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Renewable Gas Alliance

Renewable Gas Alliance Submission - Productivity Commission: Opportunities in the Circular Economy

Bioenergy Australia (BA) is the national industry association committed to accelerating Australia's bio economy. Our mission is to foster the bioenergy sector to generate jobs, secure investment, maximise the value of local resources, minimise waste and environmental impact, and develop and promote national bioenergy expertise into international markets.

This submission is on behalf of the Renewable Gas Alliance (RGA), an alliance founded to accelerate the decarbonisation of Australia's gas network through increased deployment of biomethane. The RGA has over 100 member organisations, including gas pipeline owners, gas retailers, project developers, technology providers, off takers, research organisations, and state and local government representatives. Individual members of the alliances will be providing more detailed submissions specific to their business and expertise. This submission is a collective response and does not represent the views of any specific member.

Australia's Bioenergy Roadmap (ARENA, November 2021) outlines how, by the start of the next decade, Australia's bioenergy sector could contribute to around $10 billion in extra GDP per annum and 26,200 new jobs (predominately regional), reduce emissions by about 9 per cent, divert an extra 6 per cent of waste from landfill, and enhance fuel security. Now is the time to capitalise on these opportunities by leveraging the significant circular economy opportunities from the development of a domestic biomethane industry.

Bioenergy Australia thanks the Productivity Commission for the opportunity to provide feedback on the Opportunities in the Circular Economy paper. We support the Australian Government's commitment to support a circular economy that improves materials productivity and efficiency in ways that benefit the economy and the environment.
A critical industry that can help achieve this objective is Australia's biomethane industry – an industry that recovers and utilises low value waste to create high value renewable energy.

Information request 1: Circular economy success stories and measures of success

Australia's biomethane industry is a significant waste-to energy solution that will support a circular economy. Biomethane production utilises waste that would would otherwise end up in landfills, decay in fields, be burned off, or remain as waste, transforming these materials into high-value, sustainable energy that can be utilised to decarbonise Australia's hard-to-electrify sectors, while capturing the GHG emissions that would usually be released during decomposition.

Biomethane is a renewable and carbon-neutral replacement for natural gas that can aid in the decarbonisation of Australia's gas network and hard-to-abate industrial processes. It is compatible with existing gas infrastructure, pipelines, and transmission assets and does not require new infrastructure to be created and installed, or for existing infrastructure to be retired. This compatibility enables decarbonisation while allowing existing assets to fulfill their operational lifespans, supporting a circular economy by extending the life of current resources and reducing the need for premature replacements.

Biomethane can be produced from a variety of wastes such as agriculture residues, livestock manure, landfills, organic faction of MSW, FOGO and wastewater sludge. Anaerobic digestion (AD) is a proven method for biomethane production, with over 200 AD facilities currently operating in Australia and additional projects planned for expansion.[1] Comparatively, Germany has nearly 10,000 operating digesters, with some communities achieving near fossil fuel-free status as a result. [2]

This established technology not only supports the recovery and utilisation of energy, nutrients, and heat from organic matter but also diverts large volumes of agro-industrial, domestic, and commercial waste from landfills, thus reducing methane emissions generated by these practices. At full potential, AD can deliver ~50% of the global methane pledge by 2030 through:

- Avoided landfill emissions (from food waste disposal).
- Avoided emissions from manure management.
- Avoided burning emissions.[3]

AD not only reduces methane emissions, but generates critical co-products including biogas, biomethane, bioCO2, digestate fertilisers and other valuable bioproducts. Specifically, digestate is a safe, cost-competitive, nutrient-rich organic fertiliser that captures and utilises GHG emissions that would otherwise be released during decomposition, to support that enriches and replenishes the soil, while offering a circular solution to managing increasing amounts of organic waste.[4]

Furthermore, the technology to upgrade to biomethane and inject it into the grid has been successfully implemented worldwide. By the end of 2022, over 1,200 biomethane plants were officially registered in the leading European biomethane-producing countries, with about 90% connected to the grid, contributing 37 TWh of biomethane injected into the grid.[5]

Currently, the Jemena Malabar Biomethane Injection Plant in New South Wales is Australia's first project to produce and inject biomethane into the gas network. It captures methane from sewage sludge at the Malabar Wastewater Treatment Plant in Sydney[6], which is then injected into the gas network, replacing natural gas for about 6,300 homes.[7] This is a key example of a biomethane project that is actively contributing to our circular economy.

