Australian Gas Infrastructure Group

WEST ERREGULLA PROCESSING PLANT AND PIPELINE

Greenhouse Gas Environmental Management Plan

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1 Executive Summary

AGI Operations Pty Limited (AGIO) propose to construct and operate a gas processing plant and pipeline near Dongara, Western Australia collectively referred to as the West Erregulla Gas Project (WER).

This Greenhouse Gas Environmental Management Plan (**GHG EMP**) was prepared in accordance with the *Instructions on how to prepare Environmental Protection Act 1986 (WA) Part IV Environmental Management Plans* published by the Western Australian Environment Protection Authority (2020a). Additionally, the April 2023, *EPA Environmental Factor Guideline – Greenhouse Gas Emissions* (EPA Factor Guidelines) and the *Greenhouse Gas Environmental Management Plan Template* was utilised.

The GHG EMP details the measures that are required to manage greenhouse gas emissions from the Proposal as summarised in Table 1-1.

Table 1-1: GHG EMP Executive Summary

Section 1	
Proposal name	West Erregulla Gas Processing Plant and Pipeline
Proponent name	AGI Operations Pty Limited
Proposal description and scope	The project includes the processing of gas from upstream wells (different upstream proponent) and transport of the gas to the Dampier to Bunbury Natural Gas Pipeline (DBNGP). The Proposed Action includes: • A gas processing facility (WEF), with a nominal design flow capacity of 87 terajoules per day (TJ/d); • A 16.5 km interconnecting buried gas pipeline between the WEF and the DBNGP tie- in point at MLV 93(WEP); • A pig launcher station; • A custody transfer metering facility located at the DBNGP tie in point (WEM); • Vegetation clearing of up to 90 ha of land to support the above infrastructure; and • Supporting infrastructure proposed to include but not limited to accommodation, power generation, flare system, water treatment package, back-up diesel system and communications. The location is 30 kilometres southeast of Dongara in Western Australia. The local government area is Shire of Irwin and Shire of Three Springs.
Purpose of the GHG environmental management plan	This GHG EMP identifies management and mitigation measures to ensure impacts from greenhouse gas emissions associated with the Proposal are not greater than predicted.

Emissions Estimates	The annual estimation of emissions differs depending on the phase of the project. This project has four key phases; 1. Construction; 2. Optimisation; 3. Operations; and 4. Decommissioning It is noted that in the project there are no identified Scope 2 emissions. As per the EPA Factor Guidelines, Scope 2 are defined as 'emissions from the independent consumption of an energy product by the proposal'. The project does not consume any power (energy product) from an independent source and all energy consumption is covered under Scope 1. This applies across all four phases of the project with all electricity generation produced and consumed is for the project and included in all Scope 1 emission calculations. <u>Construction</u> The annual emissions estimates for the project during construction are: • Scope 1 – 28,750 tCO_{2e} per annum which includes 25,830 loss through vegetation clearing. • Scope 2 – No Scope 2 emissions. • Scope 3 –,581 tCO_{2e} per annum upstream construction emissions (by a separate proponent) which includes 11,634 loss through vegetation clearing . • TOTAL - The construction period is expected to be two years and includes accommodation of personnel, fleet vehicles, mobile plant and equipment, diesel generators for power at construction sites. There are no downstream emissions as the plant and pipeline will not be operating so Scope 3 only encompasses upstream emissions. <u>Optimisation</u> The annual emissions estimates for operations in the first two years of operations (optimization of efficiency) are: • Scope 1 – 105,951 tCO_{2e} per annum. • Scope 2 – No Scope 2 emissions. • Scope 3 – 127,020 tCO_{2e} per annum. • TOTAL – 232,971 tCO_{2e} per annum The optimisation phase is built around refining and improving the running efficiency of the plant. This includes optimal run times, ensuring fault finding, improved onsite knowledge of processes and reduction in blowdown or maintenance that lead to controlled gas releases. <u>Operations</u> The annual emissions estimates for operations (long term post optimisation period) are: • Scope 1 – 96,319 tCO_{2e} per annum • Scope 2 – No Scope 2 emissions. • Scope 3 – 127,020 tCO_{2e} per annum • TOTAL – 223,339 tCO_{2e} per annum

	Decommissioning The annual emissions estimates for decommissioning alter per year based on 18 month decommissioning of facilities and monitoring requirements up until 2050 (which extend past 2050 on a three-year cycle based on the Rehabilitation and Offset Management Plan). Due to the timeframes involved an estimate of emissions has been used based on construction emissions plus allowances for additional plant use for rehabilitation. The emissions for the decommissioning period are Scope 1- 45,000 tCO_{2e} estimated over 18 months. Rehabilitation monitoring is estimated at 1,000 tCO_{2e} per annum for all subsequent rehabilitation monitoring years. There are no identified Scope 3 emissions once operations have ceased. Total emissions for the project over the life of project to 20 June 2050 are: Total Estimated Emissions – 2,088,963 tCO_{2e}
Trajectory of emissions reductions	Design phase emissions reductions (estimated at >30,000 tCO_{2e} per annum) are not included in setting of the baseline emissions. These controls were initiated as part of the planning phase to ensure emissions are avoided where possible with current technology. Emissions in the first two years (105,951 tCO_{2e}) will be utilised as the baseline emissions. This is due to the estimated highest volume of emissions as well as the commencement of operations. The justification for using this include: • Emissions reduction • First two years • First five years from efficient operations (post two year optimisation) The trajectory of emissions is aligned with the EPA factor guideline in relation to deep, substantial and sustained emissions reductions and the achievement of net zero emissions by 2050. AGIG has a target to reach net zero emissions prior to 2050 dependent on available technology and feasibility of implementation at the regional yet remote location.
Other statutory decision-making processes which require reduction in GHG emissions	While the project also underwent review under the *Environmental Protection and Biodiversity Conservation Act* (1999) this did not require a GHG emissions reduction program. The Safeguard Mechanism under the *National Greenhouse and Energy Reporting Act* (2007) (NGER Act) of which AGIG participates requires a review of emissions at each facility, which will include the West Erregulla Gas Plant. This will then require reporting under the NGER Act annually as it is estimated the facility will be above the required reporting threshold. As part of this the safeguard mechanism will review emissions intensity requirements. It is foreseen that the facility will be required to operate at the default intensity figures for electricity generation and the processed natural gas. This GHG EMP aligns with the EPA guideline requirements as well as providing an outline of actual determination of emissions intensity under the Safeguard Mechanism.

Key components in the GHG EMP	Management of the Proposal's contribution to global greenhouse gas concentrations from Proposal related Scope 1 and Scope 2 emissions through the implementation of the following key provisions: • Application of mitigation hierarchy and ALARP principles especially in design phase to eliminate emissions where possible. • Align with EPA Factor Guidelines for emissions reductions being sustained and a trajectory towards net zero by 2050. • Establish an emissions profile based on design and upstream gas characteristics. • Develop a baseline within the first two full years of operations (post commissioning) and monitor and report in accordance with NGER Act 2007 and any other approval reporting requirements set out in this plan. • Maintain emissions below baseline for the operating life of the plant. • Establish ongoing monitoring, maintenance and reviews that aim to minimise all emissions of natural gas. • Ongoing improvements through the life of the plant to review feasibility of projects to further reduce (avoid, mitigate or offset) emissions. • Methods to be adopted are Best practice to reduce Scope 1 emissions. Reasonable practicable measures have also been adopted to avoid Scope 3 emissions.
GHG EMP reviews and reporting	The GHG EMP was developed in conjunction with justification from Enscope Engineering to develop GHG volumes from specific gas characteristics and against other technology available through known similar projects (i.e. Waitsia). Reporting will be part of the annual report under the relevant Ministerial Statement and the NGER Act. This will be timed to coincide with NGER Act reporting.
Proposed Construction Date	Commence in Q4 2023 and approximately commence operations in late 2025. Construction period between 20-24 months is expected.
GHG EMP required pre-construction	Yes
Proposed project end of life / decommissioning date	Proposed project life for the plant is 20 years (end in 2045). The pipeline has a design life of 60 years, but decommissioning would depend on potential use at the end of plant life. Decommissioning is expected for 18 months between 2045 and 2046.

2. Context, Scope and Rationale

This Greenhouse Gas (GHG) Environment Management Plan (EMP) has been prepared by Ecological Australia (ELA) on behalf of the AGI Operations Pty Limited (AGIO) and is intended to support the assessment, approval and implementation of the Proposal under Part IV of the Western Australian *Environmental Protection Act 1986* (EP Act).

