

UPDATE #16

portkemblahydrogenhub.com.au

Date: 15 December 2021

Great to see Port Kembla being featured in the [national media](#) around the efforts to decarbonise heavy industry, power generation and heavy transport sectors.



This Hydrogen Hub Update provides information on;

- Decarbonising Heavy Transport
- Decarbonising Heavy Industry
- Decarbonising Gas Networks
- Decarbonising Power Generation

The Port Kembla Hydrogen Hub's online presence is now [live](#), with new content being added regularly.



DECARBONISING HEAVY TRANSPORT

With Heavy Transport a key carbon emitting sector, the activities of the Port Kembla Hydrogen Hub are aligned to zero emissions technologies across several heavy vehicle types including trucks, buses, trains and industrial equipment.

Future Mobility Day #3 - 4 November 2021

The third Future Mobility Day (FMD) event was held on the 4 November 2021, with 60 participants hearing from speakers on a range zero emission heavy vehicle topics. With the date for Port Kembla to be the location for Australia's first Heavy Road Transport Trail fast approaching, the region is supercharging its decarbonisation efforts in this space with a myriad of zero emissions trials planned across different heavy vehicle types.

Time	Topic	Speaker
11.00am	Welcome + Intro	Nigel McKinnon Dept of Regional NSW
11.05am	Industry Development	Adam Zarth Business Illawarra
11.10am	NSW Hydrogen Strategy + Hydrogen Hubs initiative	Sam Frisby DPIE
11.15am	Heavy Road Transport Trial + Refuelling Station	Wodek Jakubik Coregas
11.25am	Fleet Opportunities	John Feenan Hyzon
11.35pm	Repowering Mining Equipment	Brad Neilson Streamlined Energy
11.45pm	Hydrogen powered ICE (H2ICE)	Shawn Kook UNSW
11.55pm	Q & A	

Adam Zarth, the Executive Director of Business Illawarra spoke about the need for enabling infrastructure in the form of hydrogen refuelling stations to support the planned efforts to

decarbonise the region's heavy vehicle fleets. He also spoke about the development of a Centre of Excellence based on zero emission heavy vehicle technologies. This concept involves creating a world class ecosystem that supports opportunities in the following areas;

- Australian headquarters of OEM heavy vehicle importers
- Niche vehicle manufacturing
- Repowering of existing diesel vehicles with zero emissions powertrains
- Maintenance and servicing
- Research and development
- LHD to RHD vehicle conversion for domestic use and re-export

The first two FMD events have had a focus on fuel cell electric vehicle technology as a pathway to decarbonising heavy vehicle powertrains. FMD#3 participants were given an update by John Feenan from Hyzon about their plans in 2022 for fuel cell electric trucks, coaches, buses and refuse collection vehicles. This overview also included technical details on the two Hymax 450 prime movers that Coregas has ordered that will arrive mid 2022. Wodek Jakubik from Coregas gave an update about the Coregas Hydrogen Refuelling Station that will enable Australia's first Heavy Road Transport Trial. [Haskel](#) has been selected as the technology provider for the refuelling station. Further details on Heavy Road Transport Trial can be found [here](#).

Real trucks on the road or in development



[McKinsey](#) recently evaluated what they see as the only valid zero emissions technologies that will help to drive decarbonisation efforts in heavy vehicles. Hybrid and gas were seen as bridging technologies and not evaluated. The four technologies were evaluated across a range of metrics with the conclusion that the three competing zero emission powertrain types each had benefits for different heavy vehicle types and applications. FMD#3 participants heard about hydrogen powered internal combustion engine technology known as H2ICE. Most diesel powertrain OEM's are running both fuel cell electric and H2ICE development programs. Presenter Shawn Kook heads up the UNSW Engine Laboratory and is recognised internationally for his work on H2ICE gave a deep dive into benefits and challenges of this technology.



H2ICE Technology

Hydrogen can be used to power **internal combustion engines** replacing fossil fuels such as diesel and petrol. Known as **H2ICE**, it has several benefits over **fuel cell** and **battery electric** technologies, especially for **high motive power** applications such as **trains** and **shipping**.

H2ICE combines advanced internal combustion engine technology with **low manufacturing costs**, existing **global supply chains**, **servicing networks** and **expertise** that have all been **developed** over the **past century**.

