APGA Submission

Electricity and Energy Sector Plan Consultation

26 April 2024

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Executive Summary

The Electricity and Energy Sector Plan (EESP) Discussion Paper is clear in its framing – Australia needs alternative low carbon fuels to achieve its emission reduction goals. Alternative low carbon fuels such as renewable gases and renewable liquid fuels are a critical part of the renewable energy ecosystem. Policy support for these new forms of renewable energy has been insufficient across the past decade and this must be addressed as a matter of urgency if Australia is to meet its climate ambition.

The Australian Pipelines and Gas Association (APGA) supports the intent of the EESP to explore policy support for alternative low carbon fuels. Decarbonising existing fuel supply ensures all energy customers can decarbonise and is key to a future made in Australia. Gas power generation (GPG) will also play a vital role in firming renewable generation on the pathway net zero electricity supply.

When considering policy support, the Federal Government can learn from the policies which have worked to enable electricity decarbonisation. Certification and NGER recognition, target setting and contract for difference schemes have driven the energy transition to date and provide an excellent basis for its acceleration through gas and liquid fuels and GPG support.

Decarbonising gas and liquid fuel supply

Decarbonising gas and liquid fuels is critical for the economy. Gas accounts for 24% of all end-use energy consumption in Australia and is a critical input to Australian industry, mining and manufacturing.

Low-cost gas transport and storage infrastructure and low-cost gas appliances are part of the reason customers choose natural gas today. These low-cost advantages are also available to the renewable gas supply chain as it develops:

- Existing gas infrastructure costs less than electricity infrastructure, can deliver biomethane today, and can deliver 100% hydrogen with minimal additional cost[1].
- New renewable gas transport and storage infrastructure cost less than new electricity transport infrastructure and mature electricity storage options[1].
- Biomethane and hydrogen appliances cost less than their electric equivalents[1].

Some gas customers will have no option other than to decarbonise via renewable gas. Economic analysis by ACIL Allen indicates a minimum of 210PJpa of renewable gas is required to decarbonise industrial gas customers alone. More than this will be required to enable future expansion of Australian manufacturing and the production of green export products.

The policy focus areas identified for liquid fuels in Section 4.7 of the consultation paper can also be applied to decarbonising gas supply. The table below maps these policy focus areas to the gas supply chain. Consideration of renewable gas policy opportunities within this framework shows that in some regards, policy change to enable renewable gases is already underway. However, further policy support to decarbonise our gaseous fuel mix is required.

[1] See Section 1.1 of this submission for further details.

Table E1. Renewable gas policy focus areas and associated policy actions

Policy focus areas	1. Decarbonise our gaseous fuel mix	2. Reduce fossil gas demand	3. Ensure gas security and reliability	4. Manage supply chain vulnerabilities
Reason:	Driving renewable gases supports decarbonisation efforts and de-risks gas supply through diversification	Improving energy efficiency and promoting behavioural change reduces emissions and gas demand	Leveraging existing gas security and reliability of supply legislation will ensure climate and energy objectives are met through the transition	Existing mechanisms to address gas supply chain disruptions ensures government and industry can quickly respond to emerging gas supply chain risks
Renewable Gas Policy Action:	- An NGER market-based accounting method for gas emissions - A National Renewable gas target as part of the Future Gas Strategy (FGS) - Federal contracts for difference for renewable gas supply	- Increase gas appliance efficiency floor via existing NEPS process [UNDERWAY[2]]	- Expand existing gas security and reliability of supply legislation to cover renewable gases [COMPLETED[2]]	- Expand existing mechanisms to address gas supply chain disruptions to renewable gases [COMPLETED[2]]

Gas enables net zero electricity in Australia

Today's gas supply chain helps keep electricity prices low and reliability and security high. It does so by fuelling GPG and taking much of Australia's seasonally variable energy load off the electricity grid – most of Australia's winter heating is powered by gas. Gas can continue to support electricity reliability and security as both energy systems decarbonise together. However, policy support is required.

The Draft 2024 ISP clearly sets out the role of GPG in a decarbonised National Electricity Market:

> *As Australia's coal-fired generators retire after decades of service, renewable energy connected with transmission, firmed with storage and backed up by gas-powered generation (GPG) is the lowest cost way to supply electricity to homes and businesses.*[3]

Despite this, GPG is excluded from the Capacity Investment Scheme (CIS). This impedes the investment in GPG needed to secure the lowest cost pathway to 82% renewable electricity supply according to AEMO.

GPG support aside, policy support to enable renewable gas supply will support a decarbonising gas system, in turn reducing the load on a future net zero NEM.

[2] See Section 1.3 of this submission for further details.
[3] AEMO, 2024, *Draft 2024 Integrated Systems Plan*, https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2023/draft-2024-isp-consultation/draft-2024-isp.pdf

Policy recommendations

APGA recommends the Department undertake modelling on the least cost pathway to gas use decarbonisation in Australia to inform renewable gas policy. Based upon industry analysis and AEMO recommendations relating to GPG, APGA proposes four policy recommendations across the immediate and medium term.

Immediate term policy recommendations

Policy action APGA recommends the EESP identifies for immediate action:

NGER market-based method for gas emissions accounting
GreenPower renewable gas certificates are being issued today, but NGER does not recognise these. Recognising GreenPower and future renewable gas certificates in NGER emissions accounting is critical to unlocking tens of petajoules of renewable gas production projects reaching FID in the near term.

GPG support via the CIS or analogous support mechanism
Extend the CIS to include GPG or develop a similar scheme to provide the long-term investment signals necessary to support investment in GPG capacity.

Medium term policy recommendations

Policy action APGA recommends the EESP identifies for medium term action:

A national Renewable Gas Target
Targeting the least cost pathway to net zero gas sets national gas decarbonisation ambition and strong industrial reliance on renewable gas makes a national RGT no-regrets policy.

Contracts for Difference for renewable gas supply
Renewable gas certification and recognition in NGER is the first step in starting a renewable gas industry today. The Hydrogen Headstart program is an excellent start but more must be done to ensure availability of large volumes of renewable gas including biomethane. Renewable gas Contract for Difference schemes could be used to ensure the cost of biomethane does not exceed the cost of natural gas for consumers today.

To discuss any of the details within this submission further, please contact APGA's National Policy Manager, Jordan McCollum, on +61 422 057 856 or jmccollum@apga.org.au.

About

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 the safe and reliable delivery of 28 per cent of the end-use energy consumed in Australia and are at the forefront of Australia's renewable gas industry, helping achieve net-zero as quickly and affordably as possible.

APGA supports a net zero emission future for Australia by 2050[4]. Renewable gases represent a real, technically viable approach to lowest-cost energy decarbonisation in Australia. As set out in Gas Vision 2050[5], APGA sees renewable gases such as hydrogen and biomethane playing a critical role in decarbonising gas use for both wholesale and retail customers. APGA is the largest industry contributor to the Future Fuels CRC[6], 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.

[4] APGA, *Climate Statement*, available at: https://www.apga.org.au/apga-climate-statement
[5] APGA, 2020, *Gas Vision 2050*, https://www.apga.org.au/sites/default/files/uploaded-content/website-content/gasinnovation_04.pdf
[6] Future Fuels CRC: https://www.futurefuelscrc.com/

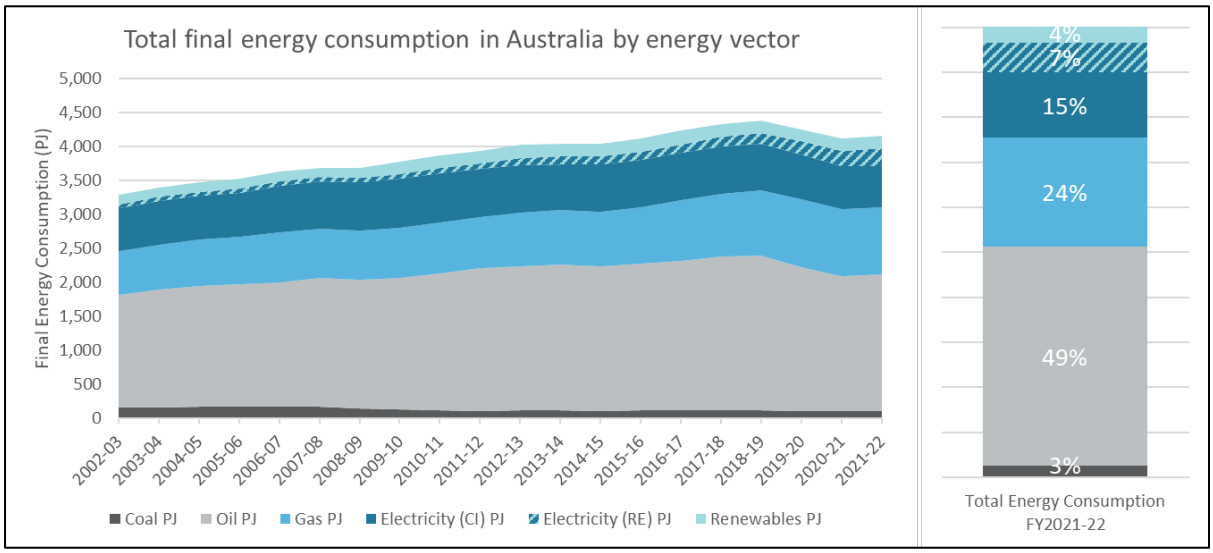
1 Decarbonising gas and liquid fuel supply

The EESP Discussion Paper takes Australia forward in its energy decarbonisation journey by committing an entire section to alternative low carbon fuels. Doing so highlights the need to decarbonise gas and liquid fuel supply chains. While both energy types are on their own decarbonisation journeys, similarities between the two mean that learnings from the decarbonisation of one can inform how best to decarbonise the other.

Over 75% of Australia's energy demand is consumed directly as fossil fuels[7] (Figure 1). Many of these direct fuel consuming energy customers are unable to electrify their energy demand – and a majority of these are the industrial energy customers upon which the Australian economy relies[8]. Gas and liquid fuel supply have renewable alternatives that must be deployed to achieve net zero:

- Natural gas has renewable gas alternatives such as biomethane and hydrogen.
- Liquid fuels have renewable liquid fuel alternatives such as bioethanol and renewable diesel.

Figure 1: Total final energy consumption in Australia by energy vector[9]



Accelerating the decarbonisation of existing gas and liquid fuel energy supply chains via alternative low carbon fuels will ensure these energy customers remain part of the Australian economy. They can continue to mine our resources, process our materials, make our products, and provide the jobs and economic activity that keeps the Australian economy vibrant and successful. Section 1.1 shows that the ability to use the lower cost infrastructure and appliances to transport, store and use fuels can help reduce the cost of an otherwise electricity – only energy transition.

[7] DCCEEW, 2023, *Australian Energy Update 2023*, https://www.energy.gov.au/sites/default/files/Australian%20Energy%20Update%202023_0.pdf
[8] Grattan Institute, 2021, *Towards net zero: Practical policies for reducing industrial emissions*, https://grattan.edu.au/wp-content/uploads/2021/08/Towards-net-zero-Practical-policies-to-reduce-industrial-emissions-Grattan-report.pdf
[9] DCCEEW, 2023, *Australian Energy Update 2023*.

Robust renewable fuels supply chains support a more secure and reliable energy system in a net zero future[10]. This makes renewable fuels essential to underpinning a future made in Australia. Secure and reliable carbon neutral energy of all forms will be required to re-align Australia's economy towards carbon neutral advanced manufacturing. Without a competitive supply of renewable fuels, Australia risks significant carbon leakage as industry chooses to relocate rather than decarbonise.

