ELECTRICITY & ENERGY SECTOR PLAN | *DISCUSSION PAPER*

Australian Energy Producers | 1 May 2024

Australian Energy Producers welcomes the opportunity to provide input into the development of the Electricity & Energy Sector Plan.

Australia's energy and electricity policies should be based on a least-cost, technology-neutral approach to delivering secure and affordable energy, emissions reductions, and economic opportunities.

Accordingly, the Electricity & Energy Sector plan must recognise:

Natural gas is central to Australia's net zero transformation and must be a key pillar of the Electricity & Energy Sector Plan. Natural gas supports the transition away from coal, provides the firm dispatchable energy required to unlock large-scale renewable deployment, and powers industries across the economy. Natural gas is one of the key technological building blocks of net zero, along with renewables, low-carbon hydrogen and carbon capture, utilisation and storage (CCUS). Net zero analysis from the International Energy Agency and Intergovernmental Panel on Climate Change show an ongoing role for natural gas to 2050 and beyond.

Renewable energy and electrification alone cannot deliver net zero; the Electricity & Energy Sector Plan must consider all fuels and technologies including CCUS. Reaching net zero across the energy and electricity sector and the broader economy will require all technologies available, including natural gas and CCUS. There is no pathway to net zero in Australia without these technologies.

There are currently no commercial substitutes for natural gas in many industrial applications. Renewable-based hydrogen and biomethane may complement natural gas supply in time but have not yet been demonstrated at scale. Renewable-based hydrogen remains significantly more expensive than other low-carbon hydrogen pathways and natural gas.

Ongoing investment is necessary across the energy and electricity sector, including in new gas supply; however, government intervention risks undermining investment confidence. Decarbonising Australia's energy and electricity sector will require significant capital investment and Australia is facing increased competition from around the world. Government intervention and *'moving the goalposts'* after investments have been made, risks severely undermining investment in the net zero transformation.

Australia's oil and gas workforce is already delivering world class energy and emissions reductions projects as part of the net zero transition. Fostering the emissions reductions potential of the oil and gas sector, including the sector's depth of skills and experience, leverages Australia's existing comparative skills advantages.

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1. Natural gas is central to Australia's net zero transformation to 2050 and beyond and must be a key pillar of the Electricity & Energy Sector Plan

Natural gas is central to Australia's energy, electricity and industrial sectors today

Natural gas plays an essential role across the energy and electricity sector and the economy | Natural gas accounts for 27 per cent of Australia's total energy demand.[1] In the last decade – while the share of coal and oil in our energy mix has declined – gas and renewables have filled the gap. Between 2012 and 2022 natural gas and renewables both increased their contribution to Australia's total primary energy consumption by exactly the same amount – 220 petajoules (PJs).[2] Over this same period greenhouse gas emissions decreased by around 20 per cent.[3]

Natural gas-based electricity produces around one fifth of the electricity Australians use each year.[4] Gas power generation is particularly important as it can quickly respond to changes in electricity demand as well as changes in supply, such as when variable renewables output reduces due to weather conditions or unexpected outages. Natural gas is a key source of energy for heating and cooking for over five million homes.

Natural gas is a particularly important energy source for industry, where it contributes 42 per cent of all the energy used by Australian manufacturing. This includes providing highly controllable heat to manufacturers of construction essentials like bricks or manufacturing glass as well as providing high-temperature heat for metal smelting, minerals processing and refining. Natural gas is also used as a feedstock for manufacturing a wide range of products including plastics, chemicals, fertilisers, and pharmaceuticals.

Natural gas plays a critical role in all credible net zero scenarios, globally and in Australia

The Australian oil and gas sector has a central role in reaching net zero across the Australian energy and electricity sector, the broader economy and the region | The Australian oil and gas industry is committed to net zero across the economy by 2050. Natural gas supports the transition away from coal, provides the firm dispatchable energy required to unlock large-scale renewable energy deployment, and powers Australian industries across the economy. The Australian oil and gas industry is central to delivering step-change emissions reductions technologies that will be crucial to decarbonising Australia's energy and electricity sector, including carbon capture, utilisation and storage (CCUS) and low-carbon hydrogen.

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[1] DCCEEW, *Australian Energy Update 2023*, 2023
[2] DCCEEW, *Australian Energy Update 2023*, 2023
[3] DCCEEW, *Quarterly Update of Australia's National Greenhouse Gas Inventory: September 2023*, 2023
[4] DCCEEW, *Australian Energy Update 2023*, 2023

Natural gas will be needed to 2050 and beyond, including in the energy and electricity sector | A range of net zero scenarios – globally from organisations such as the International Energy Agency (IEA) and the Intergovernmental Panel on Climate Change (IPCC), and domestically in studies such as the Net Zero Australia study – show a role for gas in a net zero future, well beyond 2050. In the IEA Net Zero by 2050 scenario, natural gas is the second largest contributor to total global energy supply between now and 2050 – behind only oil.[5] In the IPCC's most aggressive emissions reductions scenarios – the 97 'C1' scenarios that reach 1.5°C with limited to no overshoot – the median gas demand in 2050 is 77,000 PJs,[6] or 56 per cent of global gas demand today. This compares with around 6,100 PJ of natural gas produced annually in Australia.