Most **diesel powertrain OEMs** have both **fuel cell** and **H2ICE programs** running:

- [Caterpillar - hydrogen stationary gensets](#)
- [Cummins - hydrogen fuelled engine](#)
- [CMB – BeHydro dual fuel engine](#)
- [Wartsila - hydrogen test program](#)
- [JCB - hydrogen internal combustion engine](#)
- [Toyota - hydrogen internal combustion engine](#)

Mining industry veteran Brad Neilson gave a presentation on the need to decarbonise the underground hard rock mining environment and why hydrogen based powertrain technologies have an advantage over battery electric in terms of energy density and weight. Also mentioned was the opportunity to create a new industry in the region around the repowering of underground mining equipment with zero emissions powertrain technologies.

Repowering Mining Equipment

Focus on Underground Mining Equipment

- Repowering of diesel electric LHD Loaders with hydrogen fuel cell technology.
- LHD Loaders are the primary mining machines in underground hard rock mining.
- Each LHD Loader consumes 300,000 litres of diesel annually and generates 800,000 kg of CO₂.

Benefits

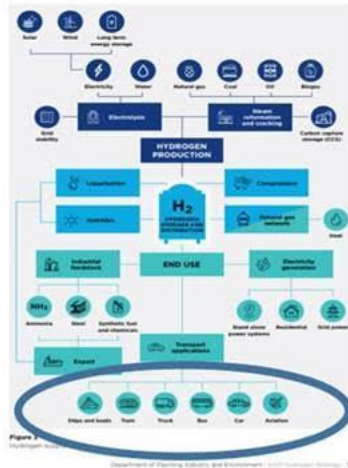
- Removal of carcinogenic diesel exhaust emissions from the underground mining environment.
- Diesel emissions are the primary driver on a mine's ventilation system.
- Ventilation system is the mine's largest energy consumer.
- Reduction in mine's energy consumption.



Safety + Training Day #1

The first Safety + Training Day event was held on the 11 November 2021. Many of the technologies and skills across the hydrogen energy supply chain are either mature or some years away from being deployed. The focus of the initial Safety + Training Day event was transport mobility where the technology is available and being deployed. With commonality in many components across battery electric and fuel cell electric vehicle platforms, there is also a large crossover in the training + safety areas.

Why Focus On Hydrogen Transport Mobility?



Scott Nargar from Hyundai Australia gave an overview of the efforts being undertaken by the car industry to adapt to new zero emissions technologies. Hyundai are a leader in this transition in terms of the new models being released, a dedicated training program for service technicians and emergency responders and a system of identification markers on vehicles with electric drivetrains. This suite of training and safety features are essential given the high voltage involved in electric powertrains.

44 new eco models
between now and 2025
23 BEV



Driving change now with innovation

Continuous investment in developing eco-friendly vehicles

- Hybrid Electric Vehicle (HEV)
- Plug-in Electric Vehicle (PHEV)
- Battery Electric Vehicle (BEV)
- Fuel Cell Electric Vehicle (FCEV)

IONIQ

Emergency Identification



Front Windscreen



Front Door B Pillars



Engine Bay



Number Plate

NSW 1st Sept 2019

Chris Greentree from TAFE NSW gave a presentation on the recently released Electric Vehicle Training Solution. This contains a structured approach to providing workforce training across zero emissions technologies, with an initial focus on electric buses in the heavy vehicle area. The TAFE NSW Electric Vehicle Training Solution is very comprehensive and is available [here](#).

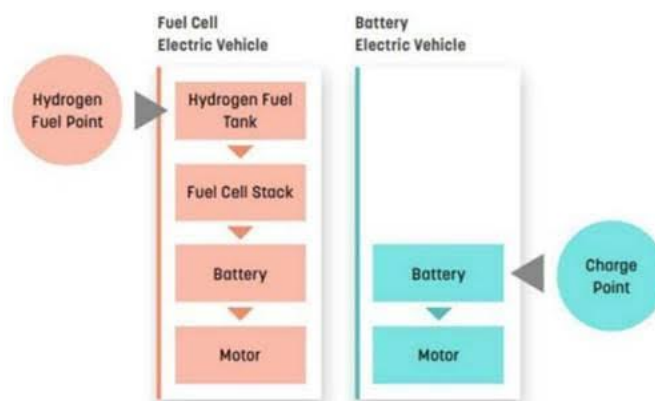
TAFE NSW ELECTRIC VEHICLE TRAINING SOLUTION

Released in October 2021, the TAFE NSW Electric Vehicle Solution will ensure that our future workforce will be ready for the transition of Electric Vehicles.