Table 2-1: GHG EMP

Section 2	
Intended reductions in Scope 1 emissions over the life of the Proposal	Section 3
Emissions Estimates	Section 2.3
Regular interim and long-term targets that reflect an incremental reduction in Scope 1 emissions over the life of the Proposal	Section 4
Strategies which demonstrate that all reasonable and practicable measures have been applied to avoid, reduce and offset a proposal's Scope 1 emissions over the life of the Proposal	Section 4
Identification of Scope 3 emissions: Third party owned or activities in relation to Scope 3 emissions	Section 2.1.6

2.1 Proposal Description

AGIO proposes to construct and operate a pipeline and gas processing plant (the Proposal) on behalf of a joint venture between Strike Energy and Warrego Energy (the JV) in the mid-west region of Western Australia, approximately 350 kilometres (km) northeast of Perth and approximately 30 km south east of Dongara (Figure 2-1). The Proposal will be associated with the development of the West Erregulla Facility (WEF) and the West Erregulla Lateral pipeline, located near Dongara in Western Australia (Figure 2-1).

The Proposal will consist of an approximate 30 metre (m) wide pipeline corridor, as well as a proposed 42 hectare (ha) plant site. The proposed 16.5 km pipeline will deliver gas from the new processing plant to the existing Dampier to Bunbury Natural Gas Pipeline.

The Proposal will involve the processing of gas delivered from upstream wells (outside of scope of this proposal) to the WEF. The sales quality gas will then be delivered via a 16.5 km pipeline to the nearby Dampier Bunbury Natural Gas Pipeline (DBNGP). The Proposal includes:

- A gas processing facility (WEF), with a nominal design flow capacity of 87 terajoules per day (TJ/d);
- A 16.5 km interconnecting buried gas pipeline between the WEF and the DBNGP tie-in point at MLV 93(WEP);
- A pig launcher station;
- A custody transfer metering facility located at the DBNGP tie in point (WEM);
- Vegetation clearing of up to 90 ha of land to support the above infrastructure; and
- Supporting infrastructure proposed to include but not limited to accommodation, power generation, flare system, water treatment package, back-up diesel system and communications.

At later stages of the Proposal, as the reservoir is depleted and the pressure into the facility declines, gas compression facilities may be installed at the WEF to maintain sufficient pressure to allow gas to be exported into the DBNGP. As the WEF requires a minimum inlet

pressure to deliver the required flow to the export pipeline, the rate at which reservoir pressure declines will govern how long the free flow period will last.

The design life of the pipeline is 60 years, and the plant is 20 years. Construction is proposed to commence in November 2023 with operations commencing late 2025.

The plant includes:

- Mercury removal equipment,
- Amine Gas Removal Unit - gas refining to remove carbon dioxide (also known as 'sweetening'),
- Waste gas incineration,
- Oxidisation process (heat control),
- Hydrocarbon dew-point control,
- Water content control,
- Sales gas metering,
- Condensate export system,
- Produced water treatment including a double lined evaporation pond, and
- Support utilities.

The Plant will operate 24 hours a day throughout the year except for planned and unplanned maintenance activities (Shutdowns).

Support Utilities include the following:

- Fuel gas system
- Electrical power generation (Gas Engine Alternators, Diesel back up)
- Instrument Air system
- Flare System
- Fire water system
- Utility water system, and
- Diesel system

2.1.1 Key avoidance measures

A number of key avoidance measures have been implemented as part of the design of the WEF which will assist in reducing GHG emissions. These include:

- Utilisation of the waste gas and flash gas from the amine package within the hot oil system
- Utilisation of produced condensate as a fuel source
- Installation of a flare as opposed to cold venting
- Fugitive emissions reduction including:
    - Adoption of low gas consuming devices
    - The use of instrument air versus instrument gas to operate the pneumatic control systems and maximization of electronic controls
    - Elimination/reduction of venting during operations and shut down
- Gas detection equipment.

There is also a recommendation for reducing GHG emissions associated with future inlet compression which would provide the ability to restart the inlet compressor from settle-out conditions. This would allow a faster restart which would minimise the flaring of gas, thus reducing GHG emissions.

These GHG reduction methods are described in further detail in Section 3.1.

AGIG is committed to a global effort to limit GHG gas emissions and this includes reducing through design, avoidance, mitigation and offsets the emissions from the operations of the WEF. With a focus on an energy source which generally generates less GHG emissions than other fossil fuels (e.g. coal and diesel)[1] AGIG supports the use of natural gas as a reduction in the use of more polluting fuel types to assist in lowering the overall carbon footprint of its operations and globally.

AGIG is a key player in trialling and introduction of a hydrogen mix to natural gas distribution in Australia. The combustion of hydrogen greatly reduces emissions with an output of oxygen and water.

2.2 Key environmental factor – Greenhouse gases

This GHG Environmental Management Plan has been prepared in relation to the Environmental Protection Authority (EPA) key environmental factor Greenhouse Gas Emissions. The EPA's objective for the factor Greenhouse Gas Emissions is '*To reduce greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change*' (EPA 2020b).

The EPA GHG emissions guideline requires proponents of major greenhouse emitting projects (i.e. projects that exceed 100,000 tonnes CO_2e per year) to show how they can reasonably and practically avoid, reduce and offset emissions. While the proposed emissions are under this threshold, the requirements of the guideline have been considered in the preparation of this management plan.

Table 2-1 identifies where key requirements of the EPA Guideline have been addressed in this GHG Environmental Management Plan.

Table 2-1: GHG environmental management plan and EPA guideline requirements

GHG Guideline Requirement	GHG EMP Section
Intended reductions in Scope 1 emissions over the life of the Proposal	Section 3
Emissions Estimates	Section 2.3
Regular interim and long-term targets that reflect an incremental reduction in Scope 1 emissions over the life of the Proposal	Section 4
Strategies which demonstrate that all reasonable and practicable measures have been applied to avoid, reduce and offset a proposal's Scope 1 emissions over the life of the Proposal	Section 4
Identification of Scope 3 emissions: Third party owned or activities in relation to Scope 3 emissions	Section 2.1.6

[1] Source: DCCEE 2010 Fuel Type Emission Factors

2.3 Condition requirements

The Proposal has not yet been assessed under Part IV of the EP Act or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A referral was submitted under the EPBC Act in March 2021 (EPBC 2021-8907) and is currently in progress.

In anticipation of likely approval conditions under the WA EP Act, this GHG management plan outlines the management approach to GHG emissions of the Proposal to ensure environmental outcomes and objectives are achieved.

2.4 Regulation and policy

2.4.1 Commonwealth regulation and policy

The United Nations Framework Convention on Climate Change (UNFCCC) provides the framework for international cooperation to reduce global GHG emissions and limit temperature increases. The UNFCCC Paris Agreement entered into force on 4 November 2016, and Australia is currently committed to reducing GHG emissions by 43 per cent below 2005 levels by 2030 (Australian Government 2022).

A framework of national legislative policies, programs and guidelines has been established to support the commitment to meeting the climate change challenge. The *National Greenhouse and Energy Reporting Act 2007* (NGER Act) establishes a framework for corporations to report GHG emissions and energy consumption and production from 1 July 2008.

Under the NGER Act, entities are required to register and report GHG emissions, energy production and energy consumption information if specific requirements are met (either at a facility or corporate group level).

The methods and criteria for calculating GHG emissions and energy data under the NGER Act are detailed in the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*. The *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* (SGM) seeks to impose limits on large GHG-emitting facilities to ensure that net emissions are kept below a defined baseline. The SGM applies to facilities with Scope 1 emissions of more than 100,000 tonnes of CO_2-e per year.

2.4.2 State regulation and policy

The Western Australian Government's Greenhouse Gas Emissions Policy for Major Projects (the State GHG Policy) commits the State Government to work with all sectors of the Western Australian economy to achieve net-zero GHG emissions by 2050 and commits to working with the Commonwealth Government's interim target of emission reductions of 43 per cent by 2030 (Australian Government 2022).

The State GHG Policy is designed to guide Government decision making for major projects that are assessed by the EPA. In accordance with the policy, the Minister for Environment will consider the particular characteristics of each project and the advice and recommendations of the EPA. The Government may then consider whether it is appropriate to apply a condition that sets out the requirements for a plan detailing the Proponent's contribution towards achieving the Government's aspiration of net zero emissions by 2050.

The State GHG Policy supports the development of GHG Management Plans for proposals and provides recommended content. Table 2-2 details how this GHG Management Plan addresses

the contents defined by the State GHG Policy.

Table 2-2: State GHG Policy management plan requirements

State GHG Policy Considerations	GHG Environment Management Plan response
The Policy supports the development of Greenhouse Gas Environment Management plans for proponents which:	
Outline strategies to avoid, reduce, mitigate and offset the project's direct (Scope 1) emissions contributing towards the State's aspiration of net zero by 2050	Strategies to avoid, reduce, and mitigate GHG emissions associated with the Proposal are described in Section 4.
Are unique to a proposal's specific circumstances	The GHG Environment Management Plan is specific to activities associated with the Proposal.
Allow proponents to take account of opportunities at either facility level or across national operations	GHG Environment Management Plan indicates that emissions will be avoided, mitigated or offset (or a combination). This may mean that offset or other processes may be used at a facility, local, regional or national level to ensure the targets for the proposal are met. This will be included in the annual reporting process and detail where and how emissions targets are being achieved.
Allow proponents to propose their own timeframes and interim targets	Management action timeframes and targets are described in Section 3.
Include requirements for periodic public reporting against their targets	Periodic public reporting of progress against the management actions is described in Section 4.
Account for and align with Commonwealth requirements.	The GHG Environment Management Plan describes how emissions will be managed in accordance with Commonwealth requirements, including responsibilities under the NGER Act.

