GEELONG GAS TERMINAL PROJECT

Greenhouse Gas Emissions

Introduction

Sustainability has been a major focus throughout the Gas Terminal Project, and the terminal has been designed to minimise greenhouse gas emissions at every stage. From the outset, we have actively looked for opportunities to improve the design so we can minimise emissions, and minimise the carbon footprint from construction and ongoing operations.

Significantly, the predominant mode of operation planned would be “open loop” operation that uses seawater to warm the liquefied natural gas (LNG) and does not require fuel-burning heaters. This is significantly less energy intensive than alternate forms of operation.

Viva Energy has committed to offset all residual Scope 1 and Scope 2 emissions from the construction and operation of the Gas Terminal, through the purchase of certified carbon offsets.

Greenhouse Gas Studies

A comprehensive greenhouse gas study was conducted in 2021 by technical experts as part of the regulated Environment Effects Statement (EES) process. The study confirmed that annual emissions are expected to account for a very small portion of state emission levels during both the construction and operation phases of the Gas Terminal. The findings of the study are publicly available as part of the EES report.

The study findings have helped inform how we best design and operate the Project to minimise and mitigate emissions.

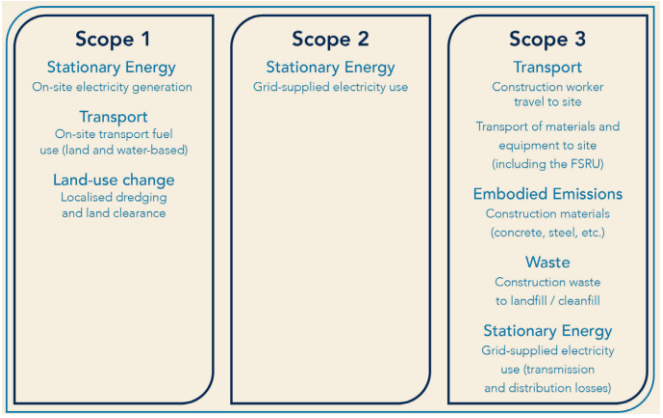
The EES is a regulated process, and emissions were assessed in line with the EES scoping requirements as specified by the Victorian Planning Minister. The study assessed Project activities that would produce greenhouse gas emissions, including construction works and operations under various scenarios. It considered both direct and indirect greenhouse gas emissions. Emissions were estimated in accordance with the principles of the Greenhouse Gas Protocol.

The impact assessment covered Scope 1 (direct emissions from our operations) and Scope 2 (indirect emissions – i.e. from the generation of electricity we purchase and use in our operations).

The scoping requirements of the EES did not require Scope 3 emissions to be included in the impact assessment, however, for completeness, we included the significant Scope 3 emissions that Viva Energy has the ability to control or influence (Scope 3 refers to other indirect emissions, which are a consequence of our activities but from sources that we do not own or control).

Emissions during construction

The total Scope 1 and 2 emissions during the construction period are estimated at 6,878 t CO2-e (equal to 0.01% of the State’s total). Construction emissions including Scope 1 and 2 and relevant Scope 3 are estimated to be 62,168 t CO2-e.
The operational boundary showing how we calculated emissions during construction is shown below.



During construction, the biggest source of potential emissions was found to be transport fuel use (60% of total emissions). This included diesel fuel consumed by vessels and equipment during construction of the Refinery Pier extension, treatment facility and pipeline, and for dredging activities. The majority of the Scope 3 emissions are associated with fuel consumed for the transport of the floating gas terminal (FSRU) to Geelong and the embodied emissions in concrete and steel for Refinery Pier and pipeline infrastructure.

What are Scope 1, 2 and 3 emissions??

The Greenhouse Gas Protocol defines three categories of emissions. This guides how emissions are classified and reported.

SCOPE 1: Direct emissions of greenhouse gas from sources that are owned or operated by a reporting organisation (examples include combustion of diesel in company-owned vehicles or used in on-site plant and equipment)

SCOPE 2: Indirect emissions associated with the import of energy from another source (examples include import of electricity from the grid, or heat)

SCOPE 3: Other indirect emissions, other than energy imports, which are a direct result of the operations of the organisation, but from sources not owned or operated by them and due to upstream or downstream activities (examples include indirect upstream emissions associated with the extraction, production and transport of purchased construction materials; and business travel by ship, air or rail).