Our training products are stackable and ready for zero emission developments in light and heavy vehicles, mobile plant and equipment, and hydrogen fuel cell technology.

For more information, go to:

tafensw.edu.au/electricvehicles



Scott Nargar from Hyundai Australia also touched on the learnings from the [ACT hydrogen refuelling station](#) that opened in March 2021, with Hyundai supplying a fleet 20 Nexo FCEVs to the ACT Government. With the Coregas Hydrogen Refuelling Station opening in mid 2022, the next Training + Safety Day event will focus on hydrogen distribution and refuelling stations.

Hydrogen2Power Site Visit

A delegation of Hydrogen Hub members visited the premises of dual fuel conversion technology company [Hydrogen2Power](#) on the 3 November 2021. This technology allows existing diesel powered internal combustion engines to be converted to run on a blended mix of both diesel and hydrogen. The conversion does not modify the existing engine internals or control systems, with hydrogen being injected into the inlet manifold thereby displacing air. With significant emissions reductions available of up to 45% with this technology, it provides a valid pathway for the decarbonisation of existing heavy vehicles.



HYDROGEN TO POWER. The critical connection between future fuels and current transport and industry challenges.

Work has commenced on identifying candidate vehicles for dual fuel conversion and this technology will be featured at the next Future Mobility Day event in March 2022.

Hydrogen Freight Train Trial

A consortium is being formed to undertake a hydrogen freight train trial at Port Kembla that will feature [BeHydro](#) Hydrogen Dual Fuel technology that runs on either blended hydrogen (75%) and diesel (25%) or diesel (100%) only. BeHydro also offer 100% hydrogen powered engines but the dual fuel option has been chosen due to the lack of hydrogen refuelling infrastructure outside of Port Kembla.

The BeHydro H2ICE technology can be used in a variety of high motive (1,000KW+) power applications in marine, rail and power generation as shown in this [video](#). This technology can be deployed in new vessels, trains and generators or be used to repower existing assets to extend their service life with a new zero emissions powertrain. The repowering route has been chosen for the Hydrogen Freight Train Trial at this stage with candidate locomotives and consortium partners now being identified and refuelling options considered.

Hydrogen Freight Train Trial

Status: Concept

Repower an existing freight locomotive with a BeHydro dual fuel hydrogen (75%) - diesel (25%) engine. The engine can also operate in diesel only mode when hydrogen refuelling is not available.

The BeHydro hydrogen dual fuel engines range in power up to 2,670KW and are designed for heavy duty marine, rail and power generation applications. Potential candidate freight locomotives and project consortium partners are being identified and refuelling options investigated.

Background

Type: Repowered Freight Locomotive

Powertrain: BeHydro Hydrogen Dual Fuel Engine

Resources: [Webpage](#) and [Video](#)



DECARBONISING HEAVY INDUSTRY

Port Kembla has been described as Australia's industrial engine room and is home to Australia's largest manufacturing establishment – the BlueScope Port Kembla Steelworks (PKSW). Operating for nearly a century, PKSW is a fully integrated steelworks meaning that it converts raw materials into steel. The following articles provide a wealth of information about the work being undertaken by BlueScope to decarbonise steelmaking at Port Kembla.

7 December 2021

BlueScope and Shell join forces to develop renewable hydrogen projects in the Illawarra

BlueScope today announced that it has signed a Memorandum of Understanding (MoU) with Shell Energy Operations Pty Ltd ("Shell") to work together to explore and develop renewable hydrogen projects at BlueScope's Port Kembla/Steelworks in the Illawarra region of New South Wales, Australia. The collaboration encompasses two projects:

Pilot renewable hydrogen electrolyser plant at the Port Kembla Steelworks

This initial project will investigate designing, building and operating a pilot-scale 10MW renewable hydrogen electrolyser to explore and test the use of green hydrogen in the blast furnace at BlueScope's Port Kembla Steelworks. The ambition is to demonstrate hydrogen as a pathway towards low emissions steelmaking. The hydrogen could also potentially be used for other purposes, such as to feed a pilot direct reduced iron (DRI) plant.

