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**WORLD BIOGAS
ASSOCIATION**



ANAEROBIC DIGESTION MARKET REPORT

AUSTRALIA

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Introduction

Australia has a vast potential for anaerobic digestion (AD) which until recently had been largely untapped. Waste management, climate change initiatives, and renewable energy targets are driving the adoption of biogas technology in Australia, which is currently dominated by landfills and wastewater plants. With intensive livestock and food-processing industries looking to valorise their waste and landfill gate fees and electricity costs rising, the Australian biogas industry is expected to increase its rate of growth even more.

Current status

- As of December 2016, there were an estimated 242 digesters operating in Australia (Bioenergy Australia, 2017). The majority of these plants are landfill and wastewater plants. The agricultural plants mainly digest pig, cattle and poultry manure while a number of the industrial digesters use red meat processing and rendering waste.
- In 2014-2015, 19.1 petajoules of energy produced from biogas was consumed in Australia, a growth of 17% over the previous year and much higher than overall renewable energy growth of 1.6% (Department of Industry, Innovation and Science, 2016).
- There are no biogas to biomethane upgrading plants currently operating in Australia.
- While most biogas captured is used for production of electricity and heat, the proportion of flared gas is high due to uncertainty over quantity of gas and the associated size of the installed generator.
- The digesters are heavily concentrated on the relatively densely populated south-east coast of Australia.
- Energy crops are not currently grown for use in biogas production.



CURRENT DIGESTERS IN AUSTRALIA

Type	Digester count	Estimated installed capacity (MW)
Agricultural	22	3
Wastewater	52	25
Landfill	129	130
Biowaste	5	1.7
Industrial	34	4.5
Total	242	165

Potential

- **Waste-based biogas:** Waste-based production (livestock manure, biosolids, food, and water) in Australia has the potential to become a £2.24 billion per year industry. With a livestock population of 29 million cattle, over 2 million pigs, and 101 million poultry in addition to about 24 million people generating biosolids and 290 kg of food waste per year, the potential for biogas is approximately 7.5 million m³. This can contribute towards achieving renewable energy targets through electricity generation and, if upgraded, can help fuel the 380,000 natural gas vehicles already driving on Australian roads or connect to the 6.5 million homes on the gas distribution network (Energy Network Australia, 2017).
- **Urban waste industry:** The Clean Energy Finance Corporation (CEFC, 2015a) has identified significant opportunity for implementation of biogas technologies in the municipal solid waste industry, attributing this opportunity to rising landfill gate fees and the decreasing cost of biogas technology.
- **Bagasse:** Australia is the third largest exporter of sugar in the world, with the industry worth \$2 billion per year (ARENA, 2016). A significant proportion of Australia's current renewable energy comes from burning bagasse, the residue left over after extraction of sugar (Department of Industry, Innovation and Science, 2016). The Australian Renewable Energy Agency has funded a project to explore more environmentally and economically viable ways of utilising this resource via anaerobic digestion and production of biogas (ARENA, 2016).
- **Livestock industry:** Australia has sizeable industries in livestock, and red meat processing and rendering, all of which face rising energy and fertiliser costs and odour and urban encroachment issues (McCabe B, 2015). Anaerobic digestion of manure and processing wastes presents an opportunity for better waste management, reduced emissions and improved regulatory compliance. CEFC (2015a) have projected agricultural biogas production at 791 GWh by 2020.

