



**Industry's actions on
reducing methane emissions**

Australia's cleaner
energy future

About APPEA

The Australian Petroleum Production & Exploration Association (APPEA) is the peak national body representing Australia's oil and gas exploration and production industry. Its purpose is to be the effective voice of the oil and gas industry on the issues that matter, working collaboratively with industry, government, and the community to achieve shared goals.

APPEA has around 200 members, comprised of oil and gas explorers and producers active in Australia and companies providing goods and services to those explorers and producers. APPEA member companies produce around 95 per cent of Australia's oil and gas.

The oil and gas sector plays a fundamental role in our nation's economy, providing essential energy to power businesses and homes in Australia and across the world. Our sector invests billions of dollars to generate reliable, secure and cleaner energy, creating jobs and economic growth for the communities in which we operate.

APPEA is forward-looking and outcomes focused, aiming to raise awareness of the economic, environmental, and social benefits of the oil and gas industry across Australia.

Acknowledgment

APPEA acknowledges the Traditional Custodians of Country throughout Australia and their knowledge in caring for land, sea, and community. We pay our respect to their Elders; past, present, and emerging.

Australia's oil and gas industry has a key role in helping Australia and the world achieve a cleaner energy future.

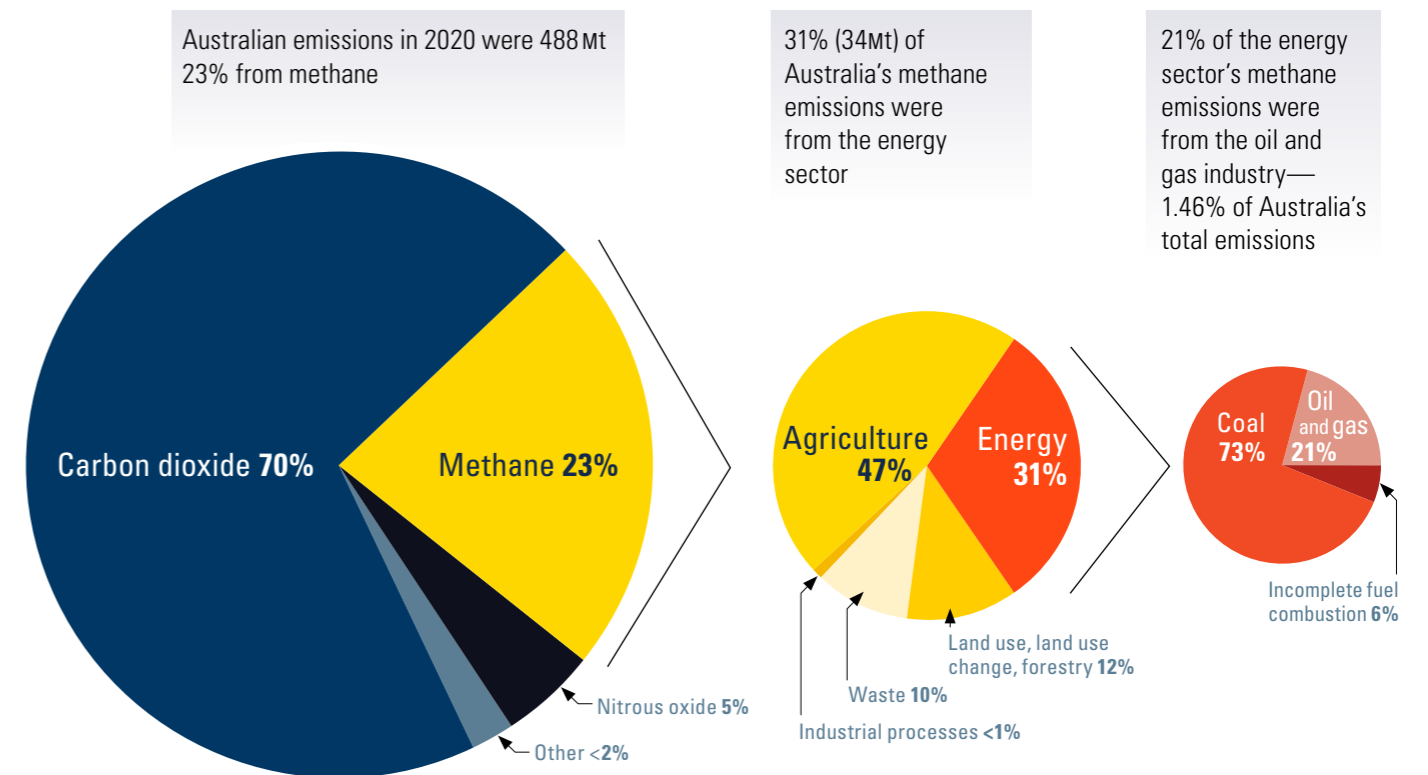
APPEA and our members support a goal of net zero emissions across the Australian economy by 2050 and that includes methane emissions.

