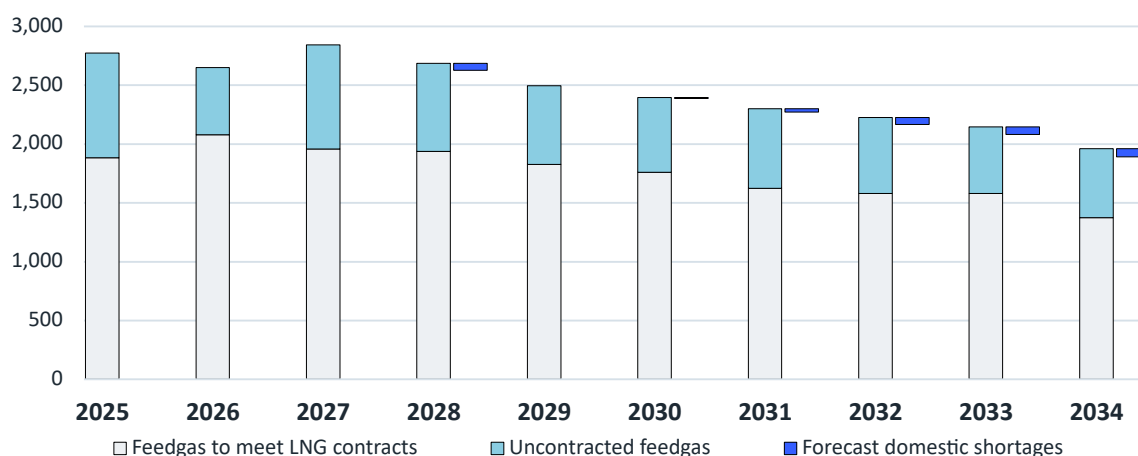
In 2024, Western Australia produced about 3,350PJ (excluding gas extracted for use in upstream oil and gas extraction). This is almost 75% higher than gas production in eastern Australia, and about six times higher than in the Northern Territory, underscoring the scale of WA's gas production.

³⁸ AEMO. [2024 WA Gas Statement of Opportunities](#). December 2024. Pages 13-14.

However, of this gas, only 418PJ was supplied to the WA gas market, lower than the volumes of LNG exported from WA to Japan (1,120PJ), China (661PJ) and South Korea (425PJ).³⁹ Domestic supply was also lower than in eastern Australia, despite the latter having lower gas production. In total, almost 3000PJ of WA gas was exported in 2024, equivalent to about 87.5% of total production (again, excluding gas produced for use in upstream oil and gas production).

A material share of WA's LNG exports were discretionary LNG spot sales, meaning they were not required to meet existing long-term LNG sale and purchase agreements (SPAs).⁴⁰ IEEFA estimates that in 2024, 37% of WA's total LNG exports were sold on a spot basis, with estimated spot LNG sales from just the NWS project totalling about 317PJ.⁴¹ Projections of future LNG production suggest that, in the absence of material new LNG contracting, WA will continue to export large volumes of spot LNG. These volumes are anticipated to be much larger than forecast gas shortages in WA (Figure 5).

Figure 5: Domestic gas shortages vs expected volumes of uncontracted LNG, PJ



Sources: IEEFA estimates; ICIS; AEMO.⁴²

Note: Forecast shortages reflect AEMO's assumptions about future gas supply and demand. AEMO assumes supply from existing projects and several new projects: Scarborough, Waitsia 2, West Erregulla and the Lockyer Gas Project. Forecast demand for LNG spot sales is based on current contract volumes, and could be lower if contracts are extended or new contracts are signed.

Specifically, IEEFA has estimated the feedgas requirements to meet existing LNG contracts to 2034, and then imputed likely uncontracted feedgas using AEMO forecasts of total LNG feedgas demand in WA. This suggests LNG exporters anticipate producing material volumes of LNG beyond those required to meet current contracts or signing new LNG contracts. In the absence of a material number of new contracts, much of the uncontracted gas is likely to be sold as spot, and forecast gas

³⁹ IEEFA. [Australian Gas and LNG Tracker](#).