2.5 Scope of the management plan

Reduction of GHG emissions have been considered in the selection and design of the Proposal, including infrastructure and site layout. This GHG Environment Management Plan applies to Scope 1 and Scope 2 emissions from Proposal activities following design that are within the operational control of AGIO.

Proposal activities that will contribute GHG emissions include:

Scope 1:

- Removal of CO_2 from the gas stream through gas processing systems (Amine Gas Removal Unit (AGRU) and Oxidiser)
- Combustion of natural gas fuel for the generation of electricity onsite (fuel gas)
- Vessel push / pull
- Flaring
- Vessel or plant blow down (to flare)

- Minor operation of mobile equipment and vehicles.

Scope 2 emissions were not identified in relation to the project as no power generated is exported and no power is imported for consumption.

Therefore estimates of the Scope 1 and Scope 2 emissions associated with the Proposal are:

Scope 1 emissions: *Up to 105,951 per year in Stage 1 (Years 1 and 2)*

Up to 96,319 tCO_{2e} per year in Stage 2 (Year 2 onwards)

Potential impacts of GHG emissions are the contribution to global GHG concentrations from Scope 1 emissions.

A number of options have been considered to improve energy efficiency and ensure that GHG emissions are minimised as far as practicable. These are described in further detail within this GHG Management Plan.

2.6 Rationale and approach

2.6.1 Key assumptions and uncertainties

This GHG Environment Management Plan has been developed using all relevant and available information at the time of preparation. As the understanding of GHG management improves over time, this GHG Environment Management Plan may require reviewing and updating (refer to Section 5.1).

2.6.2 Management approach

AGIO will implement management-based provisions for this GHG Environment Management Plan. The management approach is based on the following objectives:

- Alignment with the State Government's commitment to working with the Commonwealth Government's target of reducing greenhouse gas emissions by 43% by 2030
- Alignment with the State Government's Greenhouse Gas Emissions Policy for Major Projects to contribute towards the State's aspiration of net zero emissions by 2050
- Alignment with EPA Guidance (EPA 2020), through applying the mitigation hierarchy (i.e. considering reasonable and practicable measures to mitigate GHG emissions)
- Adopting design, technology and management measures to mitigate GHG emissions, having regard to the as low as reasonably practicable principle
- Commitment in supporting the State Government in developing technical guidance to support greenhouse gas emission reduction within the gas industry
- Compliance with relevant State and Commonwealth GHG emission monitoring and reporting requirements, including NGER and the Safeguard Mechanism
- Adaptive management to respond to current uncertainties and future developments in Government policies, markets and technology.
- Assessment of emissions reducing technology in the design stage and feasibility assessment.

2.6.3 Rationale for choice of provisions

AGIO conducted a design review on the project as part of the overall Front End Engineering and Design (FEED) process. This included assessment of potential design options that improved the efficiency of the plant, ensured safe and effective operations and also the potential to reduce emissions. The following rationale have been included the proposed

management provisions:

- The provisions and associated targets represent AGIO's alignment with National and State government targets;
- AGIO has utilised the mitigation hierarchy to assess potential management provisions and this includes assessing the overall feasibility to implement on the project;
- AGIO recognizes that there is the potential for changes to national and state policies, markets and technology over the life period of the plant and has included a management provision to periodically assess potential projects that can reduce the emissions of the plant;
- Additionally, ongoing monitoring and reporting of greenhouse gas emissions from the project will allow AGIO to minimise leaks, meet reporting requirements and identify key focus areas for improvement in the emissions profile.

3. Greenhouse gas inventory

3.1 Methodology

The assessment calculations of the WER emissions profile were completed in line with National Greenhouse Accounts Factors (Department of Environment and Energy pp11-12, 59, 70)and utilising the WEF heat and mass balance information.

The operational emissions profile accounted for an average of gas specification ranges from the upstream gas field of 6.35 mol % of CO_2 feed gas. With the output being to sales gas specifications of 3 mol % of CO_2.

A range of emission profiles were calculated with the peak emissions outlined in Table 2-1. Additionally, AGIO reviewed impacts from changes to solar, solar with battery backup and a sales gas specification of 4 mol % as ways to reduce emissions onsite. AGIO will continue to review the feasibility of these reduction potential projects as part of the management actions on the project.

3.2 Assessment boundary

The boundary for assessment of the emissions from the project include the Midstream plant and gas pipeline. The upstream emissions (wellheads, flowlines and slugcatcher) are excluded from the emissions profile in Table 2-1.

Emissions from the DBNGP tie-in point will be included in the DBNGP gas accounting under the NGER Act.

The WEF assessment boundary utilises the NGER Act description in terms of defining a facility and operational control. Areas under AGIO operational control have been included in the emissions profile.

3.2.1 Assumptions

The following assumptions were made in determining the emissions profile for the project:

- Inlet compression was not present
- Overall FEED contingency was removed
- Hot oil package contingency removed
- Total Estimated Gas Flow (87 TJ/d Net Export)

- Estimated Plant Yield = 97.5%
- GEA Fuel Gas consumption based on GHG Emission Factors of $kgCO_{2e}/GJ$ (Fuel)
- Profile includes a facility blowdown occurring six times per year.

3.3 Greenhouse gas emissions profile

3.3.1 Scope 1 Emissions

GHG emissions related to reservoir sources of CO_2 that are removed through the AGRU will vary depending on the gas characteristics of each upstream well and the gas reservoir. This ranges from 5.77 to 6.93 mol % of CO_2. This has been averaged to 6.35 mol % of CO_2 for this assessment (Table 3-1).

All calculations have been made on full 'nameplate' capacity of the plant of 87 TJ / day with an estimated plant yield of 97.5 %.

During initial startup, commissioning and optimization of the plant in Years 1 and 2, AGIG is

targeting an approximate 9% reduction of emissions Year 3.

Years 1 and 2 will have an estimated emissions of 105,951 tCO_{2e} per annum as the initial plant set up is set up for optimal running. This allows for potential inefficient operations, additional start up and shut down of equipment, additional flaring or blowdowns required, optimization of equipment efficiency and achieving steady flow rates and volumes of gas from the upstream wells.

The baseline emissions for the project are therefore 105,951 tCO_{2e} per annum. This is used to encompass any additional issues while plant is being optimized for efficient running and develop ongoing controls to minimise controlled gas releases.

Alternatively, baselines were considered at 125,000 tCO_{2e} per annum based on pre-design avoidance controls being implemented. This would mean a standing avoidance of ~30,000 tCO_{2e} per annum during the operations phase of the project. As this was built in prior to emissions calculations specifically on the plant design and would not actually cause emissions at any stage. This was not selected as the baseline volume.

The operations phase emissions (96,319 tCO_{2e} per annum) were also considered for the baseline figure. However, this would indicate a potential above baseline performance in the first two years and would not account.

This process is in line with the Safeguard Mechanism which allows suitable data collection over the 'generally three years' of initial operations to set a baseline emissions intensity.

Table 3-1: Emissions Profile – Optimised Operations Year 3 onwards

	Activity	Location	Proponent	Year 1 and 2	Predicted optimized annual emissions tCO_{2e}
Reservoir gas	Amine Gas Removal Unit (AGRU) (CO2)	Midstream	AGIO	56,907	56,907
Processing gas	Oxidiser burned gas (includes AGRU hydrocarbons in waste and flash gas)	Midstream	AGIO	38,825	32,354
Processing gas – Power consumption	Fuel Gas – GEA Power Generation	Midstream	AGIO	7,275	6,076
Processing gas	Flare	Midstream	AGIO	234	39
Processing gas	Flare blowdown (maintenance)	Midstream	AGIO	1,248	208
Processing gas	Liquid circuit atmospheric vents	Midstream	AGIO	426	71
Fugitive gas	Pipeline	Midstream	AGIO	172	172
Other	Vessel push pull	Midstream		864	492
TOTAL MIDSTREAM EMISSIONS				**105,951**	**96,319**
Power Generation	Plant	Midstream	AGIO	-	33,600 kWh

The emissions intensity for the project is based on the calculations outlined below (Table 3-2). Based on the above emissions profile, the plant has a proposed emissions intensity of 3.02 tCO_{2e} / TJ. This includes all processing, reservoir gas removal and other emissions but not including fugitive gas in the pipeline as this makes comparison (Section 2.5) difficult as this is based on distance of pipeline and not efficient plant design and operations.