Illawarra hydrogen hub concept

The MoU also provides for BlueScope and Shell to collaborate with other organisations to develop a "hydrogen hub" in the Illawarra. This project will explore options for hydrogen supply and offtake, renewable energy supply and hydrogen and electricity infrastructure. The project will also examine the logistics infrastructure required for a commercially viable hydrogen supply chain in the Illawarra. The Illawarra's diversity of sectors across industry, energy, transport infrastructure, minerals and mining, combined with research and academic partnerships, makes it well-placed for further collaborations to develop hydrogen technology and support the region's decarbonisation efforts.

BlueScope Chief Executive, Mark Vassella, said, "we are excited about the potential for these projects and are pleased to be working with Shell which brings global expertise in developing new energy technologies, including green hydrogen. "Any future potential hydrogen hub in the Illawarra will need broad support from governments, regulators, customers and suppliers. "We are looking to the future; short, medium and long term and we are looking forward to seeing what a pilot hydrogen electrolyser can teach us about the production, storage and handling of hydrogen and, importantly, how hydrogen will behave in a blast furnace. "The projects announced today demonstrate BlueScope's commitment to taking real action on climate change," Mr Vassella said.

Shell Australia Chairman Tony Nunan said: "Hydrogen has the potential to play a key role in decarbonising hard-to abate sectors, many of which are central to Australia's economic and social development. Shell looks forward to working with BlueScope and leveraging each other's strengths and capabilities to explore the development of integrated hydrogen supply chains. Collaborations

such as these are fundamental to accelerating progress towards a net-zero emissions future.” The MoU collaboration is part of BlueScope’s previously announced climate investment program of up to \$150 million over the next five years.

BlueScope and Rio Tinto sign MOU for low-emissions steelmaking at PKSW

Friday, October 29, 2021

<https://www.bluescope.com/bluescope-news/2021/10/bluescope-and-rio-tinto-sign-mou-for-low-emissions-steelmaking-at-pksw/>

BlueScope and Rio Tinto have joined forces to explore options for low-emissions steelmaking at Port Kembla Steelworks in New South Wales. The two companies have signed a Memorandum of Understanding (MOU) to research and design low-emissions processes and technologies for the steel value chain across iron ore processing, iron and steelmaking and related technologies.

The two priority action areas for immediate exploration are:

- **Hydrogen Direct Reduction and Iron Melter**
This concept will involve producing a low emissions iron feed for consumption at Port Kembla and will explore the direct reduction of Rio Tinto’s Pilbara iron ores, with the intent of using green hydrogen produced from renewable electricity. The direct reduced iron (DRI) from this process will be melted in an electrical furnace, powered with renewable electricity, to produce iron suitable for the steelmaking process.
- **Enhancing existing processes**
BlueScope and Rio Tinto will cooperate to explore the development of projects involving iron ore processing and technologies directed at reducing carbon emissions from existing iron and steelmaking processes.

The MOU expands the collaboration between the two companies, who were already jointly studying technology to reduce carbon emissions from existing iron and steelmaking processes. It will also allow more projects to be added as technologies mature. The collaboration is part of BlueScope’s previously announced climate action fund of up to \$150 million. The first phase of the collaboration will be to determine the scale of a pilot plant to be based at the Port Kembla Steelworks, consisting of a hydrogen electrolyser, direct reduction equipment and a melter.

BlueScope Chief Executive, Mark Vassella, said, “we are pleased to be working with Rio Tinto who supply the majority of iron ore to our Port Kembla plant. It’s a natural fit for us both and a meaningful opportunity for Australian steelmaking and mining to explore ways of contributing to emissions reduction targets. “The new collaboration will focus on utilising green hydrogen for direct reduction of Rio Tinto’s Pilbara iron ores, which will then be fed into a melter.” “This is an important program – one which will need broad support from governments, regulators, customers and suppliers. At a time when there is much talk and expectation about decarbonisation, this is an example of two significant Australian businesses getting on with real action. We are putting our dollars and our people right on the front line of addressing climate change.”