⁴⁰ LNG spot sales are discretionary sales of LNG cargoes into LNG spot markets, which typically involve the sale of single or several cargoes on a short-term basis.

⁴¹ IEEFA estimates based on data from ICIS.

⁴² AEMO. [2024 WA Gas Statement of Opportunities](#). December 2024.

shortages are small relative to anticipated uncontracted feedgas. For instance, AEMO anticipates a shortage of about 70PJ in 2034, equivalent to about 12% of estimated uncontracted LNG feedgas (excluding feedgas used to run LNG plants) or less than 4% of total estimated LNG exports.

WA's high uncontracted feedgas volumes provide opportunities for greater domestic supply to address supply concerns and push down gas prices without having an impact on existing LNG SPAs. In practice, this would involve existing projects increasing domestic supply, but would also require some capacity upgrades to the gas plants attached to the LNG facilities.

While this may entail some additional costs for LNG exporters, it would provide domestic market benefits given existing field production costs are likely to be lower than new fields.

Gas shortages could be smaller if LNG exporters meet obligations

Motivated by concerns over domestic supply, the WA government implemented a domestic gas reservation policy (formalised in 2006).⁴³ This policy, implemented through agreements with LNG exporters, generally requires domestic supply equivalent to about 15% of LNG production, with LNG exporters having flexibility around when gas is supplied domestically.

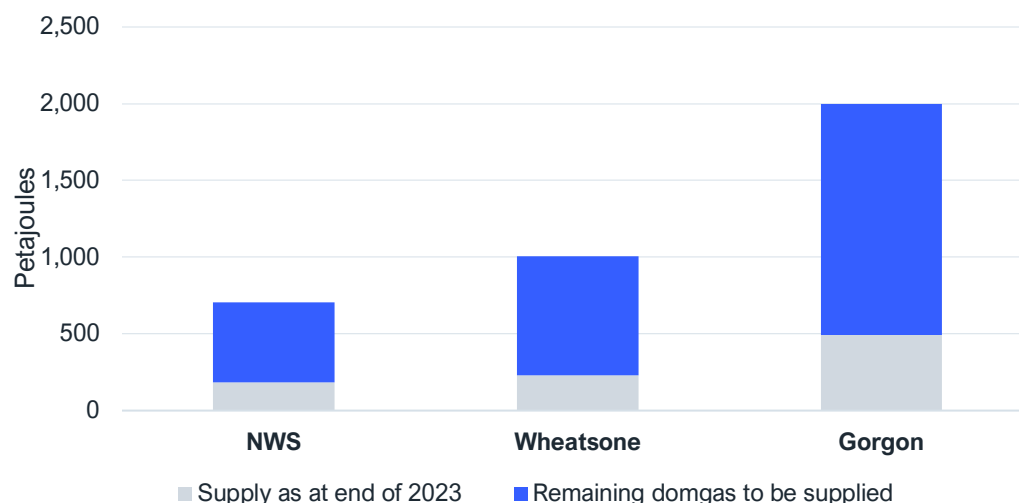
For this reason, AEMO assumes, in generating its supply adequacy/shortages forecasts, LNG exporters will supply 15% of LNG production domestically each year to 2034. However, a 2024 WA Parliamentary Inquiry found that WA LNG exporters were generally behind on their domestic supply commitments, and that “LNG producers have on average delivered around eight per cent of domestic gas relative to LNG exports”, well below the required 15%.⁴⁴ This includes Woodside's Pluto project, which had supplied only “6 per cent of its foundational commitment” – an average of about 11TJ/day, compared with an indicative commitment of 115TJ/day.⁴⁵

In practice, this means LNG exporters will likely need to supply more than 15% over the remainder of their project lives to meet their domestic market obligations. For instance, the NWS, Wheatstone and Gorgon projects are yet to supply even 30% of the volumes required (Figure 6).