Table 3-2: Emissions Intensity

Production variable	Activity	Emission Type	Estimated GHG Emissions (per annum) tCO_{2e}	Emissions Intensity	Default EI
29	Processed natural gas	Non-reservoir emissions[1]	33,164	1.04 tCO_{2e} / TJ	1.59 tCO_{2e} / TJ
57	Electricity Generation	Non-reservoir emissions	6,076 / 33,600 kWh /day	0.19 tCO_{2e} / TJ / 0.495 tCO_{2e} / MWh	0.535 tCO_{2e} / MWh

[1] National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015- Schedule 1, Division 5.

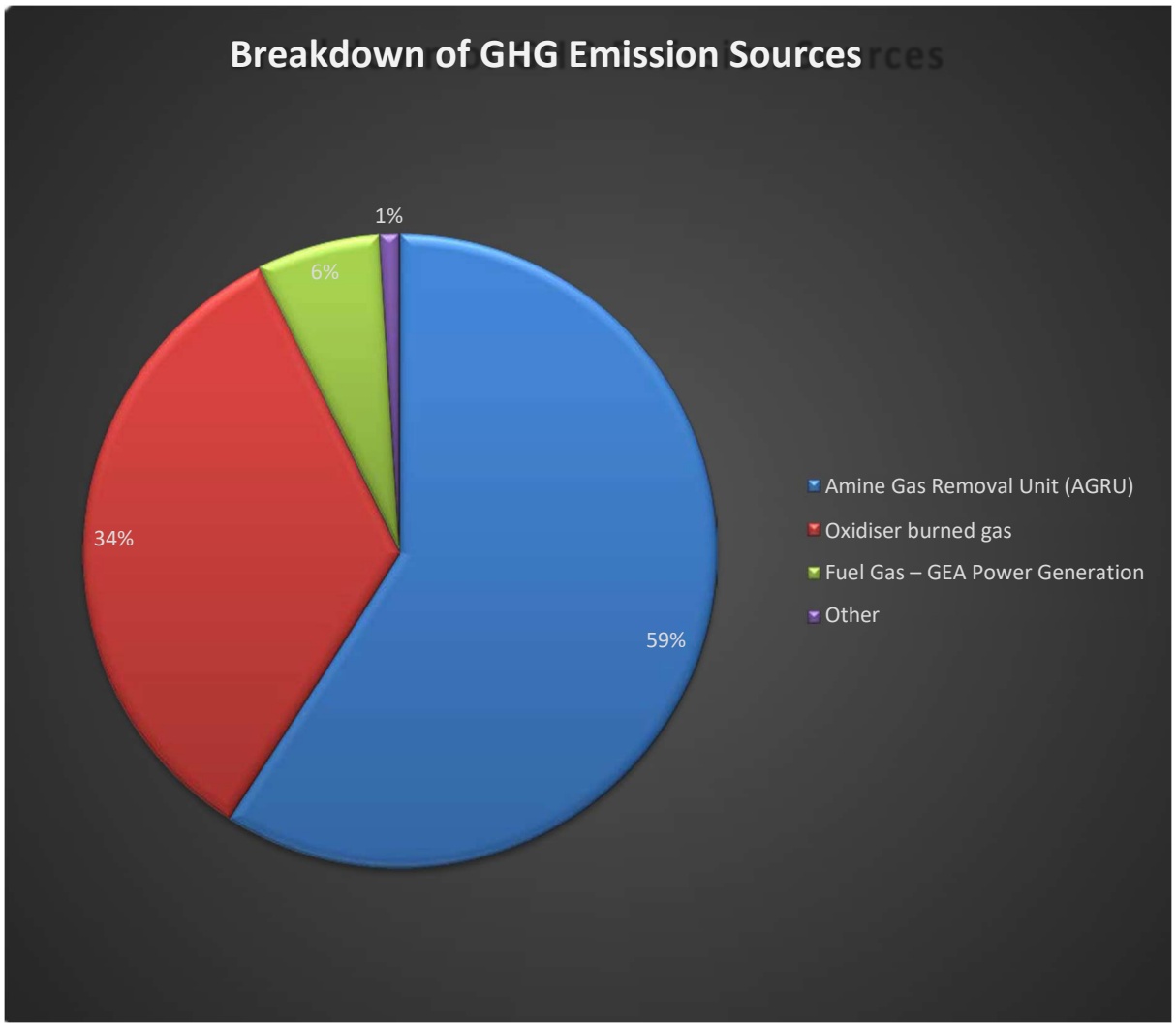

Figure 1 Breakdown of GHG emissions sources - optimised

3.3.2 Scope 2 emissions

There are no Scope 2 emissions identified as no electricity is imported or exported.

3.3.3 Scope 3 emissions

AGIO is not the owner of the processed gas. The gas is owned by the Upstream Joint Venture (JV) currently consisting of Strike Energy and Warrego Energy and the sales agreement for downstream use is a third-party process.

Information supplied by the JV, outlines that Scope 3 emissions are based on full use in non-metro activities (i.e. industrial process). Noting that this impact is outside of the scope of the processing plant, an outline of the potential Scope 3 emissions for the full West Erregulla upstream project by the JV partners is detailed below:

Scope 3 gas consumption figures detailed as outlined in NGA Factors 2020[4]. Assumes peak plant production of 87 TJ / day. Total Scope 3 emissions per day is 348 tonnes of CO_{2e} per day (Table 3-3). This equates to 127,020 tCO_{2e} per year.

Table 3-3 Scope 3 emission calculations

End Use	Emission Factor kg CO_{2e} / GJ	Approximate quantity breakdown (GJ)	Total daily emissions (approximate) tCO_{2e}
Metro WA	4.1	0	0
Non-metro (industrial) WA including export gas	4.0	87,000	348

3.3.4 Construction Emissions

Construction emissions are related to plant, equipment and fuel use including use while clearing vegetation and the loss of native vegetation. An approximate value is outlined in the following table based on a maximum conservative (highest) fuel volume in Table 3-4.

The following assumptions were made in this assessment:

- Vehicle transport for delivery of goods (truck deliveries using external transport contractors) are not included in the below as these are monitored / measured by the third-party contractor. All onsite fuel use is monitored (fuel gauges/flow meters) as part of ongoing reporting.
- All fuel is accounted for via monthly inventory.
- Fuel purchases made from local towns are included in the assessment.
- Carbon loss from removal of vegetation is captured using the Transport Authority Greenhouse Gas methodology (Section 2.3.4.1).

The majority of construction emissions relate to the loss of native vegetation (carbon sink loss).

Table 3-4: Construction emissions

Activity	Parameter	Conservative maximum fuel volumes	Predicted emissions [5]
Heavy vehicle use	Diesel combustion for transport purposes	476 kL	1,684 tCO_{2e}
Light vehicles use		143kL	
DEA / generators	Diesel combustion for stationary energy purposes	311 kL	843 tCO_{2e}
Commissioning blowdown x 2	Natural Gas	8 TJ (per blowdown)	342 tCO_{2e}
Petroleum based greases	Petroleum based greases	500 L	1 tCO_{2e}
Petroleum based oils	Petroleum based oils	200 kL	50 tCO_{2e}
Loss of carbon sink from land clearing	Emission Factor of 287 tCO_{2e} / ha	90ha	25,830 tCO_{2e}
TOTAL EMISSIONS - Construction			**28,750 tCO_{2e}**

[4] *National Greenhouse Accounts Factors 2020 (Appendix 4, Table 41) Scope 3 emission factors – natural gas for a project that is not ethane (inclusive of coal seam gas).*

[5] National Greenhouse Measurement Determination Schedule 1

3.3.5 Clearing of native vegetation

The loss of carbon sink potential for construction (clearing of native vegetation) was calculated using the Transport Authorities Greenhouse Group (TAGG) GHG Assessment Workbook for Road Projects. This was used to estimate the quantity of lost carbon sink associated with the project and the land clearing involved. This methods is inherently conservative as it assumes the full loss of carbon sinks and all carbon is lost to atmosphere. (TAGG, 2013)

By utilising the TAGG approach, project location, vegetation survey information and assuming full land clearing loss of 90 ha. The following was used to calculate the loss of carbon.

For a conservative approach, AGIG selected Class 2 maximum potential biomass class along with Vegetation Type F (Acacia Open Woodland) as the most descriptive type of vegetation to match the disturbance footprint (project location).

The associated emission factor of 287 tCO_{2e} / ha was identified using the TAGG Workbook. With 90 of clearing predicted this equated to 25,830 tCO_{2e} of lost carbon sink (Table 2-4).

As per the associated project Rehabilitation Management Plan, AGIG will fully rehabilitate 36.6 ha of land which using the same TAGG approach equates to an additional 10,504.2 tCO_{2e} of carbon sink to replace a portion of vegetation lost through clearing. Additionally, a biodiversity offset for the project (offsite location) of 163 ha is also proposed which will protect a carbon sink of similar vegetation type of over 46,781 tCO_{2e}.

