29 November 2024

Submission: Resources Sector Plan

The Australian Pipelines and Gas Association (APGA) represents the owners, operators, designers, constructors and service providers of Australia's pipeline infrastructure, connecting natural and renewable gas production to demand centres in cities and other locations across Australia. Offering a wide range of services to gas users, retailers and producers, APGA members ensure safe and reliable delivery of over 1,600 PJpa of gas consumed in Australia alongside over 4,500 PJpa of gas for export.[1] We are at the forefront of Australia's renewable gas industry, helping achieve net-zero more quickly and affordably.

APGA welcomes the opportunity to provide a submission to the Department of Industry, Science and Research (DISR) to support the development of a sectoral decarbonisation plan for the resources sector.

APGA supports a net zero emission future for Australia by 2050[2]. Renewable gases represent a real, technically viable approach to lowest-cost energy decarbonisation in Australia. APGA sees renewable gases such as hydrogen and biomethane playing a critical role in decarbonising gas use for both wholesale and retail customers[3]. APGA is the largest industry contributor to the Future Fuels CRC[4], which has over 80 research projects dedicated to leveraging the value of Australia's gas infrastructure to deliver decarbonised energy to homes, businesses, and industry throughout Australia.

APGA's submission below provides an outline of how gas can contribute to the decarbonisation of the resources sector:

- Gas powered generation (GPG) can lower the emissions intensity of resource extraction sites which currently use diesel or coal for electricity generation.
- GPG can further assist decarbonisation by providing firming services to sites that invest in solar and wind-powered generation.
- Gas production processes and infrastructure can also be decarbonised using renewable gases or electrification.
- Current gas use in the resources sector can be decarbonised using renewable gas, **but this requires policy change to enable and incentivise the necessary investment.**

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[1] DCCEEW, 2024, *Australian Energy Update 2024*, Figure 3, https://www.energy.gov.au/sites/default/files/2024-08/australian_energy_update_2024.pdf
[2] APGA, *Climate Statement*, available at: https://www.apga.org.au/apga-climate-statement
[3] ACIL Allen, 2024, *Renewable Gas Target – Delivering lower cost decarbonisation for gas customers and the Australian economy*, https://apga.org.au/renewable-gas-target
[4] Future Fuels CRC: https://www.futurefuelscrc.com/

Gas will be a key component of meeting the Future Made in Australia critical minerals strategy. Decarbonised gas will be needed to decarbonise mineral supply chains and will be a key component of developing Australia's green metals industry.[5]

These measures require policy change to incentivise and implement. Amendments to the *National Greenhouse and Energy Reporting Scheme* are necessary for facility operators to be able to measure and report actual emissions and emissions reductions using higher order methods. Policy changes are also required to incentivise the development and uptake of renewable gases, such as a renewable gas target.

A note on the development of the Resources Sector Plan

APGA has engaged across Australian Government departments to contribute to consultation processes to develop the Electricity and Energy Sector Plan, the Transport and Infrastructure Sector Plan, and the Agriculture and Land Sector Plan. The development of these plans was supported with consultation papers, open forums, and one-on-one consultations.

DISR's approach to developing the Resources Sector Plan, the Industry Sector Plan, and the Built Environment Sector Plan differs greatly. No consultation materials have been provided, or any guidance on themes and specific questions to answer. There have been limited open consultation opportunities such as forums for industry and interested stakeholders. APGA appreciates the opportunity for direct engagement with the project team, which did provide a pathway to develop this document, but the lack of a consistent approach risks comparability of feedback between stakeholders. It also risks smaller stakeholders missing out on engaging with the sector plan process.

APGA does not consider this approach to be best practice and may undermine what is ultimately recommended in the plan. This approach should be reconsidered for future work.

To discuss any of the above feedback further, please contact me on +61 409 489 814 or crafael@apga.org.au.

Yours sincerely,

CATRIONA RAFAEL
National Policy Manager
Australian Pipelines and Gas Association

[5] APGA, 2024, *Submission: Unlocking green metals opportunities*, https://apga.org.au/submissions/unlocking-green-metals-opportunities

Gas and renewable gas can decarbonise resources sector operations

The resources sector is a significant contributor to Australia's economy. The sector contributes approximately 13% of Australia's GDP, and employs over 288,000 people. However, the resources sector also accounts for 23% of Australia's greenhouse gas emissions.