Similarly, the Net Zero Australia study[7] – led by the University of Queensland, University of Melbourne and Princeton University in the United States – found that natural gas will be needed in 2050 across all net zero scenarios for Australia. Average 2050 demand for Australian gas across their five net zero-aligned scenarios is 4,700 PJs – or 77 per cent of today's levels. Further, if renewable deployment is "*constrained*" such that it can only reach 60 times the current deployment levels – adding Australia's total current renewable capacity every five to six months from now to 2050 – gas demand will need to more than double from today's levels to reach net zero in Australia and to deliver net-zero energy exports to the region. It is worth noting that the five Net Zero Australia scenarios are identical with respect to final 2050 emissions and total cumulative emissions between today and 2050.

Coal-to-gas fuel switching is a significant emissions reduction opportunity in the energy and electricity sector

Fuel switching from coal to natural gas is a significant opportunity for emissions reduction in the energy and electricity sector | Analysis by the IEA, taking into account both CO_2 and methane emissions, shows that on average, coal-to-gas switching reduces emissions by 50 per cent when producing electricity and by 33 per cent when providing heat.[8] However, this opportunity is not currently considered in the discussion paper. In 2021-22, coal fired electricity generation accounted for almost 50 per cent of Australia's total electricity generation, with this figure increasing to 65 per cent in New South Wales, and 60 per cent in Victoria and Queensland.[9] Gas power generation can help to replace coal while increasing flexibility in the electricity system and decreasing emissions.

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[5] International Energy Agency (IEA), *2023 World Energy Outlook*, 2023

[6] International Institute for Applied Systems analysis (IIASA), *AR6 Scenario Explorer and Database*, 2022

[7] Pascale, D. et al, *Net Zero Australia Modelling Summary Report*, April 2023

[8] IEA, *The Role of Gas in Today's Energy Transitions*, 2019

[9] Department of Climate Change, Energy, the Environment and Water (DCCEEW), *Australian Energy Update 2023*, 2023

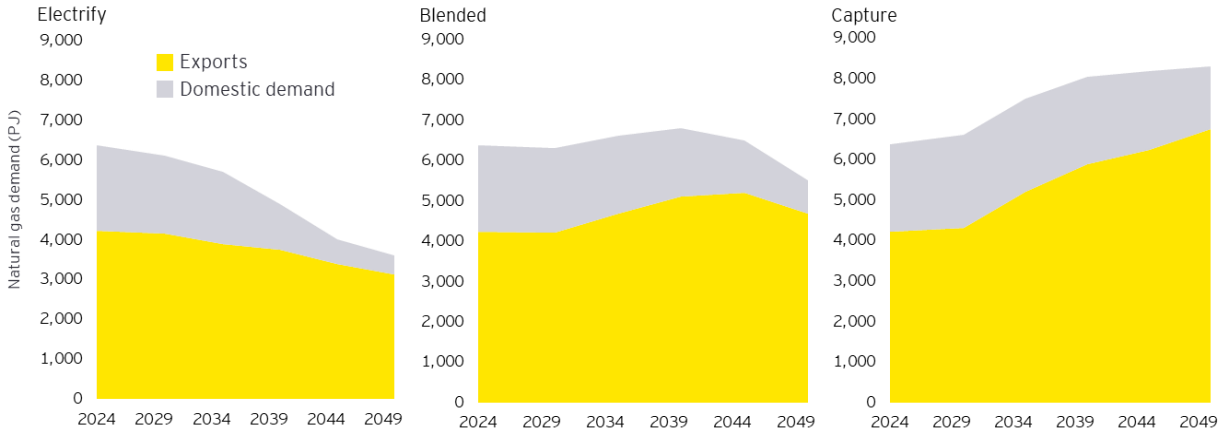
Independent analysis confirms new gas supply is needed in all net zero pathways

EY was commissioned[10] by Australian Energy Producers to provide an independent assessment of the future role of natural gas in Australia and the region[11] | EY assessed the current state of the Australian natural gas sector, the role of gas in global, regional and national net zero scenarios and energy and climate planning, and did a bottom-up technical assessment of the current status of key technologies that may compete or complement the role of natural gas in a net zero future. Building on this broad evidence base, EY was tasked with identifying the key determinants of demand for Australian natural gas and developing three plausible scenarios, representing the "*possibility space*" for gas demand to 2050.

New gas supply is needed in all Australian net zero pathways | The EY analysis established three emissions-equivalent net zero scenarios for Australia, all of which showed significant demand for Australian gas and the need for investment in new gas supply to 2050 and beyond.

The gas demand profile to 2050 for each of the scenarios can be seen in Figure 1.