3.3.6 Cumulative and Upstream Emissions

Table 3-5 includes upstream emissions from the West Erregulla Field Development project. Upstream emissions are split into two categories: construction and operations.

Construction emissions for upstream consist of 13,947 tCO_{2e} for fuel gas and emissions from well testing. Additional to this an estimated 11,634 has been included from a calculation of loss of vegetation biomass.

There are no Scope 2 emissions identified in the upstream scope of work.

Table 3-5: Upstream emissions profile

Activity	Location	Predicted Annual Emissions tCO_{2e}
Construction – Fuel Use	Upstream	149
Construction – Well Testing	Upstream	13,798
Construction Total Emissions (not including biomass loss)		**13,947**
Operations	Upstream	13

The impact of the upstream operational works adds only 13 tCO_{2e} per annum which is less than 0.01% of emissions from the processing plant. The cumulative nature of the facility operations in steady state indicates that an inclusion of an additional 13 tCO_{2e} per annum is a negligible increase.

Plant and pipeline construction emissions of 28,750tCO_{2e} are well below the optimised operational emissions, add to this the additional 13,947 tCO_{2e} (or 25,581 tCO_{2e} including biomass loss) and the construction emissions are below the 100,000 tCO_{2e}threshold and less than operational emissions for the plant.

From a cumulative impact evaluation of the approximately 31 Million tonnes of GHG emissions emitted by the energy, mining and manufacturing sector of WA[6] this project contributes less than 0.3% of the total annual emissions in this sector. Combined with Beharra Springs and Waitsia a total of less than 500,000 tCO_{2e} would be expected to be released in the region annually. This equates to less than 1.7% of the WA energy sector emissions.

From a total emissions profile in WA (of a total of approximately 100,000,000 tCO_{2e}) the project provides an emissions output of approximately 0.1% of the total WA GHG emissions per annum.

[6] Shaping WA's low carbon future pp8 (DWER 2021)

3.4 Benchmarking – Reservoir

In terms of reservoir quality, this is out of scope for this project as AGI is not the upstream producer (extraction) of gas. Based however on the gas specifications provided, the average CO_2 reservoir content is 6.35 mol % of CO_2 with a range from 5.77 to 6.95 mol % of CO_2. This equates to the nearby Waitsia Gas Field (4.5-7.5) and is lower than most other gas fields in WA with the exception of Macedon, John Brookes (Santos), Janz (Chevron) and Reindeer (Santos) fields[7].

3.5 Benchmarking – Gas Processing

AGI Operations will utilise the first two years of full operations to set the baseline emissions profile for the project. This will allow for commissioning processes to be completed for all equipment and a period of time to ensure efficient running of the WEF. This will provide additional capability to assess the actual percentage range of mol % of CO_2 feed gas and provide the ability to average this over the first two years as the upstream well use normalises to a sustainable volume (Table 2-1).

AGIO has been able to assess the plant emissions and emission intensity against existing and proposed plants within WA. Both of these are larger in size but detail the emissions expected and actually released from the plants.

These were chosen based on the following rationale:

- Macedon – WA based and a similar mass of emissions (115,000 tCO_{2e})[5] and a similar emissions intensity, however it does have a lower reservoir gas CO_2 content than West Erregulla.
- Waitsia – close proximity, similar timeframe in terms of design and expected operational efficiency, similar native gas (reservoir CO_2 content) specification however gas volume throughput is much higher than West Erregulla.

3.5.1 Macedon (BHP)

The BHP operated Macedon Gas Plant only has trace amounts of carbon dioxide within the upstream gas field and minimal to no processing is required to remove this from the gas flow to meet sales gas specification. Therefore Macedon emissions are based more on the gas plant operating equipment (gas production) rather than reservoir gas. Public documentation available as part of the approvals of Macedon include an emissions output of 115,000 tCO_{2e} per annum (EPA, 2010). This was also referenced in the recent Waitsia documentation where emissions intensity was calculated as being 3.15 tCO_{2e} / TJ (Mitsui, 2010).

However based on the 3.15 tCO_{2e} / TJ being wholly for production as there are negligible emissions from the extraction of reservoir carbon dioxide, the emissions intensity for gas production (excluding emissions from the extraction of reservoir carbon dioxide) for West

[7] *Mitsui E & P Australia – Waitsia Gas Project Stage 2 – Greenhouse Gas Management Plan 2020*

Erregulla is 1.04 tCO_{2e} / TJ. This represents a reduction in the emissions intensity level for processing of the gas of ~67%.

3.5.2 Waitsia (Mitsui)

Waitsia's Greenhouse Gas Management Plan (Revision 5) (Mitsui E&P, 2020) outlines the emissions profile, intensity and overall targets for emission reductions for the 250 TJ / day processing facility. Emissions intensity figures are comparable with the total intensity difference in line with the smaller West Erregulla plant size. Overall emissions predicted to be 300,000 tCO_{2e}, three times the emissions from the West Erregulla facility.

Waitsia outlines its proposed emissions intensity at 3.29 tCO_{2e} / TJ which is slightly higher than the 3.02 tCO_{2e} / TJ calculated for West Erregulla. As per above, this equates similarly to Waitsia but with improvements in intensity to the emissions profile for the project.

3.6 Design Emission Avoidance

The development of the processing plant design included a target to maximize efficient gas use based on the specifications provided for the upstream gas. AGIO conducted a design review to assess reasonable and feasible opportunities to ensure efficient use and this included emission reduction capabilities. This process was in line with EPA's GHG Environmental Factor Guideline to outline and demonstrate that design measures have been applied to avoid or reduce emissions for the proposal.

Those deemed feasible for the project have been adopted and are outlined in Table 3-6.

Without these designs being built into the processing plant, initial emissions for the proposal would have been ~125,000 tCO_{2e} per annum. Due to the design factors this was reduced by approximately 30,000 tCO_{2e} for optimized operations (Year 3).

Table 3-6: Design opportunities adopted to minimise emissions

Aspect	Detail	Quantification (emissions avoided annually) tCO_{2e}
Utilisation of the Waste gas and Flash Gas from the Amine Package in Thermal Oxidiser / Hot Oil Package	In many natural gas processing plants, the waste gas from the amine regeneration column and flash gas from the amine flash drum is cold vented locally (normally at the highest point of the facility). Instead of following a similar method, the design of the West Erregulla Facility utilises the waste gas and flash gas from the amine package within the hot oil / thermal oxidiser package. By doing so, the fuel gas consumption within the hot oil package is reduced which increases the overall facility yield and decreases the GHG emissions. An additional impact of the thermal oxidiser is that pollutants that are contained within the waste gas, flash gas and fuel gas are destroyed completely, for the expected gas composition these pollutants are H2S and BTEX.	3,092

Utilisation of Produced Condensate as a Fuel Source in Thermal Oxidiser / Hot Oil Package	Produced condensate is often flared or trucked off site for disposal elsewhere in natural gas processing plants. For the WEF, the condensate will be utilised as a fuel source for the hot oil / thermal oxidiser package. By utilising produced condensate, the total fuel gas requirements for this package are decreased which increases the facility yield and decreases the GHG emissions.	485
Installation of a Flare	The use of a flare to burn any gas that would otherwise have been cold vented is a method of greenhouse gas reduction. This is far better than cold venting natural gas which has a larger impact on the environment as methane has a global warming potential (GWP) of 28 compared to the CO_2 generated from combustion.	18,850
Fugitive Emissions Reduction	To minimise fugitive emissions, manual valves, instrumentation and control valves, isolation valves, piping and equipment, be designed, tested, supplied and installed as per the appropriate codes, standards and company install procedures. By doing this, the likelihood of fugitive emissions from leaking flanges, valve bodies etc. will be reduced.	NA
Gas Detection Equipment	The WEF will include line of sight (LOS) gas detectors. If a gas leakage occurs the LOS gas detectors will initiate an Emergency Shutdown (ESD) and shut in the facility to reduce the available inventory for leakage and complete a facility blowdown. By completing the facility blowdown a large inventory of gas will be flared but without the LOS detectors, if a leak is to occur the leak will be continuous for an extended period of time which will result in a higher rate of GHG emissions.	15.4 (per hour on an assumed leakrate) NOTE: not included in total
Compressor Restart from Settle-Out Conditions (FUTURE)	Reciprocating compressor start-up procedures involve the depressurisation of the compressor casing prior to operation. The WEF inlet compressor has been selected as a centrifugal compressor driven by a gas turbine which has the capability to start from settle-out pressure conditions (no depressurisation required during startup). This will allow a faster restart and will minimise the flaring of gas thus reducing GHG emissions.	233
Installation of instrument air versus instrument gas	The pneumatic control systems within the plant will utilise instrument air versus instrument gas. As most of this is vented as part of the operation – this will remove instrument gas venting emission. In addition, electronic controls will be adopted in lieu of pneumatic controls	7,554

As part of the review of opportunities to reduce emissions, solar and solar with battery backup (BESS) was reviewed as an alternative power source for the plant. This reduction in emissions

was minor (equating to ~1,327 tCO_{2e} per annum) and therefore while this remains an option, the cost involved outweighed the minor reduction in emissions across the total emissions of the plant. This equates to less than 1.5 % reduction in emissions overall.

