

UPDATE #30

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Season's Greetings from a sunny Port Kembla! This **Port Kembla Hydrogen Hub Update #30** contains information on the following key projects and initiatives:

- **Renewable hydrogen tech could give green light to jobs** - 4 December 2024
- **Lifeline for ex-steel workers from green iron exports** - 3 December 2024
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- **Time running out for Australian hydrogen, green iron** - 15 October 2024
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Previous editions of the **Port Kembla Hydrogen Hub Update** newsletter are available [here](#).

Renewable hydrogen tech could give green light to jobs

4 December 2024

<https://www.illawarramercury.com.au/story/8837208/renewable-hydrogen-tech-could-give-green-light-to-jobs/>

Making equipment to produce renewable hydrogen could help Australia lead the world in the clean energy resource and unlock up to 4000 jobs and \$1.7 billion by 2050, a study says. The research, released by CSIRO Futures on Wednesday, also warned the nation had a small "window of opportunity" to take advantage of its head start before other countries recognised the market's potential.

The findings come weeks after the release of the National Hydrogen Strategy 2024, which outlined a target to produce 15 million tonnes of green hydrogen in Australia annually by 2050. The CSIRO research, called the Hydrogen Electrolyser Manufacturing report, investigated opportunities to produce the technology used to create renewable hydrogen.

Electrolysers are specialised equipment that use renewable electricity to split water into hydrogen and oxygen, creating hydrogen without producing carbon emissions. Demand for renewable hydrogen, also known as green hydrogen, was rising worldwide, the study found, as nations sought to cut their greenhouse gas emissions. "The rapid increase in scale, demand from electrolysis projects around the world, and the space for new entrants create a clear window of opportunity for countries like Australia to develop their electrolyser supply chains," the report said.



Image: Demand for renewable hydrogen, also known as green hydrogen, is rising around the world. (Bianca De Marchi/AAP PHOTOS)

Australia could create \$1.7 billion in revenue and 3974 jobs by 2050 if it manufactured hydrogen electrolyzers, CSIRO Hydrogen Industry Mission leader Dr Patrick Hartley said. "There is an economic prize out there for jobs and revenue," he said. "We have strengths in Australia around advanced manufacturing in other sectors like aerospace, defence, medical, tech, and some of those technologies are transferable into this area." "Of course, we also have the potential to use a lot of our own raw materials too." Installing the equipment could also create another 1000 jobs, the analysis found, and an additional \$1.2 billion.



Image: Producing the technology used to create renewable hydrogen could unlock thousands of jobs. (Lukas Coch/AAP PHOTOS)

Australian equipment could also support existing plans, with 87 hydrogen projects involving electrolysis already announced locally, most of them in Queensland and Western Australia. "I would love to see Australian-made electrolyzers used in Australian projects," Dr Hartley told AAP. "We have a pipeline of hydrogen projects in Australia that could provide a domestic market for electrolysis and that would be a great outcome."

Demand for renewable hydrogen is likely to grow, with the International Energy Agency calling for almost one-third (32.8 per cent) of hydrogen to be created by electrolysis by 2030 - up from just 0.1 per cent in 2022. Australia has the second-highest number of renewable hydrogen projects underway, led by India, but the manufacturing industry needed to move swiftly to seize the opportunity, CSIRO Futures energy lead Vivek Srinivasan said. "By leveraging Australia's renewable energy advantages and innovative (research and development) capabilities, Australia can become a player in this rapidly emerging sector," he said. "We must act quickly while the opportunity is available to us." Renewable hydrogen is likely to be used in fields such as heavy freight and long-distance road transport, energy storage, and ammonia production once widely available, the report found.

Lifeline for ex-steel workers from green iron exports

3 December 2024

<https://www.illawarramercury.com.au/story/8836090/lifeline-for-ex-steel-workers-from-green-iron-exports/>



Image: The green iron industry could generate billions for the economy and support thousands of jobs. Photo: Dean Lewins/AAP PHOTOS

Australia will lose thousands of jobs to rival resource-rich economies if the federal government fails to kickstart the nascent green iron industry, experts warn. An independent report released on Tuesday by Mandala Partners found the industry could potentially generate more than \$100 billion annually for the economy and support 27,500 direct jobs.