Figure 1: Natural gas demand to 2050 across three net zero scenarios



Source: EY, *The future role for natural gas in Australia and the Region*, 2023

The Australian Competition and Consumer Commission (ACCC) and the Australian Energy Market Operator (AEMO) continue to forecast structural shortfalls in the gas market as early as 2027 | The ACCC in its *Gas Inquiry 2017-2030 Interim Reports* has repeatedly highlighted that structural gas shortfalls could occur as early as 2026-27, with potential shortfalls in peak periods as early as this summer. Should shortfalls be allowed to eventuate they will have a significant impact on the economy, including risking energy security and exacerbating cost-of-living pressures for all Australia households and businesses. The ACCC

[10] EY was engaged to provide an independent assessment of the future role of natural gas in Australia and the region. All references to the report must be considered in the context of the full report available on the Australian Energy Producers' website

[11] EY, *The future role for natural gas in Australia and the Region*, 2023

states that shortfalls *"would place continued upward pressure on prices in the domestic gas market, as well as pressure on the electricity market."*

Government must prioritise removing barriers and putting in place the policy drivers necessary to facilitate investment in new gas supply | Barriers to new gas supply persist, including constraints on gas exploration and development in southern states and lengthy and uncertain permitting processes. Further, Australia needs a stable policy and regulatory environment that provides confidence to invest in capital-intensive and long-lived gas assets.

The introduction of price controls through the Mandatory Code of Conduct has damaged investor confidence and is muting the normal market price signal to bring on new supply | The Mandatory Code of Conduct (Code) puts the government at the centre of the gas market. The Code came into force in July 2023, with the structure of the Code establishing a facilitated gas market that mutes the normal market price signal to bring on new supply. Under this framework, it remains unclear how the Code will create the conditions for investment in new production to address the forecast medium- to long-term shortfalls.

The energy and electricity sector needs to be clearly defined to avoid duplication and/or gaps with other sector plans | The discussion paper indicates that the Electricity and Energy Sector Plan will consider the settings that shape Australia's energy markets for electricity, gas and liquid fuels and will include options that reduce emissions in the energy supply system. However, it is essential that the energy and electricity sector, and all sectors being considered, are clearly defined to avoid duplication and/or gaps with other sector plans, and to aggregate into a single coherent plan for Australia. Specifically, the energy supply system can be thought of as comprising:

- The extraction of energy resources such as coal, oil, natural gas and critical energy-sector minerals
- The export and import of fuels
- Manufacturing and generation of fuels and energy through oil refining, LNG production and electricity generation
- The transport of fuels to end users via road transport, sea trade and through the electricity grid
- The end use of energy by industry and households to generate economic activity and to support the community standard of living through access to secure, reliable, and affordable energy

Each of these components of the energy system will play different roles and require different policy considerations in the overall energy transition. It is essential to think about what the transition to net-zero means for each of these components and what investment will be required and over what timeframe this investment will be required to meet the objective of transiting to a net zero economy.

2. Maximising outcomes for people and businesses, including delivering reliable affordable energy, should be the overarching focus of the Electricity & Energy Sector Plan

The Electricity & Energy Sector Plan must be outcomes-focused, least-cost and evidence-based

Government should prioritise least-cost energy and emissions policies that reduce emissions while increasing energy security and affordability | The energy and electricity plan should focus on least-cost access to secure and affordable energy that aligns the Australian economy with net zero and other environmental and social ambitions and commitments. Given all available low and zero-emissions technologies will be needed to reach net zero, including renewables, natural gas, CCUS, and all low-carbon hydrogen technologies, energy and electricity policies should seek to encourage the optimal portfolio of fuels and technologies that can deliver these outcomes. Government policies and strategies that focus on pre-selecting the balance of fuels and technologies – i.e. *'picking winners'*, rather than on these outcomes, inject inefficiencies, lead to misallocation of resources and risk poorer outcomes for people and businesses. Similarly, polices that aim to reduce gas demand rather than to provide least-cost energy security and emissions reductions risk decreased energy security, increased energy prices and increased costs of emissions reductions. Such approaches would also undercut other aspects of Government policy such as support for the manufacturing sector where energy contributes significantly to the cost structure of production.

Without energy security and energy affordability, the social license for the transition to a net-zero economy will be undermined | As identified in the Discussion Paper, energy is a significant component of household budgets. Energy also forms a significant input into business which then also flows on to households in the prices of other goods and services. The transition to a net-zero economy must maintain secure, affordable energy for Australian households and businesses.

Net Zero Zones provide a framework to fast-track emissions reduction across Australia, including using natural gas

Net Zero Zones can leverage the synergies between renewables, natural gas, CCUS, and low-carbon hydrogen to fast-track and minimize the costs of the transformation to net zero | Analysis has found that nine energy and industrial regions around Australia comprise 92 per cent of all Safeguard Mechanism emissions as well as 98 per cent of all large power generation emissions.[12] The majority of emissions sources in these regions and across Australia require the same four net zero technology building blocks to reduce their emissions: natural gas, renewable energy, low-carbon hydrogen and CCUS. In many instances, manufacturing and industrial facilities are going to need to rely on shared emissions reduction infrastructure

[12] Australian Energy Producers, *A review of Net Zero Energy and Industrial Zones*, 2023

to meet their climate mitigation targets and Net Zero Energy and Industrial Zones (NZZs) are a framework for considering and prioritising this infrastructure.