AGIO will continue to assess the feasibility of BESS as this reduction is warranted once the cost of a BESS reduces, which is likely in the future.

4. Greenhouse gas environment management plan provisions

This section outlines management-based provisions and key requirements under this GHG Environment Management Plan. When implemented, it is expected that these provisions will achieve the objective of the Air Quality (greenhouse gas emissions) environmental factor and minimise emissions so that environmental values are protected.

AGIO will implement management provisions, detailed in Table 4-1, consistent with the rationale and approach presented in Section 1.6.

Table 4-1: Management based provisions

Action	Management target	Monitoring	Reporting
1	Annual review ongoing abatement opportunities as part of annual compliance assessment report.. This includes a review of the GHG EMP every 5 years. Annual GHG Progress Report to the CEO (DWER) which includes: a) Graphical comparison of actual net emissions against approved emission limits b) Actual emissions intensity achieved in the previous annual period c) Emissions intensity comparison against proposed Emissions intensity values (in this plan) d) Summary of measures taken to avoid, mitigate or offset emissions. e) Summary of offsets purchased including details of type and location f) A clear statement as to whether limits for emissions have been met.	Emissions monitoring, Review of abatement opportunities and graded against feasibility criteria Annual Report Quarterly Emissions report 5 yearly review of plan	NGER report, Annual Compliance Assessment Report (ACAR) as likely required under Ministerial Statement Annual GHG Progress Statement to CEO
2	Maintain emissions below baseline and report annually as required (Scope 1 emissions). Baseline for initial two years (during plant optimization and commissioning) is set at 105,951 tOC_{2e} per annum, however steady state operations from Year 3 is 96,319 tOC_{2e} per annum and this will be reported to the Clean Energy Regulator (Section 2.1.5) and as part of the ongoing performance reporting to DWER and DMIRS.	Emissions monitoring quarterly with annual reporting	NGER report, ACAR

Action	Management target	Monitoring	Reporting
3	All reservoir emissions (~60% of total emissions) avoided, mitigated or offset from commencement of operations.	Emissions monitoring, baseline data, offset reporting	ACAR
4	Avoid, mitigate or offset as per the Emissions Reduction Targets (Section 3.1) In 2030 reporting year, reduce emissions by an additional 5% (approximately 5,298 tOC_{2e} per annum.	Emissions monitoring	NGER report, ACAR
5	Demonstrate that all reasonable and practicable measures have been reviewed and undertaken to reduce emissions	Emissions monitoring, Feasibility Review	ACAR
6	Preventative maintenance program implemented for leak detection and repair including: 1) Monitoring pressure relief instances and develop a target number for reduction 2) Monitor and report on fugitive emissions including the pipeline	Emissions monitoring, PSV release information, leak detection records, event reports, Work orders (preventative and corrective maintenance system).	NGER report, ACAR

4.1 MA1 - Ongoing opportunities

AGIO will annually review the potential for new technology, design, plant efficiency and emissions capture to assess feasible options for reducing emissions.

AGIO will continually assess the use of renewables and electrification of processes to reduce emissions associated with fuel gas use. This includes potential storage onsite (i.e. batteries) and the use of renewable fuel such as hydrogen to ensure reliability of power generation onsite (Section 6.4.1).

This will form part of the ongoing targets to reduce emissions through the plant life. Reductions will link to Management Action 5 in terms of meeting emission targets for the life of the proposal.

It is expected that by end of 2039 onwards, certain infrastructure may require replacement, this will be replaced with the best available technology at the time of replacement. This may include use of renewable, biodiesel, hydrogen or other low emissions technology and would commence the targeting of lower emissions onsite. This has been reflected in the targets outlined from 2040 to 2050 to reach net zero. While being conservative this would reflect around 20,000 tCO_{2e} reduction per annum through improved efficiency and lower emissions technology.

As technology improves both capability and feasibility AGIO shall continue to review adaptability into the project. Two of the key approaches which are estimated to lead to reductions post 2035 or 2040 are carbon capture and storage (sequestration) or the reuse of carbon through another industrial process. These are expected to provide a step change reduction in this time period, however, this may occur sooner dependent on the feasibility and availability of appropriate reservoirs and carbon reuse suitability. If this technology is not available, additional offsets or improved efficiencies shall be utilised to meet this commitment.

AGIO will provide an annual GHG progress statement to clearly demonstrate progress towards emissions reduction targets, emissions for the previous year, emissions trends over previous five years (or previous years in first four years) and compliance to emission limits. The content is outlined in Table 4-1 above.

4.2 MA2 – Baseline assessment

The *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* requires the establishment of an emissions baseline. For this project, AGIO proposes to establish a production-adjusted baseline determination to allow for production variability within the first two years of operations to accurately set the baseline based on efficient operations.

The Rule also includes a benchmark intensity index in relation to the emission of a production variable. Table 2-2 sets out the emissions intensity and production variables identified for the project. Once benchmarking has been completed, the emissions intensity will be reviewed for processed natural gas to establish a site based emissions intensity figure.

Baseline emissions, once set shall be the maximum allowed emissions from the site as per the MA2 target requirement. As this baseline will be production-adjusted baseline the overall emissions (prior to mitigation or offset) shall not be exceeded.

Annual reporting under the NGER Act will be completed as well as annual reporting to DWER and DMIRS as required in line with the CEMP and approval conditions. Quarterly emissions monitoring will be completed to understand changes during the year.

In the first two years of operations the following assumptions have been made:

- Efficiency of equipment is being identified and optimal production levels and potential punchlisting (improvements and refits) will be occurring
- Equipment is not running to full optimization or efficiency (i.e. power generation)
- Additional start-ups and shutdowns of equipment including power generation will be required
- Upstream gas rates are being reviewed to meet efficient volumes and flow rates
- Issues may occur that require a blowdown of the sections of the plant (gas flaring)
- Productivity levels will vary in the first 24 months as optimization of plant operations is targeted in the first 12-18 months.

Therefore, in the first two years of operations the baseline emissions of the project is proposed to be 105,951 tOC_{2e} per annum. Once steady state operations are reached our emissions is

proposed to be 96,319 tOC_{2e} per annum which includes a ~9% reduction based on plant optimization (Section 3.6).

Construction emissions are outlined in Section 3.3.5 which are below the baseline emissions and not reflective of the emission activities for the operational plant.

4.3 MA3 and MA4 – Trajectory of Emissions Reduction Targets

As outlined in Table 3-1, the emissions reductions over time shall increase as the project life continues. The profile and target reductions are outlined in Figure 3.

AGIO has developed these targets to meet the West Australian Government and Australian Government commitments to reduce greenhouse gas emissions.

AGIO also is committed through a wider business model approach to working towards the State's aspirational 2050 target of no net emissions.

4.3.1 Assumptions and considerations for target setting

The following assumptions and considerations were made in the review of potential targets and program for emissions reductions:

- Life of the gas field may cease prior to 2045, but other gas sources may be located nearby and utilise the facility, therefore any new gas sources must remain on same trajectory for net zero.
- Current review of feasible technology available has been included in the design phase (Section 2.6)
- Technology, especially around renewables, hydrogen and battery storage will continue to improve and as per MA1 will be reviewed annually for feasibility
- Feasibility includes a large focus on emissions reduction capability
- All reservoir gas must be offset from commencement of operations
- Offset purchases may differ annually based on ACCU supply and availability. Other sources of suitably accredited offsets will be sourced.
- Targets must meet Australian and WA government targets
- Offsets selected meet are at a standard to provide efficient offsets for the project.
- When feasible, emissions avoidance and mitigation shall be implemented as soon as identified.

To align with the above, AGIO has committed to offsetting the full scope of Reservoir Gas emitted from the plant from the commencement of operations. This is ~60% of the full plant emissions (all reservoir emissions) and will continue and then incrementally increase over the life of the proposal (Table 4-2). From 2040 onwards, the proposal will continue to reduce its overall emissions profile (through avoidance, mitigation or offsetting) to align with Trajectory to net-zero targets outlined in Table 4-2 and Figures 3 and 4.