Beyond achieving net zero for today's gas customers, putting gas supply on its own decarbonisation journey also enables broader decarbonisation in the immediate term. Once gas is on a pathway to net zero, existing coal and liquid fuel customers can achieve immediate short-term emission reductions by transitioning to natural gas today, knowing natural gas will transition to renewable gas tomorrow.

This makes coal and liquid fuel emissions reduction cheaper and easier in the near term, accelerating decarbonisation in the decade to 2035. An example of this can be seen in BlueScope, Rio Tinto and BHP pursuing Direct Reduced Iron (DRI) technologies to replace coal supply in the short term with natural gas, and in the long term with hydrogen[11] (Figure 2). BHP is also transitioning from diesel to gas powered generation to firm variable renewable generation[12]. The opportunity to more rapidly decarbonise beyond today's gas customers makes renewable gases a priority within the EESP.

Figure 2: Excerpt from BlueScope 2023 Sustainability Report

[10] GPA Engineering, 2022, *Pipelines vs Powerlines: A Technoeconomic Analysis in the Australian Context* available at https://www.apga.org.au/sites/default/files/uploaded-content/field_f_content_file/pipelines_vs_powerlines_-_a_technoeconomic_analysis_in_the_australian_context.pdf

[11] Bluescope, 2023, *Sustainability Report FY2023,* https://www.bluescope.com/content/dam/bluescope/corporate/bluescope-com/sustainability/documents/2023_BlueScope_Report_Sustainability_Report.pdf; Fuller K, 2024, 'BlueScope, Rio Tinto and BHP join forces on plan for low carbon steel future', in *ABC News Illawarra*, https://www.abc.net.au/news/2024-02-09/green-steel-push-bluescope-bhp-rio-tinto-join-forces-carbon-plan/103447174

[12] BHP, 2023, *Operational decarbonisation*, https://www.bhp.com/-/media/documents/media/reports-and-presentations/2023/230621_operationaldecarbonisationinvestorbriefing.pdf

1.1 The advantage of gas supply chains

All natural and renewable gas supply chains benefit from the advantages of gas infrastructure and appliances. The simple, flexible nature of pipeline infrastructure makes it a cost-effective way to not only transport energy, but store energy within transmission infrastructure. As a result, natural gas remains lower cost for customers to use today in comparison with other options – even when piped thousands of kilometres across the country.

Similarly, appliances that use natural or renewable gases are cheaper than their alternatives. This lower upfront cost can make up for their energy efficiency which is inherently lower than heat pumps. Higher energy consumption through lower cost appliances can lead to lower cost of energy and appliances combined[13].

These advantages means that renewable gases can not only serve those gas customers with no other decarbonisation choice, but they can do so at a cost competitive with renewable electricity[13]. To understand the cost of decarbonisation for energy customers through alternative low carbon fuels, it is necessary to consider the cost effectiveness of energy transport, storage and appliances alongside the cost effectiveness of energy production.

1.1.1 Existing gas infrastructure

Direct comparison of like-for-like gas and electricity infrastructure demonstrates that gas infrastructure consistently costs less when providing equal or higher supply capacity. This is why gas infrastructure draws lower revenues from customers.

Table 1 and Table 2 below demonstrate comparisons of the regulated asset bases (RABs) of comparable gas and electricity infrastructure in Victoria and the ACT.

Table 1: Costs and deliveries of Victoria's energy infrastructure[14]

Transmission and Distribution Infrastructure	Regulated Asset Base ($m)	Actual Annual Revenues ($m)	Actual Energy Delivered (GWh)	Max Demand Capacity (MW)
Electricity	17,329	2,825	41,480	8,684
Gas	5,631	774	64,722	23,250

[13] Boston Consulting Group, 2023, *The role of gas infrastructure in Australia's energy transition*, https://39713956.fs1.hubspotusercontent-na1.net/hubfs/39713956/The-Role-of-Gas-Infrastrcuture-in-Australia-s-Energy-Transition.pdf

[14] APGA, 2021, *Submission: Victorian Gas Substitution Roadmap Consultation Paper*, https://www.apga.org.au/sites/default/files/uploaded-content/field_f_content_file/210816_apga_submission_to_the_victorian_gas_substitution_roadmap_consultation_paper.pdf

Table 2: Relative cost of energy delivery for gas and electricity distribution in the ACT[15]

Energy distribution networks	Regulated asset base ($m)	Actual annual revenues ($m)	Actual energy delivered (GWh)	Average cost to deliver a GWh ($)
Electricity	981	140	2,851	49,106
Gas	377	67	2,201	30,436

In Victoria, the RAB of gas transmission and distribution infrastructure is a third of the size of that of electricity infrastructure, but delivers a third more energy, and can support peak demand 60% higher. Relevant to customer interests, gas infrastructure also generates only 27% of the revenue of electricity, which is related both to the capital cost of the infrastructure and ongoing operational expenditure. Similarly, ACT gas infrastructure delivers 80% of the capacity of electricity infrastructure at 40% of the cost.

Analysis by the ARENA-funded Australia Hydrogen Centre further shows that the cost of converting gas infrastructure to deliver 100% hydrogen comes at a fraction of gas asset RAB. Analysis on South Australian and Victorian gas distribution networks shows that conversion of the gas network and all gas appliances to 100% hydrogen would increase distribution network stay-in-business capital expenditure to 2050 by 11-12% in present value terms[16]. This small cost of conversion indicates that today's low cost of gas infrastructure will be retained when delivering renewable gases, even hydrogen, through existing gas infrastructure.

1.1.2 New gas infrastructure

Where new energy transport and storage infrastructure is required, pipeline infrastructure is a cost competitive option. This has been shown through recent pipeline and powerline infrastructure projects:

- APA's 50km Western Outer Ring Main pipeline was completed in 2024 for approximately $185 million, or $3.7 million per kilometre. This project was in an urban environment, significantly adding to cost.
- APA's $560km Northern Gas Interconnect was completed in 2023 for a cost of $821,000 per kilometre.
- AGIG's 440km Tanami Natural Gas Pipeline, completed in 2019, cost $346 million or $786,000 per kilometre.

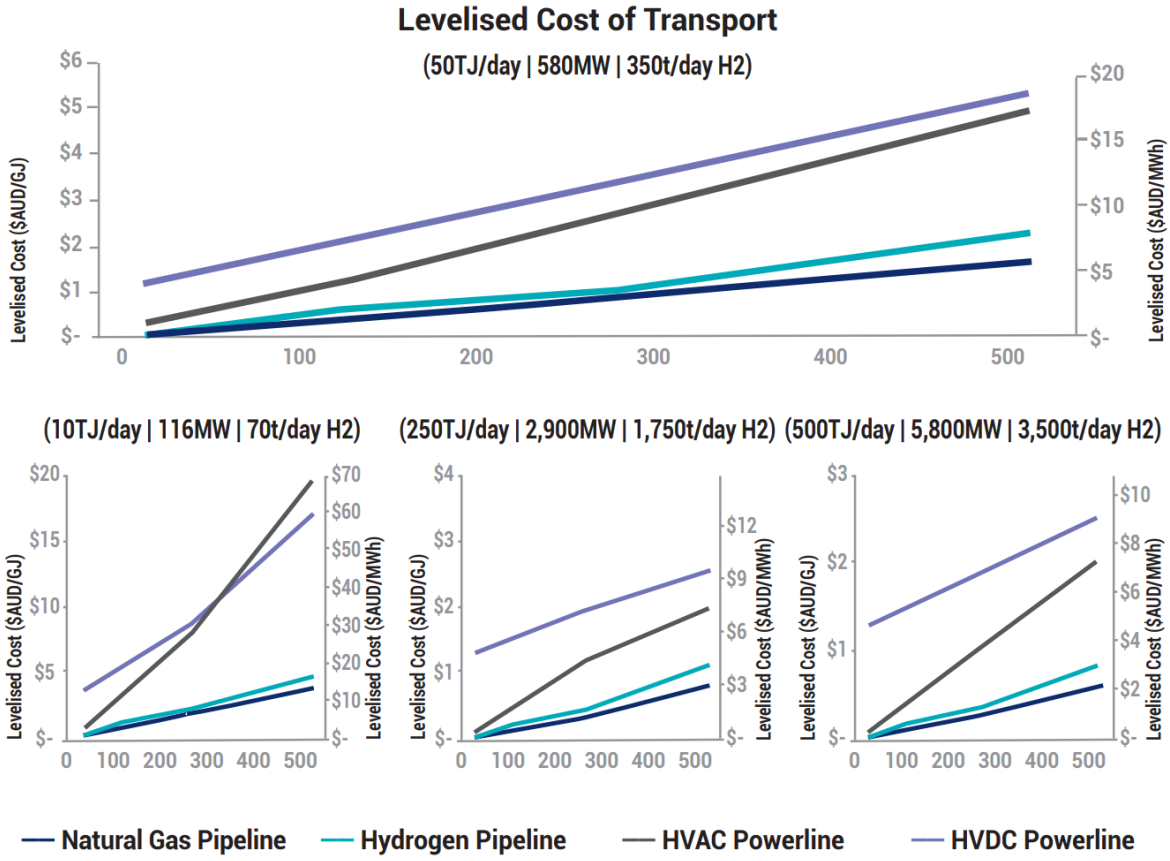
[15] APGA, 2023, *Submission: Regulating for the prevention of new fossil fuel gas network connections*, https://www.apga.org.au/sites/default/files/uploaded-content/field_f_content_file/230420_apga_submission_-_act_gas_connections.pdf

[16] Australian Hydrogen Centre, 2023, *100% Hydrogen Distribution Networks: Victoria Feasibility Study*, https://arena.gov.au/assets/2023/09/AHC-100-Hydrogen-Distribution-Networks-Victoria-Feasibility-Study.pdf; Australian Hydrogen Centre, 2023, *100% Hydrogen Distribution Networks: South Australia Feasibility Study*, https://arena.gov.au/assets/2023/09/AHC-100-Hydrogen-Distribution-Networks-South-Australia-Feasibility-Study.pdf

- The 360km HumeLink overhead transmission powerline project is expected to cost approximately $4.8 billion, or $13.3 million per kilometre.
- The proposed 400km Victoria – New South Wales Interconnector West overhead transmission project is expected to cost approximately $3.3 billion, or $8.25 million per kilometre. There are numerous reports that this cost will increase.

GPA Engineering's *Pipelines vs Powerlines* report provides further details on this relationship[17]. Both gas and hydrogen transmission pipelines consistently cost less to deliver the same quantity of energy across the same distance in comparison to electricity transmission powerlines. An example of this relationship can be seen in Figure 3, outlining the cost of energy transport for a range of energy capacity scenarios over 500km. This outcome has since been supported by academic research within the Future Fuels CRC.