The establishment of NZZs based around the four net zero building blocks and shared infrastructure could provide a range of benefits to support the equitable and efficient transformation to a net zero economy:

- reducing the costs and timelines for reaching net zero
- powering regional manufacturing and industry – creating and protecting regional jobs
- underpinning net zero critical mineral production and processing
- leveraging existing infrastructure
- creating a magnet for regional net zero investment
- providing focal points for streamlined government approvals and environmental permitting
- establishing the foundations for net zero energy and industrial exports and imports.

3. Renewable energy and electrification alone cannot deliver net zero; the Electricity & Energy Sector Plan must consider all fuels and technologies, including carbon, capture, utilisation and storage

The focus of the discussion paper seems disproportionately focussed on electricity with insufficient consideration of the other key components across Australia's energy landscape | Decarbonised electricity and electrification are critical to the net zero transition but so too are a range of other energy sources and technological actions including natural gas and CCUS. The energy sector in Australia is a lot broader than just electricity production and use. An unduly narrow focus on one component of the energy system will limit policy considerations on the least-cost pathways to net zero emissions.

To mitigate this risk, a broad portfolio of technologies and fuels should be pursued, including natural gas, CCUS, and natural gas and CCUS-based low-carbon hydrogen. By leveraging a broader range of technologies and fuels, Australia can draw on a wider set of supply chains to moderate the risks associated with any single technology.

Natural gas is a key element of a secure, affordable decarbonised electricity system

Gas power generation is an essential component of the least-cost, reliable, low-emissions electricity system in Australia | The AEMO Draft 2024 Integrated Systems Plan (ISP) states: *"With coal retiring, renewable energy connected with transmission, firmed with storage and backed up by gas-powered generation is the lowest cost way to supply electricity to homes and businesses throughout Australia's transition to a net zero economy."*[13] The ISP also notes that *"Gas-powered generation will provide necessary back up with critical*

[13] AEMO, *Draft 2024 Integrated System Plan for the National Electricity Market*, 2023

power supply when it is needed, both for 'renewable droughts' and 'dark and still' conditions, or to meet peaks in consumer demand."[14]

The AEMO 2024 Gas Statement of Opportunities highlights gas-fired electricity generation as being critical in meeting peak demand, particularly in response to outages in coal fired generation and a lack of renewable and other dispatchable electricity supply.[15] AEMO states that in response to gas shortages, diesel, with higher costs and emissions, would be an alternative source for gas fired electricity generation. This would be an adverse outcome of failing to recognise the importance of gas in the transition to a net zero energy and electricity sector.

The outage of the Loy Yang coal fired power plant on 13 February 2024 caused by storm activity demonstrated this point. Gas fired electricity generation ramped up from 0 MW at 12:00pm to 1,673 MW at 2:30pm. It was the capacity of the gas fired electricity generation to ramp up quickly that provided the flexibility to maintain the overall security of the electricity grid. There is currently insufficient renewable capacity or firming power through batteries and hydro to have met this demand in the timeframe required.

Significant investment in power generation will be required to deliver a secure and affordable, low-carbon electricity system | The AEMO optimal development path sets out the capacity of new generation, firming, storage and transmission needed in the NEM through to 2050[16]. Under that pathway investment would be required to:

- Triple grid-scale variable renewable energy by 2030 and increase it seven-fold by 2050. About 6 GW of capacity would need to be added every year, compared to the current rate of almost 4 GW. Wind would dominate installations through to 2030, complementing installations of rooftop solar systems, and by 2050 grid-scale solar capacity would be 55 GW and wind 70 GW.
- Almost quadruple the firming capacity from sources alternative to coal that can respond to a dispatch signal, including gas-powered generation, utility-scale batteries, pumped hydro and other hydro, and coordinated consumer energy resources as "*virtual power plants*" (VPPs). This includes 16 GW of flexible gas power generation.

In total, the NEM is forecast to need 16.2 GW of gas-powered generation in 2050. Of the existing 11.2 GW capacity, about 8 GW is forecast or announced to retire, so reaching 16.2 GW will require in the order of 13 GW of new gas power generation capacity.[17]

Gas power generation can help address some of the dynamic challenges associated with large-scale penetration of renewables | A glut of wind and solar energy during middle of the day is driving electricity prices to near zero, which is impacting the commercial viability for further investment in these technologies. While this will likely be addressed as the market

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[14] AEMO, *Draft 2024 Integrated System Plan for the National Electricity Market*, 2023
[15] AEMO, *2024 Gas Statement of Opportunities*, 2024
[16] AEMO, *Draft 2024 Integrated System Plan for the National Electricity Market*, 2023
[17] AEMO, *Draft 2024 Integrated Systems Plan for the National Electricity Market*, 2023

continues to develop, the intervening period where coal fired electricity generators retire will require alternative firming capacity in the market to ensure the security and affordability of electricity. As indicated in AEMO's Draft 2024 ISP, gas-powered generation will be central to this process, along with firmed storage, and will be critical to supporting renewable generation and to delivering the lowest cost electricity to homes and businesses throughout Australia's transition to a net-zero economy. A failure to support the development of sufficient gas power generation capacity will lead to higher electricity costs for households and businesses.

