

Expression of Interest – Achieving 10% Renewable Hydrogen in Australian Gas Networks

Purpose

<u>Australian Gas Infrastructure Group</u> (AGIG), <u>Jemena Gas Networks</u> (JGN), <u>AusNet Services</u> (AusNet), and <u>EvoEnergy</u> (together, the Businesses) are seeking comment and estimates from suppliers on the feasibility, approach and cost of achieving 10% by volume renewable hydrogen across their gas networks.

Information submitted as part of this process will inform the Businesses' future plans to develop feasibility studies, policy positions and hydrogen production projects to supply renewable hydrogen blended with natural gas to customers. Responses will be treated confidentially. This is not a procurement process and submissions will not be treated as a formal quote.

About Us

Gas is an important fuel to Australians, delivering reliable, low cost and low emission energy. Gas powered generation is increasingly important in balancing renewable generation. Today gas as an end user fuel is low carbon compared to mains electricity, which in Australia is produced mostly from coal. However it is higher carbon than renewable power and increasingly, customers are seeking access to greener energy products for residential, commercial and industrial applications. We will evolve to meet our customers' needs and ensure gas networks continue to play their role in a sustainable future. With this in mind, the gas sector shares a common vision of decarbonisation which is enabled by renewable hydrogen.

The Businesses own seven of the 11 gas distribution networks in Australia. These seven networks supply gas to more than 4 million connection points representing around 10 million Australians through their gas networks in New South Wales (NSW), the Australian Capital Territory (ACT), South Australia, Queensland and Victoria. We represent the largest gas networks, customer base and consumption levels in Australia.

About AGIG

AGIG is the largest gas distribution business in Australia. AGIG serves more than 2 million customers through our networks in South Australia (sole provider), Victoria (two of the three networks), Queensland (one of two networks) and several regional networks in New South Wales and the Northern Territory.

AGIG delivers these services through two businesses – Australian Gas Networks (AGN) and Multinet Gas. We also own gas transmission and storage assets across Australia including the Dampier to Bunbury Natural Gas Pipeline, Western Australia's primary gas transmission system.

About AusNet

AusNet Services owns and operates the Victorian electricity transmission network; one of five electricity distribution networks in Victoria; one of three gas distribution networks in Victoria and a commercial business that provides a range of services to energy and infrastructure customers. AusNet Services' vision is to create energising futures by delivering value to customers, communities and partners.



About JGN

Jemena owns and operates a diverse portfolio of energy assets across northern Australia and Australia's east coast. With more than \$11 billion invested across electricity distribution, gas transmission and gas distribution.

Jemena's Gas Distribution Network (JGN) is located in NSW and is the largest gas distribution network in Australia, with over 25,000kms of pipe working connecting 1.4 million residential, business and industrial sites in Sydney, Newcastle, the Central Coast and Wollongong, and over 20 regional centres including the Central West, Central Tablelands, South Western, Southern Tablelands, Riverina and Southern Highlands regions.

About Evoenergy

Evoenergy owns and operates the ACT electricity network and gas networks for the ACT, Greater Queanbeyan, Bungendore and Nowra. Management and operation of the gas networks is carried out by Jemena as part of their broader regional NSW operations.

As Australia's only utility that operates both gas and electricity networks in the same geographic area (the ACT), Evoenergy is seeking to utilize hydrogen as a replacement for natural gas and as a way of coupling the two networks together.

Gas Vision 2050

<u>Gas Vision 2050</u> was released in mid-2017 with an objective of highlighting the role of gas today and the trajectory for decarbonising gas supply into the future through hydrogen and biomethane. It was followed in October 2019 by <u>Hydrogen Innovation – Delivering on the Vision</u> which outlined innovations in the gas industry that are progressing towards a decarbonised network.

Gas Vision 2050 set out three phases as to how the transition to a lower carbon gas supply system would occur (see Figure 1). This included investing in pilot and demonstration plants in the first five years, blending low carbon gas into our networks in years 5-20 before shifting to potential conversion of entire networks.