Figure 3: Levelised cost of energy transport via pipelines and powerlines[18]

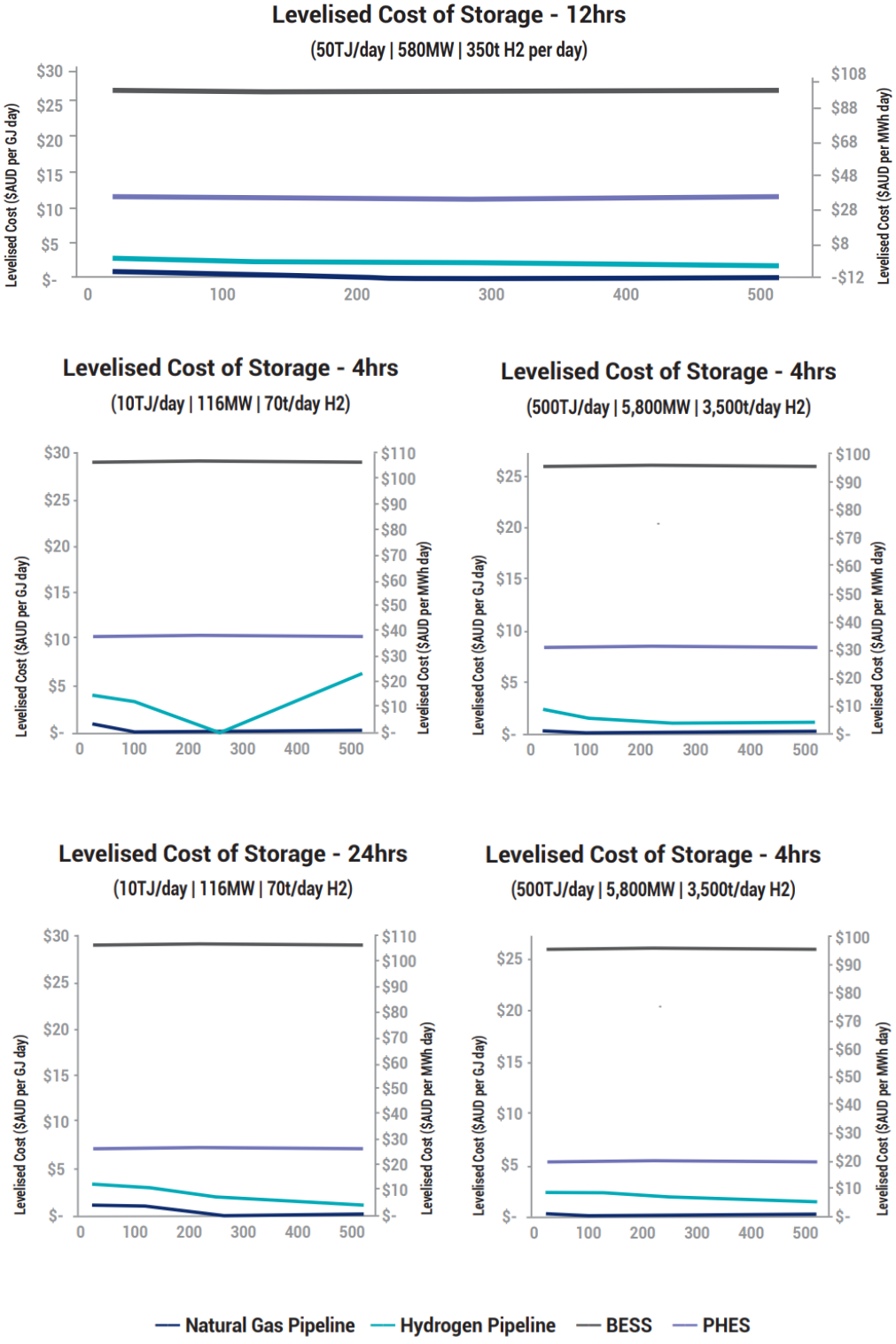


The economic benefits of new pipeline infrastructure extend beyond transport. GPA Engineering's research also examined the levelised cost of energy storage between pipelines and battery (BESS) and pumped hydro (PHES) energy storage solutions, finding that energy storage in pipelines can be hundreds of times cheaper than energy storage in utility scale batteries or pumped hydro (Figure 4). GPA Engineering found that energy

[17] GPA Engineering, 2022, *Pipelines vs Powerlines: A Technoeconomic Analysis in the Australian Context*.
[18] Ibid.

storage in hydrogen pipelines can be 2-to-36 times cheaper than energy storage in utility scale batteries or pumped hydro, excluding the instances in which it is essentially free.

Figure 4: Levelised cost of energy storage via pipeline linepack, BESS and PHES



1.1.3 Gas and hydrogen appliances

The technical simplicity of combusting gas makes gas and hydrogen appliances a cost-effective option in the majority of applications gas is used for today. Collating appliance cost assumptions for its economic analysis, ACIL Allen identified (Figure 5) that gas or hydrogen appliances were the equal or lowest cost appliance option for over three quarters of applications gas use used for today[19].

Considering the cost of decarbonising gas use, both energy cost and appliance cost needs to be taken into account. Focusing on only appliance cost or energy cost could lead to inaccurate conclusions being made about the least cost decarbonisation pathway.

Figure 5: Appliance capital cost and operating life assumptions[20]

Activity (by size)	Capital cost unit basis	Capital cost			Appliance life (years)	
		Natural gas appliance	Electrical appliance	Hydrogen appliance	Gaseous fuels appliance	Electrical appliance
Low temperature heat	m/MW_{th}$	0.5	1.3	0.65	20	15
High temperature heat (small)	m/MW_{th}$	0.4	0.4	0.5	25	25
High temperature heat (medium)	m/MW_{th}$	0.3	0.3	0.4	25	25
Metal reheat (small)	m/MW_{th}$	0.5	1.7	0.7	20	15
Metal reheat (medium)	m/MW_{th}$	0.3	1.5	0.4	20	15
Compression (medium)	$m/MW	6.4	7.8	6.4	25	25
Compression (large)	$m/MW	3.5	4.3	3.5	25	25
Glass making	m/MW_{th}$	1.5	1.5	1.6	20	20
Calcining (medium)	m/MW_{th}$	1.5	N/A	1.6	30	30
Calcining (large)	m/MW_{th}$	1.5	N/A	1.6	30	30
Digestion	m/MW_{th}$	0.3	1.7	0.4	20	15
Ammonia synthesis	$m/ktpa (capacity)	1.9	N/A	1.5	25	25
Urea	$m/ktpa (capacity)	2.7	N/A	0.8	25	25
LNG power generation	$m/MW	1.5	0.2	N/A	25	40
Commercial cooking	m/MW_{th}$	0.2	0.3	0.3	20	15
Commercial hot water	m/MW_{th}$	0.8	1.3	0.9	15	15
Commercial space heating	m/MW_{th}$	0.5	0.8	0.5	20	15
Residential cooking - existing	$000/ appliance	2.0	2.7	2.2	20	15
Residential hot water - existing	$000/ appliance	3.2	2.9 (resistive) 5.4 (heat pump)	3.6	15	15

[19] See Attachment 1

[20] See Attachment 1; note there is more appliance cost detail in Attachment 1 then shown in this document.

1.2 Economic analysis of gas use decarbonisation

To assist gas customers to decarbonise, APGA and Energy Networks Australia (ENA) commissioned ACIL Allen to undertake economic analysis of gas use decarbonisation. A copy of the study is attached to this submission and APGA invites further conversation on this study and its implications. This section will explore analysis outcomes for the following topics:

- Renewable gas supply for gas customers which have no option to electrify
- Gas use decarbonisation at lowest overall cost
- Policy to deliver gas use decarbonisation at lowest overall cost.

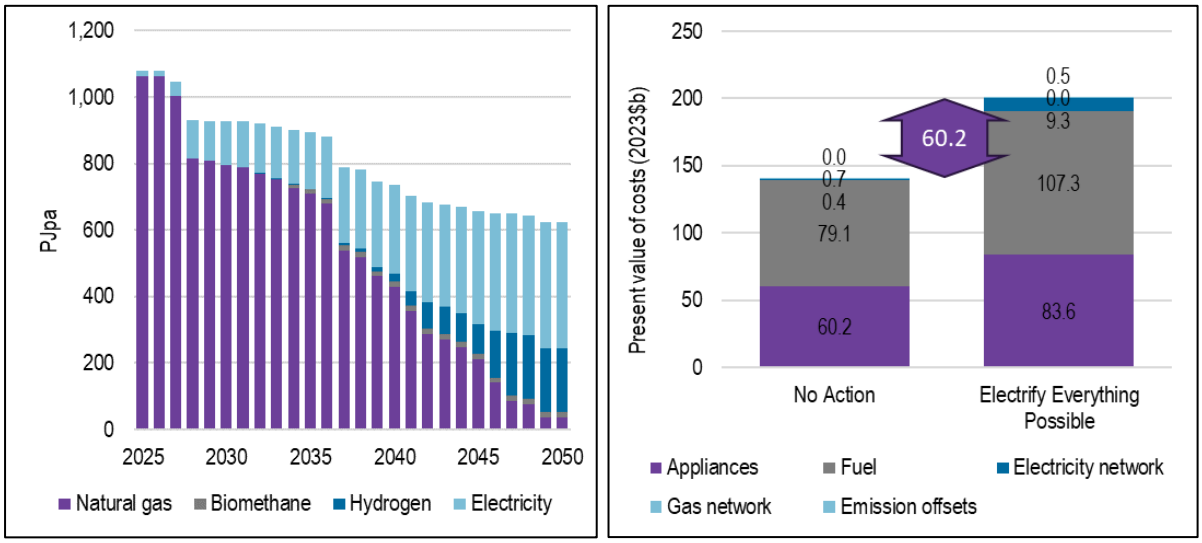
Beyond considering these results, APGA strongly recommends that the Department replicates the modelling approaches seen within this study to assess policy options to deliver gas use decarbonisation at lowest overall cost.

1.2.1 Renewable gas supply for gas customers which cannot electrify

The analysis considered the least cost pathway to decarbonise gas use, while reserving renewable gases for those who cannot electrify. In this Electrify Everything Possible (EEP) scenario, all domestic gas customers which could electrify – i.e. have an electric appliance option – were required to electrify in order to decarbonise. The least cost decarbonisation trajectory was calculated in line with a net zero carbon budget.

Figure 6 below shows that the result is a steady electrification of gas demand over the window to 2050, with 210PJpa worth of renewable gases being required decarbonise customers unable to electrify.

Figure 6: EEP scenario – energy supply breakdown and cost comparison[21]



[21] ACIL Allen, 2024, *Renewable Gas Target: Delivering lower cost decarbonisation for gas customers and the Australian economy*, commissioned by APGA and ENA.

This demonstrates that a combination of renewable gas and renewable electricity is needed to decarbonise gas demand in Australia.

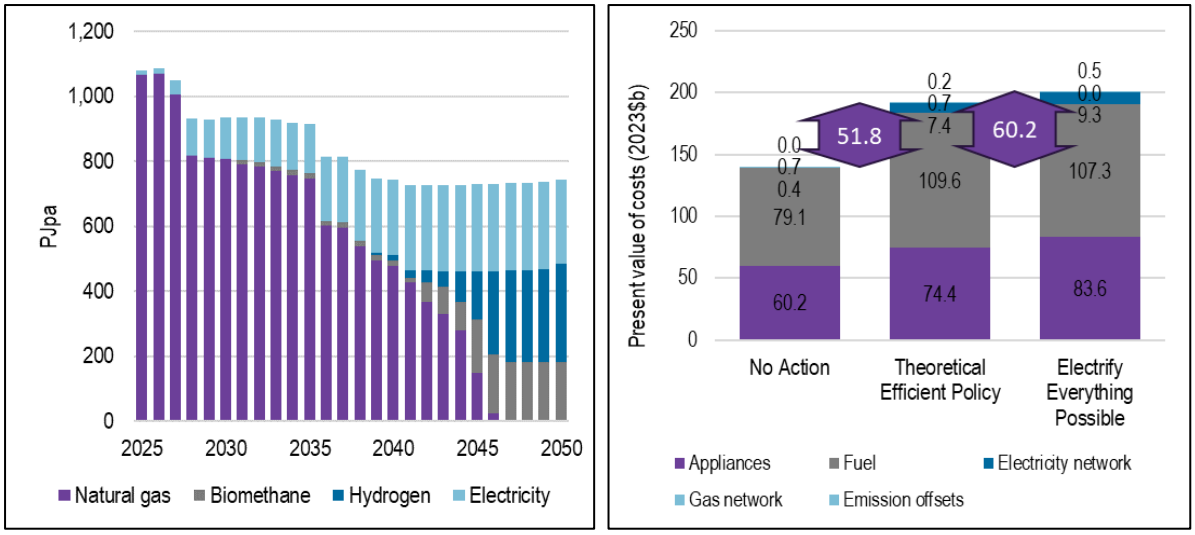
Unsurprisingly, this analysis also confirms that gas use decarbonisation will cost customers and the economy more than maintaining the carbon intensive status quo. Continuing to supply gas customers with natural gas through 2050 will require additional production and appliance replacement investments of around $140bn ($2023) through to 2050. Alternately, electrifying everything possible and supplying renewable gases to remaining gas customers is calculated to cost an additional $60.2bn ($2023), resulting in an average cost of abatement of around $165/tCO^{2}e.

