APA submission

Australian Energy Market Operator Draft 2022 Integrated System Plan consultation

February 2022

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Mr Daniel Westerman
Chief Executive Officer
Australian Energy Market Operator

Lodged by email: ISP@aemo.com.au

11 February 2022

RE: APA Submission to 2022 draft Integrated System Plan

Dear Mr Westerman,

Thank you for the opportunity to comment on the draft 2022 Integrated System Plan for the National Electricity Market (Draft ISP). We appreciate AEMO's consultative approach in developing the ISP.

APA is an ASX listed owner, operator, and developer of energy infrastructure assets across Australia. Through a diverse portfolio of assets, we provide energy to customers in every state and territory on mainland Australia. As well as an extensive network of natural gas pipelines, we own or have interests in gas storage and generation facilities, electricity transmission networks, and over $750 million in renewable generation.

We support the global transition to a lower carbon future and are actively supporting the energy transition taking place across Australia. In 2021 we announced our own ambition of net zero operations emissions by 2050.

As the Draft ISP acknowledges, gas will play an essential role in helping Australia meet its net zero ambitions targets. APA supports the earliest possible retirement of coal, with an accelerated move to renewables and gas playing a key role during the transition to net zero. As overseas jurisdictions have demonstrated, the retirement of coal is one of the most effective means of reducing emissions.

There are significant challenges associated with the energy transition, such as the potential cost and challenging timeframes of delivering the infrastructure necessary. It is important that AEMO recognises some of these challenges in the 2022 ISP.

If you wish to discuss our submission in further detail, please contact John Skinner on 02 9693 0009 or john.skinner2@apa.com.au.

Regards,

Peter Bolding
General Manager
Economic Regulation & Policy

1 Executive Summary

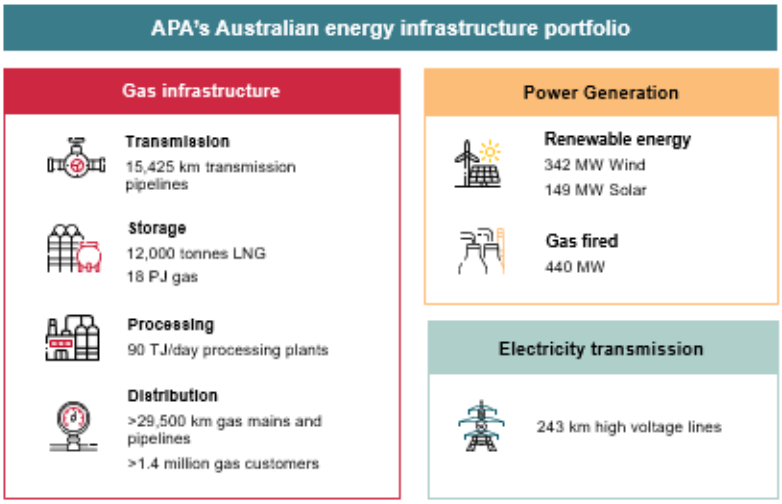
Key points

- APA supports the transition to net zero emissions. In 2021 we announced our own ambition of net zero operations emissions by 2050.
- As recent experience in South Australia and Victoria has shown, gas infrastructure plays a critical role in helping maintain system security and will help unlock low-cost renewable generation capacity.
- There are significant challenges associated with the *Step Change* scenario in the Draft ISP. Delivering the significant investment required in the identified timeframes is one of those challenges.
- The AER has asked AEMO to explain its assumptions regarding the early withdrawal of coal generation. Overseas jurisdictions such as the United Kingdom and the Netherlands have recognised that the early retirement of coal generation, with gas supporting the economy during the transition, is one of the biggest single emissions reduction initiatives that can be undertaken.

APA is a leading Australian Securities Exchange (ASX) listed energy infrastructure business. Consistent with our purpose to strengthen communities through responsible energy, our diverse portfolio of energy infrastructure delivers energy to customers in every state and territory on mainland Australia.

Our 15,000 kilometres of natural gas pipelines connect sources of supply and markets across mainland Australia. We operate and maintain networks connecting 1.4 million Australian homes and businesses to the benefits of natural gas. And we own or have interests in gas storage facilities, gas-fired power stations.