Table 4-2; Emissions targets, timeframes and reductions (5 yearly breakdown)

Time Period	Total Emissions tCO_{2e}	Net Emissions tCO_{2e} (once avoided, mitigated or offset)	% reduction
1 November 2023 to 31 December 2024	GHG Emissions no more than 28,750	Net GHG Emissions no more than 28,750	0%
1 January 2025 to 31 December 2026	GHG Emissions no more than 105,951	Net GHG Emissions no more than 42,380	60%
1 January 2027 to 31 December 2029	GHG Emissions no more than 96,319	Net GHG Emissions no more than 39,202	63%
1 January 2030 to 31 December 2039		Net GHG Emissions no more than 33,904	68%
1 January 2040 to 31 December 2042		Net GHG Emissions no more than 31,785	70%
1 January 2043 to 31 December 2043		Net GHG Emissions no more than 28,607	73%
2 January 2044 to 31 December 2044		Net GHG Emissions no more than 24,369	77%
3 January 2045 to 31 December 2045		Net GHG Emissions no more than 20,131	81%
4 January 2046 to 31 December 2046		Net GHG Emissions no more than 15,893	85%
5 January 2047 to 31 December 2047		Net GHG Emissions no more than 11,655	89%
6 January 2048 to 31 December 2048		Net GHG Emissions no more than 7,417	93%
7 January 2049 to 31 December 2049		Net GHG Emissions no more than 4,238	96%
8 January 2050 to 31 December 2050		No Net GHG Emissions	100%

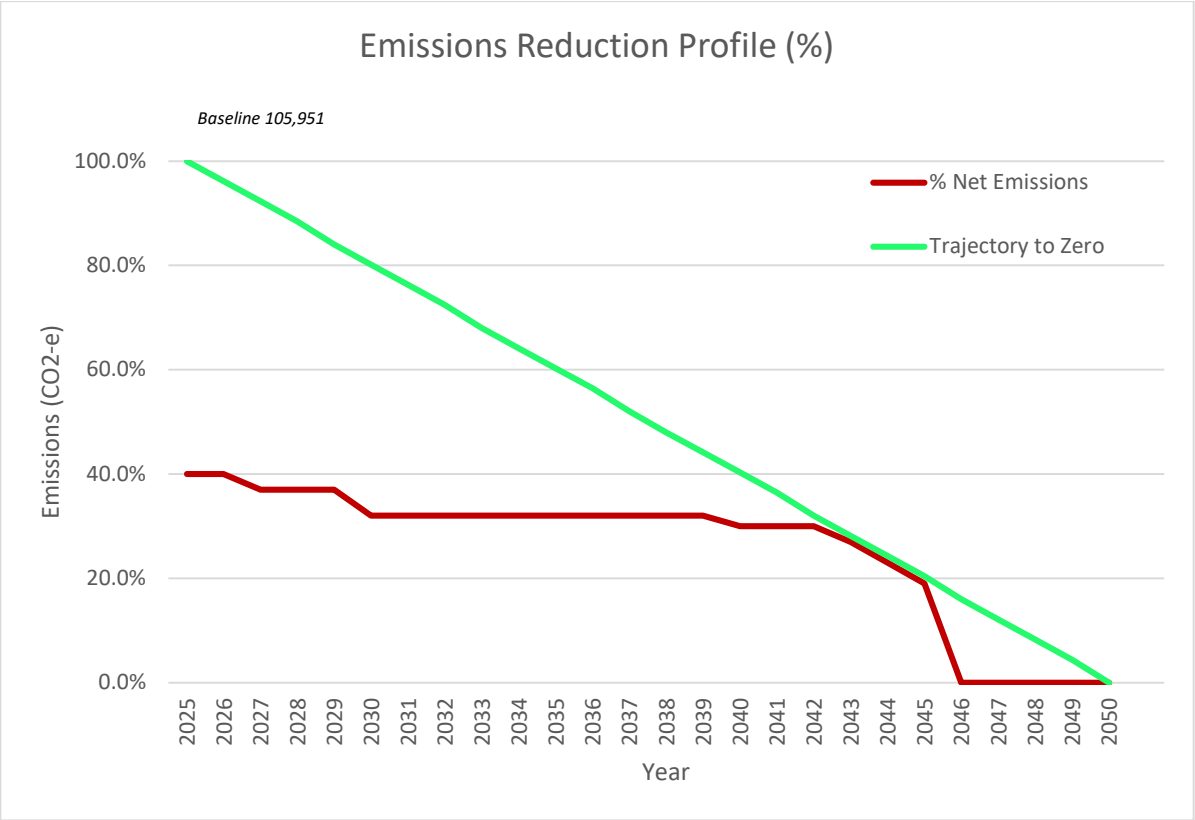

Figure 2 Emissions Reduction Target

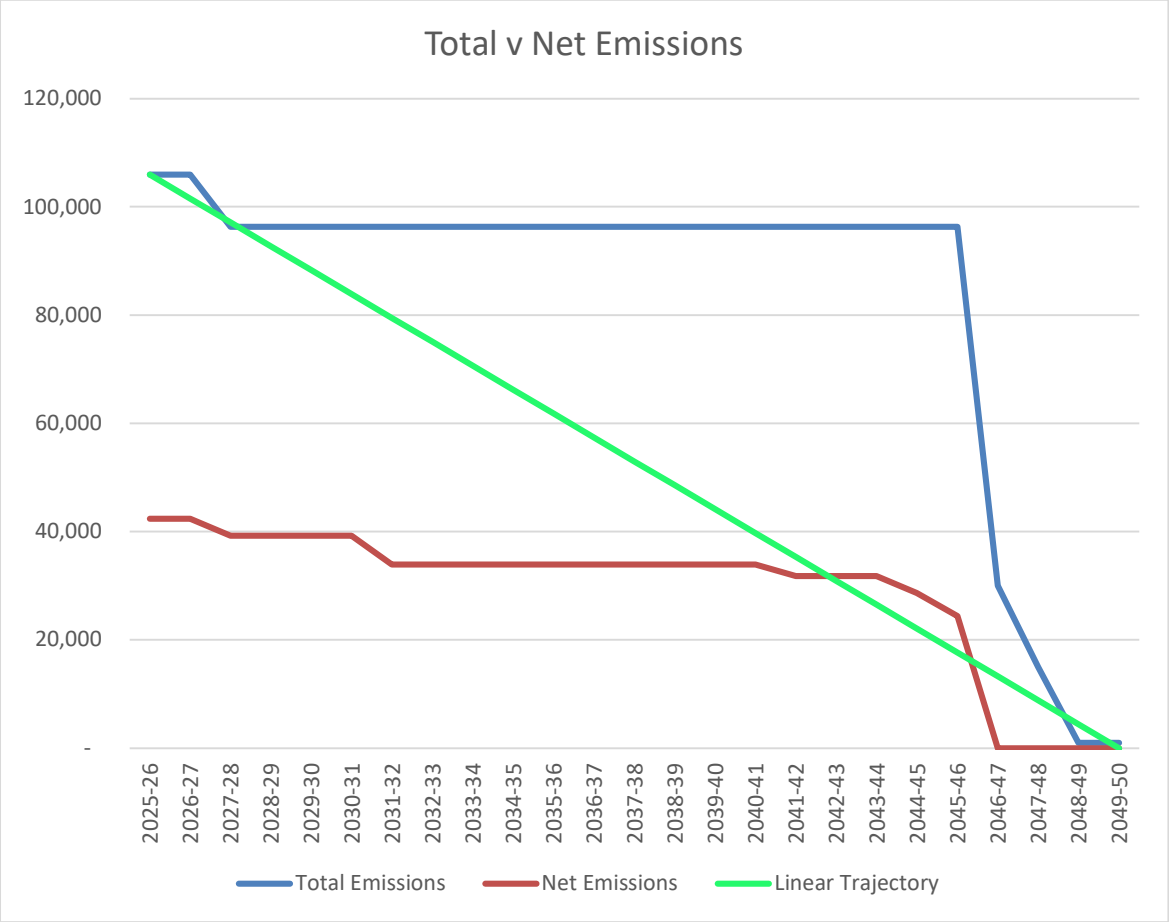

Figure 3: Emissions Reduction Profile 2025-2050

4.4 MA5 – Practicable emission reduction works

As outlined with MA1 and MA4, AGIO is committed to identifying, reviewing and implementing where feasible (reasonable and practicable) emissions reduction technology, systems or designs to minimise emissions from the proposal. Work towards this, including feasibility reviews will be conducted annually and be reported on as part of the annual report (Table 3-1).

4.4.1 Avoid Emissions

As noted in Section 3.6, the project has already avoided approximately 30,000 tCO_{2e} by application of design and emissions reducing technology. AGIO will continue to review opportunities and 'best available technology' (BAT) annually (Section 4.1 and 4.2) to review where additional or new technology can be adopted and implemented to minimise emissions from the plant. This may include the use of renewables (solar, wind, hydrogen) battery storage, other renewable fuel storage (i.e. hydrogen) and implementing design improvements. This includes programs to identify and prioritise enhancement opportunities including energy efficiency, reducing fuel use and emissions intensity and minimising flaring.

AGIG aims through the annual review to improve on the existing proposed emissions reductions commitments within this document, however as this is awaiting technology and lower emissions equipment this cannot be substantiated or evidence of reductions provided.