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[1] Race for 2030, 'Onsite anaerobic digestion for power generation and natural gas/diesel displacement' (2023)
[2] American Biogas Council, 'Biogas Market Snapshot' (2023)
[3] World Biogas Association, Biogas Insight 1, 'Delivering the Global Methane Pledge'
[4] World Biogas Association, Biogas Insight 1, 'Delivering the Global Methane Pledge'
[5] World Biogas Association, Biogas Insight 1, 'Delivering the Global Methane Pledge'
[6] https://www.jemena.com.au/future-energy/future-gas/Malabar-Biomethane-Injection-Plant/
[7] Clean Energy Council, 'Bioenergy' website

Although Australia lags behind its global peers in developing a local biomethane industry, it has the opportunity to benefit from the experiences of nations that have already made strides in this area. International examples include:

- In the United States, biomethane development has been driven by the transport sector and supported by schemes such as the Renewable Fuel Standard (RFS) and California's Low Carbon Fuels Standard (LCFS). For example, the new RFS Set Rule aims to double biomethane supplies in the next three years. Given the obligation volumes proposed, the pipeline of projects under development and California's targets for injected biomethane, biogas and RNG supplies combined are expected to expand 2.1-fold in the next five years.[8]
- Data from the American Biogas Council indicates that 2023 was the third year of record growth across the US biogas industry, with nearly 100 new projects coming online last year—representing $1.8 billion in capital investments.[9]
- Since the introduction of a new subsidy scheme in 2012, Denmark's biogas production has seen a significant increase, with approximately 150 biogas plants currently in operation[10]. This growth has been driven by the use of livestock waste, which accounts for around 75% of the feedstock, while the remaining 25% comes from various organic wastes, including household and industrial waste, straw, and energy crops[11].
- The EU Emissions Trading System (EU ETS) is a cap-and-trade system to reduce emissions of greenhouse gases covering operators of large industrial and power plants, and in the future also covering the transport and buildings sectors. Biomethane is an attractive option to reduce greenhouse gas emissions and comply with EU ETS obligations in all sectors based on its high lifecycle emission reduction.[12]
- The introduction of biomethane quotas applied to energy suppliers, notably in France and the Netherlands, requires gas suppliers to have a given share of biomethane in their sales of gas to customers, and is an effective measure to increase the integration of biomethane into the energy mix. [13]
- As part of its REPowerEU plan, the European Commission has proposed a rapid acceleration of renewable energy including 35 bcm biomethane by 2030 and a new Biomethane Industrial Partnership to 'support the achievement of the target and create the preconditions for a further ramp up towards 2050'.[14]
- In Germany, tax exemptions were applied to purchasing biomethane in both CHP and heat generations, as well as for vehicle fuelling. Norway and Switzerland have implemented full energy tax exemptions for biomethane use in transport. [15]

[8] IEA, 'Renewables 2023 - Special section: Biogas and biomethane" (2024)
[9] American Biogas Council, 'Biogas Market Snapshot' (2023)
[10] Biogas in Denmark, Danish Energy Agency available at https://ens.dk/en/our-responsibilities/bioenergy/biogas-denmark
[11] Biogas in Denmark – Biomass input and biogas production, Danish Energy Agency available at https://ens.dk/en/our-responsibilities/bioenergy/biogas-denmark
[12] Biomethane Industrial Partnership, 'A vision on how to accelerate biomethane project development' (October 2023)
[13] Ibid.
[14] Macquarie, 'Here and now: Europe backs biomethane' (2023)
[15] The International Energy Agency (IEA), 'Renewables 2023 Analysis' (2024)