Figure 1



Our investments include over $750 million in renewable generation, making APA the 8th largest renewables investor in Australia. Our high voltage electricity transmission connects Victoria with South Australia and New South Wales with Queensland.

APA is supporting the transition to a lower carbon future. Our ambition is to achieve net zero operations emissions by 2050. Through our Pathfinder Program, we are investigating how hydrogen and other

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technologies such as batteries and microgrids, can support a lower carbon future. Our first Pathfinder project is seeking to enable the conversion of around 43-kilometres of the Parmelia Gas Pipeline in Western Australian into Australia's first 100 per cent hydrogen-ready transmission pipeline and one of only a few existing gas transmission pipelines in the world, 100 per cent hydrogen-ready.

Gas infrastructure has an essential role to play in helping Australia meet its net zero ambitions targets. As the penetration of variable renewable energy sources, such as wind and solar, increase, and aging coal power stations retire, Gas Powered Generation (GPG) will play a critical role in meeting electricity demand and maintaining the security of the system.

In 2019-20, black and brown coal provided 42.2% and 12.7% of Australian electricity generation respectively.[1] Black and brown coal are also the most emissions intensive, emitting double the carbon emissions of GPG.

The Draft ISP makes the assumption that this coal generation will withdraw from operation far more rapidly than expected.[2] In its January 2022 Transparency Review, the AER questioned this assumption and asked AEMO to explain how it made such predictions.

We would be concerned by any policy measures that aim to keep coal power stations operating for longer than necessary. Such measures will cause carbon emissions to remain higher than would otherwise be the case and will make meeting Australia's emission reduction targets harder to achieve. Overseas jurisdictions such as the United Kingdom and the Netherlands have recognised that the early retirement of coal generation, with gas supporting the economy during the transition, is one of the biggest single emissions reduction initiatives that can be undertaken.

Determining the optimal pathway to a lower carbon future requires a consideration of many complex and interrelated issues. Our submission below outlines some of these issues, including the challenging timeframes associated with delivering the investment required to support the transition.

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1 Commonwealth Government, *Australian Energy Update 2021*, p.27

2 AEMO, *Draft Integrated Service Plan,* December 2021, p44.

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2 Submission

2.1 Gas is essential for energy security during the energy market transition

The National Electricity Market is going through a period of fundamental change, with large volumes of Variable Renewable Energy (VRE) displacing aging thermal generation, mostly coal power stations, at great speed. This transition is not without its challenges.

The Draft ISP suggests that treble the firming capacity will be needed as coal withdraws, together with efficient network investment to access this firm capacity.[3]

Recent experience has demonstrated the critical role that gas plays in supporting renewables and providing a critical backup when large renewable generation such as wind and solar is not available.

GPG also has the advantage that it can be located close to major demand centres, thereby reducing exposure to transmission capacity constraints often experienced by the overconcentration of renewable generation in common areas of the grid. This advantage may become critical if there are delays in building the necessary transmission investment to support VRE. It is essential that we continue to invest in, and maintain, our gas infrastructure. This will ensure that consumers continue to receive both reliable gas and electricity as the energy market transitions.

2.1.1 Gas's role in complementing variable renewable generation

As recent experience in South Australia (SA) has shown, periods of low wind and solar availability require significant volumes of dispatchable resources to be available to support the reliability and security of the system. Similar issues are likely to be experienced in other states, including Victoria, as coal power stations retire.

Despite the introduction of synchronous condensers in SA, GPG remains critical in keeping the lights on during periods of low wind and solar generation. For example, on 29 November and 30 November 2021, GPG provided critical supply at the evening peak (see Figure 2).

While the days in which SA is powered exclusively by VRE are well publicised, the days in which gas provides reliable, dispatchable generation do not get so much attention.