If you have any questions or feedback please contact us on:
1800 515 093
energyhub@vivaenergy.com.au
vivaenergy.com.au/gas-terminal

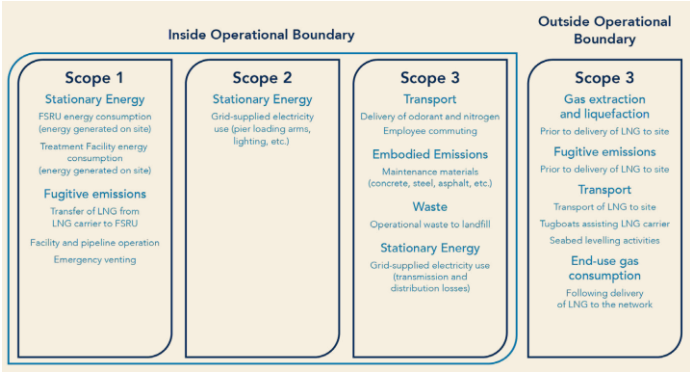
VIVA EnergyAustralia

Emissions during operations

Operating the gas terminal would generate an estimated 47,906 t CO2-e annually, equivalent to 0.05% of Victoria's annual greenhouse gas emissions.

Stationary energy use is the biggest factor, accounting for 97% of total emissions. This is mostly LNG used as fuel by the floating gas terminal in the regasification process, but also includes electricity such as that used in the onshore treatment facility.

The "operational boundary" for terminal operations is shown below. This shows the emissions which were included in the EES assessment, based on Viva Energy's ability to control or influence the activity.



Mitigation: Open loop regasification mode

The most significant opportunity to minimise greenhouse gas emissions from the Project's operation is the adoption of open loop mode for the floating gas terminal – this is the preferred and planned operational mode.

Operating at peak demand in open-loop mode will result in approximately four times less greenhouse gas emissions than under a closed-loop operating scenario

Seawater is circulated to heat the LNG, with the seawater then directed into the Refinery for re-use in the cooling water system. Whereas closed-loop mode uses natural gas-fuelled steam boilers to warm up the LNG, open-loop mode means that we don't have to use boilers to make steam in the regasification process, therefore using much less fuel and producing fewer emissions.

Other Project mitigation measures

A third-party certified Energy Management System will be put in place to monitor and improve energy and greenhouse gas emissions performance during the life of the operations.

Other opportunities to avoid or minimise emissions were identified in the technical studies and will be implemented wherever possible, such as:

- Minimise waste and excess materials and incorporate reuse/recycled materials where possible
- Use low embodied energy materials (e.g. substituting concrete mixes) where practicable
- Use materials that are low maintenance and durable to avoid unnecessary replacement
- Source local materials and equipment and engage with a local workforce wherever possible
- Sustainable procurement and resource management practices
- Avoid the inefficient use of materials, fossil fuels, and electricity
- Selection of plant and equipment would consider fuel efficiency to reduce the consumption of fossil fuels.

Fugitive emissions from FSRU operations

"Fugitive emissions" refers to greenhouse gas (generally methane) which accidently leaks from oil and gas operations, for example from valves, valve glands and flanges. Internationally, the natural gas industry is focused on reducing fugitive emissions from operations.

Our proposed floating gas terminal is a relatively simple operation, compared to the complex processing plants which are used elsewhere for LNG production and export. Our planned operation has no compressor stations and a low number of valves and flanges, hence less sources of potential leaks and fugitive emissions.

Fugitive emissions are estimated at 2% of the total (1442 t CO-e per annum) and were considered for key Project components including the treatment facility and the pipeline, maintenance and emergency venting as well as the transfer of LNG from LNG ships to the floating gas terminal.