1.2.2 Gas use decarbonisation at lowest total cost

Public sentiment analysis indicates that the majority of Australian energy consumers are sensitive to the costs of decarbonisation[22]. Australian business representatives share this sentiment[23]. While the above EEP scenario requires customers electrify if they can, ACIL Allen also modelled the prospect that renewable gases could be a lower cost option for some customers.

Figure 7 shows the result of the Theoretically Efficient Policy (TEP) scenario, in which decarbonisation was guided by only the cost of energy and appliances and the same net zero carbon budget.

Figure 7: TEP scenario – energy supply breakdown and cost comparison[24]



These two charts show that without the requirement to electrify everything possible, the model selects renewable gas options in many applications. The lowest cost outcome was

[22] RedBridge, 2024, *EnergyShift Australia*, commissioned by APGA, https://apga.org.au/research-and-other-reports/energyshift-australia
[23] Victorian Chamber of Commerce and Industry, 2024, *Gas: a burning issue*, https://www.victorianchamber.com.au/news/gas-a-burning-issue
[24] ACIL Allen, 2024, *Renewable Gas Target: Delivering lower cost decarbonisation for gas customers and the Australian economy*, commissioned by APGA and ENA.

delivered using around 480PJpa of renewable gases and 260PJpa of renewable electricity in 2050.

This scenario reduces the additional cost to decarbonise by 14% to $51.8bn ($2023). Important to note is that the ratio of energy and appliance costs differ in this scenario – lower appliance costs in this scenario indicate a lesser burden being put on customers to finance the energy transition through their own, typically higher cost capital.

This outcome accords with the principles of market economics, where providing more options to achieve an outcome often results in lower costs overall. However, the implication is profound for the energy transition. Comparing the EEP and TEP scenarios indicates:

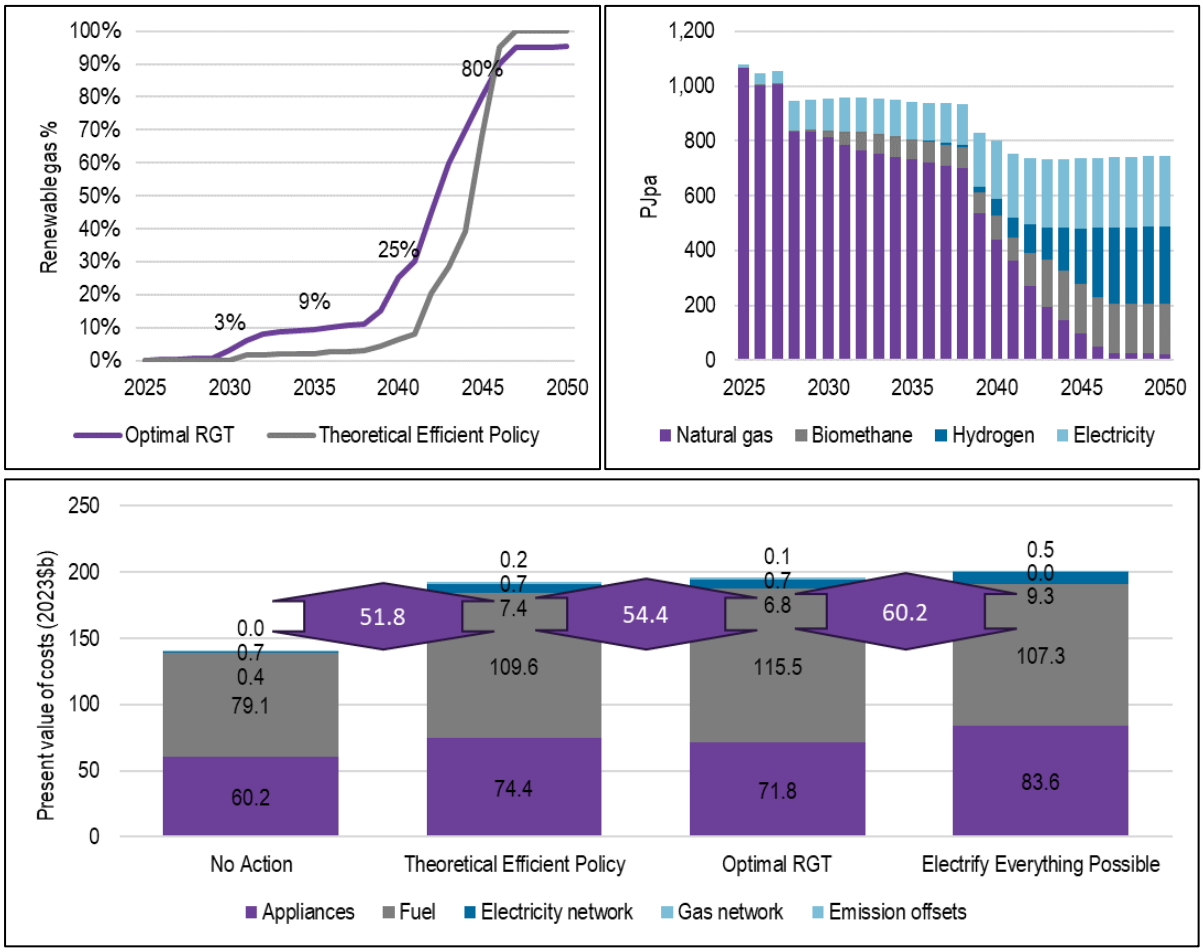
1. Not allowing customers to choose the decarbonisation solution which suits their unique circumstances will increase the cost of the transition.
2. There are gas customers which physically can electrify but could decarbonise through renewable gas purchases for lower cost.
3. Policy supporting renewable gas production is critical to delivering gas use decarbonisation at least cost, rather than at any cost.

1.2.3 Policy to deliver the least cost gas use decarbonisation pathway

While the TEP scenario demonstrates the least cost transition pathway for gas use decarbonisation, it does not represent practical policy solution to implement. Instead, it reflects a pathway achieved through perfect foresight and timing of investments. The TEP is equivalent to introducing a carbon trading scheme with unlimited banking and borrowing.

The Optimal Renewable Gas Target (RGT) was designed to deliver a practically implementable policy and based on past successful Australian energy policy (Figure 8). The intent of this scenario is to set targets of renewable gas as a percent of total gas demand between 2030 and 2050, which marginally brings forward renewable gas production, brings forward cost reduction learnings and flattens development costs in the 2040s.

Figure 8: Optimal RGT – RGT trajectory, energy supply breakdown and cost comparison[25]



The charts in Figure 8 show that by marginally bringing forward renewable gas supply, the Optimal RGT scenario secures gas use decarbonisation in line with the TEP scenario, while marginally increasing costs. Importantly, every gas customer for which it is lower cost to electrify is still able to choose to electrify under the Optimal RGT scenario.

The Optimal RGT scenario is not burdened with the same restrictions that increase cost in the EEP scenario. This scenario maintains the ability for customers to choose which decarbonisation option best suits their unique circumstances, and so reduces the cost of transition. The Optimal RGT scenario also results in lower appliance cost. This means that less of the capital cost burden of the transition falls on consumers.

1.2.4 Importance of economic efficiency when decarbonising gas

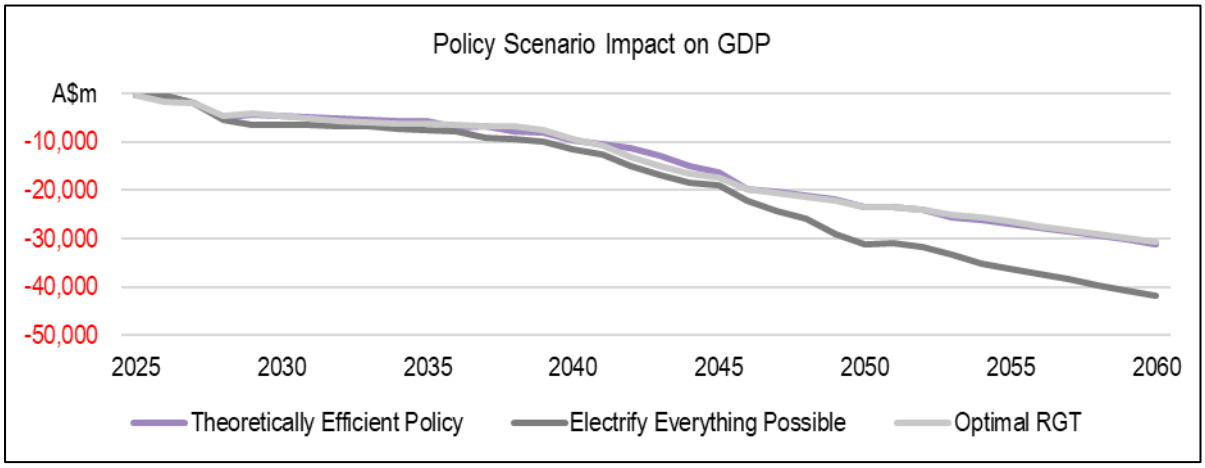
All gas use decarbonisation cases considered in ACIL Allen modelling have a higher resource cost compared to simply continuing to use natural gas. The differences in these higher costs is important when considering the impact of the transition on Gross Domestic Product (GDP).

[25] ACIL Allen, 2024, *Renewable Gas Target: Delivering lower cost decarbonisation for gas customers and the Australian economy*, commissioned by APGA and ENA.

When considering gas decarbonisation at a macroeconomic level, the higher cost of the EEP scenario is amplified. Relative to the least cost TEP scenario, the EEP scenario is 11 times more costly to GDP (-$33bn in $2023) than the Optimal RGT scenario (-$3bn in $2023) (Figure 9). This highlights the importance of economically efficient energy policy as any inefficiencies at the microeconomic level are amplified at the macroeconomic level.

Figure 9: Impacts of gas decarbonisation policy choices on GDP

Scenario	Emissions (2025-2060)	Present value of resource cost (2020-2060)	Abatement cost	Change in real economic output (GDP) relative to No Action scenario (2020-2060)	Change in GDP relative to Theoretical Efficient Policy scenario (2020-2060)
	Mt CO_2-e	$b	$/tonne CO_2-e	$b	$b
No Action	1,591	$140			
Theoretical Efficient Policy	724	$192	$143	-$121	$0
Electrify Everything Possible	729	$201	$165	-$154	-$33
Optimal RGT	722	$195	$150	-$124	-$3



1.3 Policy support for gas use decarbonisation

The policy focus areas identified for decarbonising liquid fuels in Section 4.7 of the Discussion Paper can be applied to decarbonising gas supply. Each of the four areas are equally applicable to the renewable gas transition as the renewable liquid fuel transition. Table 3 below maps these policy focus areas to the gas supply chain, including policy actions proposed by APGA.

APGA recommends that the EEPS take the same approach to policy focus areas to enable renewable gases.