Australian Workers' Union national secretary Paul Farrow said Australian steel production was "under massive pressure" and there was an opportunity to usher workers into alternative, well-paid, long-term jobs. "If the government doesn't step in, it'll shut down and we'll lose not just thousands of jobs, but the historic opportunity to transition to green iron," Mr Farrow said. "There are clever countries lining up right now to rob Australia of its green metals advantage and it would be a national tragedy if they are successful."

Rival iron ore giant Brazil is developing a new green iron province to supply world markets, while Africa is another future source for the United States, Europe and China's automakers and steel furnaces. Becoming a green iron titan would also have a greater impact on reducing global emissions than a commitment to net zero by 2050, according to the analysis commissioned by philanthropic organisation Boundless Earth. Ironmaking is the most emissions-intensive part of the steel value chain, contributing up to 90 per cent of the emissions.



Image: Union boss Paul Farrow says Australia must seize the opportunity to transition to green iron. (Joel Carrett/AAP PHOTOS)

With the steel industry pumping out up six to nine per cent of global emissions, an Australian production chain for green iron was estimated at reducing global emissions by 1.7 per cent - or more than the official national carbon footprint.

"If Australia reaches its green iron potential, it would be a huge contribution to global climate action," Boundless Earth chief executive Eytan Lenko said. "This report clearly shows the importance and strategic opportunity of transforming our iron ore industry to a green iron industry, and its critical role in Australia becoming a renewable superpower."

Australia could be a cost-competitive producer of green iron if there was taxpayer support during the "scale-up" phase as high capital requirements and technological risks were deterring private investment. Some \$28.8 billion in investment would be needed by 2030 to build production plants, hydrogen facilities, and renewable energy systems, the report found.

Mandala Partners' Amit Singh said Australia had an opportunity to position itself as a leader in a new industry where the nation had unique natural advantages, but it wouldn't happen without a big push

by governments. "Relying on private investment alone is not going to get us there, especially given the renewable energy infrastructure requirements," he said. Production would require 16 terawatt hours of renewable energy by 2030 and 775 TWh by 2050, or 2.4 times the nation's 2030 renewable energy target.

CSIRO hails successful road test of lower-cost green hydrogen technology at steel plant

1 December 2024

https://reneweconomy.com.au/csiro-hails-successful-road-test-of-lower-cost-green-hydrogen-technology-at-steel-plant/#google_vignette