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3 AEMO, *Draft Integrated System Plan,* December 2021, p10

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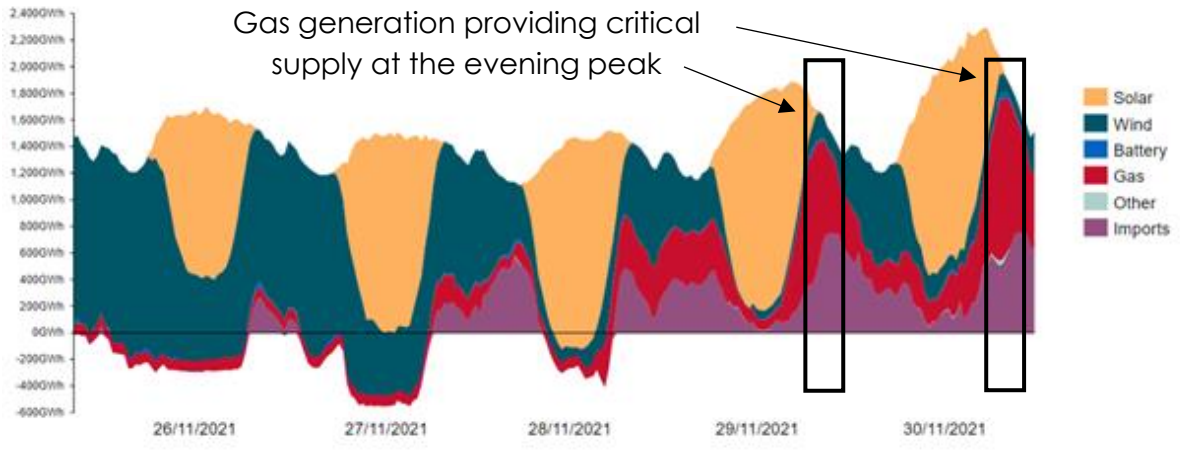
Figure 2: Case Study 26 November to 30 November 2021 in South Australia



Source: OpenNEM

The critical role that gas will continue to play into the future was also recognised by the Grattan Institute in its report *Go for net zero: A practical plan for reliable, affordable low-emissions electricity.*[4]

Grattan correctly identified that the economics of GPG make it ideal for providing backstop capacity in a system powered mostly by solar and wind. Grattan found that an energy system supported by GPG will result in lower costs for consumers than a system 100% powered by renewables. The main reasons for this include:

- in contrast to coal, gas turbines can ramp up and down quickly to balance fluctuations in demand;
- it is easier and cheaper to store gas and liquid fuels than electricity, which make them ideal for energy storage in case of a particularly challenging winter or summer; and
- Australia has substantial infrastructure for moving and storing gas.

The European Commission has also concluded that gas will play a significant role in its net zero scenario, as it will 'increasingly be a facilitator for the spread of renewable electricity and stable supply'.[5] In February 2021 Frontier Economic published a report coming to the same conclusion.[6]

2.1.2 *Gas's role in supporting the NEM*

Events in Queensland and Victoria have also demonstrated the flexibility and security offered by GPG:

4 Grattan Institute, *Go for net zero,* April 2021, p30
5 European Commission, https://ec.europa.eu/commission/presscorner/detail/en/qanda_22_712
6 Frontier Economics, *Potential for Gas-Powered Generation to support renewables,* Feb 2021

- On 25 May 2021a failure of one of the generation units at Callide Power Station in Queensland caused 477,000 customers to lose power.
- In mid-June 2021, Yallourn Power Station in Victoria reduced electricity generation to approximately 20% capacity due to the threat of floodwater from the Morwell River. This was the second time Yallourn experienced a significant flooding event, with the Power Station shutting in 2012 when floodwaters entered the adjoining mine.

Following both these events, GPG stepped up to help provide crucial electricity generation in both Queensland and Victoria. GPG doubled its output while not increasing overall emissions. The ability of gas turbines to quickly ramp up and provide long term dispatchable generation shows they will be a critical part of the energy system for many years to come.

2.1.3 The gas network is a vital energy store

Due to their ability to compress and store gas, pipelines are ideally placed to help with energy supplies either during extreme weather or in the event of supply failure. In many respects they are just like big batteries capable of being turned on in minutes, and able to be sustained for days, offering a unique ability to deliver energy security when it's needed most. This was shown to be the case following the supply disruption at Longford.