Resource extraction can be an emissions-intensive process. In 2022 the resources sector emitted 99 Mt of CO^2-e, accounting for 23% of national emissions. Onsite fuel combustion and electricity generation is a major contributor of those emissions (53%), with most of the remainder made up of fugitive emissions from coal mining and oil and gas operations.[6]

Decarbonising resource extraction sites

Energy on resource extraction sites is often supplied by the combustion of coal or diesel. Others use lower-emission gas fired power stations, supplied with natural gas from pipelines. These fuel sources provide the stable energy source required, in remote locations where access to local electricity grids is limited or not available.

On many sites, these energy sources are increasingly being replaced by renewable sources, such as local wind or solar generation. Renewable electricity generation generally requires firming, commonly through battery storage though this has limitations.

Operators are increasingly investing in renewable energy microgrids backed by gas powered generation, which has the flexibility to provide firming services when there is inconsistent generation, and as a backup when generation is insufficient.

Box 1 – Gruyere gold mine microgrid

The Gruyere JV gold mine operates 900km east of Perth, producing over 350,000 ounces of gold annually. The mine operates 24/7, requiring a stable source of energy. The mine was powered at commissioning by 45 MW of gas turbines, supplied by the 198 km Yamarna Gas Pipeline (YGP).

In 2022 APA, which operates the Gruyere Power Station and the YGP, transformed the power station to a hybrid renewable microgrid. This project was intended to increase power supply along with increased production capacity, while reducing overall emissions from the mine.

A 13MW solar farm and a 4.4MW/4.4MWh battery energy storage system was added to the existing station infrastructure, as well as an additional gas turbine.[7] This has resulted in approximately 10% lower carbon intensity of the energy supplied to the mine.

Emissions from the resource sector can also include transport infrastructure, such as mining vehicles and road and rail transport. Opportunities to reduce emissions from these vehicles can often be limited by connection to electricity grids. While electrification is one

[6] Climate Change Authority, 2024, *Sector Pathways Review*, https://www.climatechangeauthority.gov.au/sites/default/files/documents/2024-09/2024SectorPathwaysReview.pdf

[7] APA, 2024, *Gruyere microgrid*, https://www.apa.com.au/our-services/other-energy-services/gas-fired-power-generation1/gruyere-microgrid/

obvious pathway, renewable gases and low carbon liquid fuels can offer an alternative pathway where this may not be feasible.

APGA's submission to the Transport and Infrastructure sector plan goes into detail on the opportunities of decarbonising vehicles with renewable gases, which is also applicable to resources sector transport infrastructure.[8] Light and heavy vehicles on resource extraction sites, and long-distance haulage provided by trucks and trains can all be decarbonised through hydrogen fuel cell technologies.

Decarbonising gas infrastructure

Other than end-use consumption, gas infrastructure has two main emissions sources: fugitive emissions, and combustion of gas to power gas processing and LNG production.

Compression facilities are generally the largest source of combustion and fugitive emissions for the pipeline industry. Pipelines themselves rarely leak; rather, leaks from components such as seals and valves, and fuel gas used in compression systems, are of key concern as well as standard venting and blowdown practices.[9]

Box 2 – Pipeline methane and gas combustion emissions reduction opportunities

In 2024 APGA engaged Worley Consulting to examine components and practices to identify emission reduction opportunities in the pipeline industry.[10] The highest 'bang for buck' opportunities included:

- capturing compressor seal gas leakage at \$37/tonnes CO_2-equivalent (tCO_2-e) abated
- implementing a leak detection and repair program at \$55/tCO_2-eabated
- electrifying compressors, ranging between \$545-1,010/tCO_2-e abated
- switching to renewable gas sourced via the network at \$189/tCO_2-e abated.

These opportunities are significant. Scaled up across the country, implementing methane reduction opportunities could abate up to 3.1 million tCO_2-e over 10 years. Up to 53 million tCO_2-e could potentially be abated over 10 years as a result of implementing combustion reduction opportunities.