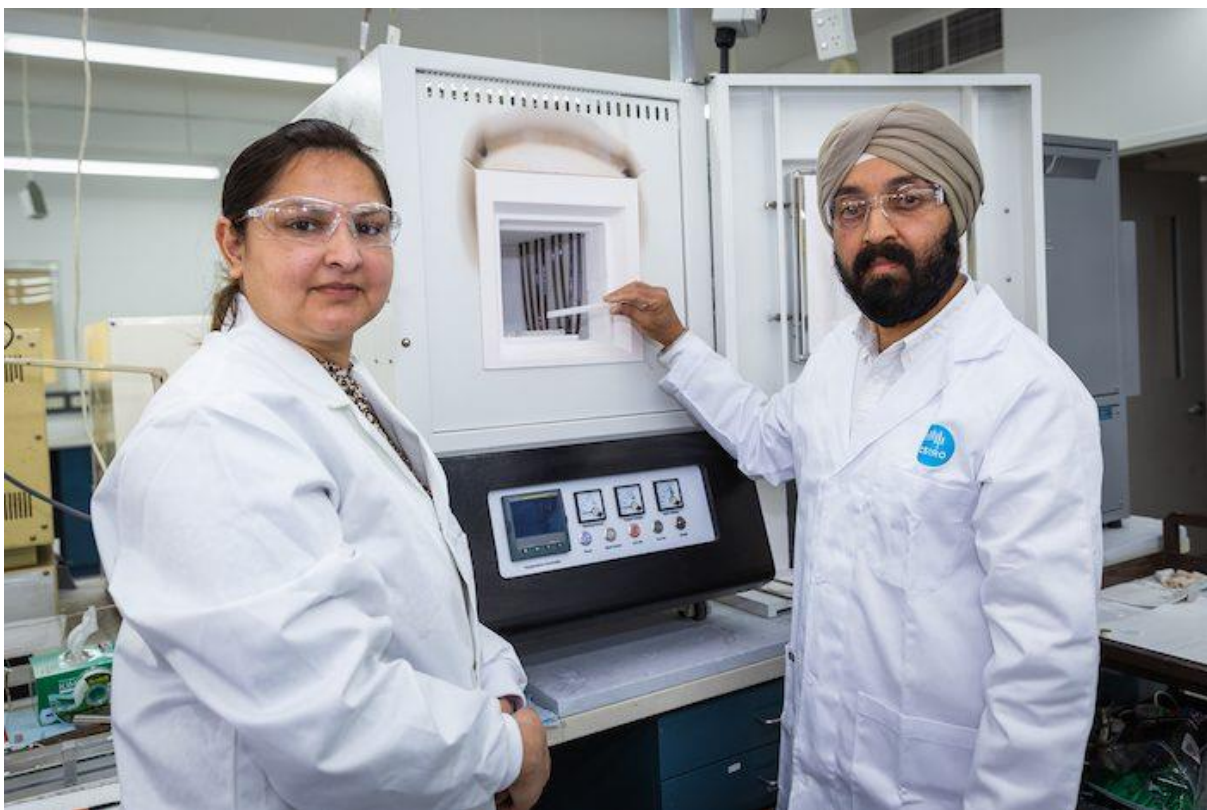


Image: CSIRO. Dr Gaurpreet Kaur, who refined the SOE system, and lead hydrogen researcher Dr Sarbjit Giddey, with a high temperature furnace for tempering the tubes.

An innovative electrolyser design that uses steam to produce green hydrogen rather than water has completed its first successful road test in a real world setting. The solid oxide electrolysis (SOE) technology – a modular assembly of tubes about half a metre long – has been installed at BlueScope's Port Kembla Steelworks in New South Wales where it has run without incident for over 1000 hours.

This system has been the product of seven years of work by a team of 14 scientists from CSIRO and in partnership with Hadean Energy which has licensed the technology and has ambitions to build a 250 kWh demonstration system. Conventional hydrogen electrolyzers work by splitting water into hydrogen and oxygen, but the new technology developed by CSIRO passes 750C waste heat

generated in heavy industrial processes through a series of ceramic tubes. An electric current is run along the walls of these tubes which splits the high temperature steam into hydrogen and water.

The modular design of these tubes promises to reduce the cost of manufacturing, reduces production costs by 30 percent, allowing the system to make hydrogen at less than 36 kWh a kilo. CSIRO Senior Principal Research Scientist and Group Leader Dr Sarb Giddey says the use of steam is important in lowering costs of green hydrogen. The lion's share of variable production costs for renewable hydrogen are in electricity, and a 30 per cent reduction in the electricity required – by using this steam-based technology – could be a game changer for the industry.

Giddey says that with the trial run serving as proof of concept, the question now was how to scale up the system to provide the amount of hydrogen needed for use applications such as iron and steelmaking, or ammonia production. “There are two factors that are really critical to decarbonising iron making and steel making – one is the cost of hydrogen, the other is the scale we can produce at,” Giddey said. “We are looking at tonnes and tonnes of hydrogen being produced. If you look at the scale required for iron and steel making, it's a lot of hydrogen. You have to replace the coal.”

According to the International Energy Agency, the steel industry globally accounts for 2.8 gigatonnes of CO2 emissions each year, or 8 percent of total energy system emissions. Hydrogen is expected to be essential in helping to decarbonise iron and steelmaking processes but it is currently made using gas or coal. Some proposals have sought to use carbon, capture, utilisation and storage to remove the CO2 from the steel production process, but a recent analysis by IEEFA took a dim view of the approach.

Of the six proposed steelmaking projects that are seeking to rely on CCUS, the analysts found all lack transparency about key details on the projects including capture capacity and storage type. Two of three projects considered in “advanced development” do not have dates by which they expect to enter production. The world's only operational commercial-scale CCUS project for steelmaking, the Al Reyadah project in the United Arab Emirates, only manages to capture a quarter of its emissions, the analysts found.