Table 3: Renewable gas policy focus areas and associated policy actions

Policy focus areas	1. Decarbonise our gaseous fuel mix	2. Reduce fossil gas demand	3. Ensure gas security and reliability	4. Manage supply chain vulnerabilities
Reason:	Driving renewable gases supports decarbonisation efforts and de-risks gas supply through diversification	Improving energy efficiency and promoting behavioural change reduces emissions and gas demand	Leveraging existing gas security and reliability of supply legislation will ensure climate and energy objectives are met through the transition	Existing mechanisms to address gas supply chain disruptions ensures government and industry can quickly respond to emerging gas supply chain risks
Renewable Gas Policy Action:	- NGER market-based accounting method for gas emissions - A national Renewable gas target in the FGS - Federal contracts for difference for renewable gas	- Increase gas appliance efficiency floor via existing NEPS process [UNDERWAY[26]]	- Expand existing gas security and reliability of supply legislation to cover renewable gases [COMPLETED[27],[28]]	- Expand existing mechanisms to address gas supply chain disruptions to renewable gases [COMPLETED[27],[29]]

In some regards, the decarbonisation of gas supply is ahead of liquid fuels. Amendments passed in 2023 extended the National Gas Law (NGL) to renewable gases, extending recent supply security and reliability reforms to renewable gas supply. This ensures that gas security and reliability is maintained and supply chain vulnerabilities are managed. The recently published National Energy Performance Strategy (NEPS) includes consideration of gas appliance efficiency which will support reducing fossil-based gas demand. Decarbonising Australia's gas supply is the logical next step.

[26] DCCEEW, 2024, *National Energy Performance Strategy*, https://www.dcceew.gov.au/energy/strategies-and-frameworks/national-energy-performance-strategy

[27] DCCEEW, 2023, *Extending the national gas regulatory framework to hydrogen and renewable gases*, https://www.energy.gov.au/energy-and-climate-change-ministerial-council/working-groups/gas-working-group/gas/extending-national-gas-regulatory-framework-hydrogen-and-renewable-gases

[28] AEMO, 2023, *East Coast Gas Reforms*, https://aemo.com.au/en/initiatives/major-programs/east-coast-gas-reforms

[29] Including through the National Gas Emergency Response Advisory Committee; see AEMO, 2024, *National role*, https://www.aemo.com.au/energy-systems/gas/emergency-management/national-role

1.3.1 Policy support to decarbonise our gaseous fuel mix

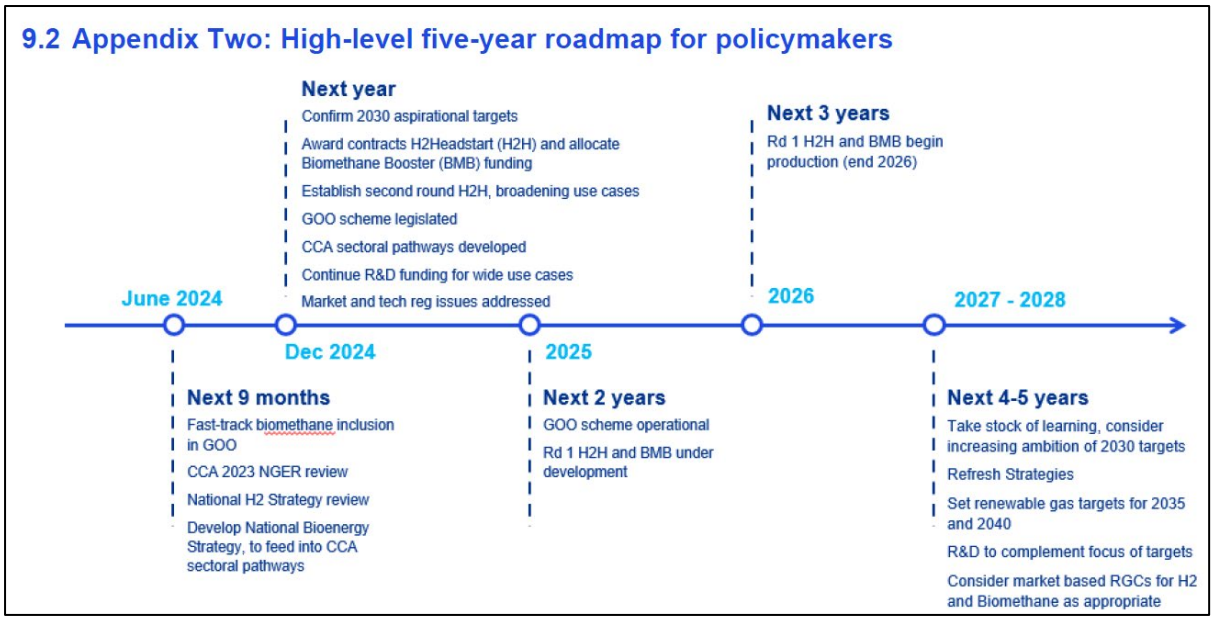
Analysis by KPMG of policy mechanisms supports the economic analysis of ACIL Allen by identifying past successful policy mechanisms which are appropriate to apply to the renewable gas challenge (Figure 10).

APGA identifies three policy mechanisms as being key to enable renewable gas to decarbonise gas use in Australia:

1. Immediate: Enabling renewable gas markets via NGER recognition of renewable gas certificates;
2. Medium term: Sending an investment signal through the introduction of an aspirational national Renewable Gas Target within Australia's emission targets; and
3. Longer term: Avoiding increased energy costs while ensuring targets are met through federally-funded contracts for difference (CfD) schemes targeting renewable gas costs above the cost of natural gas.

At a minimum, APGA recommends the Federal Government undertake modelling to inform its policy development, which considers least cost gas use decarbonisation similar to the ACIL Allen analysis.

Figure 10: KPMG High-level five-year roadmap for policymakers[30]



1.3.1.1 NGER recognition of renewable gas certificates

Renewable gases do cost more than natural gas. To justify paying a higher price, wholesale gas customers must be able to gain additional value beyond energy supply alone when purchasing renewable gas. The additional value which renewable gases can provide is through emissions reduction: the energy is provided at less than 1% of the scope 1

[30] KPMG, 2023, *Renewable gas: policy options to support Australia's decarbonisation journey*, https://www.energynetworks.com.au/resources/reports/kpmg-report-policy-options-to-support-australias-decarbonisation-journey

emissions of natural gas. For customers to gain access to this value, the NGER Measurement Determination needs to be updated to include a market-based method for accounting for Scope 1 gas emissions.

This is not a new idea. Introduction of a market-based method for Scope 1 gas emissions was recommended by the Climate Change Authority in its December 2023 NGER review report[31]. Such a method already exists for scope 2 emissions accounting for renewable electricity certificates. Renewable gas industry and customers have been requesting this relatively simple policy change for some time – a change which is key to Safeguard Mechanism Facilities being able decarbonise through renewable gas supply.

A market-based method for gas could recognise the surrender of renewable gas certificates issued by Australian state or Federal governments, departments, or agencies. The GreenPower Renewable Gas Certification pilot is already producing Renewable Gas Guarantee of Origin (RGGO) certificates. This scheme could form a basis for design before the Federal Guarantee of Origin (GO) Scheme is finalised, or as an alternative to the GO Scheme.

Design for certificates beyond the GO Scheme is important. Currently, the design of the GO Scheme makes it impossible to integrate with Australia's facilitated gas markets[32]. Additionally, the GO Scheme does not consider biomethane -Australia's lowest cost renewable gas option. The GreenPower scheme does not have these issues.

1.3.1.2 A National Renewable Gas Target (RGT)

It is difficult to see how 2035 targets can be set without understanding the extent to which natural gas use will be decarbonised in the next decade. This makes a renewable gas target an essential input to 2035 economy wide target.

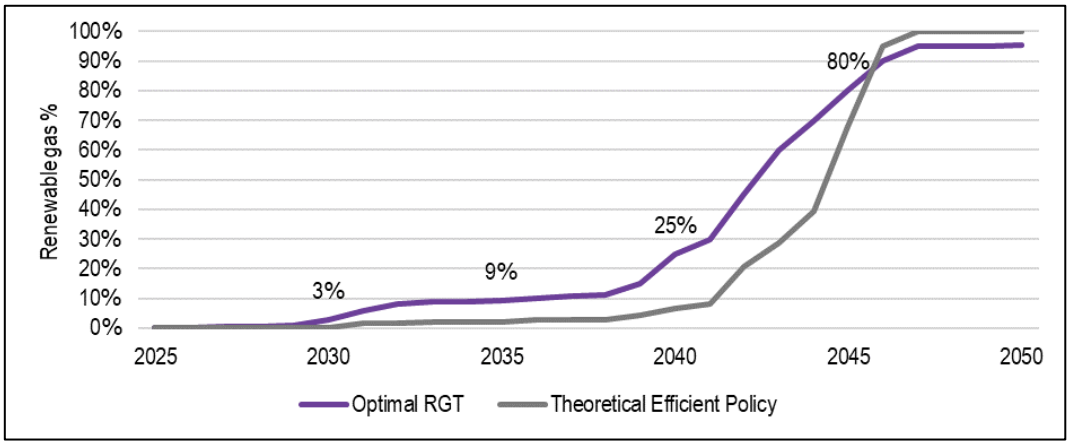
Setting ambitious decarbonisation targets has been a key policy mechanism used by Australian state and Federal governments. While the impact of the Renewable Energy Target (RET) on renewable electricity production makes it Australia's most successful target, more recent schemes indicate the value of simple, aspirational targets in framing renewable energy investment opportunities. As is the case with Australia's 82% by 2030 renewable electricity target, aspirational targets can also leverage government funding to drive public investment – as seen through the Capacity Investment Scheme.

Target Pathway
Through the *Optimal RGT* scenario, ACIL Allen identifies a National RGT pathway that secures a least cost gas use decarbonisation pathway. A National RGT design could be made simple yet agile by setting renewable gas quantity targets every five years, based on a

[31] 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
[32] APGA, 2023, *Submission: Guarantee of Origin Scheme Accounting*, https://apga.org.au/submissions/guarantee-of-origin-scheme-emissions-accounting; APGA, 2023, *Submission: Guarantee of Origin Scheme Design*, https://apga.org.au/submissions/guarantee-of-origin-scheme-design; APGA, 2023, *Submission: Australia's Guarantee of Origin Scheme,* https://apga.org.au/submissions/australias-guarantee-of-origin-scheme

desired renewable gas percentage of total gas supply (Figure 11). As seen through the RET, regular percentage-based quantity setting ensures that targets remain relevant to Australia's changing energy needs, avoiding over- or under-ambition.

Figure 11: Optimal RGT – Renewable gas target as a percentage of all gas consumption



Value of a National Target over state-based targets

ACIL Allen's renewable gas supply availability and cost findings demonstrate that not all states are equally abundant in renewable gas supply opportunities. However, both the operation of the east coast gas market and ACIL Allen's modelling shows that gases – including renewable gases – can be moved cheaply and efficiently between states. This is in part due to Australia's world class gas transmission pipeline infrastructure which transports gas across the country today.

This indicates that a National RGT can secure lower decarbonisation costs, compared to a state-by-state approach. This is a key reason why ACIL Allen's analyses and the Victorian Government's analyses differ – when only considering renewable gas supply *from* Victoria, the opportunity for renewable gas in Victoria looks much poorer than shown in national modelling.

1.3.1.3 Federally funded contracts for difference

All forms of gas decarbonisation cost more than remaining on natural gas. This must be addressed through the transition as decarbonisation will have cost implications across the economy. It is important that this fact does not prevent the first renewable gas production projects from reaching FID.