⁴³ Allens. [Reserving gas for the domestic markets – Queensland's next step](#). 18 December 2018.

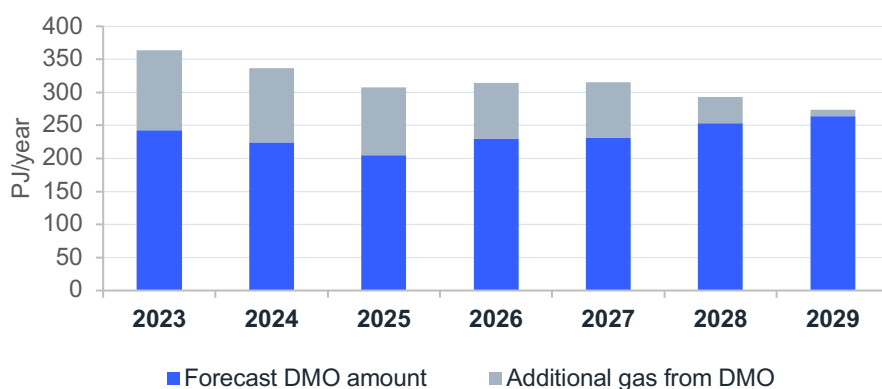
⁴⁴ WA Parliament Economics and Industry Standing Committee. [Inquiry into the WA Domestic Gas Policy: Interim Report](#). February 2024. Page 27.

⁴⁵ WA Parliament Economics and Industry Standing Committee. [Inquiry into the WA Domestic Gas Policy: Final Report](#). August 2024. Page 71.

Figure 6: WA's biggest LNG projects will need to supply large volumes in future

Source: WA Government.⁴⁶

As noted by the Australian Department of Science, Industry and Resources (DISR), domestic supply equivalent to 15% could materially increase domestic supply from LNG exporters (Figure 7). In particular, Figure 7 forecasts how much additional gas would be supplied domestically (“Additional gas from DMO”) if LNG exporters increased their domestic supply to meet the 15% obligation. This shows “strict” adherence (i.e. domestic supply aligned with LNG production on an annual basis) with domestic market obligations would increase domestic gas supply by about 500PJ in a seven-year period.

Figure 7: Additional domestic gas supply from domestic market obligation (DMO), 2023-2029

Source: Department of Industry, Science and Resources (DISR).⁴⁷

⁴⁶ WA Government. [WA Domestic Gas Statement](#). August 2025.

⁴⁷ DISR. [Future Gas Strategy Analytical Report](#). May 2024. Page 98.

Whether this additional supply would affect the likelihood and materiality of forecast shortages is not clear as AEMO has not explicitly modelled a scenario in which LNG exporters supply more than 15% of LNG production.

In IEEFA's view, AEMO should account for volumes of future domestic supply required to ensure compliance with domestic market obligations when assessing future supply adequacy, which would improve market transparency and help to inform investment decisions by gas producers and users.

Reducing gas demand in power generation and industry

IEEFA's analysis also found there are opportunities to reduce WA's gas demand through industrial decarbonisation and an accelerated shift to renewables, in part because the vast majority of WA's gas consumption is in industrial and electricity applications.⁴⁸ Several of those opportunities are likely to be cost-effective today or in the medium term.

The LNG sector is the largest gas using sector in WA, consuming material volumes of gas to power LNG processing plants, with gas used "as a fuel for refrigeration compressors and power generation during the liquefaction of gas".⁴⁹ However, there are commercially available electric turbines that could reduce gas demand while lowering emissions and maintenance costs. The Freeport LNG plant in the US demonstrates the potential, with the all-electric facility reducing emissions by 90% while increasing LNG production by 6.5%.⁵⁰ With respect to WA gas demand, IEEFA estimates that based on LNG production in 2024, full electrification of WA's LNG plants would free up 229PJ of gas that could be used elsewhere in WA. IEEFA notes, however, that there may be technical challenges with electrifying LNG plants in remote locations in WA.