Industry has made good progress on the first Phase of delivering on this Vision, most notably through:

- Evoenergy's Hydrogen Test Facility. Producing first hydrogen in December 2018 was the first installation of an electrolyser by a gas utility in Australia. The project seeks to 1) test pipe, fittings, procedures and other elements of the Network's Safety Management System when converted to 100% hydrogen; 2) explore how hydrogen systems can couple the gas and electricity networks; and 3) understand how hydrogen and natural gas blends work with appliances currently on the market.
- <u>Hydrogen Park South Australia (HyP SA)</u>. An Australian-first demonstration project which will blend 5% renewable hydrogen with natural gas for supply to more than 700 customers on AGN's South Australian distribution network from mid-2020. HyP SA is an important demonstration of how renewable hydrogen can be safely injected into the gas distribution network to decarbonise gas supply and other sectors, such as industry and transport.
- <u>The Western Sydney Green Gas Project.</u> NSW's first renewable hydrogen injection project. The \$15m power to gas project, co-funded by Jemena and ARENA, will convert renewable energy from wind and solar into hydrogen via electrolysis. The majority of the hydrogen produced will be injected into the gas network, providing enough energy to meet the cooking, heating and hot-water requirements of approximately 250 homes. A portion of the hydrogen will be utilised via a gas engine generator for electricity generation back into the grid with the remaining stored in an underground hydrogen buffer store with the capability to provide hydrogen for a future onsite hydrogen refuelling station. The project will not only demonstrate the blending and storage of renewable electricity in the gas grid, it will evaluate the opportunities to better couple electricity and gas networks with transport of the future.
- <u>The Australian Hydrogen Centre (AHC)</u>. Leveraging off HyP SA, the AHC will develop feasibility studies into decarbonising gas supply in South Australia and Victoria. AGIG and AusNet are founding members of the AHC.
- <u>Hydrogen Park Gladstone (HyP Gladstone)</u>. HyP Gladstone will deliver a 10% hydrogen blend across AGN's entire Gladstone distribution network, a mix of 770 residential, small commercial and industrial customers.
- <u>The Future Fuels Cooperative Research Centre (FFCRC)</u>. A seven year \$90 million research commitment into future fuels and their deployment in the Australian energy industry. AGIG, JGN and AusNet are all participants in the FFCRC.

We are now seeking to make progress on Phase 2 – large scale blending of hydrogen and biomethane in the networks. We consider that pursuit of renewable gas will provide the lowest cost decarbonisation for our customers, particularly given the scale of gas networks will allow for deployment of large scale hydrogen production technology, driving down unit costs of production.

National Hydrogen Strategy

Significant work towards decarbonisation is already underway in Australia. It has released a <u>National Hydrogen Strategy</u> and many state-based hydrogen strategies. Industry and Government committed funding for hydrogen pilots, trials and demonstrations over 2018 and 2019 exceeded \$180 million. A Future Fuels Cooperative Research Centre and other research organisations have also been established.

The National Hydrogen Strategy has identified blending hydrogen in gas networks as one of three measures for building widespread domestic hydrogen demand, along with industrial feedstocks and transport¹. Both industry and government recognise a key next step for the sector is to consider hydrogen blending across towns and cities at volumes of up to 10%.

For example, the New South Wales Government recently announced a target of up to 10% hydrogen in gas networks by 2030 as part of its <u>Net Zero Plan Stage 1: 2020-2030</u> to fast-track emissions reductions and the establishment of a dedicated Hydrogen Program.

The National Hydrogen Strategy has identified a number of enabling activities required for Government to support hydrogen industry development to 2025, including:

- Financing of clean hydrogen supply chains or other policies that attract private investment
- Policies to build widespread domestic hydrogen demand, including measures that enable:

¹ Page 33.



- using clean hydrogen for industrial feedstocks and heating
- blending of hydrogen in gas networks
- using hydrogen for long-distance heavy-duty transport and development of associated refuelling infrastructure
- Ensure community safety and confidence, deliver benefits for all Australians, and protect the environment.
- Provide long-term governance structures, and support market settings to foster industry growth and competition.

