7 August 2026

Submission: Fossil methane: A near-term abatement opportunity

The Australian Pipelines and Gas Association (APGA) represents the owners, operators, designers, constructors and service providers of Australia's pipeline infrastructure. We support a net zero emission future for Australia by 2050[1] and our members are committed to doing their part in the transition to net zero. Our members' assets transport over 1,500 PJpa of gas consumed in Australia, alongside over 4,500 PJpa of gas for export.

APGA welcomes the opportunity to comment on the Climate Change Authority's (CCA) consultation on fossil methane abatement. This abatement is naturally relevant to transmission pipelines, which transport "fossil" methane – natural gas – from production to end use. Despite this relationship there are limited opportunities or incentives under current frameworks for pipeline asset owners to reduce emissions, particularly fugitive emissions which is largely methane. These should be addressed as a priority by governments.

Executive summary

The current National Greenhouse and Energy Reporting scheme (NGERs) is world-leading but needs a fundamental shift in focus if it is to keep pace with international reporting frameworks, with the biggest gap being the ability to report directly measured emissions.

Pipeline infrastructure is relatively lean when it comes to emissions. Nevertheless pipeline assets report methane emissions estimations and reducing these emissions, and particularly fugitive methane emissions, is a priority for gas transmission pipeline operators. It is good business to do so: it enables operators to meet sustainability expectations, as well as reducing the loss of product (known as "unaccounted-for gas"). This is true even when assets do not currently fall over the threshold for inclusion in the Safeguard Mechanism, which is most transmission pipelines.

However, there are mismatched incentives under both the Safeguard Mechanism and NGERs, which largely comes down to the fact that gas pipeline facilities are not permitted to *measure* fugitive emissions. They must make very coarse *estimations* which, depending on which method is selected, is likely to either over or underestimate actual facility emissions.

[1] APGA, *Climate Statement*, available at: https://www.apga.org.au/apga-climate-statement

More importantly, none of the available methods under NGERs allows facilities to demonstrate *changes*, including reductions, in those emissions estimations or differentiate, for example, between leaking components and non-leaking components. This requires "higher order" methods which are not currently available for transmission pipelines or indeed the majority of the resources sector.

The Federal Government, in response to a previous CCA review of NGERs, has appointed an expert panel to provide advice on atmospheric measurement of fugitive methane emissions in Australia. This will begin to bridge the gap to developing a formal framework for higher order methods – but it will take time, with advice to government not due until mid-2027. In the meantime, there is the very real possibility that consequential changes to the Safeguard Mechanism will mean more facilities captures who cannot demonstrate either accurate emissions or reductions to those emissions, undermining the intent of the scheme.

Specific resources sector focus is unnecessary

The CCA justifies the focus on "fossil" methane (methane emissions from the resources sector) in the consultation paper as it makes up around 24% of Australia's reported methane emissions with gas sector emissions contributing about a quarter of this. Relative to the larger agricultural emissions CCA considers these emissions simpler to target and will reap emission reduction rewards sooner.

APGA doesn't disagree that there are indeed currently limited options commercially available to achieve significant abatement in the agriculture sector. In comparison, resources sector emissions are generally tied to facilities which unlike livestock, don't typically move. However, it does not necessarily follow that the next target is necessarily the next best target, and especially not when spread across an entire industry. There are risks in prioritising abatement in one sector over another, not in the least that the energy and commodity needs of the Australian economy make those industries necessary. There are also very limited options to achieve significant abatement in gas transmission pipelines, which is discussed in a later section.

Transmission and distribution pipeline emissions are very small overall part of the total gas supply chain scope 1 emissions, although this is difficult to quantity because across all Safeguard Mechanism gas sector facilities, there are very few pipeline facilities that qualify and hence are required to report. But of those, transmission and distribution pipeline facility emissions make up approximately 3% of reported covered emissions in the Safeguard Mechanism; over 97% comes from non-pipeline facilities, mostly LNG facilities.