Natural gas power generation should be integrated into any state or national capacity mechanisms | Traditionally, electricity generators are paid based on the amount of electricity they provide to the grid. With increased penetration of variable renewables, there will be a range of power generation plants that will be required for limited periods. For these projects, it can be challenging to secure the necessary investment in an energy-only market such as the NEM, given in such markets, generators need to recover their fixed costs from an uncertain and infrequent number of higher priced periods. A capacity mechanism, such as the Capacity Investment Scheme,[18] can assist with this by providing longer term revenue certainty for these projects.

As outlined above, gas power generation will play this role in the energy system – providing significant capacity to the system to support the rollout of renewable energy. This was recently emphasised by the Minister for Climate Change and Energy who stated,[19] in the context of Australia's 82 per cent renewable target by 2030, that "*as aging coal-fired power stations leave the grid, that 18 per cent will increasingly be focused on gas*" highlighting that "*Gas is a flexible fuel necessary for peaking and firming as we undertake this transformation.*" To provide the necessary investment certainty for the construction, operation and maintenance of the gas power generation needed for net zero, gas power generation should be incorporated into any national or state capacity mechanisms, including the Capacity Incentive Scheme.

CCUS is a pre-requisite for meeting net zero in Australia and needs to be an integral part of the Electricity & Energy Sector Plan

CCUS is a proven technology with decades of large-scale operational experience globally | There are currently more than 40 commercial CCUS projects in operation today around the world, which together store 49 million tonnes of CO_2 ($MtCO_2$) per year[20] – equivalent to over 10 per cent of Australia's annual emissions. A further 26 projects are currently under construction.[21] The Sleipner project in Norway has been storing 1 $MtCO_2$ per year, in geology deep below the North Sea, continuously since 1996. Recent years have delivered unprecedented momentum in CCUS development globally, with around 350

[18] DCCEEW, *Capacity Investment Scheme (website)*, November 2023 (checked Nov 2023)

[19] Minister for Climate Change and Energy, *Speech to CEDA WA Energy Transition Summit (website)*, November 2023, (accessed Nov 2023)

[20] Global CCS Institute, *Global Status of CCS 2023*, 2023

[21] Carbon Capture Journal, *2023 Global Status of CCUS Report article*, website (accessed April 2024)

commercial projects currently under development. Almost two-thirds of planned investments are in the United States, Canada and Europe, where governments have recognised the critical role of CCUS and introduced strong policy incentives to fast-track investment. In the United States, this includes a tax credit of USD 85/t for CO_2 captured and stored from industrial or power generation facilities.

The Australian oil and gas sector is among the world-leaders in CCUS deployment, representing a comparative advantage for Australia | Chevron's Gorgon CO_2 Injection Project,[22] that commenced operation in 2019, and Santos's Moomba CCUS Project,[23] which is due to commence in 2024, are among the largest CO_2 storage projects globally. World-class CO_2 storage resources along with a wealth of CCUS skills and experience within the industry, give Australia a comparative advantage on the roll-out of CCUS. This comparative advantage can deliver large-scale emissions reductions across the Australian economy and the region, while attracting investment in Australia to the benefit of all Australians. A national CCUS strategy, CCUS policy certainty and a stable regulatory and investment environment are required to build on this strong foundation and to realise Australia's CCUS opportunity.

Reaching net zero will be *"virtually impossible"* without CCUS[24] | CCUS plays a unique role among a portfolio of emissions reduction technologies as it can address emissions from existing facilities, mitigate emissions from hard-to-abate industry and underpin large-scale carbon removal. Natural gas combined with CCUS is also currently the most affordable pathway to low-carbon hydrogen production. The IEA's NZE scenario requires 1 billion tonnes of CO_2 ($GtCO_2$) to be captured annually in 2030, increasing to 6.1 $GtCO_2$ in 2050. Similarly, findings from the Net Zero Australia study show CCUS to be an integral part of the least-cost pathway to net zero in Australia – no scenario can achieve net zero without CCUS. Across the five scenarios in the Net Zero Australia study, the lowest demand for CCUS in 2050 is over 80 $MtCO_2$ stored per year – almost double the current CCUS capacity globally.

CCUS will play a key role in decarbonising the energy and electricity sector, including addressing energy emissions in hard-to-abate industry, in low-carbon hydrogen production and in conjunction with biofuel use where it can contribute negative emissions | The Net Zero Australia study sees significant deployment of CCUS across the energy and electricity sectors. Energy and electricity applications of CCUS seen in the analysis include natural gas production and processing, low-carbon hydrogen production, gas power generation and biofuel use. Across the scenarios, the energy and electricity sector is an early deployer of CCUS representing as much as 60 to 70 per cent of all CCUS deployed in 2035. By 2050, deployment of CCUS in the energy and electricity sectors ranges from 30 to 440 $MtCO_2$ per year. The Net Zero Australia analysis sees between 20 and 30 Mt per annum of CCUS capacity being deployed in conjunction with biofuel use in 2050. Importantly the application of bioenergy with CCUS (BECCS) is a source of negative emissions that could be

[22] The Chevron-operated Gorgon Project is a joint venture of Chevron (47.3%), ExxonMobil (25%), Shell (25%), Osaka Gas (1.25%), Tokyo Gas (1%) and JERA (0.417%).