CSIRO's green hydrogen technology has been licenced to Hadean Energy which is seeking to develop a modular design. A showcase of a 5kW demonstration unit as part of the Australia-UK Renewable Hydrogen Innovation Partnership is in planning. Under this partnership the company is working to build a small 5kW electrolyser for use in a UK powerplant run by French nuclear energy giant EDF.

Toyota pushes on with hydrogen power to keep engines alive

24 November 2024

<https://www.illawarramercury.com.au/story/8827903/toyota-pushes-on-with-hydrogen-power-to-keep-engines-alive/>

Toyota is one of the few brands still investing in hydrogen internal combustion engine (ICE) technology, and it says it remains a firm part of its 'multi-pathway' solution to automotive decarbonisation. The Japanese carmaker has been developing hydrogen ICE technology alongside hydrogen fuel-cell (FCEV) technology for a while now. The former incorporates a traditional combustion engine that makes sounds, unlike FCEVs which are silent like a battery-electric vehicle (EV).

To date, Toyota has been trialling the powertrain technology through motorsport, though it has also shown off a few road-going prototypes. However, at this stage there have been no production models offered to the public with a hydrogen combustion powertrain. Asked whether Toyota is still pursuing hydrogen combustion engine tech, Toyota Australia vice president of sales, marketing and franchise operations Sean Hanley told CarExpert it will become more relevant as a mainstream powertrain technology later next decade.

"Hydrogen combustion technology is very much alive and well... we're still developing and trialling," said Mr Hanley. "All I'll say in relation to hydrogen ICE engines is that it's a technology that will continue to develop over the next five years. It's not a quick technology. "It's not a technology that we'd be suggesting will be mainstream even in this decade.

"But hydrogen itself, particularly ICE conversions, as well as fuel-cell electric hydrogen vehicles, that 2035 to 2040 is huge, and I think that's where you can expect to see a lot more talk. "I wish I was around for that long to see it, because it's going to be an exciting time, not only for Toyota, but the industry. "Toyota is definitely very much still investing in hydrogen."

In addition to motorsport-oriented hydrogen combustion vehicles like its H2-powered GR Yaris racer, Toyota chose Australia to be the central point for development of the Hydrogen HiAce prototype that it revealed last year. A pilot program saw seven examples of the Hydrogen HiAce prototype loaned out for a month at a time to fleet operators for transportation. They were required to report back daily on their experience. Unlike the regular HiAce sold in Australia, which is currently powered exclusively by a 2.8-litre four-cylinder turbo-diesel, this hydrogen prototype is powered by a 3.4-litre twin-turbo V6 modified to run on hydrogen instead of petrol.



Image: Toyota pushes on with hydrogen power to keep engines alive

This engine currently burns petrol in the Lexus LX 600, as well as the Toyota LandCruiser 300 Series in other markets. Toyota says one of the few modifications made to the engine are the fuel-injectors, which are upgraded to run on compressed hydrogen gas. The hydrogen-fuelled V6 in the HiAce prototype produces 120kW of power and 354Nm of torque, which is 185kW and 296Nm less than its petrol-powered counterpart. While Toyota continues to develop hydrogen combustion engines, brands like BMW and Mazda have previously also investigated the technology, which like FCEVs are dependent on a widespread hydrogen refuelling network.

Clean Energy Showcase #3

21 November 2024

The third Clean Energy Showcase was held at Port Kembla on the 21 November 2024. A total of 18 delegates from across key government agencies were in attendance. The event was hosted by the Port Kembla Hydrogen Hub, Invest Wollongong and the Illawarra Shoalhaven Joint Organisation (ISJO). The purpose of the event was to showcase the \$750m in major energy projects being completed both at Port Kembla and within the broader region.



Image: Robots on the Orrcon Tube Mill facility

The morning program included site visits to Green Gravity, Hysata and the BlueScope Port Kembla Steelworks. The Coregas H2Station, Australia's largest hydrogen refuelling station was featured as well as the Squadron Energy LNG Import Terminal and Jemena Port Kembla Lateral Pipeline project.