Decarbonising LNG facility gas consumption would have significant emissions dividends. As noted in the Worley Consulting report, electrification of LNG compressors is an expensive exercise – estimated at \$545-1,010/tCO2-e abated. The use of renewable gases in those compressors could provide an alternative or dual decarbonisation pathway.

[8] APGA, 2024, *Submission: Transport and Infrastructure Consultation Roadmap*, https://apga.org.au/submissions/transport-and-infrastructure-consultation-roadmap

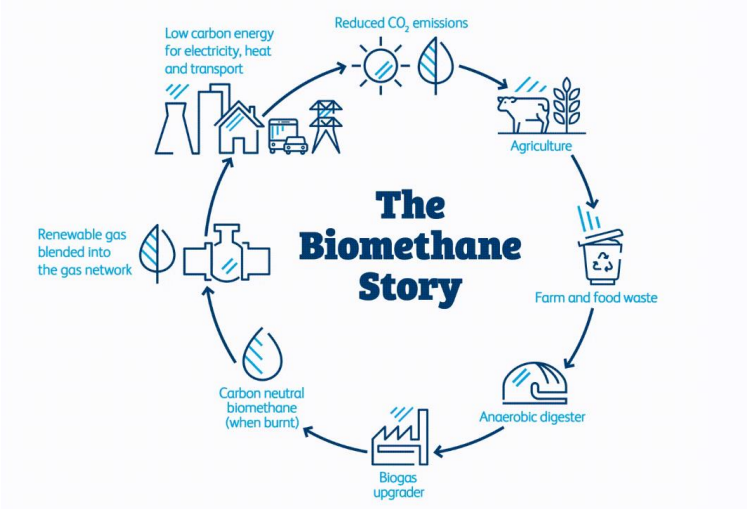
[9] The pipeline industry has historically vented methane to atmosphere when access to compression components or the pipeline itself is required, such as for routine or emergency maintenance. The industry is now moving away from this practice wherever possible, through adjusting maintenance schedules and investing in technologies which can capture the gas and reinject it into the pipeline.

[10] Worley Consulting, 2024, *Australia's pipeline methane and gas combustion emissions reduction opportunities*, https://apga.org.au/en-au/pipeline-methane-and-gas-combustion-emissions-reduction

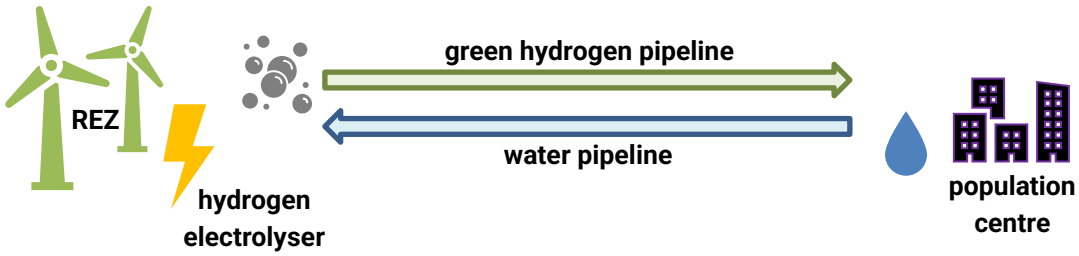
Renewable gas can support further decarbonisation

Renewable gases, including biomethane and renewable hydrogen, are a key pathway to decarbonising gas infrastructure emissions and to decarbonise gas use.

Biomethane is produced through the transformation of waste biomass into energy. While biomethane does produce the same emissions as natural gas when combusted, that combustion of biomethane releases the carbon absorbed by the biogenic material from the atmosphere during its life. On this basis it is considered to have net-zero carbon emissions.[11]



Renewable hydrogen is typically produced through electrolysis using renewable electricity, generated from wind and solar. Water is pumped into an electrolyser and separated into hydrogen and oxygen using electricity. When produced this way, hydrogen has no emissions of production or combustion.



Renewable hydrogen can also be produced using a method called steam methane reformation, using biomethane rather than natural gas. Given the value of biomethane this technique is unlikely to become common in Australia relative to electrolysis.