[23] The Santos-operated Moomba Project is a joint venture of Santos (66.6%) and Beach Energy (33.4%).

[24] IEA, *The Role of Gas in Today's Energy Transitions*, 2019

used to offset emissions that are technically or economically challenging to address elsewhere in the energy and electricity sector, or elsewhere in the economy.

Critical mineral processing in Australia cannot proceed without natural gas, with electrification in many instances not viable

Electrification cannot address emissions from hard-to-abate sectors where natural gas provides a feedstock or high-temperature heat | Electrification using renewable energy is commonly cited as an alternative to natural gas use across the economy, including in industry. However, the role of natural gas in industry is often to provide high-temperature or precision heat or as a chemical feedstock. In these instances, electrification is not an alternative to natural gas use. Further, where significant power is required, natural gas may still be the most viable energy source in the near- to medium-term, due to the scale, reliability and dispatchability natural gas power generation provides. This is particularly the case in remote, off-grid locations. Large-scale renewable projects in the industrial sector may also encounter supply chain challenges given the pace of renewable roll-out also required in the electricity sector.

Critical mineral processing in Australia cannot proceed without natural gas | Independent analysis from EY found that if Australia was to *"focus on onshoring processing of critical minerals, it will be expected to increase the need for reliable, affordable, low-carbon power, heat, and chemical feedstocks in Australia from natural gas with and without CCUS."*[25] Critical mineral processing, like other manufacturing and industrial processes, needs significant volumes of affordable, reliable energy both in the form of electricity and heat. Where heat is necessary, natural gas – or coal – are currently the most viable energy sources available. Alternative heat sources such as low-carbon hydrogen may become viable in the medium- to long-term but currently they are not available at the scale required, and the costs per unit energy for low-carbon hydrogen is currently significantly more expensive than natural gas.

4. The Electricity & Energy Sector Plan must recognise that there are currently no commercial substitutes for natural gas in many industrial applications.

Policies that attempt to force the substitution of natural gas with alternatives that are costly and not demonstrated at scale, risk pushing up energy costs | Policies that intervene in the market to favour one technology over another are likely to create inefficiencies in the market that risk resulting in increased energy costs to consumers and in some instances, energy insecurity and increased emissions. This is particularly the case where the technologies advanced are costly and/or not demonstrated at scale as is the case with low-carbon hydrogen and biomethane.

[25] EY, *The future role for natural gas in Australia and the Region*, 2023

Low-carbon hydrogen is a potential fuel of the future, however renewable-based hydrogen in particular is currently very expensive and not produced at scale

The oil and gas sector is at the forefront of renewable- and gas-based low-carbon hydrogen development but both will take time to scale and reduce costs | The oil and gas sector is one of the primary producers and users of hydrogen today and will be a critical demand centre for low-carbon hydrogen going forward. The oil and gas sector also has the technical and commercial skills and experience necessary to scale up and commercialise low-carbon hydrogen production. The IEA highlights that 80 per cent of all large-scale renewable-based hydrogen projects today are being developed by the oil and gas industry or with the oil and gas industry as the off-taker.[26] The oil and gas sector is also central to the development of low-carbon hydrogen from natural gas with CCUS, both from a gas production perspective as well as being the industry with the experience in developing and deploying CCUS.

Low-carbon hydrogen produced from natural gas with CCUS is the lowest cost and most technologically advanced pathway to low-carbon hydrogen | Low-carbon hydrogen from natural gas coupled with CCUS is expected to be two- to six- times cheaper than renewable-based hydrogen per kilogram of low-carbon hydrogen produced today[27,28] – meaning more emissions reductions per dollar today depending on the emissions intensity of the low-carbon hydrogen produced. Further, natural gas with CCUS is the most technologically advanced and widely deployed pathway to low-carbon hydrogen, meaning it has the ability to scale up faster, to facilitate other low-carbon hydrogen pathways as they scale up and costs come down.

The exclusion of low-carbon hydrogen from natural gas with CCUS from national hydrogen planning will delay low-carbon hydrogen roll-out and ultimately emissions reductions | In contrast to the evidence base provided by the IEA and IPCC analysis, low-carbon hydrogen using CCUS is excluded from Australia's hydrogen support programs such as the Hydrogen Headstart Program. Lack of CCUS inclusion in current climate and energy policy further undermines the development of low-carbon hydrogen in Australia. The legislated moratorium on financial support for CCUS projects under the Clean Energy Finance Corporation Act remains a significant barrier to Australia meeting its legislated emissions reduction targets.