The Showcase Luncheon event at the BlueScope Visitor Centre was addressed by Wollongong City Council Mayor Tania Brown who welcomed the delegates to Wollongong. David Wilson from EnergyAustralia gave an overview of the new Tallawarra B power station and the Tallawarra A power station high efficiency upgrade project currently underway. BlueScope's Amber Waldron gave an

overview of the \$2bn in major projects that are happening and their continuing decarbonisation journey towards green steel.



Image: Mark Swinnerton, Green Gravity CEO, addressing Showcase delegates at their Gravity Lab facility

The afternoon program included a site visit to the new BlueScope tube mill which is making components that can be used for solar farm frames, a capability that did not exist previously in Australia. A highlight of this visit was seeing the high level of technology at this facility and the BlueScope Hub that is helping local industry remain competitive.

Excellent feedback was received from the delegates about the Showcase event with another planned for 2025. It is important that Port Kembla remains on the radar screen of people involved in the clean energy ecosystem across government and industry.

Time running out for Australian hydrogen, green iron

15 October 2024

<https://www.illawarramercury.com.au/story/8792225/time-running-out-for-australian-hydrogen-green-iron/>



Image: The proposed certification scheme covers green hydrogen production that uses renewable energy. Photo: Lukas Coch/AAP PHOTOS

Time is running out for investors in genuine clean industries, but a time-stamp for green hydrogen could track production down to the hour to prove its credentials, an inquiry has been told. Proposed Future Made in Australia laws being considered by parliament would track and verify emissions associated with hydrogen, renewable electricity and potentially other energy sources. 'We need to see this get through,' Australian Hydrogen Council chief executive Fiona Simon told the inquiry on Tuesday.

The industry might be "frustrated" by the length of time it was taking, but the mechanisms in the guarantee of origin scheme would hold producers accountable, Dr Simon said. "The whole point of the emerging clean and green hydrogen industry is because of the role that it plays in a decarbonised future," she said. "People are going to be keen on using clean and green hydrogen to replace fossil fuels ... They are going to want to understand what they are buying."

The proposed certification scheme covers green hydrogen production that uses renewable energy, although Europe has a framework that also extends to so-called blue and pink hydrogen. Blue hydrogen allows gas to be used in the process, while pink hydrogen is generated through electrolysis of water by using nuclear-powered electricity. But WWF-Australia industry decarbonisation expert Nicole Wyche said the legislation was "fundamental" to show Australia was aligned with best practice, particularly in iron ore-rich Western Australia which lacked a renewable energy target to support development.

"This is making potential investors lose confidence and really consider that they might be better off somewhere else," she said. She said Asian steel manufacturers were planning for the financial consequences of Europe's carbon border adjustment mechanism that would impose a tariff on carbon-intensive goods from 2026. "We don't have as much time to attract investment as people might think," Ms Wyche said. "And it isn't something that we can do overnight to get these types of major industrial revolutions happening in the sector ... the sooner we get started the better."

Origin joins green hydrogen exodus, dumps “risky” Hunter project to focus on renewables, storage

3 October 2024

<https://reneweconomy.com.au/origin-joins-green-hydrogen-exodus-dumps-risky-hunter-project-to-focus-on-renewables-storage/>



Image: Source Origin Energy

Australia’s biggest electricity utility Origin Energy has pulled out of plans to develop a giga-scale renewable hydrogen production plant on Koorangang Island in New South Wales, that was to power the surrounding Hunter region industrial hub and wean it from fossil gas. In a fresh blow to Australia’s green hydrogen ambitions, Origin said on Thursday that it was “unable to see a current pathway to take a final investment decision” on the Hunter Valley Hydrogen Hub (HVHH), which it is developing in collaboration with industrial major, Orica.

In a statement, Origin CEO Frank Calabria said the decision to exit the project – which has attracted both state and federal funding to the tune of \$115 million – reflects uncertainty around the pace and timing of the renewable hydrogen market and the risks associated with such “capital-intensive” projects. “We continue to believe hydrogen could play a role in the future energy mix,” Calabria said. “However, it has become clear that the hydrogen market is developing more slowly than

anticipated, and there remain risks and both input cost and technology advancements to overcome.”