4.4.2 Mitigate emissions

Mitigation and improvements in technology; BAT adaption and ongoing energy efficiency focus will help to mitigate impacts from emissions. This includes the reviews outlined in Section 4.1 to ascertain performance and identify areas for emission reduction based on monitoring and measuring in place. AGIO currently mitigates emissions through the flare design and use process which targets minimal use of the flare except in blowdown situations. By designing a flare instead of a cold vent, AGIO has both enabled avoidance and mitigation of emissions from release of natural gas via a flare.

AGIO is currently involved in several hydrogen facility projects to trail the use of hydrogen blending with natural gas to decrease the emissions profile of the gas. Based on the ongoing improvements and adaptation costs decreasing, AGIO is keen to use BAT with hydrogen to minimise emissions from fuel gas.

4.4.3 Offset emissions

AGIO has engaged Reputex a leading advisory service for local carbon markets in relation to the purchase of carbon offsets. AGIO currently will target Australian Carbon Credit Units (ACCU's) for use as offsets. Additionally, AGIO will prioritise offsets generated from local project developers in Western Australia to develop local carbon offset projects. This can provide value at a local scale as well as provide purchasable offsets for the project.

Additional offsets may be purchased where the annual emissions are greater than that outlined in this plan and above the emissions intensity default figures and required reductions. Only good quality ACCU's would be purchased (i.e., to ensure the environmental integrity of offsets).

The timing of offset purchases will be based on annual results and will occur at least annually. The full amount of offsets required for that reporting year will be purchased (see Figure 4). If a specific project or offset purchase that provides additional offset value than is required, this may be purchased and used as credit for the following year/s. For example if 60,000 tonnes of offsets are required annually and 180,000 tonnes of offsets generated from a local Western Australia tangible activity (on-ground planting) became available, AGIO may purchase the full suite of offset tonnes available and offset against its emissions over a three year period.

AGIO will target net zero emissions from its transmission and midstream assets by 2050. Purchasing of carbon offsets will align to AGIG's Environment, Social and Governance (ESG) Strategy. ACCU's will be Australian based, certified by the CER and the preference would be for an ACCUs that is closely located or related to the project area (depending what is available at the time).

Any purchase and surrender of the ACCUs will be reported to the CER and DWER annual compliance assessment report.

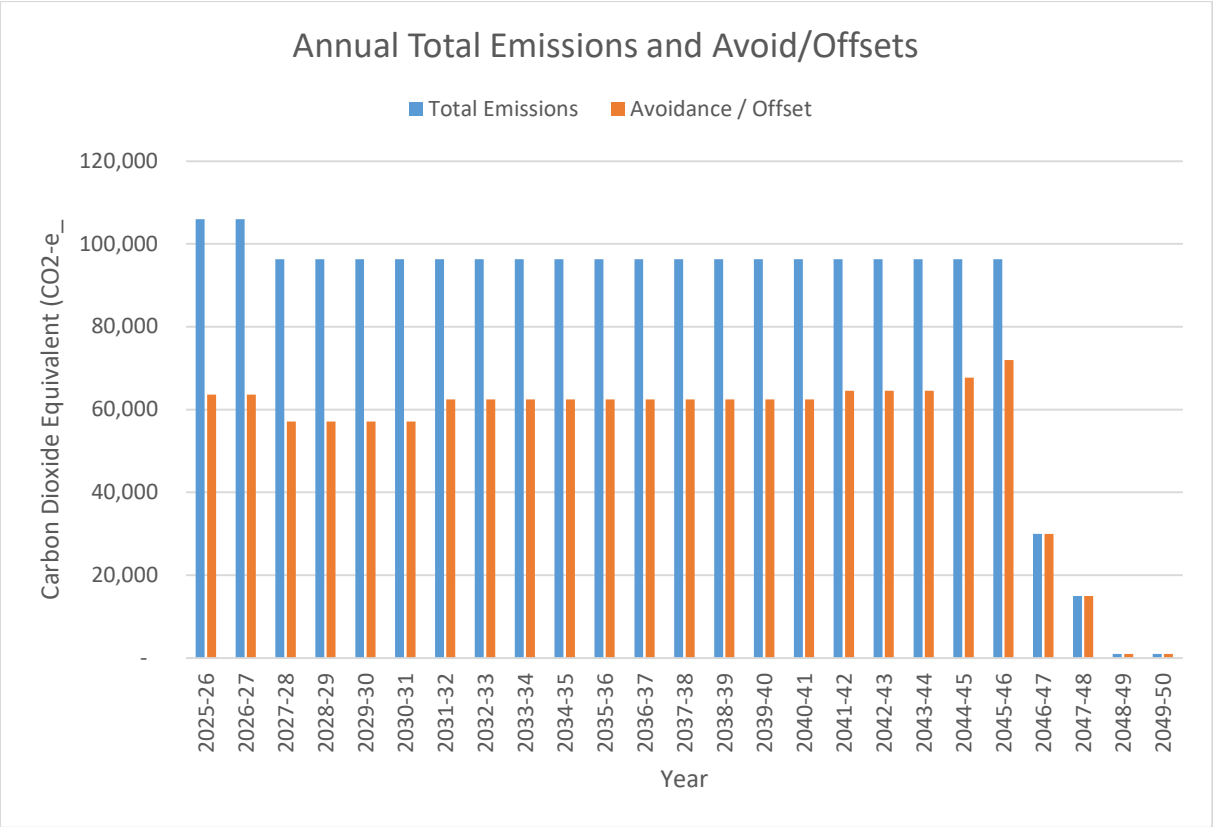

Figure 4 Estimated volume and proportion of emissions proposed to be offset against the total emissions

4.5 MA7 – Preventative maintenance and leak identification – Fugitive emissions

AGIO processes and procedures will be developed and implemented to ensure emissions from plant operations and design will be minimised and actioned through consistent and constant monitoring, leak detection capability and frequent site inspections.

These processes will include (but not limited to) the following:

- Personnel profile (roster and onsite/offsite operations and response timeframes);
- Leak monitoring
- Leak detection devices
- Response procedure
- Critical spares inventory
- Gas chromatographs (gas quality / specifications)
- Flare monitoring (gas flow)
- Pressure Safety / Pressure Relief Valves (PSV or PRV) release monitoring
- Custody transfer monitoring (upstream, midstream, downstream)

The proposal is designed and will be constructed and operated in line with Australian and International Standards (e.g. AS2885, ASME B31.3).

AGIO will continue to build on the long term success of AGIG in the management of the DBNGP and other transmission, distribution and gas storage projects all of which have a high quality environmental record and focus on the safe and effective handling and storage of gas.

A component of this management action will be targeting ongoing improvements (reductions) in the amount of PSV/PRV releases to minimise emissions for these sources.

5. Adaptive management and review

5.1 Management plan review

This GHG Environment Management Plan will be reviewed, evaluated and updated at a minimum of every five years or in response to the following triggers:

- Introduction of a new process or activity that could introduce new or amend existing GHG emissions;
- Outcomes of relevant technical studies and investigations into new GHG emission reduction opportunities or new energy efficiency technologies or techniques;
- Changes in relevant State or Commonwealth legislation;
- Comments from the EPA during the document review process.

An internal review of the monitoring and reporting procedures will be carried out annually to ensure accuracy and compliance with relevant legislation. The annual reviews will include checking that:

- All requirements have been adequately reported
- Inventory boundaries have been set correctly
- Correct calculation methods have been used to quantify GHG emissions
- Correct energy production and consumption reporting factors and methods have been applied
- Energy efficiency opportunities have been reported
- Reporting procedures show relevance, completeness, consistency, transparency, and accuracy
- Quarterly reporting to DMIRS matches NGER Act reporting requirements; and
- Timeframes have been met for outputs and deliverables.

Independent verification of the GHG inventory will be conducted as required for quality assurance purposes and to provide feedback on managing data collection and inventory quality.

After a review is triggered, any updates to the GHG Environment Management Plan (other than administrative changes) will be submitted to the EPA and published when approved.

AGIG will provide a GHG EMP Summary Document as part of its public disclosure and will include as part of the transparent approach the following on its website:

- Copy of the latest approved GHG EMP
- GHG EMP Public Summary of the approved GHG EMP (once approved)
- Latest GHG Progress Statement
- Latest Annual Compliance Assessment Report (ACAR)
- Copy of CEMP and Rehabilitation Management Plans
- Any other documentation required under approval conditions

5.2 Review of mitigation measures

AGIO shall review all measures to avoid, reduce and offset emissions through an ongoing basis and in line with targets set out in Table 3-1. This includes meeting the timeline for overall reduction in line with 'Target Zero by 2050'. This review as per MA1 will be conducted annually to assess feasible opportunities to reduce emissions.

5.3 Stakeholder consultation

AGIO has detailed the Stakeholder Consultation for the project within the project CEMP.

6. References

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