Electricity is the next largest gas user in WA, with the share of gas in electricity higher than every other state, with only the Northern Territory having a higher share. In absolute terms, WA's gas use in generation is multiple times higher than all other Australian jurisdictions.⁵¹ In part, this reflects a slower rollout of renewable energy, both in grid and off-grid applications, than in eastern Australia despite the state having excellent renewable resources.⁵² An accelerated shift towards renewables is likely to be cost effective; the CSIRO found that renewables, even when accounting for additional integration costs, are already cheaper than gas generation in Australia.⁵³

In alumina refining, technologies are available that could reduce gas consumption in the sector. Specifically, the use of mechanical vapour recompression technology (effectively a series of open heat pumps) "could replace two-thirds of alumina gas use in the next decade, which would add up to

⁴⁸ IEEFA. [Reining in Western Australia's gas addition](#). 13 March 2025. Page 1.

⁴⁹ Ibid. Page 5.

⁵⁰ Ibid. Page 6.

⁵¹ Ibid.

⁵² Ibid.

⁵³ CSIRO. [GenCost 2024-25](#). July 2025. Page 76.

about 94PJ per year” nationally.⁵⁴ If deployed in WA, it would reduce annual gas consumption by about 10%. With a ratio of 1GJ of electricity replacing 5GJ of gas, the technology has the potential to become financially attractive even without government subsidies, provided it is demonstrated and derisked for industry. The emerging technology of electric calciners could further reduce gas use in alumina refining, and Alcoa is trialling renewable-powered calciners.⁵⁵

Finally, IEEFA analysis clearly shows decarbonising local ammonia production could deliver “a triple win for Australia that would: alleviate pressures in our domestic gas market; reduce emissions; and catalyse Australia’s emerging green hydrogen industry”.⁵⁶ This reflects that about 30% of gas used to make ammonia is converted into hydrogen, which is a feedstock for ammonia production.

Replacing this gas with green hydrogen would directly lower gas demand, but the relatively high cost of green hydrogen remains a barrier. This could be alleviated through offtake requirements of green-hydrogen-based explosives (which represent about half of ammonia production domestically) for miners. Thanks to the Australian government’s Hydrogen Production Incentive Tax and declining forecast green hydrogen costs, a target to replace 30% of gas for explosives manufacturing with green hydrogen by 2035 “would raise [mine site] costs by just 0.2%” while potentially displacing 5PJ of gas consumption.⁵⁷

Browse is not anticipated to be vital to Asia’s energy security

Developments in LNG markets may also provide opportunities for governments to take steps to ensure greater domestic supply in WA by LNG exporters.

Booming LNG supply will outstrip demand and drive down prices

An unprecedented boom in new LNG supply is set to come online, with about 360 billion cubic metres of new liquefaction capacity anticipated by the early 2030s, equivalent to a more than 60% increase in LNG supply.⁵⁸

Meanwhile, LNG demand in the established LNG markets is either falling or anticipated to fall. For example, in Japan, Australia’s largest LNG market historically, LNG demand has fallen by 25% since

⁵⁴ IEEFA. [Industrial heat pumps key to addressing excess gas demand](#). 31 October 2024. Page 25.

⁵⁵ IEEFA. [Reining in Western Australia’s gas addition](#). 13 March 2025. Page 8.

⁵⁶ IEEFA. [Local ammonia production the ideal early adopter for green hydrogen](#). 20 June 2024.

⁵⁷ IEEFA. [Reining in Western Australia’s gas addition](#). March 2025. Page 9.

⁵⁸ Columbia Centre on Global Energy Policy. [How Qatar’s LNG Decisions Will Impact an Oversupplied Global Market](#). 8 September 2025.