“BlueScope’s goal is net zero greenhouse gas emissions by 2050 for our global operations, as set out in our [Climate Action Report](#). This complements the target we set in 2018 to reduce the emissions intensity of our global steelmaking operations by 12 per cent by 2030. In meeting this

target, BlueScope's Australian business will achieve a Paris Agreement aligned 45 per cent reduction in greenhouse gas emissions against 2005," Mr Vassella said.

Rio Tinto Iron Ore Chief Executive Simon Trott said "We are excited to work with BlueScope to study the use of clean hydrogen and renewable electricity at the Port Kembla Steelworks, which could provide another potential pathway to crack the code on producing low emissions steel from Pilbara iron ore." "It is very early days, but both BlueScope and Rio Tinto are committed to net zero greenhouse gas emissions by 2050 and we realise that, to get there, we need to investigate multiple pathways and strike partnerships across the steel value chain", Mr Trott said.

BlueScope continues to explore projects that will help to make low-emissions steelmaking a reality. Concept studies already underway include exploring the potential use of charcoal from forestry and construction waste to replace coal and other carbon sources in a blast furnace. Process improvements already implemented at Port Kembla include increased use of waste gases and heat to produce electricity, using more scrap where feasible, and implementing a range of big data techniques to improve our process efficiency.

https://youtu.be/eEY0I_ORnDE



Hydrogen touted as solution in BlueScope's long road to green steel

The following [ABC article](#) also provides detailed information on BlueScope's decarbonisation plans for steel production at Port Kembla and the potential key role of green hydrogen in that journey. From a trial 10MW electrolyser, scaling up to 300MW for use in blast furnace technology and up to 1400MW for DRI technology. In comparison, Port Kembla Steelworks currently use around 100MW of electricity.

[ABC Illawarra](#) By [Nick McLaren](#)

Posted Mon 25 Oct 2021 at 6:07am Monday 25 Oct 2021 at 6:07am, updated Mon 25 Oct 2021 at 2:40pm



Swedish company SSAB is credited with making and delivering the world's first fossil-free steel. (Supplied: SSAB)

Australia's largest steel producer BlueScope wants to start the transition to zero-carbon green steel inside the next decade, but the catch is the technology is yet to be proven on a large scale.

Key points

Steel manufacturer BlueScope is looking to hydrogen as a way to cut its greenhouse emissions. A Swedish collaboration is leading the way with green steel delivered to Volvo. The NSW government is touting the benefits of hydrogen, but the investment needed is immense. Using current technology would make green steel prohibitively expensive. So part of BlueScope's plans include building a 10-megawatt electrolyser to split water into hydrogen and oxygen, with the hydrogen utilised in the steel making process to reduce carbon emissions. Steel accounts for 8 per cent of carbon emissions globally, so deep emission reductions from the steel industry will be essential to meet global emissions targets. The Port Kembla integrated steel plant manufactures 8,000 tonnes each day of raw or slab steel that is transformed into slab, hot rolled coil, and plate or coated products, with demand for steel in the building industry, in particular, growing despite a global pandemic.

It is the largest manufacturing site in Australia, directly employing about 3,000 people, while indirectly supporting about 10,000 jobs in the Illawarra. But this comes at a cost, with carbon capture researchers CO2CRC estimating BlueScope Steel alone generated nearly 12 per cent of all manufacturing emissions in Australia in 2020. The company this year outlined aspirational targets to reduce total emissions to net zero by 2050. It also has mid-term 2030 targets to reduce greenhouse gas emission intensity by 12 per cent for steelmaking and 30 per cent for non-steelmaking activities, based on 2018 levels. There is widespread agreement the only way this can be achieved is by adopting a hydrogen strategy.

How steel is made

At its most basic, steel is made by mixing carbon and iron at very high temperatures, usually in a giant sealed cooking device called a blast furnace. The raw or pig steel created is then refined by adding scrap metal in a second furnace called the basic oxygen furnace where many of the impurities are removed. Fossil-free steel is made without creating CO2 emissions by using fossil-free energy sources, namely green hydrogen, as a binding agent instead of coke made from coal. The by-product from making green steel is water vapour rather than large amounts of CO2.