The news follows the July decision by Fortescue Metals to abandon the development of a green hydrogen and ammonia hub in the Northern Territory’s Middle Arm industrial hub near Darwin, and to put on hold out its Gibson Island green hydrogen and ammonia project, forcing Genex to find another customer for its solar project. In August, gas giant Woodside pulled its Tasmania hydrogen project from the federal environment approval process, citing a lack of available renewables.

Calabria says that for Origin, the move away from green hydrogen aligns with its strategy to prioritise investments in solar, wind and battery storage. “Ultimately, we believe investments focused on renewables and storage can best support the decarbonisation of energy supply and underpin energy security over the near-term,” he said.

Origin’s withdrawal from the Hunter project is a blow to co-developer Orica, whose Koorangang Island ammonia manufacturing plant is one of the state’s largest industrial users of gas – and was to be the green hydrogen hub’s primary customer. But it also puts another dent in Australia’s renewable hydrogen ambitions, less than a month after federal Labor set out its new national strategy to produce at least 15 million tonnes of the green fuel a year by 2050, and at least 0.5 million tonnes a year by 2030.

The 2024 National Hydrogen Strategy provides a framework to establish Australia as a world leader in the production and export of the green fuel, underpinned by the estimated \$8 billion in funds allocated in this year’s federal budget. “Industry called for long term production incentives. So we’ve put in place about \$8 billion over the next decade for exactly that,” federal energy minister Chris Bowen said at the unveiling of the strategy. “We expect this to unlock at least \$50 billion in private investment. We anticipate it will help sustain 10 to 20 large projects – both export and for domestic manufacturing. “And collectively this could support at least 5GW of electrolyser capacity by 2030, producing over 1 million tonnes of hydrogen annually.”

In a statement on Thursday, Bowen said Origin’s decision is disappointing for the workers and businesses developing Hunter hydrogen hub. “Green hydrogen plays to Australia’s unique strengths and remains important to the future of manufacturing and industry both in the Hunter and other regions, as well as globally. “The Albanese Government’s hydrogen incentives are estimated to unlock around \$50 billion of private investment, with Australia’s announced pipeline for hydrogen already valued at over \$200 billion from 100-plus projects, a quarter of which are already operating or under construction.” He pointed out that Orica still intends to move forward with the project, and will be looking for a new partner.

For Origin, however, the promise of government support – alongside the funds already secured through the Clean Energy Finance Corporation and through the NSW government – has not been enough to keep it in the game. Rather, in addition to its decision on the Hunter Valley Hub, the gentailer says it “intends to cease work on all hydrogen development opportunities.”

“Origin has been closely following the global development of hydrogen technology and markets over the past four years and we have evaluated a range of options across several jurisdictions,” Calabria said on Thursday. “We acknowledge there will be some disappointment at this decision and are grateful for the opportunity to evaluate the feasibility of this project in conjunction with Orica, and with the support of both federal and state governments, local representatives and the community.”

In its own statement, Orica said it was grateful for the progress made with Origin on the HVHH and still wants to pursue the project, and is open to discussions with interested parties “who share our vision” for Australia’s hydrogen economy. “We’ve been operating our Kooragang Island site for over 50 years and are committed to ensuring both our manufacturing facility and the Hunter Valley region remain competitive in a low carbon economy,” Orica managing director and CEO, Sanjeev Gandhi on Thursday.

“The support of both the federal and the NSW governments for the Hunter Valley Hydrogen Hub project should also be acknowledged and Orica looks forward to continuing the collaboration with ministers and responsible agencies on the transition of Orica’s Kooragang Island manufacturing facility and the Hunter Valley region.”

Origin entered into a joint development agreement with Orica in July 2023 to progress through front-end engineering and design, received NSW government planning approval and had been targeting a final investment decision. The project was shortlisted under the Australian government’s Hydrogen Headstart program, having previously secured Commonwealth and New South Wales grant funding program commitments.

FURTHER INFORMATION

The Port Kembla Hydrogen Hub is facilitated by the [Illawarra Shoalhaven Joint Organisation](#) (ISJO) in partnership with the [Department of Primary Industries and Regional Development](#) (DPIRD). For further information about the [Port Kembla Hydrogen Hub](#), please visit the [webpage](#) or contact Nigel McKinnon, Deputy Director, Department of Primary Industries and Regional Development by email nigel.mckinnon@regional.nsw.gov.au.