Biomethane may complement natural gas but is challenging to scale

Scalability and sustainable supplies of biomass impact the total potential for biomethane production in Australia | Global biomethane production currently equates to around 145 PJ[29] of energy, or the energy equivalent of around 10 per cent of Australia's total gas demand. Biomethane production is currently concentrated in Europe which produces around 91 PJ per year, compared with the Asia Pacific region that produces around 9 PJ annually. The majority

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[26] IEA, *World Energy Outlook 2022*, 2020
[27] CSIRO, *National Hydrogen Roadmap*, 2018
[28] IEA, *CCUS in Clean Energy Transitions*, 2020
[29] IEA, *An introduction to biogas and biomethane (website)*, accessed Nov 2023

of biomethane today (92 per cent) is produced through the upgrading of biogas, which is produced from biodigesters, landfill gas recovery systems and wastewater treatment plants. The remaining 8 per cent of biomethane is produced from gasification of solid biomass. The IEA highlight that *"biogas and biomethane are the smallest part of the bioenergy supply chain, but there is growing interest in biomethane in particular as a source of low-emissions domestic gas supply, especially in Europe."*[30]

5. Ongoing investment is necessary across the energy and electricity sector, including in new gas supply, however government intervention risks undermining investment confidence

The net zero transformation will require significant capital investment including in gas production and gas infrastructure

Total additional net zero investment required across the economy could reach $5.8 trillion by 2050 | The Climateworks study cited by the discussion paper suggests that the investment required in industrial abatement technologies and transitioning the energy system could be as high as $625 billion by 2050, or almost $21 billion per year over a 30-year horizon. However, across the five Net Zero Australia scenarios, total supply-side capital investment across all sectors in 2050 ranges from $5.3 trillion in the *Onshoring* (E+ONS) and $6.3 trillion in the *Constrained Renewables* scenarios, up to $7.0 trillion in the *Unconstrained Renewables* scenario. Taking into account the $1.2 trillion in investment needed in the business-as-usual *Reference* scenario, the additional capital investment required to reach net zero could range from $4.1 trillion to $5.8 trillion by 2050. This level of investment required underscores the need for robust economic modelling to inform policy development to ensure that costs to the economy are minimised in achieving the objective of a net-zero economy. This is a large divergence from the estimate in the Net Zero Australia study. This may reflect a ring-fencing of only some parts of the economy in the Climateworks analysis and/or significantly more optimistic cost assumptions compared with the Net Zero Australia work. Irrespective this range of potential investment needs points to the need for significantly more analysis.

Australia is facing increased competition from around the world for energy and emissions reductions investment

Clean energy incentives, such as the US Inflation Reduction Act, increase competition for capital and risk drawing net zero investment away from Australia | It is worth reflecting on the scale of international climate regimes that serve to attract international capital. For example, the United States (US) Inflationary Reduction Act[31] provides USD 40 billion of loan guarantees for energy projects (including for natural gas and CCUS) and USD 250 billion for energy infrastructure reinvestments including for projects utilising innovative technology and reducing, avoiding, utilising, or storing emissions. The European Union has a range of large-scale funding programs that include support for emissions reductions activities, with the

[30] IEA, *An introduction to biogas and biomethane*, website (accessed Nov 2023)
[31] United States Department of Energy, *Inflation Reduction Act of 2022*, website (accessed April 2024)

Green Deal Industrial Plan the latest program announced, adding hundreds of billions of Euro of funding to *"enhance the competitiveness of Europe's net-zero industry and support the fast transition to climate neutrality."*[32] Japan is also investing heavily in decarbonisation through their Clean Energy Strategy to Achieve Carbon Neutrality by 2050, with projected spending of 150 trillion Yen over the ten years to 2030.[33] Australia must have regard to the scale and scope of global initiatives when considering how to attract low-carbon investment to Australia.

Australian LNG is a significant contributor to energy security and emissions reductions in the region | Natural gas, through LNG, is important in supporting the energy security and decarbonisation objectives of our regional partners. In 2022, Australian natural gas provided 40 per cent of Japan's total gas demand, 36 per cent, 25 per cent and 25 per cent, 8 per cent of Taiwan, South Korea, Singapore and China's gas demand respectively.[34] This underscores the importance of Australia's role as a valued trading partner in our region.

Regional LNG demand is expected to grow as countries decarbonise | The Institute of Energy Economics, Japan (IEEJ) has forecast that Asia's LNG consumption will more than double from 2021 to 2050, from 273 million tonnes to 551 million tonnes. This growth will be driven by surging demand from China, India and the Association of Southeast Asian Nations (ASEAN) economies with continued demand in Japan and Korea[35]. The IEEJ notes that the importance this will place of having access to secure supplies of LNG into the future. The IEA has indicated that in the Southeast Asian region *"Near term growth in the regions natural gas output falls short of rising demand, increasing the call on LNG markets."*[36] This results in the southeast Asian region, which has historically been an exporter of gas, becoming a net importer of gas by 2025.