BlueScope needs to find a way to reduce CO2 emissions, and hydrogen is touted as the answer. (AAP: Dean Lewins)

BlueScope's hydrogen plans

BlueScope Steel's head of technologies Chris Page recently told a virtual Town Hall community meeting that producing green hydrogen from water using an electrolyser is massively energy intensive. In fact, he said it would require up to 15 times the amount of electricity used to produce steel at Port Kembla. "In terms of hydrogen, we are going to need a lot of it," Mr Page said. "I mentioned a 10MW pilot and said we could use 300MW of

hydrogen for the blast furnace." Currently, the largest electrolyser operating in Australia is just 1.25MW. "And further if we want to go to [full hydrogen steel production] we are going to need something like 1400MW to do that," Mr Page said. "To give you an idea of the scale of what we are talking about, today Port Kembla uses a little bit under 100MW of electricity all the time. "Not only do we need fifteen times what we currently use, it all has to be renewable."

Mr Page revealed the company is looking at how to grow its commitment to hydrogen with government agencies keen for BlueScope to be more ambitious in that space. The NSW government has indicated hydrogen production is set to attract more than \$80 billion of investment through deals with major trading powers, with places like the Illawarra, Parkes, and [the Upper Hunter uniquely placed to take advantage](#). This pathway to using hydrogen to create a tipping point away from fossil fuel energy and towards zero-carbon is strongly promoted by hydrogen influencers like Australia's richest man Andrew Forrest and NSW Treasurer and Energy Minister Matt Kean. "The solution is hydrogen," Mr Forrest recently said in his ABC Boyer Lecture. "To make it, all you need to do is run electricity through water."



Andrew Forrest is a firm believer in future hydrogen production for Australia. (ABC News)

He already has skin in the game, having been formally awarded a \$30 million grant from the Coalition for early works on a Port Kembla gas-hydrogen power station through his company Australian Industrial Power. He has also been in talks with BlueScope about making hydrogen for both the steelworks and his power station. Mr Forrest's Fortescue Metals Group also has plans for a green steel pilot plant in his home state of Western Australia. "We aim to start building Australia's first green steel pilot plant this year with a commercial plant in the Pilbara, powered entirely by wind and solar, in the next few years," he said at the Boyer Lecture. Mr Kean is equally enthusiastic, recently declaring hydrogen will play a key role in decarbonising the economy and help bring down energy costs. "Hydrogen will not only help the state halve our emissions by 2030 and get to net zero by 2050, it will create new opportunities for our heavy industry and an economic bonanza of investment and jobs," he said.

How it was done in Sweden

Much has been made of the Swedish company SSAB which developed a hydrogen process to make steel. The prototype steel was then used by Volvo to make a car, positioning them as pioneers. Not surprisingly, the Swedish steelmaker is immensely proud of its achievement. "The first fossil-free steel in the world is not only a breakthrough for SSAB, it represents proof that it's possible to make the transition and significantly reduce the global carbon footprint of the steel industry," president and CEO Martin Lindqvist said in a company statement in August. "We hope that this will inspire others to also want to speed up the green transition." And no doubt it has.

Still early days for BlueScope

But the man charged with forging a green steel pathway at BlueScope is not fully convinced the Swedish model can be replicated at scale. Not yet anyway. Mr Page welcomed the SSAB breakthrough, achieved after forging a partnership with an iron ore maker and the Swedish government. He said five years after the starting the project they produced 100 tonnes of steel. "Just to give you some perspective we make 8,000 tonnes here a day in Port Kembla," Mr Page said. "And we believe the transition to green steel still has a long way to go. "It's not going to be a day or a month or a year, it's going to be decades."



Gretta Stephens was appointed BlueScope's chief executive of climate change in February. *(Supplied: BlueScope)*

This longer-term outlook is shared by BlueScope's new chief executive of climate change, Gretta Stephens. "While there's lots of research and development underway, the technology is still decades off," Ms Stephens said. "It needs this enormous amount of renewable energy and an entire hydrogen industry to be built up, and that's not going to be BlueScope alone doing that." The future of green steel at Port Kembla awaits.