Australian Government Support

Since 2015, the Australian Government has committed over \$146 million to hydrogen projects along the supply chain.

In addition to its priorities of smart, consistent and light-touch regulation and shaping international markets, the Australian Government is focused on accelerating technology commercialisation including through Australian Renewable Energy Agency (ARENA) and the Clean Energy Finance Corporation (CEFC). In November 2019, ARENA committed <u>\$70 million in grants</u> through its <u>Renewable Hydrogen Deployment Funding Round</u> ('the Round') to support hydrogen supply chain scale-up and large-scale market activation in electrolysers, particularly over 10MW in scale. The Round is expected to open in April with Expressions of Interest due in May/June 2020.

Further information about the process is available <u>here</u>. Separate and complementary to the Round, the CEFC has made available <u>\$300 million in concessional finance</u> to support hydrogen projects in Australia.

State Government Support

All Australian states and territories have committed to net zero emissions targets by 2050 or sooner. Supporting that intent, many made early moves through supporting specific renewable hydrogen projects and in some cases, releasing their own hydrogen strategies. A summary of each jurisdiction is as follows in Table 1.

Jurisdiction	Renewable energy penetration (2018/19) ² ; and targets	Hydrogen Strategy Document	Relevant Policy or Program
New South Wales	15.0%, n/a	<u>The Net Zero Plan</u> Stage 1: 2020-2030	 Target of up to 10% hydrogen in the gas network by 2030 Hydrogen Program (under development) Electric Vehicle Infrastructure and Model Availability Program (under development)
Victoria	20.6%; 25% by 2020; 40% by 2025; 50% by 2030	<u>Victorian Hydrogen</u> <u>Investment Program</u> (under development)	 Victorian Green Hydrogen Industry Development Plan (under development) <u>Zero Emissions Vehicle Roadmap</u> (under development)

Table 1: Summary of State Government Support

² Clean Energy Australia Report 2019, Clean Energy Council, link

Australian Gas		Jemena bringing energy to life	evo energy
----------------	--	-----------------------------------	-------------------

Queensland	9.5%; 50% by 2030	Queensland Hydrogen Industry Strategy 2019–2024	 \$15 million <u>Hydrogen Industry</u> <u>Development Fund</u> (closed) <u>Queensland's Electric Vehicle Strategy</u>
Western Australia	16.2%; n/a	<u>Western Australian</u> <u>Renewable Hydrogen</u> <u>Strategy</u>	 \$10 million <u>Renewable Hydrogen Fund</u> (closed)
South Australia	53.0%; net 100% in the 2030's	<u>South Australia's</u> Hydrogen Action Plan	 \$50 million <u>Renewable Technology Fund</u> (closed) \$1 million <u>Hydrogen Export Study,</u> <u>Modelling Tool and Prospectus</u>
Tasmania	95.9%; 100% by 2022	<u>Tasmanian</u> <u>Renewable Hydrogen</u> <u>Action Plan</u>	 \$50 million <u>Tasmanian Renewable</u> <u>Hydrogen Fund</u>
Australian Capital Territory	54.1%; 100% by 2020	No specific hydrogen policy	<u>ACT's Transition to Zero Emissions</u> Vehicles Action Plan 2018-21
Northern Territory	4.0%; 50% by 2030	No specific hydrogen policy	

Scope

Blending of hydrogen with natural gas for supply via the gas distribution network is an efficient approach to decarbonisation being pursued in Australia and throughout the globe. It will also create jobs and economic growth, strengthen industrial competitiveness and enhance Australia's fuel security.

We believe Australia's gas networks are hydrogen ready. Many have already or are in the process of replacing older mains with next generation polyethylene which is suitable for 100% hydrogen. A limiting technical factor for hydrogen blending is the end-use appliance. Appliance testing work being undertaken across the globe supports a 10% volume blend as suitable for current appliances.

We consider a 10% hydrogen volume blend to our networks is achievable over the next decade, and potentially sooner. We also consider that a systematic approach to this goal will deliver economies of scale and cost reductions to benefit our customers.