The industry is fast-tracking initiatives and technologies to reduce its own emissions profile and continue delivering reliable, secure and cleaner energy to customers across Australia and in Asia.

Energy for a better Australia

Fugitive emissions by sector

Methane emissions associated with oil and gas production account for around 1.5 per cent of Australia's total emissions.¹



Oil and gas production is a relatively small, but still significant, source of methane emissions. In Australia, the largest sources of methane emissions are agriculture (for example, livestock), coal, land use, and waste.



¹ AUSTRALIAN GOVERNMENT (2022), NATIONAL INVENTORY REPORT 2020: THE AUSTRALIAN GOVERNMENT SUBMISSION TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, AUSTRALIAN NATIONAL GREENHOUSE ACCOUNTS, MAY.

Commitment to transparent reporting

The industry meets all its estimation, measurement and reporting obligations under the *National Greenhouse and Energy Reporting Act 2007* and all its carbon liabilities under the Emissions Reduction Fund Safeguard Mechanism—there is no misreporting or under-reporting of emissions and no lack of regulation of emissions.

“ The industry has for many years worked with government and the scientific community to improve the accuracy of emissions reporting and estimation. ”



A 2019 CSIRO study confirmed the robustness of the national greenhouse accounts estimates. The study suggested that upstream fugitive methane leakage rates are less than 0.5 per cent of production. This estimate validates the upstream leakage rates estimated from data in the national inventory, of around 0.4 per cent. The Australian Government’s estimate of the methane leakage rate for the entire Australian gas production system—both upstream and downstream—is around 0.7 per cent. This compares with the methane leakage rate of US gas production which is around 1.2 per cent.

IMAGE COURTESY CHEVRON

Methane detection and monitoring

The industry invests heavily in methane detection and monitoring to keep fugitive emissions as low as possible. CSIRO has been a lead partner with the industry in monitoring and benchmarking emissions in gas producing areas.

CASE STUDY: ORIGIN ENERGY

'Sniffer truck' detects and remedies methane leaks

A specialised 'sniffer truck' is helping Origin meet its climate change commitments. Origin inspects all wells using a Picarro surveyor vehicle which is effective at detecting and remedying very small leaks. To date the vehicle has surveyed about 31,000 kilometres of the south-west Queensland gas fields.

The truck is fitted with a three-metre extendable mast containing sensors that can detect methane in ambient air. It's sensitive enough to detect a cow at 50 metres, a gas well at 500 metres, and a large source of methane, such as a compressor station or gas plant, at more than two kilometres.

This innovative technology is creating a baseline by identifying non-gas related landscape emissions and quantifying fugitive emissions from CSG infrastructure.

CASE STUDY: SANTOS

Stringent leak detection limits fugitive emissions to <1 per cent

Fugitive emissions comprise less than one per cent of Santos' operated emissions, however Santos is committed to further reduce their occurrence through improved leak detection, asset maintenance and repair practices.

Santos has stringent processes to ensure the risk of leaks is minimised. Gas infrastructure and facilities—including well heads, pipe joints and flanges—are monitored using specialised gas detectors and infrared cameras. Each operational asset has a specific well integrity plan, which defines the regulatory framework and accountability as required by legislation, as well as the frequency of well integrity assessments.

To further improve measurement of fugitive emissions, Santos has engaged with CSIRO to undertake field monitoring of its onshore assets, including measuring background levels of methane to determine the quantity of any fugitive emissions over and above background levels.

CASE STUDY: SHELL

Rigorous Leak Detection and Repair (LDAR) program at forefront of maintaining methane emissions below 0.2 per cent

Shell has an industry-leading target of maintaining methane emissions intensity below 0.2 per cent by 2025. This target covers all oil and gas assets for which Shell is the operator.

Shell's QGC business has a rigorous Leak Detection and Repair (LDAR) program which requires at a minimum annual integrity audit survey of all facilities. The LDAR program is being improved to include more comprehensive coverage of QGC facilities, increased survey regularity, adoption of more accurate emissions identification technology, such as Forward Looking Infra-Red (FLIR cameras) and Tunable Diode Laser Absorption Spectroscopy (TDLAS), with leak repair prioritisation.



Industry actions to reduce methane emissions

The industry has committed, both in Australia and globally, to a range of initiatives to reduce fugitive emissions.

Methods to reduce emissions include:

- reducing flaring and venting as far as practical, such as via strategic planning of field operations
- where flaring or venting cannot be avoided (for testing or safety reasons), ensuring appropriate design and controls are put in place to maximise efficiency and avoid unacceptable impacts
- designing and constructing wells to strict industry standards and subjecting well heads, pipes and equipment to a rigorous maintenance and inspection regime
- leak detection programs and continuous monitoring and/or regular testing of wells and process equipment.