Biomethane and to a certain extent hydrogen can be used in existing natural gas infrastructure. Because biomethane is chemically identical natural gas, existing gas turbines can combust 100% biomethane today. The pipelines which currently carry natural gas to

[11] Clean Energy Regulator, 2022, *Emissions Reduction Fund: Biomethane Method Package 2022 – Simple Method Package*, https://cer.gov.au/document/biomethane-method-package-simple-method-guide

resource extraction sites can carry 100% biomethane. Many of these pipelines may also carry hydrogen blends with minimal augmentation, or even up to 100% hydrogen.[12]

Future microgrids supplying energy for resources sector operations will likely take advantage of hydrogen-capable turbines. Turbines with capability of combusting hydrogen blends have been available on the market for some time, and some manufacturers are bringing to market turbines which can combust 100% hydrogen.[13]

Australia's first hydrogen-capable gas power turbine is currently operating at the Tallawarra B Power Station in New South Wales.

Box 3 – Tallawarra B Power Station

In February 2024 EnergyAustralia opened the Tallawarra B gas power station in the Illawarra region of NSW. This new station complements the existing Tallawarra A gas power station and partly replaces the Liddell coal fire power station.

Tallawarra B provides 320 MW dispatchable electricity using a GE Vernova 9F.05 open cycle, dual-fuel gas turbine.[14] This class of turbines is currently rated to combust up to 20% hydrogen blends. GE Vernova is developing technology that will raise this capability to 100%.

Depending on green hydrogen production capacity, EnergyAustralia expects to operate on a blend of 5% green hydrogen and natural gas from 2025. As a peaking plant, Tallawarra B will firm the NSW electricity grid and help ensure consumers have continued access to affordable, reliable, and more sustainable power.

The Tallawarra B project was supported with New South Wales Government funding of $78 million and Federal Government funding of $5 million.

Dual-fuel turbines provide an option to further decarbonise mining operations without the need to compromise on grid stability, or variable renewable energy (VRE) availability. For mine operations with large fleets of VRE generators, onsite hydrogen production to soak up excess renewable electricity is also a possibility, with the hydrogen then used in a gas turbine to provide firm electricity.[15]

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[12] APA Group, 2024, *Parmelia Gas Pipeline – Hydrogen Conversion Technical Feasibility Study*, https://www.apa.com.au/globalassets/our-services/gas-transmission/west-coast-grid/parmelia-gas-pipeline/3419_apa_public-pipeline-conversion_v6.pdf

[13] Kawasaki Heavy Industries, 2023, *Kawasaki Launches World's First 1.8 MW Class, 100% Hydrogen-fueled, Dry-combustion Gas Turbine Cogeneration System*, https://global.kawasaki.com/en/corp/newsroom/news/detail/?f=20230905_2781; Siemens Energy, 2023, *HYFLEXPOWER consortium successfully operates a gas turbine with 100 percent renewable hydrogen, a world first*, https://www.siemens-energy.com/global/en/home/press-releases/hyflexpower-consortium-successfully-operates-a-gas-turbine-with-.html

[14] CSIRO HyResource, 2024, *Tallawarra B Dual Fuel Capable Gas/Hydrogen Power Plant*, https://research.csiro.au/hyresource/tallawarra-b04-dual-fuel-capable-gas-hydrogen-power-plant/

[15] The South Australian Government is developing a renewable hydrogen production and energy generation facility in Whyalla. This plant is designed to 'soak' excess renewable energy generated from large-scale wind and solar farms. The hydrogen produced will be combusted in to provide firming services to the electricity grid. The project will use turbines sourced from GE Vernova, that are expected to run on 100% renewable hydrogen, sourced from a 250 MW electrolyser.

Policy change is required to enable resources sector decarbonisation

Many some operators in the resources sector are acting to reduce emissions through their own initiatives. However, policy change is required to coordinate this across the sector, and provide incentives where cost to abate might otherwise be a significant barrier.

Implement a national renewable gas target

APGA has been advocating for a national Renewable Gas Target (RGT) to provide a strong demand signal for investment. This has precedent in the successful Renewable Energy Target, which supercharged the roll-out of renewable electricity by derisking investments.