Federally-funded CfD, pinned to wholesale natural gas prices, could ensure renewable gas production projects are guaranteed the revenue they need to achieve FID while addressing the cost-of-living concern of potentially higher gas prices. This scheme would be consistent with the intent of the Made in Australia Act and could mirror other such schemes including the Capacity Investment Scheme.

2 Gas enables net zero electricity in Australia

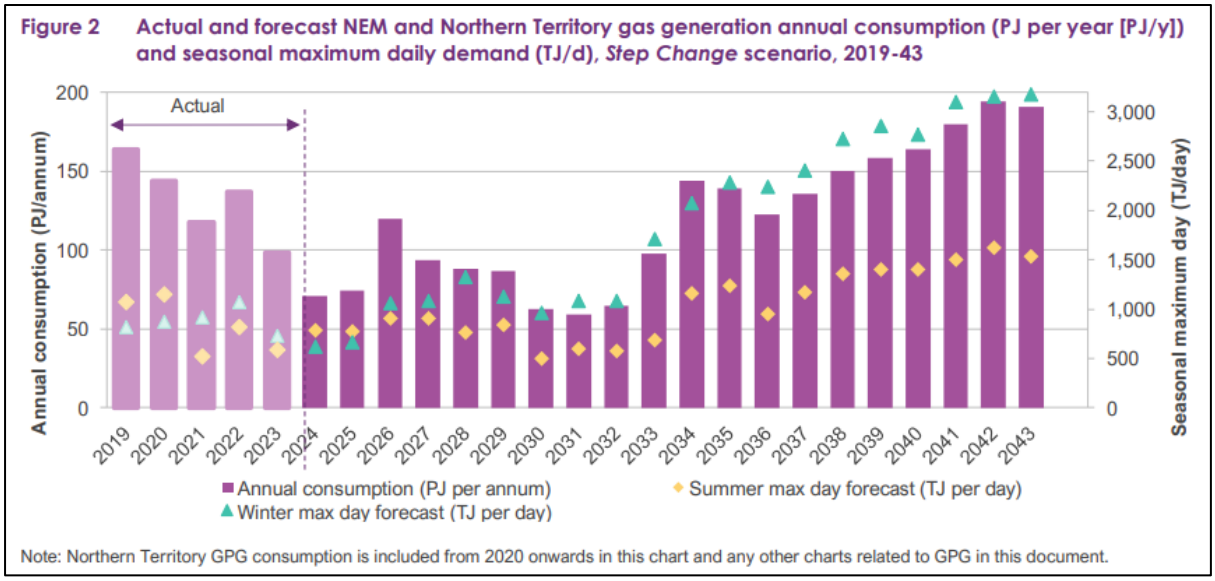
Today's gas supply chain helps keep electricity prices low and reliability and security high. This parallel energy supply chain does so directly by fuelling GPG, and indirectly by reducing electricity system load through supplying large volumes of energy to gas customers.

As Australia transitions towards net zero, a decarbonised gas supply chain can continue to perform this role. It can do so by firming variable renewable generation in a net zero NEM and reducing electricity system demand by supplying energy to those gas customers which need decarbonise via renewable gas for practical or economic reasons.

2.1 GPG helps Australia achieve net zero electricity

There is no doubt about the critical role that GPG plays in achieving net zero electricity in Australia. AEMO analysis shows over 4.4x the GPG capacity used in 2023 is required to supply winter peak demand in the 2040's in line with their net zero consistent Step Change scenario[33] (Figure 12). Analysis by Frontier Economics indicates that a net zero NEM can be achieved at least cost through 93% variable renewable generation and 7% GPG[34]. Frontier Economics also determined that GPG has whole of system cost (WESC) equal to or less than solar in a paper considering the impracticalities of levelised cost analysis in the transition to electricity systems with increasing levels of variable generation[35].

Figure 12: AEMO Gas Statement of Opportunities GPG Forecast



[33] AEMO, 2024, *2024 Gas Statement of Opportunities,* https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2024/aemo-2024-gas-statement-of-opportunities-gsoo-report.pdf

[34] Frontier Economics, 2021, *Potential for Gas-Powered Generation to support renewables*, commissioned by APGA, https://apga.org.au/research-and-other-reports/potential-for-gas-powered-generation-to-support-renewables

[35] Frontier Economics, 2021, *The role of gas in the transition to net-zero power generation*, commissioned by the Australian Gas Industry Trust and Jemena, https://apga.org.au/research-and-other-reports/the-role-of-gas-in-the-transition-to-net-zero-generation

Public sentiment analysis indicates that the majority of Australian energy consumers are sensitive to the costs of decarbonisation [36]. While it is technically possible to firm the NEM without GPG, it will be necessary to achieving net zero at least cost.

Importantly, GPG doesn't have to remain carbon intensive. Biomethane is 100% compatible with GPG today, and projects including the South Australian Hydrogen Jobs Plan Power Plant Project are on their way to Australian-first demonstrations of 100% renewable GPG. GPG remains a competitive firming option even with renewable gas prices as high as $50/GJ[37].

Without GPG, the NEM falls back on using the next most readily available generation source – coal fired generation. The fact that it is GPG being squeezed out of the NEM while coal generation remains competitive indicates the challenge of achieving lower emissions within the electricity market. Government policy is required to ensuring sufficient competitive GPG is brought online in time for the 2030s in order to avoid more circumstances in which state governments need to underwrite continued coal fired generation that is otherwise ready for retirement[38].

2.1.1 Policy support to ensure GPG investment

Despite this widely recognised and critical role, GPG has been omitted from the Capacity Investment Scheme (CIS). This creates an imbalance in investment incentives against GPG, which puts achieving a net zero NEM at risk. This is because this imbalance in investment incentives risks:

a) Driving investors in existing GPG out of the market; and
b) Deterring potential investors away from investing in the additional GPG the country needs to achieve net zero at least cost.

Including GPG into the CIS would be the simplest way to address this imbalance. Otherwise, a separate targeted scheme is required to ensure the necessary GPG capacity is delivered in time. This scheme could be designed to target delivery of the capacity requirements identified by AEMO's GSOO and/or ISP in the years before they are required.

[36] RedBridge, 2024, *EnergyShift Australia*, commissioned by APGA, https://apga.org.au/research-and-other-reports/energyshift-australia
[37] Gilmore J, Nelson T, Nolan T, *Firming technologies to reach 100% renewable energy production in Australia's National Electricity Market (NEM)*, https://www.energy.gov.au/sites/default/files/2022-02/Iberdrola%20Australia%20Response%20to%20Capacity%20Mechanism%20Project%20Initiation%20Paper%20-%20Attachment%201.pdf
[38] NSW Office of Energy and Climate Change, 2023, *Electricity Supply and Reliability Check Up: NSW Government Response*, https://www.energy.nsw.gov.au/sites/default/files/2023-09/Electricity_Supply_and_Reliability_CheckUp_NSW_Government_Response_September_2023.pdf; Office of the Premier of Victoria, 2023, *Agreement Secures Transition For Loy Yang A*, https://www.premier.vic.gov.au/agreement-secures-transition-loy-yang

2.2 Decarbonising gas supply takes pressure off a net zero NEM

A big part of achieving net zero electricity and ensuring reliability and security of supply is the scale of uplift required across the coming decades. The scale of change to the Australian electricity system is unprecedented. If there are options to reduce the strain on this system while still achieving a net zero outcome, other important outcomes including energy equity, reliability and security can be more easily achieved.

There is an opportunity for the resilience of a net zero NEM to be optimised by considering:

- Alternative energy infrastructure; and
- Reducing overall demand.

Alternative energy infrastructure

- The NEM is already the longest electricity transmission system in the world. Keeping costs low while maintaining reliability and security of supply, all while increasing variable generation and demand, will be a key challenge of the transition.
- More electricity storage and transmission powerlines will also increase the cost of the NEM, increasing bill costs. Any option to optimise energy infrastructure costs should be taken.
- The hydrogen supply chain can help optimise the electricity supply chain as energy transport and storage using hydrogen pipelines is cheaper than electric alternatives.

Reducing overall demand

- Today, gas and electricity systems share domestic energy demand at a ratio of 20% electricity and 24% gas.
- While many gas customers will electrify, other gas customers will need to stay on the gas system as it decarbonises for practical or economic reasons.
- If continuing to consume energy from a next zero gas supply chain is the right choice for particular gas customers, then this reduces the load – and hence the reliability and security of supply challenge – on a future net zero NEM.

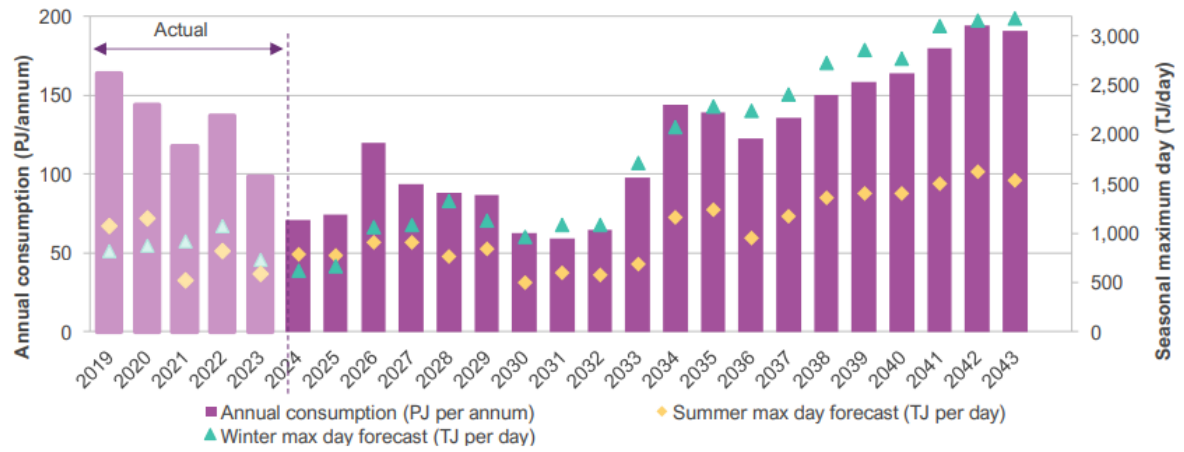
2.2.1 Policy to decarbonise gas supply

The same policy options proposed to decarbonise gas supply will enable a steadily decarbonising gas supply chain to take pressure off a net zero NEM. This demonstrates the value of Australian maintaining parallel and complimentary renewable electricity and renewable gas supply chains in a net zero future. With both supply chains able to firm supply and optimise demand of the other, Australian energy consumers can be the recipients of an optimised net zero energy system able to cater to each consumers unique energy needs.

3 APGA Responses to consultation questions

Consultation question	APGA response
Mobilising investment to transform energy 1. What actions are needed to attract the required large scale private capital and household investment in the energy transformation, with or without government intervention?	<u>Market-based method for Scope 1 emissions of gas combustion accounting under NGER</u> A market-based method is a key immediate action the Australian Government could take to mobilise investment in support of the transition. This would create a commercial proposition for the development of alternative low carbon fuels. • The CCA recommended this action in its 2023 NGER Review report[39]. • A market-based emissions accounting method is needed to create the commercial proposition for purchasing alternative low carbon fuels such as renewable gases. ○ NGER permits recognition of renewable gases in infrastructure, but only where there is a direct connection between a single producer and single customer. • If customers cannot reduce emissions by purchasing renewable gas, then there is no commercial proposition to purchase renewable gas at above natural gas prices. • Without a market-based method, procuring renewable gas supplied via common user infrastructure does not reduce a gas customer's accounted emissions under NGER. • Common user gas infrastructure is the cheapest way to transport and firm wholesale volumes of renewable gas due to low infrastructure cost and economies of scale[40]. • Without a market-based method, state-based renewable gas targets such as the NSW Renewable Fuels Scheme will result in gas customers being levied to subsidise the decarbonisation of others[41]. This is worse for NSW Safeguard Mechanism Facilities which would need to pay for decarbonisation under both the Safeguard Mechanism and the Renewable Fuels Scheme. A market-based method would resolve these conflicts.