With this in mind, we are seeking expressions of interest from parties to supply this hydrogen. More specifically we are seeking to understanding industry views/comment on:

- Feasibility of achieving this 10% by volume blend challenges, requirements etc.
- How the supply chain would be organised and the specific role of the interested company.
- High level detail on what would be required to deliver these volumes in terms of:
 - Production technology and capacity (i.e. capacity required for electrolysis or steam methane reforming or coal gasification non-renewable hydrogen should be accompanied by carbon capture and storage);
 - Associated input/output volumes (i.e. megawatt hours of electricity, PJ of natural gas, litres of water, carbon capture and storage, storage, other), plus the facilities required, i.e. solar and wind generation, electrolysis plants, electricity infrastructure;
- Estimates of production costs or capital cost (\$ million, \$ per megawatt, \$ per kg of hydrogen, or \$ per GJ of hydrogen);





- Estimates of timing by when could we achieve 10% hydrogen blend and what is the optimal delivery profile, noting we are looking to achieve lowest cost production.
- The potential to access complementary markets such as the industrial and transport sector is there an opportunity to/how would you look to integrate with other markets to bring costs down.

These are outlined in the submission template provided (Attachment 1).

lemena

Whilst the above scope is quite broad, respondents should feel free to respond to the part(s) of the scope which best fit their own capabilities.

Deliverables

Australian Gas

Infrastructure Group

Your Submission should consider the volume of hydrogen required and the delivery points, set out in Table 2, based on information from the Annual Report documents from the Businesses, as well as standard conversion factors.

A respondent may only be able to supply a portion of the below. Any Submission should clearly state the volume of clean hydrogen that they are able to deliver.

Distributed Hydrogen Required for **Delivery Points** Gas Demand a 10% (volume) Blend The ultimate delivery points for the hydrogen will be blended with natural gas for supply to New South 95PJ 3PJ (21,000 tonnes) homes and businesses through the distribution Wales networks in each state. This is achievable through a variety of mechanisms - distributed hydrogen production or centralised, near or far from the demand 6PJ 216TJ (1,500 tonnes) Queensland centre (with the latter requiring transmission) We will collaborate with shortlisted parties via workshops to develop the optimum delivery model that will take into consideration various South factors including demand centers and demand 32PJ 1PJ (7,000 tonnes) profiles. Australia A reasonable proxy in the first instance is the more than 200 "custody transfer points" at which the existing gas transmission pipelines meet the gas networks and blending could occur, being: • 53 in New South Wales/Australian Capital 175PJ 6PJ (42,000 tonnes) Victoria Territory; 18 in Queensland; 17 in South Australia; and 115 in Victoria.

Table 2: Approximate Hydrogen Required (Per Annum)

Timeframes

- March 2020: EOI period open.
- **16 April 2020**: Respondents indicate whether they will provide a response to the EOI, Q&A sessions planned as necessary.
- 22 May 2020: EOI period closes ("Closing Date").



- Submissions should be submitted as described in Section 1: Lodgment and Format.
- 15 June 2020: Submissions reviewed and parties contacted for further information as required.

Contact

Key contacts for this EOI are outlined below.

Australian Gas Infrastructure Group

Jemena Gas Networks

Owen Sharpe Senior Strategy Advisor owen.sharpe@agig.com.au 0409 363 154 Mike Davis Network Innovation Manager <u>mike.davis@jemena.com.au</u> 02 9867 8275

AusNet Services

Deepank Gupta Network Innovation and Integrity Manager <u>deepank.gupta@ausnetservi</u> <u>ces.com.au</u> 03 9688 1471



Bruce Hansen Group Manager, Gas Networks bruce.hansen@evoenergy.c om.au 0411 479 604



Legal

By lodging a Submission, the respondent accepts the following terms and conditions:

1 LODGEMENT AND FORMAT

- 1.1 The Submission must be received by the Businesses by no later than 2.00 p.m. Australian Central Standard Time on the Closing Date. To lodge a Submission, send it by email to owen.sharpe@agig.com.au in accordance with the instructions provided at Attachment 1.
- 2 ENQUIRIES ABOUT THIS EOI

All enquiries concerning this EOI must be directed, in writing, to any of the contacts listed in the EOI. Enquiries and responses will be recorded and may be distributed to all respondents at the option of the Businesses.