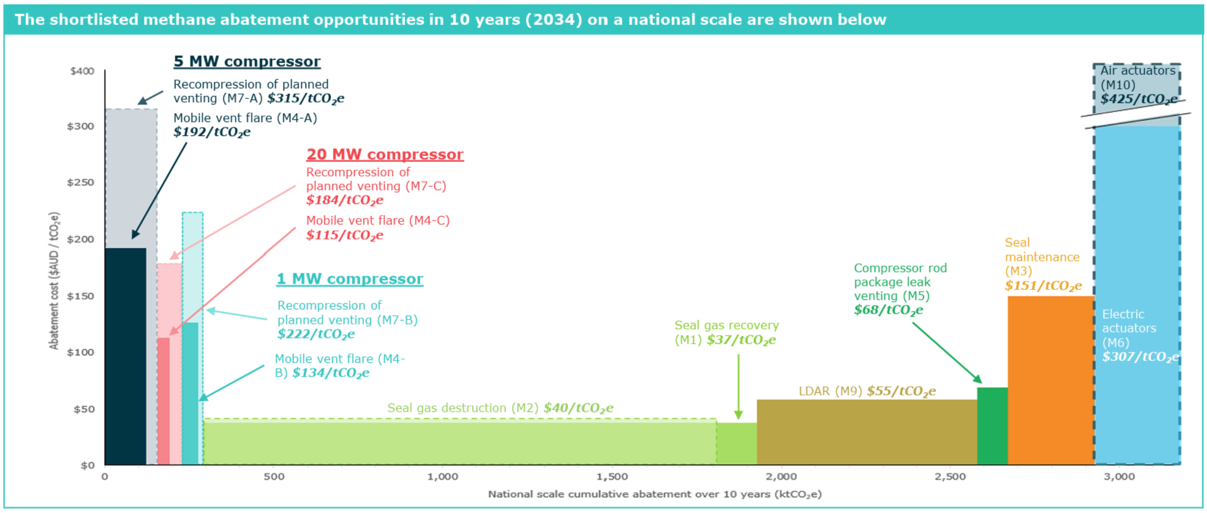
Gas pipeline assets are already working to reduce emissions

Gas transmission pipelines have several broad types of direct emissions: direct combustion emissions, vented emissions, fugitive emissions and non-routine emissions. Excepting CO_2 emissions from combustion, the majority of the emissions from gas transmission assets are methane and hence germane to this consultation. Reducing these emissions are a key focus for gas transmission pipeline operators, despite the fact that currently the majority of assets are not captured under the Safeguard Mechanism.

Exactly how to do this remains up to each asset owner. In 2024 APGA commissioned Worley[2] to study emissions reduction opportunities for Australia's gas transmission network and provide advice to asset owners on key decarbonisation opportunities. This analysis, published as *Australia's pipeline methane and gas combustion emissions reduction opportunities*, identifies strategies to reduce both fugitive methane and gas combustion emissions, relative to an assumed carbon price to determine best vale.

This analysis revealed some surprising results. For example, contrary to assumptions, the "low hanging fruit" of eliminating gas-actuated valves proved to be one of the costlier options with lower reduction potential relative to other opportunities. Importantly, many opportunities can be implemented at a lower cost than the Safeguard Mechanism's $75 ACCU cap, and hence represent no regrets investment. Additionally, transitioning compressors to renewable gas is more cost-effective than electrification, particularly when grid connection is required – but this is dependent on a scaled renewable gas industry backed by a robust certification scheme and, more critically, enabling policy. The latter is currently insufficient.

These opportunities are demonstrated in the below graph, which shows abatement opportunities relative to cost. The largest abatement opportunities are the centrifugal compressor seal gas recovery opportunities and implementing leak detection and repair programs.



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[2] Worley Consulting, 2024, *Australia's pipeline methane and gas combustion emissions reduction opportunities*, https://apga.org.au/en-au/pipeline-methane-and-gas-combustion-emissions-reduction

Pipeline facility owners are actively considering what components can be replaced or augmented to reduce emissions. For example,

- SEA Gas is implementing system optimisations to reduce fuel gas consumption.
- Jemena is exploring projects including electrifying end-of-life compressors and water bath heaters on the Queensland Gas Pipeline, optimising compressor operations and settings, introducing dry-gas seal re-injection, and expanding a trial of capturing and re-injecting vented gas.
- APA has implemented a range of activities across its assets, including
    - compressor valve and compressor seal upgrades and fuel gas optimisation models to achieve fuel gas reductions, and completed engineering studies and delivery planning for compressor methane recovery;
    - commissioning an electric motor drive compressor station for the Kurri Kurri Lateral Pipeline Project;
    - studying the feasibility of electrifying the Wallumbilla compressor, and is now instead considering biomethane options for that asset.
- AGIG's decarbonisation activities for its transmission asset, the Dampier to Bunbury Pipeline, includes pipeline reconfiguration to reduce compressor requirements, progressive replacement of gas engine alternators, and progressive electrification of closed-circuit vapour turbines. Its extensive distribution mains replacement program is replacing old cast iron mains with polyethylene piping, reducing leaks.

Pipeline fugitive emissions remain between a rock and a hard place

Many of the opportunities identified above are aimed at reducing fugitive emissions from components. Unfortunately, translating this from theory to reality is much more difficult than for combustion emissions, because of the way NGERs handles these emissions.