Drivers

- **Paris Agreement** – Australia has committed to reducing emissions to 26-28% below 2005 levels by 2030. This ambition has triggered an overall decarbonisation of the energy sector (Energy Network Australia, 2017).
- **Gas Vision 2050** – An initiative created by Australia's gas industry, the Australian Pipelines and Gas Association, the Australian Petroleum Production & Exploration Association, Energy Network Australia, the Gas Appliance Manufacturers Association of Australia, and Gas Energy Australia, Gas Vision 2050 focuses on decarbonisation of gas beyond 2030. It highlights biogas as one of the primary technologies for achieving this, with the potential for it to become mainstream and transform the sector while using already extensive existing infrastructure (Energy Network Australia, 2017).
- **Emission Reduction Fund (ERF)** – Set up with AUS\$2.55 billion funding from the Australian government and aimed at incentivising the adoption of new practices and technologies that reduce greenhouse gas emissions, ERF implements climate change policy for Australia via a mechanism of carbon credit units in the form of tonne of CO₂-eq stored or abated. The carbon credit units are sold to the government or in the secondary market. The ERF is a voluntary scheme that supports farmers, businesses and households. Digesters recycling agricultural wastes such as pig, cattle, and poultry manure, industrial wastewater from red meat processing and rendering plants, and municipal wastewater all qualify for this fund (Department of Environment and Energy, 2017).
- **Renewable Energy Target (RET) scheme** – Operating in two distinct parts, RET aims to generate 23.5% of Australia's electricity from renewable sources by 2020:
 - **Large-scale Renewable Energy Target (LRET)** – Aimed at large-scale renewable energy power stations, the LRET has a legislated target of 33,000 GWh of renewable energy generation by 2020.
 - **Small-scale Renewable Energy Scheme (SRES)** – The SRES aims to financially incentivise small-scale production of renewable energy by households, small businesses and community groups (Department of Environment and Energy, 2015).
- **Industry cooperation** – In recent years, the Australian biogas industry has organised itself into a national participation group comprising industry, researchers, and government representatives to exchange and disseminate knowledge and develop guidelines and frameworks for organised and organic growth.
- **Loan support from Clean Energy Finance Corporation (CEFC)** – CEFC has committed up to AUS\$100 million to the Australian Bioenergy Fund, which invests in energy from agricultural waste, anaerobic digestion of sustainably sourced biomass, and landfill gas capture (CEFC, 2015b).

CASE STUDIES

Darling Downs Fresh Eggs Biogas Plant (ABC Southern Queensland, 2015)

- **Inputs:** Poultry manure from 250,000 chickens.
- **Outputs:** The electricity and heat generated meet 95% of the farm's operational energy requirements including the feed mill, rearing sheds, egg-laying operations, cooling the birds in summer and providing warmth in the winter.
- **What is unique:** The digester is the first in Australia and one of the first around the globe to be running 100% on poultry manure, meeting 95% of the farm's energy requirements and making the farm almost carbon neutral.

Richgro biogas plant at Jadankot, near Perth, Australia (Richgro, 2016)

- **Inputs:** Commercial and industrial organic waste from breweries, chicken farms, supermarkets, and other food suppliers.
- **Outputs:** Electricity (to meet onsite requirements and export enough to meet the requirements of up to 1800 western Australian households) and digestate.
- **What is unique:** Richgro is a supplier of premium garden products and has included digestate in its supply chain, thus monetising it as a commercial organic fertiliser.

Barriers

- **Poor power purchase arrangements** – The incentive for producing and using power onsite is higher than that for exporting power (McCabe, B., 2015). This is also reflected in the high percentage of biogas captured and flared without being converted into power.
- **Lack of experience** – Being a nascent industry, there is a lack of experience and available reliable data, leading to construction risks and over/under capacity of CHP units (McCabe, B., 2015).
- **Digestate regulations** – There is a lack of consistent national regulation for digestate; depending on the State, it may be classified as a waste or as compost.

"ENERGY FROM BIOGAS IS LIKELY TO EXPAND IN AUSTRALIA. THERE'S HUGE POTENTIAL FOR GROWTH IN FEEDSTOCK FROM THE LIVESTOCK AND FOOD-PROCESSING SECTORS IN PARTICULAR, COUPLED WITH RISING ELECTRICITY PRICES AND LANDFILL GATE FEES.

AUSTRALIA IS TRANSITIONING TOWARD CLEAN ENERGY TECHNOLOGY, GIVING BIOGAS A MASSIVE OPPORTUNITY TO HELP MEET RENEWABLE ENERGY TARGETS AND DECARBONISATION EFFORTS, AS WELL AS PROVIDING A HOLISTIC SOLUTION TO A RANGE OF WASTE MANAGEMENT ISSUES."

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