In mid-July 2021, the Longford gas plant in Victoria suffered a reduction in production due to technical problems, significantly reducing the amount of gas being supplied to the Victorian market. This led to AEMO issuing a notice of threat to system security.[7]

In response to this event, it was the flexibility of APA's 7,500 kilometres of interconnected gas transmission pipelines that form East Coast Gas Grid that enabled us to get gas from the north to the south, helping to rapidly address these shortfalls. Following this rapid response, AEMO subsequently removed the threat to system security.

2.2 Early retirement of coal

While current announcements by coal power station owners suggest only a fraction of existing coal capacity will retire by 2030, the Draft ISP's *Step Change* scenario modelling assumes that 14GW of the current 23GW will withdraw by 2030.[8] This is a much more rapid change to the energy sector than previously expected.

Since publication of the Draft ISP, the AER has published its Transparency Review and requested that AEMO provide an addendum to the ISP explaining how AEMO has derived its assumptions about early coal closures, and why greater coal plant flexibility

7 AER, *Weekly Gas Market Report, Weekly Summary,* 20-26 June

8 AEMO, *Draft Integrated Service Plan,* December 2021, p44.

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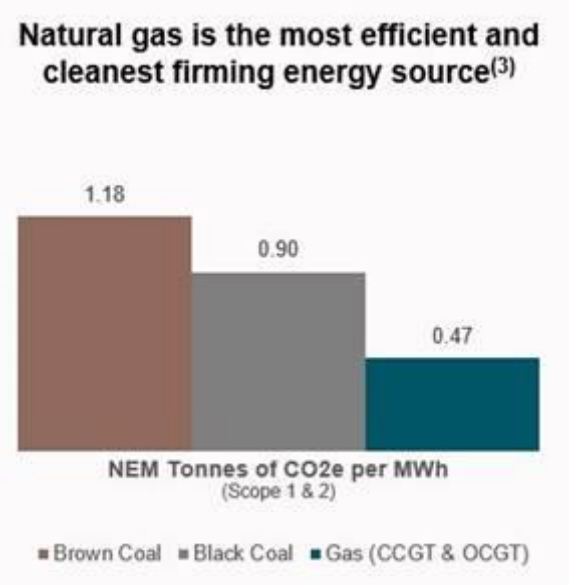
has not been measured.[9] The AER is therefore keen to understand how AEMO made is predictions about early coal closures, and in particular why coal plant flexibility will not keep coal generation operating for longer than suggested in the *Step Change* scenario.

Black and brown coal provide the largest share of electricity generation in Australia. In 2019-20, black and brown coal provided 42.2% and 12.7% of electricity generation respectively.[10] Black and brown coal are also the most emissions intensive, emitting double the carbon emissions of GPG (see Figure 3).

Figure 3: Carbon intensity of coal and natural gas



Source: National Greenhouse and Energy Reporting Data, Clean Energy Regulator

We would be concerned by any policy measures that aim to keep coal power stations operating for longer than necessary. Such measures will cause carbon emissions to remain higher than would otherwise be the case and will make meeting Australia's emission reduction targets harder to achieve.

To the contrary, overseas jurisdictions have recognised that the early retirement of coal generation is one of the biggest single emissions reduction initiatives that can be undertaken. For example:

- **United Kingdom** – coal will soon be completely phased out of the UK economy, with the government recently announcing plans to bring forward the 2025 phase out of coal to October 2024 (see Figure 7). Major upgrades of the natural gas network will continue until 2032. This will reduce methane leakage and provide options to switch to hydrogen in the future.