This has implications for the ability of gas pipeline operators to both accurately report emissions, and to be able to report *reductions* in emissions. While currently there are only a few transmission pipelines that are also Safeguard Mechanism Facilities (SMFs), APGA is very aware that the upcoming Safeguard Mechanism Review may change the threshold to capture more facilities.

NGERs fugitive emission estimation methods for gas transmission pipelines

Currently, NGERs provides three methods to gas transmission pipeline for *estimating* fugitive emissions. Method 1 is a simple calculation based on a standard emissions factor per length of pipeline.

3.76 Method 1—natural gas transmission (other than flaring)

Method 1 is:

$$E_{ij} = (L_i \times EF_{ij})$$

where:

$\boldsymbol{E_{ij}}$ is the fugitive emissions (other than flaring) of gas type (***j***) from natural gas transmission through a system of pipelines of length (***i***) during the year measured in CO_2-e tonnes.

$\boldsymbol{L_i}$ is the length of the system of pipelines (***i***) measured in kilometres.

$\boldsymbol{EF_{ij}}$ is the emission factor for gas type (***j***), which is 0.02 for carbon dioxide and 11.6 for methane, measured in tonnes of CO_2-e emissions per kilometre of pipeline (***i***).

Method 2 uses emissions factors for separate components, varying the amounts of gas/condensate. The component emissions factors are sourced from the American Petroleum Institute (API) Compendium, which provides ways to measure and calculate greenhouse gas emissions in the oil and gas industry. For lack of an alternative, the Australian NGERs utilises the API Compendium for oil and gas emissions factors.

3.77 Method 2—natural gas transmission (other than flaring)

(1) Method 2 is:

$$E_j = \sum_k (Q_k \times N_k \times EF_{jk})$$

where:

$\boldsymbol{E_j}$ is the fugitive emissions (other than flaring) of gas type (***j***) measured in CO_2-e tonnes from the natural gas transmission through the system of pipelines during the year.

$\boldsymbol{\Sigma_k}$ is the total emissions of gas type (***j***) measured in CO_2-e tonnes and estimated by summing up the emissions released from each equipment type (***k***) listed in sections 5 and 6.1.2 of the API Compendium, if the equipment is used in the natural gas transmission.

$\boldsymbol{Q_k}$ is the total of the quantities of natural gas or plant condensate measured in tonnes that pass through each equipment type (***k***) or the number of equipment units of type (***k***) listed in sections 5 and 6.1.2 of the API Compendium, if the equipment is used in the natural gas transmission during the year.

$\boldsymbol{N_k}$ is the total number of equipment units of each equipment type (***k***) listed in section 6.1.2 of the API Compendium if the equipment type is used in the natural gas transmission during the year.

$\boldsymbol{EF_{jk}}$ is the emission factor of gas type (***j***) measured in CO_2-e tonnes for each equipment type (***k***) listed in sections 5 and 6.1.2 of the API Compendium as determined under subsection (2), where the equipment is used in the natural gas transmission.

(2) For $\boldsymbol{EF_{jk}}$, the emission factors for a gas type (***j***) as the natural gas or plant condensate passes through the equipment type (***k***) are:

(a) as listed in sections 5 and 6.1.2 of the API Compendium, for the equipment type; or

(b) as listed in that Compendium for the equipment type with emission factors adjusted for variations in estimated gas composition, in accordance with that Compendium's sections 5 and 6.1.2, and the requirements of Division 2.3.3; or

(c) as listed in that Compendium for the equipment type with emission factors adjusted for variations in the type of equipment material estimated in accordance with the results of published research for the crude oil industry and the principles of section 1.13; or

(d) if the manufacturer of the equipment supplies equipment-specific emission factors for the equipment type—those factors; or

(e) estimated using the engineering calculation approach in accordance with sections 5 and 6.1.2 of the API Compendium.

Method 3 also uses emissions factors for separate components, varying the hours of operation.

3.78 Method 3—natural gas transmission (other than flaring)

(1) Method 3 is:

$$E_j = \sum_k (T_k \times N_k \times EF_{jk})$$

where:

$\boldsymbol{E_{ij}}$ is the fugitive emissions (other than flaring) of gas type (*j*) measured in CO_2-e tonnes from the natural gas transmission through the system of pipelines during the year.

$\boldsymbol{\Sigma_k}$ is the total emissions of gas type (*j*) measured in CO_2-e tonnes and estimated by summing up the emissions released from each component type (*k*) listed in section 6.1.3 of the API Compendium, if the component is used in the natural gas transmission.

