



GOVERNMENT OF
WESTERN AUSTRALIA

Monitoring, mitigation and offsetting of Greenhouse Gas Emissions for hydraulic fracturing proposals in Western Australia

Position Paper
December 2021

Implementation of the Government's response to the Independent Scientific Panel Inquiry into Hydraulic Fracture Stimulation in Western Australia

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1. PURPOSE

The purpose of this paper is to explain the State Government's position relating to the implementation of the Independent Scientific Panel Inquiry into Hydraulic Fracture Stimulation in Western Australia's (the Inquiry) recommendations for the monitoring, **mitigation** and offsetting of greenhouse gas (GHG) emissions from hydraulic fracturing proposals in Western Australia.

This Position Paper closes out Action 10 of the Government's Implementation Plan.

2. BACKGROUND

The State Government announced the establishment of the Inquiry in September 2017.

In September 2018, the Independent Scientific Panel handed its report to the Minister for Environment. The report, containing 91 findings and 44 recommendations, was released publicly in November 2018 via the [Inquiry's website](#).

The State Government accepted in-principle the Inquiry's 44 recommendations; and on 27 November 2018 announced its Policy Decisions (Government's Decisions) relating to hydraulic fracture stimulation (**hydraulic fracturing**) in Western Australia.

On 12 July 2019, the State Government released its [Implementation Plan](#), itemising the Actions necessary to implement its response to the Inquiry.

This paper is the State Government's response to the Inquiry recommendations 10, 11, 12, and 13 as they relate to the monitoring, mitigation and offsetting of GHG from hydraulic fracturing.

What is a greenhouse gas?

GHG is a gas that absorbs and emits radiant energy within the thermal infrared range. The greenhouse gases that are reported under the *National Greenhouse and Energy Reporting Act 2007* (NGER Act) include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆) and specified kinds of hydro fluorocarbons and perfluorocarbons.

The Inquiry noted that the principal GHG emissions associated with hydraulic fracturing for the oil and gas production industry are CO₂ and CH₄.

What are GHG offsets?

GHG offsets are generated from activities that avoid emissions of greenhouse gases or remove greenhouse gases from the atmosphere and therefore offset the impacts from emissions occurring elsewhere. Offsets are generated under a number of different schemes. Government will have regard to integrity, transparency and provenance in authorising offsets for the purposes of compliance with EP Act/ Ministerial conditions. Such offsets may be limited to a subset (not all) of those eligible under the Commonwealth's **Climate Active Carbon Neutral Standards** (formerly the National Carbon Offset Standards) such as:

- a) [Australian Carbon Credit Units](#) (ACCUs) issued under the *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cwth);
- b) [Verified Emission Reductions](#) (VERs) issued under the Gold Standard program; and
- c) [Verified Carbon Units](#) (VCUs) are fully accredited and traded carbon credits sourced from projects worldwide, including many in the developing world verified by the Verified Carbon Standard program that is managed by [Verra](#).
- d) Any other offset proposed and justified by the proponent and approved by the Minister on advice from the Environmental Protection Authority (EPA) may also be found acceptable.

World Bank zero routine flaring by 2030

To eliminate emissions of CO₂ to the atmosphere from routine flaring of reservoir gas, the World Bank established the Zero Routine Flaring by 2030 initiative (ZRF 2030) to bring together governments, oil companies and development institutions who agree to cooperate to eliminate routine flaring no later than 2030.

ZRF 2030 is based on the premise that routine flaring is not sustainable during production from a resource management and environmental perspective.

In February 2019, the Western Australian Government became the first Australian jurisdiction to endorse the World Bank's ZRF 2030 initiative.

Companies operating production oil and gas fields in Western Australia are therefore required to comply with ZRF 2030.

3. GUIDING PRINCIPLES

The Government has developed the following guiding principles for the estimation, monitoring, mitigation and offsetting of GHG emissions from onshore oil and gas exploration and production involving hydraulic fracturing in Western Australia:

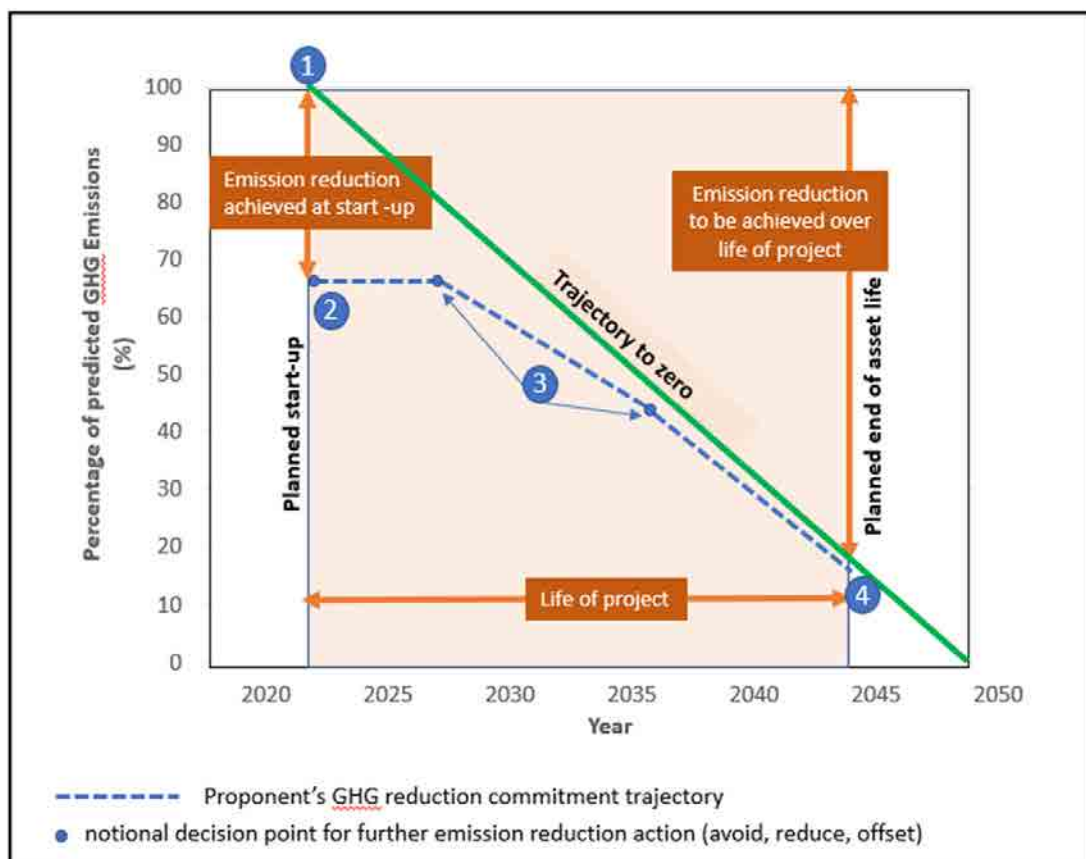
1. All proposals for onshore oil and gas exploration and production involving hydraulic fracturing are required to be referred to the EPA under the *Environmental Protection Act 1986* (EP Act), as required by regulation 2C of the Environmental Protection Regulations 1987. If formally assessed, the EPA may determine that GHG emissions throughout the life of the proposal is a key environmental factor for hydraulic fracturing proposals.
2. All proposals for onshore oil and gas exploration and production involving hydraulic fracturing are required to comply with relevant hydraulic fracturing regulations under the EP Act and the *Petroleum and Geothermal Energy Resources Act 1967* (PGER Act). The Regulations ensure enforceability of the 14 recommendations of the Inquiry relating to the Code of Practice, setting minimum standards and requirements for ensuring well integrity, reduced emissions completions, monitoring and reporting of GHG emissions and detection and repair of leaks over the **life cycle** of wells.
3. All proposals for onshore oil and gas exploration and production involving hydraulic fracturing must address GHG emissions in a manner consistent with the *Greenhouse Gas Emissions Policy for Major Projects* by application of the mitigation hierarchy to avoid, reduce and offset emissions.
4. All proposals for onshore oil and gas production involving hydraulic fracturing will be required to offset fugitive emissions, including reservoir CO₂ released to the atmosphere.
5. That Government's response to the Inquiry's recommendations should be implemented as an integrated approach to the estimation, monitoring, mitigation and offsetting of GHG over the lifecycle of hydraulic fracturing projects.

4. ACHIEVING NET ZERO GREENHOUSE GAS EMISSIONS BY 2050

The State Government policy has set an aspiration of net zero emissions by 2050 and a commitment to working with all sectors of the Western Australian economy to achieve this goal.

Figure 1 illustrates the principles to be considered by a proponent to achieve net zero GHG emissions from oil and gas proposals involving hydraulic fracturing, by 2050.

Figure 1. Towards zero GHG emissions



The proponent should:

- 1 estimate all Scope 1 and Scope 2 **GHG** emissions (including **fugitive emissions**) for the proposal, prior to the application of avoidance, reduction and offset strategies;
- 2 estimate the % **GHG** emission reduction proposed at start-up from avoiding and reducing **fugitive emissions** released to the atmosphere;
- 3 demonstrate a production proposal's trajectory to achieve net zero **GHG** emissions by 2050 and progress to achieving this goal; and
- 4 estimate the % **GHG** emission reduction to be achieved over the life of project.