DECARBONISING GAS NETWORKS

30 NOV 2021

AIE and Höegh LNG Sign Deal To Secure NSW and Victoria's Energy Future; Co-Develop New Generation Clean Energy Transport Potential

Australian Industrial Energy (AIE) has signed a long-term charterparty agreement with leading energy infrastructure and transport provider Höegh LNG to supply the first Floating Storage and Regasification Unit (FSRU) to operate at the Port Kembla Energy Terminal being developed by AIE. Under the agreement, the Höegh Galleon will serve the Terminal, which has commenced construction of its berth facilities at Port Kembla, and is expected to be operational by mid-2023, making it the first project of its kind in Australia. In addition, AIE and Höegh LNG have agreed to collaborate on the future design and development of a new generation FSRU capable of receiving clean fuels which can be used as part of future green energy supply chains. Initial feasibility work on the new FSRU will now begin, and while the final design is yet to be confirmed, the vessel is expected to have the capability of delivering both natural gas and green hydrogen or derivatives thereof, unlocking further opportunities for the Terminal to support a future hydrogen energy industry in Australia.

Chairman of AIE and Tattarang CEO Andrew Hagger said the agreement with Höegh LNG supports AIE's vision to actively resolve the energy crisis on the East Coast and accelerate the use of clean energy fuels that support Net Zero ambitions. "With the phasing down of Australia's fossil fuel industry already underway, the Terminal will be critical to ensuring hundreds of thousands of Australian businesses and households avoid supply shortfalls from 2023 onwards," Mr Hagger said. "Now that critical infrastructure agreements and approvals are in place for the Terminal, we look to NSW and Victorian natural gas retailers to now take active steps to help resolve the energy security crisis they have warned about."

Richard Tyrrell Chief Development Officer at Höegh LNG said the company is excited by the potential to support Australia's first natural gas import terminal, providing the market with resilience and security of supply. "We share AIE's clean energy vision and look forward to working together on the next generation capabilities that will ensure that the Port Kembla Energy Terminal remains at the forefront of the energy transition," Mr Tyrrell said. Höegh LNG is a leading FSRU provider with a large, modern fleet of FSRUs transporting and regasifying natural gas globally. The Höegh Galleon is the newest FSRU in Höegh LNG's fleet and it will be used to receive, store and regasify liquefied natural gas at the Terminal when operations begin.

Bioenergy Roadmap

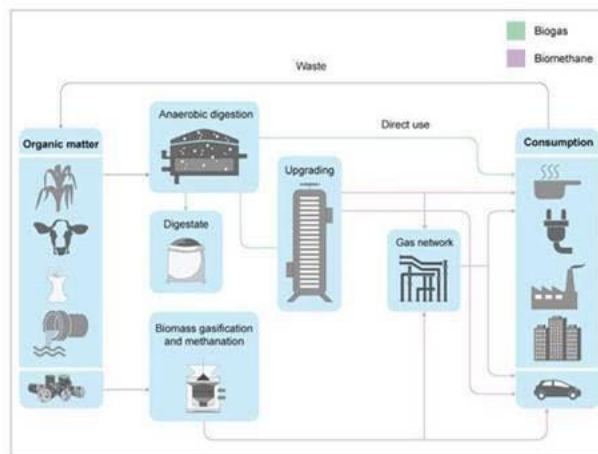
Australia's [Bioenergy Roadmap](#) has been now released with four key themes as shown below. Theme 1 includes decarbonising gas networks through renewable gas injection. This is a key priority of the Bioenergy Roadmap as it is seen as a hard to abate sector with limited low emission alternatives. Green hydrogen injection is one decarbonisation option. The NSW Hydrogen Strategy includes a stretch target of 10 percent green hydrogen gas network blending by 2030. Another option is biomethane injection that does not have some of the technical issues associated with large scale hydrogen blending.



The region already has a significant bioenergy footprint through the production of biofuels at industrial scale. Around 74 percent of Australia’s ethanol is produced by the Manildra Group at their [Shoalhaven Starches](#) plant at Nowra with plans to develop an [export terminal](#) at Port Kembla.