While Australia's LNG capacity has plateaued and is forecast to decline, other producers are expanding capacity significantly reflecting more favourable investment conditions | The US has now overtaken Australia to be the world's largest exporter of LNG. The BP Energy Outlook 2023 notes that global LNG demand to 2030 will be met by substantial expansion in exports from the US and Qatar. It expects that by 2030 the US and Qatar will account for around half of global LNG supplies compared with a third in 2019. The Outlook forecasts declines in Australian LNG exports post 2030 reflecting increasing costs and constraints on upstream natural gas production.[37]

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[32] European Parliament, *Briefing on EU's response to the US Inflation Reduction Act (IRA)*, 2023

[33] JapanGov, *Clean Energy Strategy to Achieve Carbon Neutrality by 2050*, 2022, website (accessed April 2024)

[34] DISR, *Future Gas Strategy consultation paper*, 2013

[35] IEEJ, *IEEJ Outlook 2023*, 2023

[36] IEA, *Southeast Asia Energy Outlook*, 2022

[37] BP, *Energy Outlook*, 2023

Intervention in markets and *'moving the goal-posts'* after investments have been made, risks severely undermining investment in the net zero transformation

A stable and consistent fiscal and regulatory environment is critical to ensure investors have confidence in making investment in long-lived, capital-intensive projects | The Australian oil and gas industry has invested well over $400 billion[38] in the Australian economy over recent decades, undertaking exploration and developing natural gas production, transport, liquefaction and export facilities. | The transition to a net-zero emissions economy by 2050 will require investment in all energy technologies and fuels to ensure access to affordable, secure and reliable supplies of energy for households and business in Australia. Australia's reputation as a destination of choice for foreign investment will be paramount in ensuring that Australia is seen as an attractive investment option, including for investment in renewable energy, gas production and power generation, low-carbon hydrogen, and CCUS. The scale and nature of the government interventions in the gas industry has impacted on the confidence of international investors about the reliability of Australia as a destination for mobile foreign capital.

Energy and electricity sector planning needs to be supported by rigorous economic analysis and modelling, of both investment and overall economic impact

Energy policy must be based on rigorous economic modelling given the potentially significantly impact poorly informed policy could have on Australia's economy, including key export industries | The Electricity & Energy Sector Plan should be informed on economic modelling to show the impacts of the transition on the Australian economy. While there will be opportunities for new industrial development that will stimulate new job creation, there will also be significant dislocation in other industries and communities that will need to be addressed. Climateworks analysis – cited in the discussion paper[39] – notes five supply chains of significance in relation to their energy use and emissions – iron and steel, aluminium, other metals, chemicals and LNG. Together, these five supply chains generate 17.3 per cent of Australia's GDP with exports of around $236 billion annually and an estimated employment of 414,000.[40] The indirect economic impact of these industries would be significantly larger across the Australian economy. This is a useful indicator of the size of the economic impacts for Australia if policies are not well formulated and do not consider the least cost pathways of achieving a net-zero economy.

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[38] Wood Mackenzie, *Australia Oil and Gas Industry Outlook Report*, 2020

[39] Climateworks Centre and Climate-KIC Australia, Australian Industry Energy Transitions Initiative, *Pathways to industrial decarbonisation: Positioning Australian industry to prosper in a net zero global economy*, 2023

[40] Climateworks Centre and Climate-KIC Australia, Australian Industry Energy Transitions Initiative, *Pathways to industrial decarbonisation: Positioning Australian industry to prosper in a net zero global economy*, 2023

6. Australia's oil and gas workforce are already delivering world class energy and emissions reductions projects as part of the net zero transition

Fostering the emissions reductions potential of the oil and gas sector, leverages Australia's existing comparative skills advantage

The gas industry has a highly skilled workforce, including across regional Australia | The gas industry workforce comprises skills ranging from geophysicists, petroleum and civil engineers, construction, exploration drillers, electricians and plant operators. In addition, the gas industry relies on occupational skills in supporting remote worksites. Many of these jobs are in the regions and much of the expenditure associated with the industry occurs in the regions providing significant economic outcomes for these communities. The oil and gas extraction industry also exemplifies a safety-first culture, as one of the safest industries in Australia according to Safe Work Australia safety statistics.[41]

Australia's oil and gas skills and experience are already delivering world class emissions reductions projects | The skills and experience of Australia's oil and gas industry represent a comparative advantage for Australia as we transform the economy, and the economies of the region, to net zero. Australians are already delivering the natural gas needed to reduce emissions in Australia and beyond. The Australian oil and gas sector is also delivering world-class emissions reductions projects such as the Chevron's Gorgon CO_2 Injection Project and Santos's Moomba CCUS Project.

The capacity study should examine the skills base of the gas industry as a potential source of skilled labour for clean energy development | It should develop a clear understanding of the gas industry workforce and what skills development will be required for the industry in supporting the transition to a net zero economy. This would include the geographic dispersal of these skills and the contribution they make to regional communities to understand the consequences and opportunities of the energy transition to the regions.

Australian Energy Producers welcomes the opportunity to provide input into the development of the Electricity & Energy Sector Plan and looks forward to inputting further as the plan develops.

[41] Safe Work Australia, *National Dataset for Compensation-based Statistics (NDS)*, 2022