$\boldsymbol{T_k}$ is the average hours of operation during the year of the components of each component type (*k*) listed in section 6.1.3 of the API Compendium, if the component is used in the natural gas transmission during the year.

$\boldsymbol{N_k}$ is the total number of components of each component type (*k*) listed in section 6.1.3 of the API Compendium if the component type is used in the natural gas transmission during the year.

$\boldsymbol{EF_{jk}}$ is the emission factor of gas type (*j*) measured in CO_2-e tonnes for each component type (*k*) listed in 6.1.3 of the API Compendium as determined under subsection (2), where the component is used in the natural gas transmission.

(2) For $\boldsymbol{EF_{jk}}$, the emission factors for gas type (*j*), as natural gas or plant condensate passes through a component type (*k*), are:

(a) as listed in Table 6-18 in section 6.1.3 of the API Compendium, for the component type; or

(b) as listed in that Compendium for the component type with emission factors adjusted for variations in estimated gas composition, in accordance with that Compendium's Table 6-18 in section 6.1.3, and the requirements of Division 2.3.3; or

(c) as listed in that Compendium for the component type with emission factors adjusted for variations in the type of component material estimated in accordance with the results of published research for the crude oil industry and the principles of section 1.13; or

(d) if the manufacturer of the component supplies component-specific emission factors for the component type—those factors; or

(e) estimated using the engineering calculation approach in accordance with section 6.1.3 of the API Compendium.

This only way to reduce estimated fugitive emissions under Method 1 is to reduce the length of the pipeline. Nevertheless, Method 1 is the method all gas transmission pipeline operators use, which likely provides an underestimate of emissions relative to direct measurement. Methods 2 and 3 are considered commercially impractical – they would likely result in an overestimate of emissions for some components, largely due to actual differences in components used in North American versus Australia.

This concern has merit. FirstGas, which operates New Zealand's gas transmission pipelines, is currently undertaking an emissions factor validation project, comparing measured emissions to the API Compendium. Initial results from direct measurement of fugitive emissions of more than 18,000 individual components demonstrate that actual emissions were considerably lower than the assumed API emissions factors. New Zealand uses similar asset components to Australia.

The API Compendium provides what is effectively an average emission for each component. Hence, Methods 2 and 3 also do not easily permit variations to those factors based on actual operation of those components – including whether they are actively leaking, or not leaking, which requires direct detection if not measurement.[3]

Higher order methods needed sooner rather than later

Direct measurement of emissions (which form the basis of "higher order" emissions reporting methods) is commonly used and often required by regulators overseas (such as in the EU, Japan and Korea). In the oil and gas sector, the UN Environment Programme's Oil and Gas Methane Partnership 2.0 (OGMP 2.0) is considered the flagship scheme, and

[3] Incidentally, leaker/non-leaker component emissions factors are available for upstream oil and gas operations.

provides a comprehensive, measurement-based framework which requires reporters to shift from generic emissions estimates to higher order methods.

While de rigueur internationally, there is currently no scope for use of direct measurement for estimating methane emissions for the oil and gas sector in Australia. This was identified in the Climate Change Authority's 2023 review of NGERs in 2023[4], which noted:

> *The authority's analysis suggests that direct measurement methods or detailed engineering calculations should be made available for all activities reported in the oil and gas sector, to ensure all emission sources with high materiality can be measured using Method 4. Gold standard reporting under OGMP 2.0 guidelines require a minimum of 70%, and targets of over 90%, of an oil and gas asset's total emissions to be reported at the equivalent of Method 4 (OGMP, 2022). Higher order method availability will enable enhanced monitoring of emissions reductions and facilitate Australian reporters to be able to sign up for OGMP 2.0.*

In response, the Federal Government appointed an Expert Panel on Atmospheric Measurement of Fugitive Methane Emissions to provide advice on atmospheric methane detection for the coal, oil and gas sectors. Their goal is to advise whether these approaches could enhance Australia's estimation of fugitive methane emissions, with an initial focus on open cut coal mine emissions.

The Panel is not due to report until mid-2027, and this reporting will be in an advisory capacity. Government will need to consider and respond to this advice, with the implication this may not be implemented in any kind of useful way until closer to 2030. Meanwhile, gas transmission pipeline operators are embarking on direct methane detection and measurement programs regardless of whether they can formally be used in reporting:

- Jemena's Leakage Survey Program uses Picarro methane detectors mounted on vehicles to detect and quantitively measure emissions from its Jemena Gas Networks distribution operations. Picarro is used across more than thirty gas networks in Europe and North America. Within Australia, Jemena is sharing information with other gas network operators are seeking to implement the Picarro system.
- APA is progressing an aerial survey method of some of its pipeline assets, using helicopter- and drone-mounted LiDAR methane detectors and using the US EPA Method 21 for converting detected parts per million to volume flow rates, consistent with the methodology that would be applied under OGMP2.0. Through this it has delivered enhanced methane measurements at the Mondarra Gas Storage and Processing Facility, Eastern Goldfields Gas Pipeline and the South West Queensland Pipeline.