- The Project has actively looked at opportunities to reduce fugitive emissions, for example where the number of flanges can be reduced, and the potential to "weld-in valves (where it does not create an issue for maintenance).
- Close monitoring of pipelines will also reduce the risk of leaks and fugitive emissions from flanges and glands

Emissions outside the 'operational boundary'

The greenhouse gas studies for the Project were conducted in accordance with the regulated EES process and the Greenhouse Gas Protocol.

It is important to note that the role of the gas terminal would be to receive LNG and re-gasify it, then deliver natural gas to the Victorian gas transmission system for delivery to end users. The decisions around the sourcing of LNG cargoes would be made by the customers of the terminal and not by Viva Energy as the terminal operator, therefore the upstream emissions associated with transport of the LNG to the terminal were not included in our study.

Upstream emissions associated with the production of LNG were also not included as these would represent Scope 1 emissions for the company that undertakes the production activities, and the project has no control or influence over these activities. It has been assumed that the extraction, and liquefaction of gas which would generate emissions would occur irrespective of the project.

Similarly, we have no ability to influence how the gas is used and consumed by end-use customers.

Estimates for other Scope 3 emissions are included for full transparency in the Appendix to the Greenhouse Gas Impact Assessment technical report. These include the upstream (production, liquefaction and transport of LNG) and downstream

If you have any questions or feedback please contact us on:
1800 515 093
energyhub@vivaenergy.com.au
vivaenergy.com.au/gas-terminal

VIVA EnergyAustralia

(end-use) emissions which are outside the Project's operational boundary (per the diagram above).

Emissions from LNG shipping

Modern LNG ships are powered by natural gas (not diesel) and are among the most environmentally friendly vessels on the ocean.

Their systems are designed to avoid accidental or fugitive emissions by capturing surplus vapour from the LNG tanks and re-using it in the vessels engines or reliquefying it and returning it back into the tanks.

Frequently Asked Questions

Q. What impact would the Gas Terminal have on Victoria's carbon emissions?

The terminal would account for a small percentage of Victoria's greenhouse gas emissions – around half of one per cent of Victoria's overall annual emissions during operations.

The emissions projections for the Project are based on the proposed business model, that is, the gas terminal is an import and regasification terminal to receive and distribute gas to market. Viva Energy will not produce LNG or natural gas. The project is aimed at filling a shortfall not creating demand. The gas planned for import through the new terminal will replace existing /declining supplies, to meet demand as local gas fields decline.

The overall use of gas is not expected to increase due to the Project. It is assumed that end-use consumption of gas in Victoria would occur irrespective of the Project - if the Project does not proceed it is anticipated that gas would be sourced from elsewhere to fill the forecast shortfall.

We have actively looked for opportunities to improve project design so we can minimise emissions, and minimise the carbon footprint from Gas Terminal construction and ongoing operations.

Q. Why isn't the Project accounting for all Scope 3 emissions – including the transport of LNG?

The emissions from transportation of LNG (as well as other Scope 3 emissions) have been calculated, and are available online as part of the EES documentation.

They were not, however, included in the EES impact assessment of Gas Terminal Project emissions, consistent with the scoping requirements.

- The widely accepted standard (Greenhouse Gas Protocol) for measuring GHG emissions is that a facility should account for the emissions that it produces, and has some ability to control or influence.
- Our Gas Terminal business model would be an import and regasification terminal only (unlike the AGL Crib Point proposal, where AGL were building the terminal for their own use, to process gas they owned).
- The customers who use our terminal would be in control of LNG sourcing and transport, and as such the customer would account for the Scope 3 emissions generated from delivering their LNG to our terminal. Upstream emissions associated with the production of LNG were not included as these would represent Scope 1 emissions for the company producing the gas.
- The scoping requirements of the EES issued by the Minister for Planning, did not require Scope 3 emissions to be included in the impact assessment

Converting natural gas to LNG is one of the most efficient ways to transport large amounts of energy.

If you have any questions or feedback please contact us on:
1800 515 093
energyhub@vivaenergy.com.au
vivaenergy.com.au/gas-terminal

VIVA EnergyAustralia

If you have any questions or feedback please contact us on:

1800 515 093
energyhub@vivaenergy.com.au
vivaenergy.com.au/gas-terminal