2015, with further falls possible under government policy.⁵⁹ Import volumes to China, Australia's largest LNG buyer in 2024, fell by more than 20% in the first half of 2025.⁶⁰

In Europe, IEEFA anticipates the surge in LNG demand to replace declining Russian pipeline gas supply will peak in 2025, before declining by 20% by 2030.⁶¹

More generally, there is increasing acknowledgement that future LNG demand is uncertain. For example, the President of the International Group of Liquified Natural Gas Importers noted that “the trajectory of demand remains deeply uncertain, influenced by conflicting market drivers”.⁶²

Surging LNG supply and relatively weak and uncertain demand growth will have implications for the financial case for new LNG supply projects. The IEA forecasts existing and under-construction LNG capacity will be sufficient to meet global LNG demand until 2040 even under its slowest energy transition scenario. This will increase competition between LNG suppliers and put downward pressure on prices. Under more ambitious transition scenarios, there is no need for any liquefaction capacity beyond existing and under-construction capacity.⁶³

Further, the IEA notes that absorbing all the new supply in the short-term would likely require some combination of higher electricity and industrial demand, greater coal to gas switching, a slower renewable energy rollout and lower than anticipated energy-efficiency improvements. In effect, avoiding a prolonged LNG supply glut will likely require a slower energy transition.

Japan resells Australian LNG as its demand falls

The Japanese government and major gas producers have become increasingly vocal about Australia's domestic gas and energy policies, arguing that Japan needs Australian LNG to keep the lights on in Tokyo.⁶⁴ More recently, WA Premier Roger Cook noted concerns expressed by the Japanese government about the potential of a reservation policy in eastern Australia and the risks to Japanese investment in Australia if LNG is not made available to ensure Japan's energy security.⁶⁵

However, it is clear Japan's interests in Australian LNG extend well beyond energy security.

In response to declining Japanese LNG demand, and government LNG handling targets, Japanese companies are increasingly becoming LNG traders, selling large volumes of LNG to third countries.

⁵⁹ IEEFA. [Prices, not politics, will shape U.S. LNG flows to Japan going forward](#). 27 February 2025.

⁶⁰ Gas to Power Journal. [China's LNG imports plunge over 20% on lower industrial demand](#). 28 July 2025.

⁶¹ IEEFA. [European LNG Tracker](#). February 2025.

⁶² TradeWinds. [Trajectory of LNG demand 'deeply uncertain', GIGNL president says](#). 27 May 2025.

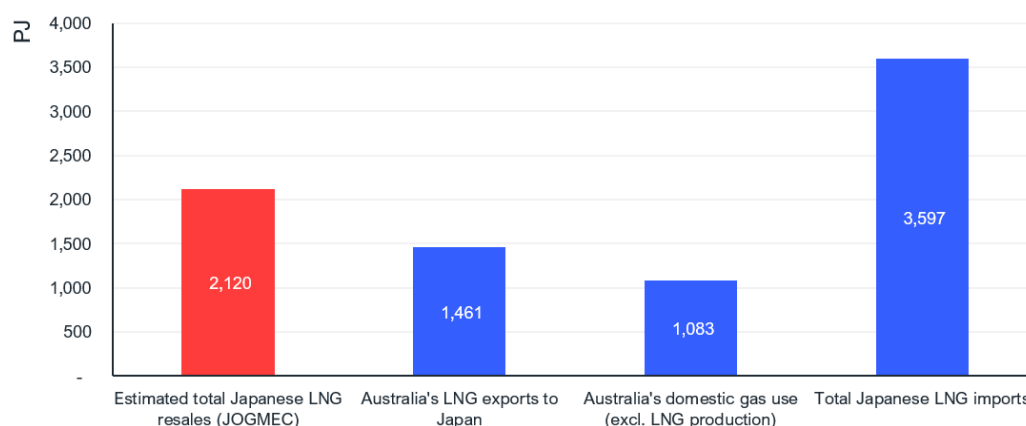
⁶³ IEA. [World Energy Outlook 2024](#). 16 October 2024. Pages 50-52.