[39] Climate Change Authority, 2023, *2023 Review of the National Greenhouse and Energy Reporting Legislation*.
[40] GPA Engineering, 2022, *Pipelines vs Powerlines: A Technoeconomic Analysis in the Australian Context*.
[41] APGA, 2024, *Submission: Renewable Fuels Scheme Rule 1*, https://apga.org.au/submissions/renewable-fuels-scheme-rule-1-consultation; APGA, 2023, *Submission: NSW Renewable Fuels Scheme Expansion*, https://apga.org.au/submissions/nsw-renewable-fuels-scheme-expansion; APGA, 2023, *Submission: NSW Renewable Fuels Scheme*, https://apga.org.au/submissions/nsw-renewable-fuels-scheme

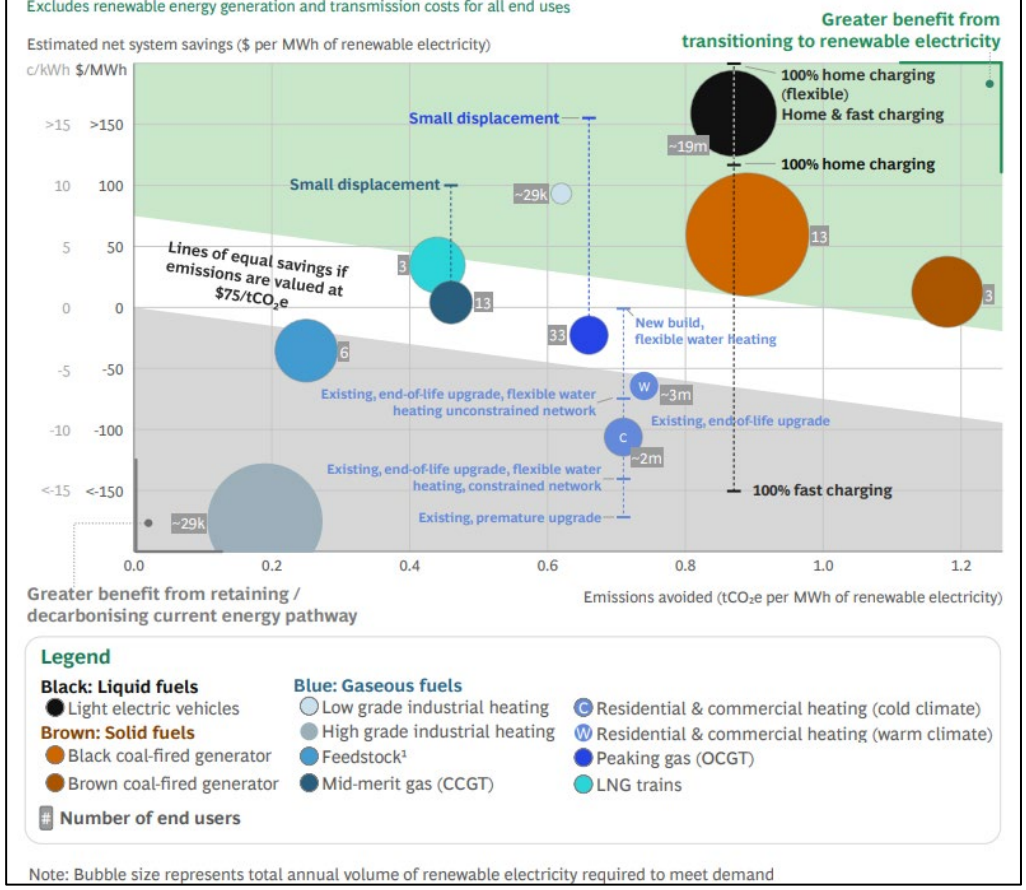
Consultation question	APGA response
	• A market-based method needs a viable certificate scheme – Renewable Gas Certificates being issued today under the GreenPower Renewable Gas Guarantee of Origin program could be used in market-based method design. • Note that current Guarantee of Origin (GO) certificate accounting design makes it impossible to use when supplying hydrogen via existing gas infrastructure[42].
Enabling electrification for a smooth transition 2. What actions are required to ensure Australia's energy systems can enable increased electrification, while maintaining equity, reliability and security?	<u>Enable 82% renewable energy target through Gas Power Generation (GPG)</u> • It is widely recognised that GPG can provide a firming role in an 82% renewable NEM, including AEMO analysis which shows by the 2040s, to supply winter peak demand the NEM will need 4.4x the GPG capacity required during 2023 [43]. Figure 2 Actual and forecast NEM and Northern Territory gas generation annual consumption (PJ per year [PJ/y]) and seasonal maximum daily demand (TJ/d), *Step Change* scenario, 2019-43  Note: Northern Territory GPG consumption is included from 2020 onwards in this chart and any other charts related to GPG in this document.

[42] APGA, 2023, *Submission: Guarantee of Origin Scheme Accounting*; APGA, 2023, *Submission: Guarantee of Origin Scheme Design*; APGA, 2023, *Submission: Australia's Guarantee of Origin Scheme*
[43] AEMO, 2024, *2024 Gas Statement of Opportunities*

Consultation question	APGA response
	• The exclusion of GPG in the Capacity Investment Scheme reduces the incentive for investment in existing or new GPG. • This puts at risk the investment in GPG capacity identified by AEMO as being required to firm the NEM from the mid 2030s onward. • To maintain reliability and security of supply in the NEM, policy support is required to maintain investment in GPG. <u>Maintain grid reliability and security by optimising between powerlines and pipelines</u> • Australian and international analysis concludes that energy transport and storage by pipeline, including hydrogen pipeline, costs less than energy transport by powerline and energy storage via battery energy storage or pumped hydro44. • Gas infrastructure underpins the flexible operation of GPG today, enabling GPG to provide its firming capacity role. Renewable gas infrastructure has the opportunity to provide the same role. • Pipelines also have higher reliability, lower bushfire risk and greater social licence related to electricity transmission powerlines. <u>Maintain equity, reliability and security by enabling customers to choose lower cost options</u> • One of the challenges of maintain equity, reliability and security as Australia electrifies is the scale of the task at hand – more customers electrifying means more money needing to be spent on renewable generation, electricity transmission, electricity storage, and in turn, grid reliability and security mechanisms. • The lowest cost decarbonisation option for some energy customers will be an alternative low emission fuel such as renewable gas or renewable liquid fuel.

[44] Oxford Institute for Energy Studies, 2023, *Hydrogen pipelines vs. HVDC lines: Should we transfer green molecules or electrons?*, https://www.oxfordenergy.org/wpcms/wp-content/uploads/2023/11/ET27-Hydrogen-pipelines-vs.-HVDC-lines_HG_AP_2.pdf; GPA Engineering, 2022, *Pipelines vs Powerlines: A Technoeconomic Analysis in the Australian Context*.

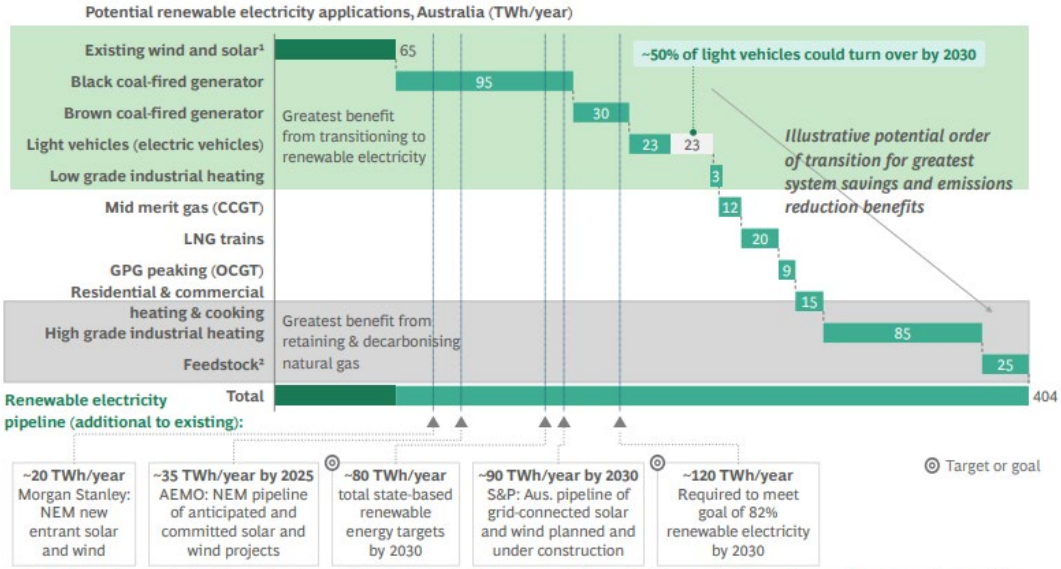
Consultation question	APGA response
	• Creating policy to ensure customers which can decarbonise for lower cost are able to choose their lowest cost option will avoid unnecessary load being placed on the electricity system as it experiences the growing pains of the coming decades. • Customers being able to choose their lowest cost decarbonisation option also supports equity throughout the transition.

3. What insights do you have on the pace, scale and location of electrification, and how to embed this in system planning? 4. How can electrification efforts be sequenced to align with expansion of electricity generation and network capacity?	<u>Analysis by Boston Consulting Group (BCG) considers staging of electrification[45]:</u> • BCG analysis considered the benefits of deploying each MWh of grid-connected solar/wind: **Exhibit 6: Grid-connected renewable electricity will have the greatest impact if first used to displace coal generation and liquid fuels** **Benefits of deploying 1 MWh of grid-connected solar/wind** Excludes renewable energy generation and transmission costs for all end uses  Note: Bubble size represents total annual volume of renewable electricity required to meet demand

- This analysis was then used by BCG to consider end uses which could be prioritised to transition to renewable electricity based on system benefits analysis:

Exhibit 7: In the transition, natural gas can serve critical end uses that are hard and expensive to electrify

End uses could be prioritised to transition to renewable electricity based on system benefits analysis in Exhibit 6

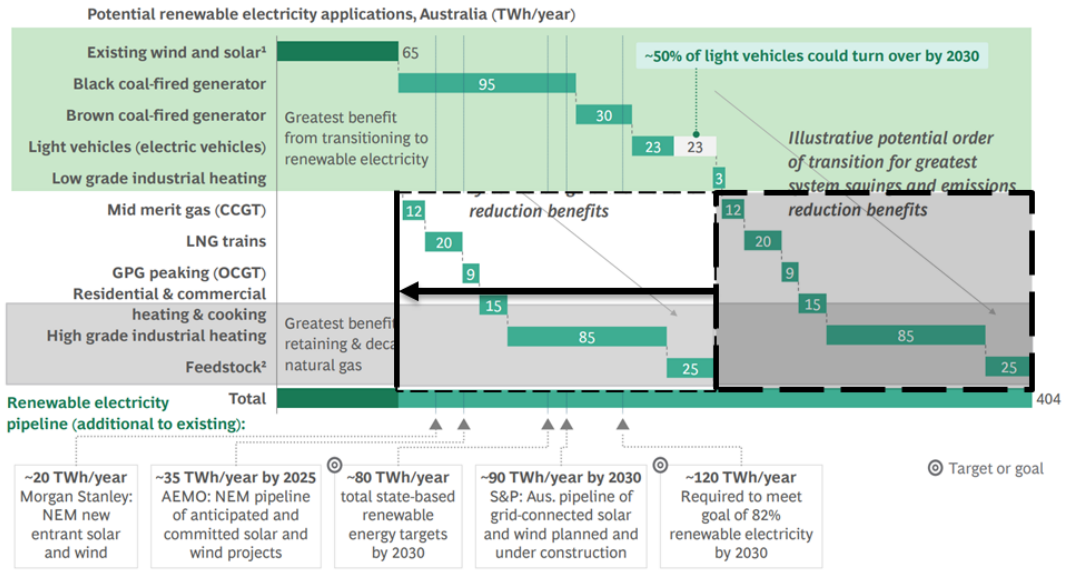


1. Includes onshore wind, utility scale solar, rooftop solar 2. Methane gas substituted with green hydrogen from grid-connected electricity
Source: Morgan Stanley Research, NEM new entrant plant estimate; AEMO, NEM Generation Information (Feb 2023); S&P Capital IQ, World Electric Power Plants Data Base; DCCEEW, Annual Climate Change Statement 2022; BCG analysis

- The energy end uses in the white and grey sections are energy uses which could be decarbonised for equal or lesser cost through renewable gas or liquid fuel uptake.
- This indicates that the energy transition can be accelerated for equal or lesser cost by enabling alternative low carbon fuels such as renewable gas and biomethane.