[Innovating Energy](#) is developing a bioenergy facility at Nowra that converts biomass from dairy farms and food waste into renewable energy. The biomass feedstock is converted into biogas through an anaerobic digestion process as shown in the image below that is from the [IEA Report on Biogas and Biomethane \(2020\)](#). The biogas produced is then used as fuel to run a generator and produce renewable electricity. Alternatively, biogas can be upgraded to produce biomethane, known as renewable natural gas, which can be used to decarbonise existing natural gas networks. The ARENA funded \$14m [biomethane demonstration project](#) will see biogas produced at the Sydney Water Malabar wastewater treatment plant upgraded into biomethane for injection into the Jemena natural gas network.

There are multiple production pathways for biogas and biomethane



Germany has some 9,000 mostly farm based biogas plants in operation. As the Bioenergy Roadmap notes, this mature technology is only in its first phase of adoption in Australia. Innovating Energy is in the final approvals stage under the State Significant Developments pathway to create a bioenergy centre of excellence at the Shoalhaven site which is planned to be operational by early 2023. This project will produce 2.2 MW of electricity in Stage 1 using manure from 19 local dairies and food waste. Discussions are also underway with Jemena to upgrade the biogas produced to biomethane for injection into the gas grid using modular biomethane upgrading technology that can connect directly to the current facility design. Community engagement for the Nowra project has commenced.

DECARBONISING POWER GENERATION

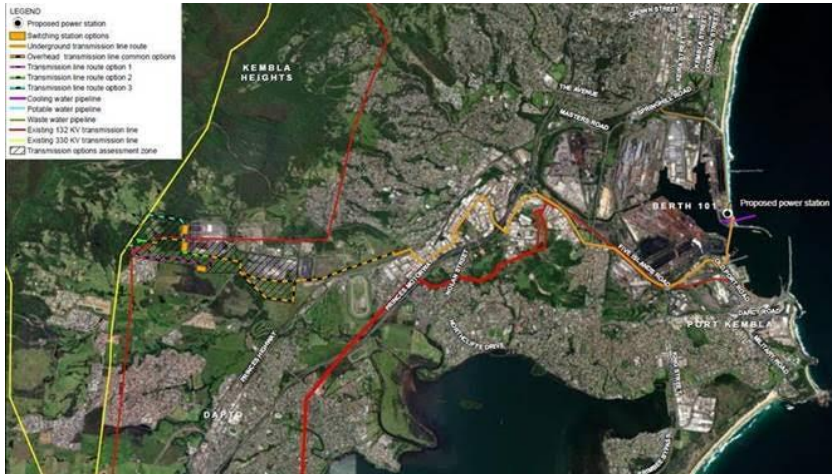
Port Kembla and the region is at the forefront of the push to decarbonise power generation through the use of blended green hydrogen as a fuel source. Tallawarra A Power Station commissioned in 2008 is the most efficient gas fired power station in Australia and will be joined by the Tallawarra B Power Station on-site by the end of 2024.

Tallawarra B Power Station

The Tallawarra B announcement that included the commitment to use 200,000kg of green hydrogen from 2025 was extensively covered in Updates #10 and #11. The Tallawarra B project draws on the GE's extensive experience in [hydrogen fuelled gas turbines](#) and the [GE White Paper – Hydrogen for Power Generation](#) provides detailed information on the challenges of running hydrogen in large turbines.

Port Kembla Power Station

Work on the proposed \$1.3 billion Port Kembla Power Station continues with the project now entering the Approvals stage. Recent important project milestones include Critical State Significant Infrastructure (CSSI) classification being made in August and a \$30 million Federal Government grant announced in October to allow the early work on the project to continue. Proponent Squadron Energy has established a [Virtual 24/7 Community Engagement Room](#) where a range of project resources can be viewed online. The resources include an informative 30 minute [video](#) that provides a large amount of detail about the proposed project. A key element of the project is the establishment of a 330kV transmission line that will connect the Port Kembla Power Station into the existing electricity grid.



Nigel McKinnon

Deputy Director, Illawarra-Shoalhaven

Regional Development Branch | Department of Regional NSW

M 0418 259 055 | E nigel.mckinnon@regional.nsw.gov.au

Level 1, Block F, 84 Crown St, Wollongong NSW 2500

nsw.gov.au/regionalnsw