[4] Climate Change Authority, 2023, *2023 review of the National Greenhouse and Energy Reporting legislation*, https://www.climatechangeauthority.gov.au/sites/default/files/documents/2023-12/2023%20NGER%20Review%20-%20for%20publication.pdf

APGA does not necessarily recommend a direct implementation of the OGMP2.0 approach to the Australian context. For instance, membership of OGMP2.0 puts a time limit on moving to the highest order method (the Gold Standard), which may not be reasonable or necessary for Australian facilities. However, aspects of the framework can and should provide a basis for developing methods 4 and 5 for the Australian oil and gas sector, where it can be used to augment the wheel rather than reinvent it.

To discuss any of the above feedback further, please contact Catriona Rafael, Head of Policy, on +61 409 489 814 or crafael@apga.org.au.

Consultation Questions

1. Do current policies and measures adequately cover the material sources of fossil methane emissions in Australia? For example, are emissions from decommissioned and abandoned mines material, and are they adequately monitored and mitigated?

- APGA observes that emissions from back-up diesel generator fleets for data centre developments may be underrepresented in current policies. While governments are exploring "bring your own" renewable energy expectations for data centre proposals, it is not clear whether this covers back-up power arrangements.

2. To what extent will Australia's current policy settings, including the Safeguard Mechanism and state regulations, drive near term fossil methane abatement? Please provide relevant analysis or evidence.

- Methane abatement for gas transmission pipeline assets is largely driven by company-level internal policies and governance, as most of these assets are not Safeguard Mechanism Facilities.
- The price of ACCUs is not high enough to encourage abatement across all industries and even if it was, there is no way for gas transmission SMFs to get ACCU 'credit' for even essential regular activities to reduce Unaccounted For Gas.

3. What fossil methane abatement technologies and practices are commercially ready, or likely to be viable in the near term in Australia? Where available, please provide indicative costs, timelines, and examples.

- Fossil methane abatement is technically challenging for the gas infrastructure industry but not impossible. There are a number of avenues for abatement of methane emissions, such as valve seals, amended blowdown, flaring and venting practices, water heater electrification, and compressor decarbonisation through renewable gas use or electrification.
- The need to mitigate emissions from venting has led to some innovative technology development. Venting is a necessary part of pipeline maintenance, but historically that gas has been vented to atmosphere. Zevac has developed a compressed air pump system that allows 100% of that gas to be vented into an adjacent pipeline or appropriate storage container, eliminating fugitive emissions from that process.
- Worley's Australia's pipeline methane and gas combustion emissions reduction opportunities report details the breadth of opportunities available to gas transmission pipeline operators.

5. What are the main barriers – whether commercial, regulatory, market or other – preventing the uptake of fossil methane abatement opportunities in Australia? How could those barriers be overcome?

7. Do current approaches to measuring, reporting and verifying fossil methane emissions create any practical barriers to the uptake of abatement options in Australia? Please identify the relevant issue and explain how it affects abatement decisions, incentives or compliance outcomes.

- As discussed in the substantive submission, current NGERs fugitive emissions estimation methods for gas transmission pipelines cannot use direct measurements. This means they also do not recognise leaking vs non-leaking components, or changes in operations such as reducing venting. The only way to reduce estimated emissions is to use fewer components, have less throughput, or physically shorten the pipeline.
- All gas transmission assets use Method 1. The only way to reduce estimated emissions is to physically shorten the pipeline.
- Using Methods 2 and 3 is similarly impractical. The only way to reduce assumed fugitive emissions under these methods is to use fewer components or have less throughput. These methods rely on the American Petroleum Institute (API) Compendium as a source for emissions factors for components, despite considerable differences in the type of components used in Australia.
- Under all of these methods, efforts to reduce fugitive emissions like repairing leaking components, or changes in operations such as reducing venting, cannot be reflected in reported emissions. This means there is little regulatory incentive for gas transmission pipeline operators to invest in methane emissions abatement technologies or processes. Operators who do so presently are doing so through their own initiative.
- Higher order methods, that emphasise the use of direct measurement of emissions, must be developed for gas transmission assets as a priority.