- In the UK, The Green Gas Support Scheme (GGSS)[16] is a government environmental scheme that provides financial incentives for new anaerobic digestion biomethane plants to increase the proportion of green gas in the gas grid. With supportive policies in place in Great Britain, The Institute of Gas Engineers & Managers notes that "There are currently 124 biomethane sites connected to the gas grid, with 29 further sides in the connections process. The renewable gas capacity from connected sites is 10.1 TWh – enough to heat over 840,000 homes. Including connecting sites, the total capacity will be 14.5 TWh – enough to heat 1.2m homes, or if maximising the potential for hybrid heating systems, with boilers burning biomethane used in conjunction with heat pumps powered by renewable electricity, biomethane can help heat up to £6m homes – 22% of all homes in the UK." [17]
- According to the IEA Net Zero Emissions by 2050 Scenario, production of biogases should quadruple by 2030.[18]

Information request 2: Priority opportunities to progress the circular economy

Prioritising the development and adoption of biomethane presents a significant opportunity to advance a circular economy in Australia. Biomethane is a complete circular economy solution. It diverts waste, converting it into a critical energy source while producing valuable by-products such as digestate, which can support feedstock growth. The residuals from these feedstocks can recirculate back into the system. These opportunities include:

- Environmental opportunities:
    - Biomethane operates within a closed-loop system by converting organic waste into renewable energy, capturing methane and greenhouse gas emissions, and producing digestate that enriches soil health, allowing nutrients to cycle back into the ecosystem.
    - Replacing natural gas with biomethane can reduce emissions by 8–31%, depending on policy support.[19]
    - Producing biomethane from manure prevents methane emissions from decomposition, benefiting the agriculture sector.
    - Using digestate instead of mineral fertilisers cuts emissions tied to their production; for example, one tonne of digestate can save one tonne of oil, 108 tonnes of water, and seven tonnes of CO_2.
    - Produces a concentrated CO_2 stream for various applications, aiding in the permanent removal of carbon from the atmosphere.
    - As a renewable, carbon-neutral alternative to natural gas, biomethane can quickly scale to supply 23% of the pipeline gas market by 2030.[20]

[16] See Green Gas Support Scheme and Green Gas Levy | Ofgem
[17] https://www.igem.org.uk/resource/call-for-evidence-future-policy-framework-for-biomethane-production.html
[18] International Energy Agency (IEA), 'Net Zero Emissions by 2050 Scenario (NZE)- Global Energy and Climate Model' (2023)
[19] Energy Networks Australia, '2030 Emission Reduction Opportunities for Gas Networks'
[20]

- Supports Australia's commitments under the Global Methane Pledge by reducing methane, a greenhouse gas up to 86 times more potent than CO_2 over 20 years.[21]

- Feedstock opportunities:
  - Australia is one of the highest per capita waste generators in the world, highlighting the significant feedstock available for biomethane production.
  - Australia generated an estimated 74.1 million tonnes (Mt) of waste in 2018-19, with 27 per cent going to landfill (20.5 million tonnes).[22] There is a clear opportunity to divert this waste for biomethane production.
  - A Race for 2030 report highlighted that within Australia, our vast amount of agricultural waste could account for 86 per cent of the total biomethane potential by 2050. Thus, agricultural waste could account for 319 PJ/yr of the overall biomethane potential of 371 PJ/yr in 2050, and landfills, wastewater sludge, livestock manure, and FOGO accounting for the remaining 52 PJ/yr. This biomethane could supply up to 6.2 per cent of Australia's total energy consumption or replace 22.5 per cent of the nation's current fossil gas usage (approximately two-thirds of the current gas demand on Australia's east coast). This highlights the significant waste feedstock available and compatible with supporting biomethane production, contributing to an overall circular economy.[23]
  - According to the Australian Bureau of Statistics (2016-17), crop stubble and other agricultural waste are commonly removed by burning, with approximately 2.1 million hectares cleared using cool to moderate burns and around 1.4 million hectares cleared with hot burns. This agricultural waste holds significant energy potential and could be utilised for biomethane production. [24]
  - Diverting organic waste from landfill by processing it through anaerobic digestion (AD) aligns well with circular economy principles and overall decarbonisation objectives and provides significant potential not yet tapped into, with currently only 2% of organic waste in Australia processed via AD (DCCEEW, 2022a) which is significantly lower than many comparable countries. The Race for 2030 study 'Mapping Organic Waste in Sydney to Advance Anaerobic Co-Digestion for Energy Generation and Greenhouse Gas Reduction[25] found that:
    - The three Sydney Water wastewater treatment plants involved in the study could provide up to 20% of the necessary AD infrastructure capacity gas for Sydney by 2030.
    - This diversion could generate 38 billion liters of biogas, with an energy value of 1,371,362,013 MJ.