5. POSITION: MONITORING, MITIGATION AND OFFSETTING GHG EMISSIONS

The following requirements will apply to all onshore oil and gas proposals involving hydraulic fracturing:

1. For both exploration and production proposals the **title holder** is required to:
 - engage the Commonwealth Scientific and Industrial Research Organisation to independently design, undertake, manage and review the baseline GHG monitoring program on their **petroleum titles** and prepare the Baseline GHG Monitoring Report;
 - submit the baseline GHG monitoring plan for approval by the **Relevant State Decision Maker**, at the time of referral of the proposal to the EPA and Department of Mines, Industry Regulation and Safety (DMIRS);
 - undertake the monitoring program prior to assessment and approval of the proposal and prior to commencement of any petroleum activities. It must at a minimum include:
 - o four seasonally representative baseline monitoring campaigns within the relevant **petroleum title**, each of minimum 14 days duration within a period of not less than 12 months duration, prior to commencement of any **petroleum activities**, to account for natural diurnal and seasonal variability. Each campaign to involve:
 - mobile monitoring across trafficable roads and tracks within the project's **petroleum title**, utilising state of the art analysers and methodologies to quantify ambient air concentrations and fluxes of CO₂ and CH₄; and
 - involve fixed monitoring for ambient air concentrations and fluxes of CO₂ and CH₄ in proximity to the proposed well pads;
 - submit the Baseline GHG Monitoring Report and data to the EPA and DMIRS as part of the project assessment documentation;
 - publish the baseline report and data on a publicly accessible website in accordance with the EPA Guideline for making information publicly available;
 - estimate annual and total (for life of project) **scope 1, scope 2 and scope 3 emissions** for **GHGs** listed under the NGER Act, with total emission expressed as tonnes carbon dioxide equivalent, for all sources including mobile and stationary plant and machinery, land clearing, site preparation, **hydraulic fracturing** operations, gas flaring and potential leakages;
 - commit to and implement strategies for mitigating **fugitive emissions**;
 - demonstrate compliance with the minimum standards and requirements of the relevant regulations;
 - maintain well integrity over the **life cycle** of every well (i.e. during the drilling, well completion, development, operation, suspension and following decommissioning phases of a well);
 - provide a monitoring and reporting program, measuring atmospheric concentrations and process leakage of methane over every well's entire **life cycle**, with recognition that any detected leaks must be fixed by the operator; and
 - prepare a greenhouse gas management plan in accordance with EPA Environmental Factor Guideline – Greenhouse Gas Emissions¹.

¹www.epa.wa.gov.au/policies-guidance/environmental-factor-guideline-%E2%80%93-greenhouse-gas-emissions-0 Environmental Factor Guideline – Greenhouse Gas Emissions

2. Additionally, for production proposals, the proponent is required to:
- commit to the World Bank’s Zero Routine Flaring 2030 initiative²;
 - undertake reduced emission completions (“**green completions**”) of production wells;
 - report scope 1 and scope 2 emissions recorded or estimated consistent with the National Greenhouse and Energy Reporting scheme, on a publicly accessible website in accordance with the EPA Guideline for making information publicly available;
 - offset all reservoir CO₂ emissions released to the atmosphere; and
 - for scope 1 emissions, set interim and long-term targets to demonstrate how the proposal will achieve net zero GHG emissions by 2050 and publicly report progress towards achieving this goal (See Figure 1).

6. ADDITIONAL GUIDANCE

Other useful guidance regarding reduction of GHG emissions from oil and gas exploration and production involving hydraulic fracturing is provided below.

Department / organisation	Document and link
Environmental Protection Authority (WA)	Technical Guidance: Environmental Impact Assessment of Onshore Hydraulic Fracture Stimulation Proposals (under development)
	Environmental Factor Guideline – Greenhouse Gas Emissions).
Western Australian Government	Greenhouse Gas Emissions Policy for Major Projects
	World Bank Zero Routine Flaring 2030 policy
The United States Environmental Protection Agency (US EPA)	Reduced Emissions Completions (green completions)
Department of the Prime Minister and Cabinet, Australia	Australia’s 2030 Emission Reduction Target
Australian Government Clean Energy Regulator	National Greenhouse and Energy Reporting Act 2007
	National Greenhouse and Energy Reporting (Measurement) Determination 2008