⁶⁴ Embassy of Japan in Australia. [Speech by His Excellency YAMAGAMI Shingo Ambassador of Japan to Australia](#). 30 March 2023.

⁶⁵ AFR. [Japan's warning over Albanese's east-coast gas reserve](#). 8 July 2025.

Japanese government data, based on a survey of Japanese LNG traders, suggests these traders sold up to 38.25Mt (equivalent to about 2,100PJ) of LNG to other markets in the Japanese 2024 financial year (Figure 8).

Figure 8: Japanese LNG resales in perspective



Source: IEEFA.⁶⁶

With respect to Australia specifically, IEEFA's bottom-up analysis (using reliable ship-tracking data) has identified that Japanese companies on-sold at least 627PJ of Australian LNG in 2024, with total on-sales potentially as high as 812PJ.⁶⁷ With respect to WA, IEEFA was able to identify that Japanese companies on-sold at least 280PJ from WA in 2024 (not including sales transported to third countries by non-Japanese ship charterers), about four times the volume of the anticipated WA gas shortage in 2034.

In 2024, Japan imported about 26.36Mt of Australian LNG compared with contracted volumes of 26.6Mt.^{68,69} In other words, Japanese company on-sales of Australian LNG are clearly being driven by commercial factors, rather than reflecting sales of surplus LNG due to over-contracting with Australian LNG suppliers. This is partly why some Japanese company on-sales of LNG are purchased from Australia on a spot basis (i.e. not under existing LNG SPAs).

The commercial rationale for Japan's LNG trading was noted by the influential Institute of Energy Economics Japan, which warned that a reservation policy could undermine the profits earned by Japanese traders in the South-East Asian region. The Institute's CEO further noted, "Our [Japan's] policy is to expand our LNG network for Asia, and Australian gas assists in this."⁷⁰

⁶⁶ IEEFA. [Slides: How Japan cashes in on resales of Australian LNG at the expense of Australian gas users](#). 6 June 2025.

⁶⁷ IEEFA. [How Japan cashes in on resales of Australian LNG at the expense of Australian gas users](#). 20 May 2025. Page 1.

⁶⁸ IEEFA. [Australian Gas and LNG Tracker](#).

⁶⁹ IEEFA. [How Japan cashes in on resales of Australian LNG at the expense of Australian gas users](#). 20 May 2025. Page 3.

⁷⁰ AFR. [Japan warns on Dutton's gas reservation policy](#). 8 April 2025.

Conclusion

Western Australia is rapidly approaching a decision point about Woodside's Browse gas project. While proponents of the project point to the benefits, such as energy security in WA and abroad, there are serious questions about whether the project is in WA's best interests.

In particular, the estimated high cost of the project, and likely reliance on CCS, means Browse gas could be expensive, potentially placing upward pressure on WA gas prices and possibly inducing demand destruction. The estimated high cost of Browse LNG also means it is likely to be uncompetitive with coal and renewable generation in Asia, which will limit its ability to displace coal.

The project will have material emissions that will in turn likely require greater decarbonisation elsewhere in Australia and increase demand and costs for carbon offsets.

The need for sufficient domestic gas supply in WA is, nonetheless, crucially important for WA's industrial and mining sectors. Fortunately, there are alternatives that could help to address gas shortages without exposing WA to potential risks associated with the Browse project. Forecast gas shortages, while material relative to contemporary domestic consumption, are small relative to forecast uncontracted LNG feedgas volumes. Diverting small volumes of gas that would otherwise be exported would be sufficient to address the risks of gas shortages without relying on a risky, costly, new gas project.

There are also cost-effective untapped opportunities to reduce gas demand in existing and emerging businesses, which would reduce emissions while freeing up gas for those businesses without available alternatives to gas. These opportunities include greater support for renewable energy, thereby lowering the reliance on gas generation, and electrification of major industrial processes.

In IEEFA's opinion, given the anticipated risks of Browse, the WA government should carefully consider all options available to address gas security concerns.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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