The following case studies highlight the emissions reduction initiatives by industry that are in addition to complying with regulatory requirements.

CASE STUDY: EXXONMOBIL

Strong reductions in flaring deliver big gains

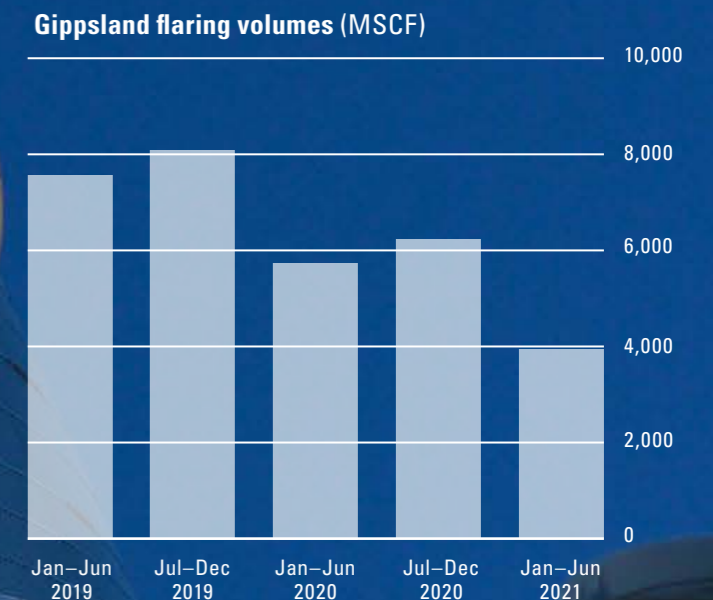
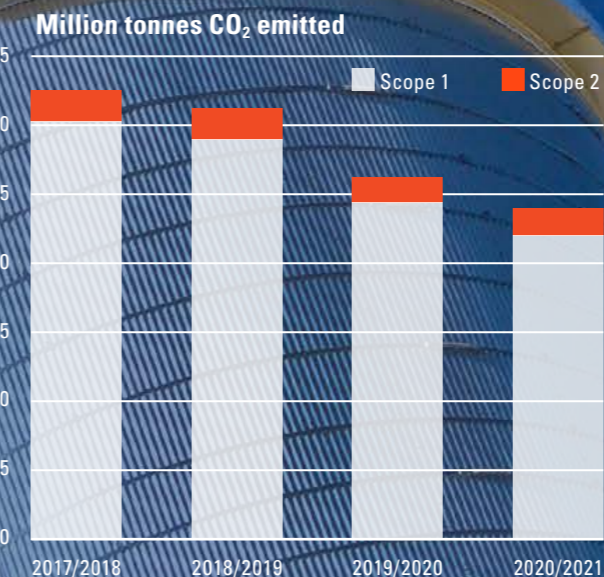
ExxonMobil Australia's Victorian operations supply 40 per cent of the natural gas used across eastern Australia, and are also a major supplier of transportation fuels including diesel, jet fuel and petrol.

The company has reduced emissions from its Victorian operations by 26 per cent since 2017 and is continually seek ways to improve the sustainability of its operations while meeting Australia's energy needs.

Reducing methane emissions

ExxonMobil has set strong targets for methane emissions including between 40 and 50 per cent reduction in absolute flaring and methane emissions by 2025 and eliminating routine flaring by 2030 (consistent with the World Bank's initiative to eliminate routine flaring).

The company has reduced flaring associated with its Gippsland operations by approximately 30 per cent over the last two years. This was achieved through optimising the energy footprint of individual pieces of equipment within the site and implementing changes to improve energy use.



CASE STUDIES:

WOODSIDE

Operations: Compressor seal gas vent re-routing to flare

Woodside has clear near and medium-term targets for reducing greenhouse gas emissions on a pathway to achieving its aspiration of net zero by 2050. The company is committed to reducing emissions, including methane emissions, through efficient operations and design of their facilities together with carbon offsets.

One example of Woodside's action on methane reduction is the capture and compression of methane at operating facilities. Low pressure methane vapor (end-flash gas) produced after the liquefaction process is captured and compressed and then recycled back through the LNG train as product.

New controls and piping were installed in 2021 to minimise methane leakage whilst enabling routing of methane streams into the Pluto flare. They are estimated to save 2,400 tCO₂-e per year compared to venting uncombusted methane.

ARROW ENERGY

Air-driven control devices reduce emissions by up to 700 tonnes CO₂-e per year.