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[21] World Biogas Association, Biogas Insight 1, 'Delivering the Global Methane Pledge'
[22] https://cdn.revolutionise.com.au/cups/bioenergy/files/jsgqguyb1zftkx6c.pdf
[23] Race for 2030, 'Anaerobic Digestion for electricity, transport, and gas B5 Opportunity Assessment' (2023)
[24] https://www.abs.gov.au/statistics/industry/agriculture/land-management-and-farming-australia/latest-release
[25] Mapping organic waste in Sydney to advance anaerobic co-digestion for energy generation and GHG reduction | RACE for 2030

        - Of this potential, 49% comes from food organics, 38% from garden organics, and the remainder from sewage and fats, oils, and greases.
    - Co-digestion of different types of waste can optimise biomethane production, as opposed to the traditional approach of treating each waste type separately. This shift emphasizes biogas production rather than merely waste treatment. This was covered in the RACE for 2030 Biogas from agricultural waste: a techno-economic evaluation and also their Anaerobic co-digestion of red meat industry wastes project.
    - Wastewater treatment plants (WWTPs) in general consume a significant amount of energy, representing about 1% of grid energy across Australia. However, there is potential for WWTPs to become net energy generators rather than significant energy consumers if onsite biogas production can be optimised.[26]

- Economic opportunities:
    - Biomethane incentivises the repurposing and utilisation of waste, serving not only as a waste management solution but also creating revenue streams from materials that would otherwise be discarded.
    - Biomethane generates valuable energy and critical co-products, including biogas, bioCO2, and digestate fertilizers, creating new and diverse income streams.
    - Biomethane can contribute to the stability and reliability of the wider energy market by catering to both basic energy demands and peak loads, reducing the risk of shortages and price spikes, and enhancing energy security for all consumers. Increased availability of biomethane can support the electricity grid by providing firming capacity, leading to lower costs and more stable electricity delivery.
    - The Race for 2030 report identifies that from 2022 to 2050, the adoption of biogas technology could create over 18,000 full-time jobs in Australia, primarily in regional areas, and contribute $50 billion to the nation's GDP.[27]
    - The 2023 Jobs and Skills Australia Report emphasises that the biomethane sector can leverage existing skills in the gas sector, allowing traditional energy workers to transition to cleaner energy roles while retaining their jobs. With approximately 2,100 people currently employed in pipeline transport, this workforce can be repurposed for future biomethane infrastructure projects, supporting sector growth and the broader energy transition.[28]

- Gas customer opportunities:

[26] Techno-economic analysis on improving biogas from anaerobic digestion on pre-treated sewage sludge | RACE for 2030
[27] Race for 2030, 'Onsite anaerobic digestion for power generation and natural gas/diesel displacement' (2023)
[28] Jobs and Skills Australia, The Clean Energy Generation: workforce needs for a net zero economy (2023)

- Research undertaken by AGIG highlights that biomethane production from landfill gas capture ($10.20/GJ) and wastewater treatment plants ($9.40/GJ) could be competitive with the natural gas price (~$10.73).[29]
- Biomethane is compatible with existing gas infrastructure and appliances, enabling gas customers to utilise this renewable product without the need for upgrading investments or prematurely retiring existing gas assets.
- By converting waste into energy and fertilizers, businesses can maximise resource use, minimise waste, and lower disposal costs. This not only reduces operational costs but also enhances sustainability.
- Biomethane complements electrification efforts, providing an alternative pathway to decarbonisation for hard-to-electrify industries that will continue to rely on gas.
- Increased availability of biomethane supports the electricity grid by providing firming capacity, leading to lower costs and more stable energy delivery across the economy.
- Access to biomethane enables businesses to maintain competitiveness by reducing environmental impact while continuing operations, ensuring viability in a sustainability-focused market.
- Biomethane diversifies energy sources, reduces reliance on imported fossil fuels, and ensures a stable energy supply, which is crucial for uninterrupted operations and meeting customer demands.
- When used as part of a site decarbonisation strategy, biomethane production and its use in an onsite generator can help manage energy flexibility and demand response. It allows for load shedding of the genset during periods of low electricity demand while generating electricity during peak demand times. This process effectively creates storage in the energy system, such as the current RACE for 2030 CRC Energy Flexibility for Water Corporations project.
- Digestate produced from biogas generation can be more competitively priced than mineral and inorganic fertilizers for farmers. Additionally, farmers with high manure loads can build their own digesters to produce digestate locally, ensuring supply, saving on transport costs, and creating new income streams by selling surplus.