² www.worldbank.org/en/programs/zero-routine-flaring-by-2030

7. GLOSSARY OF SELECTED TERMS

Term	Definition
Carbon dioxide equivalent (CO₂ -e)	A standard measure that takes account of the global warming potential of different greenhouse gases and expresses the effect in a common unit, usually expressed as tonnes carbon dioxide equivalent (tCO ₂ -e).
Climate Active Carbon Neutral Standards (CACNS)	The CACNS were previously called the National Carbon Offset Standards which were established in 2010 and rebranded in 2019 under the Climate Active Initiative. They are voluntary standards for managing greenhouse gas emissions and to achieve carbon neutrality. They provide best-practice guidance on how to measure, reduce, offset, report and audit emissions and certify emissions reduction that occur as a result of the operations of an organisation.
Decommissioned well	A well permanently closed off when it is depleted and no longer capable of producing profitably. The well is permanently plugged downhole, producing subsurface formations have been isolated and permanently plugged, and is basically permanently decommissioned.
Fugitive emissions	Are “greenhouse gas emissions that are released in connection with, or as a consequence of, the extraction, processing, storage or delivery of fossil fuel”. The fugitive emissions required to be measured and reported under the NGER (Measurement) Determination 2008 include emissions released from gas flared from natural gas production and processing, fugitive emissions of methane, and deliberate venting of gases including the release of reservoir CO ₂ .
Green completions	An alternate practice to conventional venting or flaring of CH ₄ to atmosphere, that captures gas produced during well completions and well workovers following hydraulic fracturing and delivers it to pipelines or mobile pressure vessels for sale/use.
GHG (Greenhouse gas)	Greenhouse gases are gases that absorb and emit radiant energy within the thermal infrared range. The greenhouse gases that are reported under the NGER Act include carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), sulfur hexafluoride (SF ₆) and specified kinds of hydro fluorocarbons and perfluorocarbons. The principal GHG emissions associated with petroleum activities involving hydraulic fracturing for the oil and gas production industry are CO ₂ and CH ₄
Hydraulic Fracturing	A process used to enhance the productivity of an oil or gas well. Petroleum and Geothermal Energy Resources (Hydraulic Fracturing) Regulations 2017 define hydraulic fracturing as the underground petroleum extraction process that involves the injection of fluids under high pressure into low permeability rock to induce fractures for the purpose of increasing the rock’s permeability.

Term	Definition
Life cycle (of a well)	Includes the period from inception to end of life of a well involving planning and exploration; design and construction; completion and operation; suspension; and decommissioning phases of a well, and rehabilitation of the land.
Mitigation of emissions	Application of the hierarchy to avoid, reduce and offset emissions by application of strategies and controls to reduce net GHG emissions. These may include the use of renewable energy sources, adoption of best practice design, technology and management, preventative maintenance programs and carbon capture and storage, among other things.
Operator	The company or legal entity implementing the proposal once approved, whose job is to manage, use and control the activities and equipment on site. The operator may also have been the proponent for the project.
Petroleum activity	Any operations or works carried out in the State under a petroleum instrument or relating to petroleum exploration or development which may have an environmental impact as itemised in the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012.
Petroleum Title(s)	The onshore Petroleum Exploration Permits, Petroleum Retention Leases and Petroleum Production Licences existing as of 26 November 2018, held by the proponent, issued under the PGER Act, administered by DMIRS.
Proponent	The company or legal entity proposing a project for approval. The proponent may also become the operator , once the proposal is approved for the project.
Relevant State Decision (Maker)	The approval of, or the grant of, or amendment to, an authorisation under a State law that involves the assessment of environmental impacts of the kind with which the relevant requirement is concerned. (The agency within which the jurisdiction for making that decision lies).
Reservoir carbon dioxide (CO₂)	CO ₂ that is present in the extracted natural gas (or oil) that is released to the atmosphere prior to the energy intensive liquefaction process that transforms it into liquefied natural gas (LNG). The CO ₂ occurs naturally as part of natural gas (or oil) and originates from the source rocks in a petroleum reservoir. The CO ₂ content of any given petroleum reservoir is mainly related to the source rock properties, including volume and composition of the organic matter within the source rock, and the geothermal maturity conditions and may be present as a gas or liquid.

Term	Definition
Scope 1 emissions	Direct emissions released into the atmosphere arising from the activities under the control of the proponent, at a facility level, including those from leakage, venting and flaring and the emissions from vehicles and equipment on site.
Scope 2 emissions	Indirect emissions from the consumption of purchased electricity, heat or steam produced outside the proponent's control. Most scope 2 emissions represent electricity consumption but can include other forms of energy transferred across facility boundaries.
Scope 3 emissions	Indirect emissions generated in the wider economy as a result of activities of a facility (e.g. production and sale of LNG to a third party), occurring as a consequence of sources not owned or controlled by that facility's business (e.g. third party use of the LNG).
Title holder	The person or entity to whom a petroleum title has been issued.

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