3 FURTHER INFORMATION REQUIRED

Respondents must provide promptly all documents and information that the Businesses request to determine whether the respondent has the capacity to meet its obligations.

- 4. MISCELLANEOUS
- 4.1 This EOI should not be construed as an agreement to purchase goods or services or to make any payment to the respondent or any other person.
- 4.2 The respondent acknowledges that the Businesses have sought the Submission solely for the purposes of obtaining information which will allow it to better consider the project which is the subject of this EOI, and accordingly the Businesses are under no obligation to act on any of the information provided in the Submission, and may elect to refrain from undertaking any further action in relation to the project once all Submissions have been received.
- 4.3 The respondent releases and shall make no claim against the Businesses and their officers, employees and consultants from all liability, loss, damages, claims, suits, actions, demands, expenses and proceedings of any nature (including negligence) arising out of or relating to this EOI and the EOI process.
- 4.4 The Businesses reserve the right to modify the terms of the EOI at any time at their sole discretion.
- 4.5 This EOI, and any part of the EOI, may not be used for any purpose other than the submission of the proponent's Submission.
- 5. CONFIDENTIALITY
- 5.1 In this EOI "Confidential Information" means all trade secrets, know-how, business and financial information, and other proprietary information or data disclosed to one party by the other, or incorporated in materials or products provided to one party by the other.



- 5.2 Each party acknowledges that the other party's Confidential Information is valuable and undertakes to keep the Confidential Information of the other party secret and to protect and preserve the confidential nature and secrecy of that Confidential Information.
- 5.3 Each party must:
 - not disclose Confidential Information of the other party to any person except as permitted by this EOI;
 - not make, assist, permit or allow any person (including its employees, officers or representatives) to make any unauthorised use, disclosure or reproduction of the Confidential Information of the other party; and

take reasonable steps:

- to ensure that any person who has access to Confidential Information of the other party does not make any unauthorised use, reproduction or disclosure of that information;
- to enforce the confidentiality obligations imposed or required to be imposed by this EOI including diligently prosecuting any action at its cost; and
- co-operate with the other party in any action taken to protect the Confidential Information of that party.
- 5.4 A party may disclose confidential Information of the other party to:
 - its employees, officers and representatives to the extent that they require the information for the purposes of this EOI, so long as each has executed a confidentiality agreement if required by the other party;
 - its legal advisers and auditors for the purpose of obtaining advice in relation to this EOI; or
 - to the extent required by law or by a lawful requirement of any government or governmental body, authority or agency having authority over the party, subject to the party giving the other party sufficient notice of any proposed disclosure to enable the party to seek a protective order or other remedy to prevent the disclosure.
- 5.5 The confidentiality obligations in this condition 5 survive until the confidential Information becomes public knowledge other than by breach of this condition 1.
- 5.6 Each party acknowledges that:
 - the Confidential Information which will be made available to the other party is of such a special, confidential, unique and invaluable nature that an award of damages or an account of profits would not adequately compensate the party for a breach of this condition 5; and
 - each party has the right to seek and obtain an ex parte interlocutory or final injunction to prohibit and restrain the other party from any breach or threatened breach of any provision of this condition 5.

Attachment 1 - Submission Template

Purpose and Scope

<u>Australian Gas Infrastructure Group</u> (AGIG), <u>Jemena Gas Networks</u> (JGN), <u>AusNet Services</u> (AusNet), and <u>EvoEnergy</u> (together, the Businesses) are seeking comment and estimates from suppliers on the feasibility, approach and cost of achieving 10% by volume renewable hydrogen across their networks.

Information submitted as part of this process will inform the Businesses' future plans to develop feasibility studies, policy positions and hydrogen production projects to supply renewable hydrogen blended with natural gas to customers. Responses will be treated confidentially. This is not a procurement process and submissions will not be treated as a formal quote.