Recent research has demonstrated how an RGT would boost investment in renewable gases and contribute to least-cost economy-wide decarbonisation.[16] APGA anticipates that once the renewable gas market is enabled through a market-based method and an RGT, similar to the renewable electricity market since the year 2000, the renewable gas market will develop to multiple times its current size.

Australia will need access to renewable gas as part of an efficient transition, and to enable other 'green economies' such as green metals. Governments will need to implement mechanisms to develop renewable gas and ensure it is available for hard-to-electrify sectors and as a feedstock for other sectors, in a timely manner. An RGT offers a viable and cost-effective approach to deliver these benefits.

Certification and reporting schemes necessary

Robust certification and emissions reporting of renewable gases is critical to putting a financial value on the emissions reduction, allowing explicit values to be put in business cases for renewable gases.

Currently, the National Greenhouse and Energy Reporting Scheme (NGERS) does not recognise the emissions reduction potential of renewable gases when they are transported in shared user infrastructure – pipelines. As pipelines are the cheapest and easiest form of transport for gases, this is a considerable barrier.

DCCEEW is currently developing a market-based method for renewable gases to address this issue, and we look forward to this being implemented.

Certification of renewable gases is also piecemeal. The GreenPower Green Gas Certification currently certifies renewable gases, including the biomethane injected into the Sydney network. This scheme limits end use to commercial and industrial customers.

The Federal Guarantee of Origin Scheme[17] will initially only certify green hydrogen, although it is intended to expand the scheme to other products in the future. Currently, the draft

[16] ACIL Allen, 2024, *Renewable Gas Target: Delivering lower cost decarbonisation for gas customers and the Australian economy*, https://apga.org.au/renewable-gas-target

[17] Parliament of Australia, 2024, *Future Made in Australia (Guarantee of Origin) Bill 2024*, https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/GuaranteeofOrigin

legislation inhibits interaction of the scheme with facilitated gas markets through which the majority of Australia's gas is traded. This limits its domestic usability.

Enable facilities to report emissions reductions

As identified in Box 2, emissions abatement comes at a cost, sometimes significant. In the absence of a carbon price or a way to value reductions in emissions, none of these opportunities has a net savings per tCO_2-e abated or return a positive net present value.

The Safeguard Mechanism is designed to incentivise cost-effective abatement. Amendments to the Safeguard Mechanism now in effect impose an emissions baseline on facilities emitting over 100,000 tCO_2-e per annum. These baselines reduce over time. Facilities that exceed their baselines are required to offset this through the purchase Safeguard Mechanism Credits or Australian Carbon Credit Units.

However, the current fugitive emissions estimation methods for many resources sector facilities do not permit operators to report measurements of emissions. More importantly, they do not permit facilities to measure and report *reductions* in those emissions.

The current emissions estimations methods available use 'emissions factors' for components in the facility. These are used to coarsely calculate an assumed fugitive emissions figure. For example, three 'lower order' methods are provided for estimating emissions from natural gas transmission pipelines (other than emissions that are flared):

- Method 1, an emissions factor times length of pipeline
- Method 2, sum of emissions factors for each component, times the number of components and throughput of gas through those components
- Method 3, sum of emissions factors for each component, times the number of components and hours of operation of those components.

None of these methods permit the direct measurement of emissions ('higher order' methods). The only way to reduce assumed fugitive emissions under these methods is to use fewer components, or have shorter pipelines. These methods cannot recognise efforts to address leaks in components, or improve components, or changes in operations such as reducing venting. Operators have little incentive to invest in these changes

The Climate Change Authority recognised this in its 2023 *Review of the National Greenhouse and Energy Reporting legislation*, recommending that higher order estimation methods be established for all fugitive methane emission sources.[18] The Government has agreed with this in principle and is establishing an independent expert advisory panel, and urgently phase out of Method 1 and review of Method 2 for extraction of coal in open cut coal mining.

Until higher order methods are implemented, as they are in jurisdictions internationally, operators will not be able to accurately report their emissions and any reductions.

[18] Climate Change Authority, 2023, *2023 Review of the National Greenhouse and Energy Reporting legislation*, https://www.climatechangeauthority.gov.au/sites/default/files/documents/2023-12/2023%20NGER%20Review%20-%20for%20publication.pdf