9 AER, *Transparency Review,* 7 January 2022

10 Commonwealth Government, *Australian Energy Update 2021,* p.27

- **Netherlands** – the abundant supply of gas has supported the transition from coal and the Netherlands is now considering various measures to decarbonise gas.[11]

2.3 Challenges associated with the electrification pathway

The *Step Change* scenario outlined in AEMO's 2021 *Inputs, Assumptions and Scenarios Report* has been identified by stakeholders as the most likely scenario on a 2050 time horizon.[12] This scenario is characterised by:

- Strong climate action and rapid decarbonisation of the economy
- Electrification of coal, gas, oil and diesel-powered processes
- Rapid take up of electric vehicles, distributed energy resources (DER) and other technologies
- Breakthroughs in energy efficiency

While the *Step Change* scenario assumes some opportunities for domestic hydrogen or biofuel substitution, this scenario assumes that 'electrification potential is high'.[13] There are some significant challenges associated with this predominantly electrification pathway, including the cost to consumers and the challenging timeframes outlined in the Draft ISP.

2.3.1 The cost of electrification must be carefully evaluated

The Draft ISP identifies the significant investment required to support the *Step Change* scenario:

- 45GW of new battery and hydro;
- 9 GW of GPG;
- 10,000km of new transmission.

Attempting to estimate the cost of this investment is beyond the scope of this submission, however some simple benchmarks are readily available which indicate that the investment required, and therefore the cost to consumers, could be substantial.

For example, the 900km Project Energy Connect (PEC) transmission line between NSW and SA was approved by the AER in May 2021 at a cost of $2.3 billion.[14] While it is a

11 Accenture Strategy, *Gas infrastructure: international comparisons,* April 2021

12 AEMO, *Draft Integrated System Plan,* December 2021, p8

13 AEMO, *Inputs, Assumptions and Scenarios Report,* July 2021, pp18

14 AER, *AER approves costs for Project EnergyConnect,* 31 May 2021

simple extrapolation, we can therefore estimate that the cost of building 10,000km of new transmission infrastructure will cost somewhere around $23 billion to $25 billion.

To put this figure into context, the five transmission network service providers in the NEM (Powerlink, TransGrid, AusNet, ElectraNet and TasNetworks) have a combined Regulatory Asset Base (RAB) of around $21 billion.[15] The 10,000km identified by AEMO therefore represents a **doubling** of the value of the transmission assets in the NEM.

This increase in the value of transmission assets would significantly push up transmission costs for all customers across the NEM, costs which would flow through to customer bills.

The costs of distribution and generation investment also need to be factored in. What this simple exercise shows is that the cost of the *Step Change* scenario needs to be very carefully considered.

2.3.2 *The Optimal Development Path contains very challenging timeframes*

The Draft ISP outlines an Optimal Development Path (ODP) to support the NEM's transformation. The ODP includes 22 network projects with a total length of around 10,000km.[16] All but one of the projects are to be delivered before 2030.

Recent experience across the NEM has demonstrated that there are significant challenges to the timely delivery of new transmission infrastructure. The AEMC's Transmission Investment and Planning Review is investigating how to resolve some of these challenges. APA's submission to the AEMC's review identified some of the factors that increase the risks and timeframes associated with investment in linear infrastructure:[17]

- Environmental factors, including environmental approval processes
- Land access issues
- Complex relationships with communities and landowners
- Cultural heritage and native title
- Vegetation approvals
- Government approvals, such as crown land licences, flora and fauna approvals, water and creek crossing approvals, and road work permits.

Concerns about financing and the limited skills available to help build the electricity transmission required have also been raised as potential barriers to the timely delivery of new infrastructure.

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15 AER, TNSP Network Performance Report, Operational Performance Data

16 AEMO, *Draft Integrated System Plan,* December 2021, p13

17 APA, *Submission to AEMC Transmission Planning and Investment Review,* September 2021

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Businesses like APA wish to invest in long term energy projects that support the transition to net zero. For this reason, we support the delivery of major transmission projects, such as those in the ODP, being made contestable. This will enable businesses like APA to leverage their financial strength and expertise to help deliver the necessary infrastructure.

2.4 Continuing to utilise existing assets is a more efficient option

The *Step Change* scenario, by assuming the electrification of many processes that currently utilise gas, may not be the option that is in customers' long-term interests. For example, the significant investment that will be required in electricity transmission and distribution networks will have to be paid for by customers for 365 days of the year, for many decades to come, even if it is underutilised for much of the year.

