



Fact Sheet

It is too risky for Western Australia to bet on "grey iron"



"Grey iron" is produced using gas, and needs vast amounts of it, while WA is facing domestic shortages



WA's gas prices are uncompetitive, with new projects unlikely to help



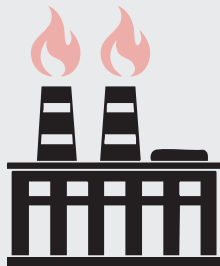
WA has a competitive advantage in green iron, but is falling behind other countries

Green iron is made using green hydrogen by reducing iron ore in a direct reduced iron (DRI) process. But DRI can also run on gas – iron produced this way can be described as "grey iron". Green hydrogen is currently more expensive than gas, and several projects are considering using gas first, potentially locking in gas use for an undetermined period. This presents high risks for Western Australia (WA).

Grey iron needs vast amounts of gas...

A DRI production facility with output similar to Port Kembla Steelworks would require:

**30-40PJ gas/year
= 7-10%
of WA's domestic gas use**



DRI uses a lot of gas – about 11GJ per tonne of steel produced. Developing several gas-based DRI plants in WA would drive material increases in the state's gas demand.

While WA is one of the largest LNG exporters in the world, domestic gas shortages are forecast for as early as 2028. The Australian Energy Market Operator expects shortfalls of about 60PJ (or 15% of current domestic gas demand) for several years in the next decade, even before accounting for new gas demand for gas-based DRI production.

Is grey iron green?

- ▶ Grey iron has an average emissions intensity of 1.4 tonnes of carbon dioxide per tonne of steel
- ▶ This is about 40% less emissions than coal-based steel, but more than double recycled steel
- ▶ This is also well above green steel benchmarks
- ▶ Carbon capture and storage (CCS) cannot be relied upon to decrease grey iron emissions, with its prohibitive costs and an established record of underperformance and failure

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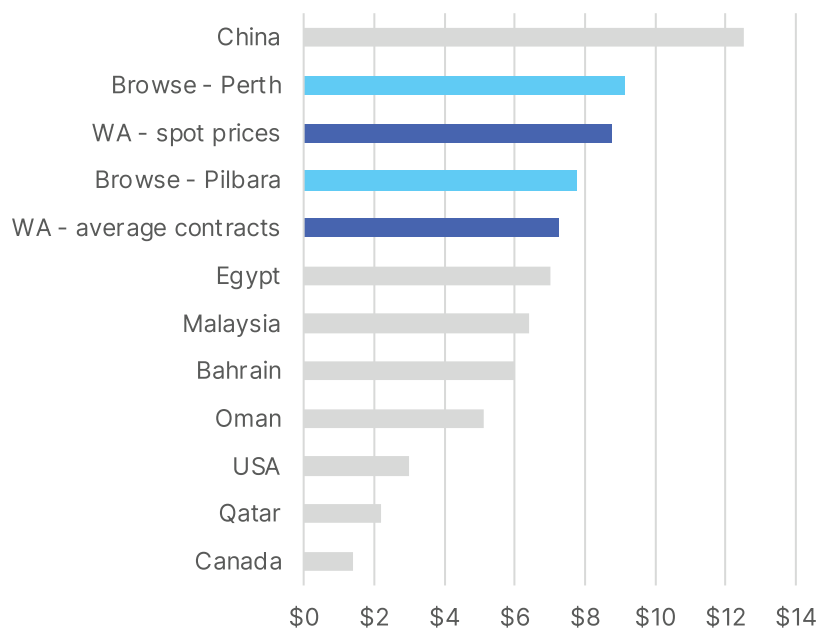
Browse gas: Expensive,
emissions-intensive,
unnecessary



Australia's steel sector too
focused on replacing one
fossil fuel with another

WA unlikely to be cost-competitive for gas-based DRI

Wholesale gas price comparisons, 2024, AU\$/GJ



About 7% of the world's iron is already produced via gas-based DRI. Major producers include Middle Eastern countries and North America, which have access to cheap gas.

While WA has typically had access to gas at a price of about AU\$4/GJ, in 2023 and 2024 prices reached an average of AU\$7/GJ for contracts and nearly AU\$9/GJ for spot sales. These price increases were driven by increased market tightness and exposure to international LNG prices. New proposed gas fields are unlikely to lower gas prices, with IEEFA estimating gas from Browse could cost nearly AU\$8/GJ to produce.

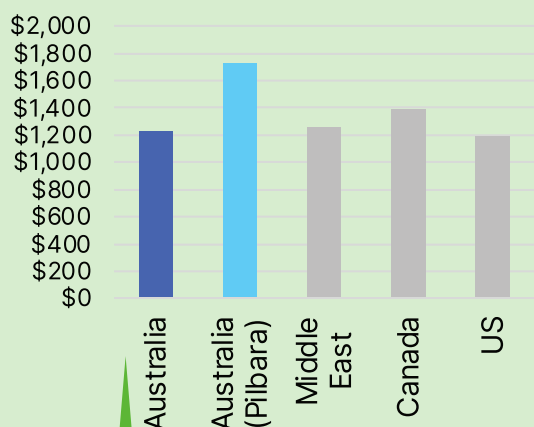
Source: Bluescope, AEMO, IEEFA Note: Browse costs are IEEFA estimates

WA's advantage lies in green iron, but it is falling behind

WA is expected to be globally competitive for the production of iron from green hydrogen, due to its vast resources of low-cost renewables, but a gas-DRI lock-in would risk seeing it miss the opportunity.

In Sweden, Stegra will begin producing green iron and steel at commercial scale from next year. Despite having much cheaper gas than Australia, Oman is requiring early use of green hydrogen for new DRI projects. Meranti Green Steel's planned DRI plant in Oman intends to start on a mix of 15% green hydrogen and 85% gas, before progressively ramping up green hydrogen use. This puts Oman's DRI plans on a credible pathway towards truly green iron and steel that sets a benchmark for Australia

Comparison of cost of steel production for hydrogen-DRI in 2030, AU\$/t



Source: Deloitte

The Superpower Institute found Geraldton would be one of the lowest-cost locations in Australia

Lessons learnt from US and EU:

Projects with a "gas first, green hydrogen later" approach struggled, while those focused instead on locations with sufficient clean firm power were more successful.

Grey iron did not command a premium and failed to establish offtakes whereas hydrogen-based DRI was able to secure offtakes at a 20-30% premium.

Many of the US and EU projects were unable to secure affordable supplies of gas or hydrogen but integrated projects with secure energy supplies had more success.

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.

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