Information request 3: Hurdles and barriers to a circular economy

Key barriers restricting the development of Australia's biomethane industry, thereby limiting a significant opportunity for a circular economy:

- Lack of biomethane certification under the Federal Guarantee of Origin Scheme.
- Absence of market-based reporting that recognises renewable gas certification, such as the GreenPower Renewable Gas Guarantee of Origin Certificates, within the National Greenhouse and Energy Reporting (NGER) Scheme.

[29] AGIG & Blunomy- Biomethane Potential in AGIG's Network Catchment and Associated Co-benefits

- Lack of alignment across judications. For example, although the NSW GreenPower Renewable Gas Certification Scheme is actively issuing renewable gas certificates, the Federal National Greenhouse and Energy Reporting (NGER) Scheme does not recognise these certificates. This lack of market-based reporting for renewable gas certificates creates a disconnect between state and federal initiatives, leaving Australian industries with limited decarbonisation options and hindering the development of Australia's renewable gas sector.
- The AS4564 – Specification for General Purpose Natural Gas standard does not adequately support biomethane injection, resulting in additional cost barriers for its integration into the gas distribution network.
- Insufficient supply-side support, creating an uneven playing field compared to traditional fossil fuel alternatives.
- Market and investment uncertainty that hinders project development and investment.
- Inconsistent and unclear regulations for anaerobic digestate across states is preventing this valuable by-product from achieving its full potential and providing associated benefits.
- Lengthy and complicated planning approval processes delay biomethane project development, introducing uncertainty, inefficiencies, and increased costs.
- Lack of equal support for biomethane compared to other alternative energy sources, which may be less practical, feasible or available for large energy users. This disparity of support is impacting the widespread recognition and investment certainty for biomethane projects.
- Lack of adequate support, recognition, and enabling regulations is delaying the development of the domestic market in Australia. In contrast, other countries with thriving biomethane industries benefit from supports such as targeted capital funding, premium feed-in tariffs (FIT), and guaranteed access to the pipeline network at low, regulated rates.

Information request 4: Governments' role in the circular economy

The technology, production and market readiness of biomethane are long-proven, a fact demonstrated by Australia's international counterparts who have been reaping the significant circular economy benefits from biomethane for many years. However, with supportive policies in place, there is no reason why Australia cannot also take advantage of these benefits.

We recommend the following policy actions as critical to supporting Australia's domestic biomethane industry and leveraging its circular economy benefits:

- Fast-track the inclusion of biomethane in the Future Made in Australia (Guarantee of Origin) Bill.
- Fast-track the introduction of market-based reporting that recognises renewable gas certificates, including GreenPower Renewable Gas Guarantee of Origin Certificates, within the NGER Scheme.
- Implement supply-side support, such as capital and development grants, production credits, tax incentives, and R&D support, to support an Australian biomethane market.

- Support revisions to AS4564 to facilitate biomethane injection into gas networks Provide targeted feedstock incentives to support the collection, cultivation, and processing of waste for feedstock.
- Support the coordination of supply chains to improve feedstock collection, storage, and processing, as a means to reduce logistical costs.
- Streamline regulatory and planning approvals for biomethane projects to reduce delays and costs.
- When designing policy, strengthen support and recognition for biomethane to match the level afforded to other energy sources, such as hydrogen.
- Develop nationally consistent, clear, and streamlined regulations for digestate approval, use, and application processes.
- Raise public awareness and educate consumers about the role, compatibility, and sustainability of biomethane and digestate.

Thank you for taking the time to consider our submission. Any questions or request for further assistance are welcome

Sincerely,

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CEO Bioenergy Australia