As a next step, the Businesses may identify respondents for further discussions, including in relation to possible commercial-scale opportunities, e.g. Australian Government and other industry support in the second quarter of 2020.

You are invited to respond to all sections of this template within the specified fields (as applicable. Responses that are consistent with the format are strongly preferred, with supporting material to be included as attachments.

We are seeking to understanding industry views/comment on:

- Feasibility of achieving this 10% by volume blend challenges, requirements etc.
- How the supply chain would be organised and the specific role of the interested company.
- High level detail on what would be required to deliver these volumes in terms of:
 - Production technology and capacity (i.e. capacity required for electrolysis or steam methane reforming or coal
 gasification non-renewable hydrogen should be accompanied by carbon capture and storage);
 - Associated input/output volumes (i.e. megawatt hours of electricity, PJ of natural gas, litres of water, carbon capture and storage, other), plus the facilities required, i.e. solar and wind generation, electrolysis plants, electricity infrastructure;
- Estimates of production costs or capital cost (\$ million, \$ per megawatt, \$ per kg of hydrogen, or \$ per GJ of hydrogen);
- Estimates of timing by when could we achieve 10% hydrogen blend and what is the optimal delivery profile, noting we are looking to achieve lowest cost production.
- The potential to access complementary markets such as the industrial and transport sector is there an opportunity to/how would you look to integrate with other markets to bring costs down.

Whilst the above scope is quite broad, respondents should feel free to respond to the part(s) of the scope which best fit their own capabilities.

1.1. Company Information

Trading name	
Head office address	
Australian office address	

Website	

1.2. Contact

Contact person	
Position	
Address	
Email	
Telephone	
Date of submission	

1.3. About

Relevant experience	
Relevant organizational structure or business units	
Relevant projects	

1.4. Approach

Proposed role of organisation	
Detail methodology used to deliver	
This may consider the distributed nature of potential hydrogen	

delivery points (~200 points across 4 states) and provide an outlook on the most cost effective production and delivery model.	
Feasibility of achieving a 10% by volume blend Outline any key challenges, requirements etc.	
How the supply chain would be organised including partnerships or consortiums (if applicable)	
Details of any subcontractors that would be required (if applicable)	

1.5. Technology

1.5.1. Production Technology

Production technology proposed	
Make and model	
Capacity required (e.g. megawatts)	
Water input requirements (i.e. purification needed)	

Electricity input requirements (i.e. flexibility, voltage, efficiency)	
Flexibility (i.e. ability to ramp up, ramp down)	
Pressure output (i.e. bar)	
Hydrogen output (i.e. kg/hour etc.)	
Hydrogen purity (i.e. %)	
Estimated cost (e.g. \$, \$/kg, \$/GJ)	
Estimated timing of delivery (e.g. Q1 2020)	
Warranty period (i.e. years, conditions)	
Scalability	
Detail any innovative solutions or considerations that add value to production technology proposed (i.e. future technology, other markets)	

1.5.2. Production Technology Balance of Plant

Production technology balance of plant proposed (i.e. water treatment, purification, storage, electricity integration costs, etc.)	
Capacity required (e.g. volume, hours)	
Estimated cost (e.g. \$, \$/unit)	
Warranty period (i.e. years, conditions)	
Scalability	
Detail any innovative solutions or considerations that add value to balance of plant technology (i.e. future technology, scalability, other markets)	

1.6. Timing

Provide a high level schedule outlining the main tasks and timeframes for delivery in accordance with the proposed methodology (i.e. chart or table)

This may include consideration of a staged approach to reaching a 10% by volume blend

1.7. Costs

Provide a high level summary of indicative capital, operational and other costs

This may include timing of payments under a staged approach to reaching a 10% by volume blend in line with section 1.6

1.8. Innovation

Detail any innovative solutions or considerations that add value to the objective of reaching a 10% by volume blend

This may include consideration of access to complimentary markets such as industrial and transport sectors, ancillary services provided to electricity and gas networks etc.

1.9. Other information

Detail any other relevant information for consideration.