Frontier Economics has investigated the potential for gas infrastructure to decarbonise the economy. In its September 2020 report, Frontier concluded that making continued use of existing gas assets wherever possible, including for the transport of hydrogen or biomethane, can help avoid the material costs of investing in new assets to deliver energy.[18]

The main reason Frontier came to this conclusion was due to the significant cost of the electrification pathway, particularly for industrial energy load. Frontier also recognised that gaseous fuels are essential as industrial feedstock, and if gaseous fuels are not available, the industries that rely on this feedstock will not be viable.

2.5 Hydrogen superpower scenario

Australia has some of the world's best natural resources, such as wind and sunshine, for producing renewable energy. This is one of the key reasons why hydrogen has been identified as one of Australia's key comparative advantages and one of the logical options to help decarbonise the Australian economy.[19] We therefore support the Draft ISP identifying the *Hydrogen Superpower* as one of the plausible future energy scenarios for the NEM.

Much of APA's gas pipeline infrastructure is adjacent to some of the best geographical areas for hydrogen production in Australia. We are actively leading efforts to unlock the innovation and new technologies that will lead to the development of a new hydrogen industry in Australia.

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18 Frontier Economics, *The Benefits of Gas Infrastructure to Decarbonise Australia,* September 2020, p.9

19 Australian Government, *First Low Emissions Technology Statement – 2020,* p17.

2.5.1 *Pathfinder Program*

Through our Pathfinder Program we aim to unlock energy solutions of the future and develop opportunities to extend our core business. Pathfinder will also be a key enabler to achieving our new ambition for net zero operations emissions by 2050.

Our first Pathfinder project is seeking to enable the conversion of around 43-kilometres of the Parmelia Gas Pipeline in Western Australian into Australia's first 100 per cent hydrogen-ready transmission pipeline and one of only a few existing gas transmission pipelines in the world, 100 per cent hydrogen-ready.

This project, which is being delivered in partnership with Future Fuels Cooperative Research Centre and Wollongong University, carries enormous significance for APA and the entire industry. It will create a significant opportunity for the development of a hydrogen hub in Western Australia, while more broadly the results will support decision-making as to the potential for APA's other gas infrastructure assets to be hydrogen-ready.

2.5.2 *Repurposing existing gas infrastructure*

Complementing our natural advantage in renewable energy is the fact that Australia has one of the most extensive interconnected gas infrastructure networks in the world, with an expert workforce supporting it. It therefore makes strong sense for Australia to explore the opportunities to repurpose this existing infrastructure to support the development of renewable gases such as hydrogen.

While Australia has only recently begun the journey of decarbonising its gas infrastructure, other countries around the world, particularly in Europe, are further ahead. An increasing number of projects around the world are demonstrating the potential for re-use of gas infrastructure to transport renewable gases.

For example, the Gasunie hydrogen pipeline in the Netherlands has been transporting hydrogen along a modified natural gas pipeline since 2018. In June 2021 Gasunie announced a significant expansion of the Dutch hydrogen transmission network, with 85% of the new network reusing existing natural gas pipelines (see case study below).

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Case study: Gasunie repurposing transmission pipelines in the Netherlands

In November 2018, Gasunie, the Netherlands' gas transmission operator, started transporting hydrogen along a 12km long stretch of repurposed natural gas pipeline. The pipeline will transport more than 4,000 tons of hydrogen per year for industrial purposes, saving over 10,000 tons of carbon emissions each year.[20]

Figure 8: Gasunie's hydrogen transmission pipeline

On 30 June 2021 the Netherlands Ministry of Economic Affairs and Climate Policy announced that it will commission Gasunie to develop the national infrastructure for the transport of hydrogen.[21] The project, with an estimated investment of €1.5 billion, is scheduled for completion in 2027. Most importantly, the new national hydrogen network will consist of 85% reused natural gas pipelines, resulting in costs four times lower than if entirely new pipelines were laid.

[20] https://www.gasunie.nl/en/news/gasunie-hydrogen-pipeline-from-dow-to-yara-brought-into-operation, accessed 11 August 2021

[21] https://www.gasunie.nl/en/news/dutch-german-cooperation-secures-european-future-of-hydrogen, accessed 11 August 2021


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