Exhibit 7: In the transition, natural gas can serve critical end uses that are hard and expensive to electrify

End uses could be prioritised to transition to renewable electricity based on system benefits analysis in Exhibit 6



1. Includes onshore wind, utility scale solar, rooftop solar 2. Methane gas substituted with green hydrogen from grid-connected electricity
Source: Morgan Stanley Research, NEM new entrant plant estimate; AEMO, NEM Generation Information (Feb 2023); S&P Capital IQ, World Electric Power Plants Data Base; DCCEEW, Annual Climate Change Statement 2022; BCG analysis

Consultation question	APGA response
Growing alternative low carbon fuels 3. What policy settings and certainty are required to support a fair, equitable and orderly transition for the decarbonisation of both natural gas and liquid fuels?	<u>An NGER Market-Based Method for gas emissions accounting supports decarbonisation certainty and an orderly transition</u> • Renewable gases cost more than natural gas, but for many current gas customers renewable gases will be the only or the least cost decarbonisation option . • A market-based method is required for gas customers to have the emissions reduction from procuring renewable gas recognised in NGER accounting. • Members of APGA and Bioenergy Australia indicate there are tens of petajoules per annum of identified renewable gas projects which are awaiting a commercial basis upon which to reach FID. • A market-based method creates this basis by connecting emissions reduction to renewable gas procurement. <u>A Renewable Gas Target (RGT) creates certainty and supports a fair and equitable transition</u> • An RGT demonstrates to industry and the Australian public that the Australian government is committed to decarbonising gas supply. • This certainty will reduce investment risk for renewable gas production, allowing for more renewable gas projects to reach FID. • An RGT also provides a purpose for government initiatives in support of renewable gas to target – a government funding aimed at achieving a target is more politically justifiable than a government funding alone. • ACIL Allen analysis indicates that an RGT of 3% by 2030 and 9% by 2035 is sufficient to develop a renewable gas industry in time to achieve net zero gas supply by 2050. <u>Federal renewable gas Contracts for Difference (CfD) supports a fair and equitable transition</u> • A challenge of enabling renewable gases is that they are simultaneously more expensive than natural gas and can be a gas customer's only or least cost decarbonisation option.

Consultation question	APGA response
	• Government support in the form of CfD schemes can target CfD values based on ensuring that renewable gases are sold at the same price as natural gas. • Tying government support to a guarantee of no increase in energy prices addresses cost-of-living impact risks while the scheme is in place • A CfD scheme sufficient tied to natural gas price targeting a 3% RGT by 2030 would ensure no cost of living impacts while enabling renewable gas production to develop.

4. What actions are required to establish low carbon fuel industries in Australia, including enabling supply and demand, and what are the most prospective production pathways?	<u>See answers to Questions 1 and 3 above considering policy required to establish renewable gas low carbon fuel industries in Australia.</u>
	
	<u>Biomethane and hydrogen are the most prospective renewable gas production pathways</u>
	
	• ACIL Allen analysis shows that a combination of hydrogen and biomethane are used alongside electrification to decarbonise gas use at least cost.
	  ○ Biomethane represents low hanging fruit being more economically viable than hydrogen in the immediate term, while hydrogen plays a large role in the long term.
	  ○ If hydrogen or biomethane constraints occur, modelling shows that the alternative renewable gas is the next best alternative. This is shown in modelling by constraining hydrogen or biomethane supply.
	• The low cost of energy transport and storage via hydrogen pipeline makes electrolysis collocated with renewable energy supply the most prospective hydrogen production pathway[46].
	  ○ Transporting desalinated water to hydrogen production locations represents negligible increase in hydrogen cost[47].

[46] GPA Engineering, 2022, *Pipelines vs Powerlines: A Technoeconomic Analysis in the Australian Context*.
[47] Nous Group, 2023, *Net Zero Australia Final Modelling Results*, https://www.netzeroaustralia.net.au/wp-content/uploads/2023/04/Net-Zero-Australia-final-results-launch-event-presentation-19-April-23.pdf

Consultation question	APGA response

5. Are the proposed policy focus areas for managing the liquid fuels transition (outlined in Section 4 of the discussion paper) the correct areas to focus on, and what is missing?	<u>Proposed policy focus areas for managing the liquid fuels transition are equally applicable to managing the gas transition</u>
	• As identified by the EEPS Discussion Paper, Australia needs decarbonised gas supply to achieve net zero as some gas customer have no other decarbonisation alternative.
	• This need sits alongside the need to firm the NEM via GPG and the opportunity for hydrogen to be used in transport decarbonisation.
	• The table below maps these policy focus areas to the gas supply chain including policy actions proposed by APGA to deliver upon each area.
	• In some regards, the decarbonisation of gas supply is ahead of liquid fuels.
	  ○ Amendments passed in 2023 extended the National Gas Law (NGL) to renewable gases, extending recent supply security and reliability reforms to renewable gas supply. This ensures that gas security and reliability is maintained and supply chain vulnerabilities are managed.
	  ○ The recently published National Energy Performance Strategy (NEPS) considers gas appliance efficiency which will support reducing fossil-based gas demand.
	• The remaining policy focus area, decarbonising Australia's gas supply mix, can be supported by the policy options identified under Question 5 above.

Consultation question	APGA response

Policy focus areas	1. Decarbonise our gaseous fuel mix	2. Reduce fossil-based gas demand	3. Ensure gas security and reliability	4. Manage supply chain vulnerabilities
Reason:	Driving renewable gases supports decarbonisation efforts and de-risks gas supply through diversification	Improving energy efficiency and promoting behavioural change reduces emissions and gas demand	Leveraging existing gas security and reliability of supply legislation will ensure climate and energy objectives are met through the transition	Existing mechanisms to address gas supply chain disruptions ensures government and industry can quickly respond to emerging gas supply chain risks
Renewable Gas Policy Action:	- NGER recognition of renewable gas certificates - Setting a national Renewable gas target in the FGS - Federal contracts for difference for renewable gas supply	- Increase gas appliance efficiency floor via existing NEPS process [UNDERWAY[48]]	- Expand existing gas security and reliability of supply legislation to cover renewable gases [COMPLETED[49],[50]]	- Expand existing mechanisms to address gas supply chain disruptions to renewable gases [COMPLETED[49],[51]]

<u>Policy options to ensure the decarbonisation of gas in Australia is fair, equitable and orderly.</u>

- An NGER Market-Based Mechanism ensures fairness by enabling gas customers the ability to account for emissions reduction in line with the renewable gas paid for.

[48] DCCEEW, 2024, *National Energy Performance Strategy.*
[49] DCCEEW, 2023, *Extending the national gas regulatory framework to hydrogen and renewable gases.*
[50] AEMO, 2023, *East Coast Gas Reforms*.
[51] Including through the National Gas Emergency Response Advisory Committee; see AEMO, 2024, *National role*, https://www.aemo.com.au/energy-systems/gas/emergency-management/national-role

Consultation question	APGA response

	• This includes instances where gas customers are required to pay for renewable gas certificates under legislation such as under the NSW Renewable Fuels Scheme and proposed Victorian and Western Australian renewable gas targets.
	• A national RGT promotes a fair, equitable and orderly transition.
	  ○ Fair and equitable transition is enabled by an RGT as it would still allow customers to choose to electrify if this is the best option for the customer. No customer is forced to decarbonise via renewable gas if it is not the best option for their individual circumstances. Less gas customers results in RGT percentages being met more easily by reducing total gas demand.
	  ○ An RGT promotes an orderly transition by bringing a moderate yet practical portion of renewable gas production forward, ensuring sufficient supply is available in time to be available for customers which required it. This also ensures that cost reducing lessons are learned earlier in the transition.
	• Government CfDs promote an equitable transition where they are used to keep renewable gas prices low, avoiding cost of living impacts.

Building Australia's clean energy workforce 6. What actions are required to ensure workforce requirements for the energy transformation are met, while supporting equitable outcomes?	<u>Australia's natural gas workforce is ready to deliver renewable gas today</u> • The Australian gas industry boasts a robust skilled workforce skilled in ensuring Australia's gas industry is one of the safest and most successful globally. • The skills to operate natural gas infrastructure are the skills required to operate renewable gas infrastructure. • The rapid development of the Queensland LNG industry demonstrates its ability to mobilise rapidly to deliver upon investment in gas production, transmission and export infrastructure. • Continued lack of government support for renewable gases risks leading to a brain drain on the gas industry – government support of renewable gases should influence more skilled workers staying and moving into the gas industry.

Consultation question	APGA response
Maximising outcomes for people and businesses 7. What actions are required to ensure better energy outcomes for people and businesses, and maximise their benefit from the energy transformation? 8. What social licence and circular economy aspects should be considered as part of the pathway for the energy transformation?	<u>Hydrogen pipelines can derisk energy infrastructure social licence</u> • Not only are gas, biomethane and hydrogen pipelines lower cost than HVAC and HVDC powerlines, but pipelines are inherently underground infrastructure52. • This means that there are less visual and practical impacts on landholders once pipelines are installed. • Third party impact and bushfire risks are also lower with buried pipelines compared to aboveground powerlines.
Other 9. What are other gaps in Australia's energy sector decarbonisation policy and what actions are required to address them?	<u>Robust multi- sector energy modelling</u> • ACIL Allen analysis demonstrates the value of modelling the opportunity for multiple energy vectors to decarbonise energy customers. • Modelling robustness including consideration of energy and appliance cost as well as cost ranges can uncover a wider range of cost-effective decarbonisation options. • Without analysis like this, Australia risks making the wrong renewable energy investment decisions, delaying the transition. • APGA recommends that the least cost decarbonisation pathway be modelled each sector of customers considering all physically possible renewable energy alternatives. • APGA understands that the CSIRO is proposing a Smart Energy Mission to pursue multi-sector modelling and recommends that this be prioritised by government.

[52] GPA Engineering, 2022, *Pipelines vs Powerlines: A Technoeconomic Analysis in the Australian Context* available at https://www.apga.org.au/sites/default/files/uploaded-content/field_f_content_file/pipelines_vs_powerlines_-_a_technoeconomic_analysis_in_the_australian_context.pdf

Attachment 1: Renewable Gas Target – Delivering lower cost decarbonisation for gas customers and the Australian economy by ACIL Allen