Arrow's initiatives to reduce fugitive emissions from its production facilities have reduced emissions by hundreds of tonnes per year. Actions include:

- Replacing natural gas driven pneumatic control devices with air driven pneumatic control devices in Arrow's CSG fields. The switch to an air-driven system has reduced greenhouse gas emissions by up to 700 tonnes CO₂-e per year.
- Commissioning of Daandine-Kogan pipeline to improve management of distressed gas. This improves the distressed gas management option during compression outages (either at Daandine CGPF or APA's Kogan CGPF). This in turn reduces the amount of gas flared or vented at either Daandine CGPF or Kogan CGPF and thereby reduces the rate of fugitive greenhouse gas emissions.

INPEX

Zero routine flaring by 2030 and methane intensity at 0.1 per cent or below

INPEX Corporation has set strong global targets for reducing emissions. By 2030 INPEX is targeting a 30 per cent reduction in Scope 1 and 2 emissions compared to 2019 intensity, and a net zero emissions ambition by 2050.

Specifically on methane emissions, INPEX's target is to maintain its current level of 0.1 per cent methane emissions—where the percentage of methane emissions is determined as the ratio of methane emissions to total natural gas production.

In addition, INPEX is committed to achieving zero routine flaring by 2030.

INPEX Australia has a leak detection and repair regime in place at the Ichthys facilities to minimise fugitive emissions from production.

ORIGIN

Halving flaring and advanced detection keeps methane intensity to less than 0.1 per cent

Origin has reduced flaring at its gas processing facilities by 57 per cent and is also adopting advanced technologies, processes and equipment to further reduce fugitive emissions. This includes retrofitting facilities to reduce venting of methane and fuel gas consumption, and implementation of new wells that feature three electric flow controllers, replacing the gas-driven ones currently used.

As a result of surveying and operational improvements, Origin's methane intensity is less than 0.1 per cent of metered gas sales from operated areas.

“ Industry has committed, both in Australia and globally, to a range of initiatives to reduce fugitive emissions ”



Industry partnership with CSIRO to ensure methane measurement accuracy

APPEA members have partnered with CSIRO to be at the forefront of research into the emissions profile of Australian regions where gas is produced.

Industry works with CSIRO and other independent scientific experts to research landscape emissions, which occur naturally across regional Australia. The aim is to quantify these emissions against operations and to identify and quantify other sources of emissions, such as abandoned coal exploration bores that pre-date gas production, landowner bores and other agricultural activity.

In 2018 and 2019, background and baseline studies were conducted in the McArthur and Amadeus Basins in the Northern Territory, Gunnedah Basin in New South Wales and the Bowen and Surat basins in Queensland, which involved taking continuous measurements over thousands of kilometres on roads and tracks.

The results of each of the studies show that background concentrations of methane were in the range of 1.78 to 1.82 parts per million consistent with normal background concentrations of methane expected in rural or natural areas.

CSIRO also measured emissions from coal seam gas (CSG) wells across the Surat Basin in 2019 as part of its fugitive emissions research. CSIRO found that fugitive emissions from unconventional gas across the Surat Basin were 1.4 per cent of production. This figure included all emissions, not just methane. (*Whole of Life Greenhouse Gas Emissions Assessment of a Coal Seam Gas to Liquefied Natural Gas Project in the Surat Basin, Queensland, Australia, July 2019.*)

In April 2020, the CSIRO released the results of a landmark, three-year scientific research program into the impacts of hydraulic fracturing in Australia, finding it has minimal to no impact on air quality and no detectable impact on local waterways, groundwater or soils. The comprehensive study included more than 1,000 air samples collected from 13 sites across the Surat Basin, which were analysed for various pollutants and chemical concentrations, 113 water samples from different water sources and 40 soil samples (Ambient air quality in the Surat Basin).

CSIRO's Fugitive emissions from unconventional gas fact sheet summarises the latest scientific research on fugitive methane emissions from unconventional gas.



International partnerships and initiatives to reduce methane emissions

APPEA members participate in several international partnerships instrumental to the industry's emission reduction success:

Methane Guiding Principles

A coalition of industry, international institutions, non-governmental organisations and academics focusing on areas of action to reduce methane emissions along the full natural gas value chain.

Oil & Gas Climate Initiative (OGCI)

A consortium of 12-member upstream companies that represent 30 per cent of the world's oil and gas production. OGCI aims to reduce its collective average methane intensity to 0.20 per cent by 2025. OGCI Climate Investment (\$1bn+ fund) allocates 30 per cent to cost-effective technologies to minimise GHG footprint and maximise transparency of the natural gas value chain.

Climate and Clean Air Coalition (CCAC) Oil & Gas Methane Partnership (OGMP)

A multi-stakeholder coalition focused on demonstrating actions to report and reduce methane emissions.

World Bank Global Flaring Reduction Partnership

Zero Routine Flaring by 2030 Initiative for oil/associated gas assets.



“The oil and gas industry, both internationally and in Australia, is working collectively to reduce greenhouse gas emissions and play a positive role in climate change policy developments.”



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