Chapter 2

ject rationale

COLUMN THE OWNER

The Viva Energy Gas Terminal Project (the project) is one key project that is part of Viva Energy's broader vision to create the Geelong Energy Hub at the Geelong Refinery to support the energy needs of Victoria and south-east Australia. The Gas Terminal Project is the first project related to the proposed Geelong Energy Hub to be developed and is the subject of this Environment Effects Statement (EES). The project would provide a flexible option for short and long-term energy supply by providing a secure and flexible source of gas. This chapter discusses the rationale for the project in the context of Victoria's energy security and affordability, established legislative and policy framework and forecast supply shortfalls in Victoria and south-east Australia.

The EES scoping requirements set out the following evaluation objective related to the project rationale:

Energy efficiency, security, affordability and safety – To provide for safe and cost-effective augmentation of Victoria's natural gas supply having regard to projected demand and supply in context of the State's energy needs and climate policy.



Supporting information on the need for the project considering future gas supply and demand is provided in Attachment I: *Energy demand and market statement*. Risks associated with severe weather events on the project's infrastructure and operations in the context of climate change scenarios and extreme weather events are discussed in Attachment II: *Risks to project from climate change*. Potential safety impacts on nearby residents, the workforce and nearby operations within Corio Bay and surrounds are discussed in Technical Report N: *Safety, hazard and risk assessment.*

2.1 How the project contributes to Victoria's energy security and affordability

Liquefied natural gas (LNG) regasification facilities provide a flexible and competitive means of securing natural gas and would form an important part of Victoria's energy infrastructure mix, meeting gas demand for as long as gas is needed. The project would enable gas imports of up to 160 petajoules (PJ) per year of LNG to meet an expected shortfall in the south-eastern states of Australia by the mid-2020s and improve energy security and affordability by providing a new source of gas close to major demand centres. South-eastern Australia refers to Victoria, Tasmania, South Australia, New South Wales (NSW) and the Australian Capital Territory (ACT).

The key objectives of the project are to:

- Provide a new, secure and flexible source of gas to the south-east Australia domestic gas market
- Ensure forecast annual supply shortfalls in Victoria are avoided
- Contribute to meet peak seasonal and peak day demand for gas in Victoria
- Support the Geelong Energy Hub vision for the Geelong Refinery, the Geelong economy and Victoria's energy transition.

The project would be able to supply 100% of the existing Viva Energy refinery and the Geelong region's natural gas needs every year. The Geelong Regional Withdrawal Zone consumes over 20PJ of gas per year, of which the refinery would use 4 to 5PJ. This new source of gas would contribute to the security of Victoria's gas supply which has traditionally come from the Gippsland Basin through the Longford Gas Plant.

2.1.1 Geelong Energy Hub

In June 2020, Viva Energy announced a vision to develop the site of the Geelong Refinery into an Energy Hub which would support Victoria and south-eastern Australia's evolving energy needs. The Geelong Energy Hub would leverage the benefits of Geelong Refinery's strategic location, positioning Geelong as a core supplier of energy for Victoria and the south-eastern states into the future.

The Geelong Energy Hub comprises a number of potential projects. The Gas Terminal Project is the first and most advanced of the Geelong Energy Hub projects. The Geelong Energy Hub vision could see the site taking a lead role in supplying liquid fuels and gas as well as supporting the development of other alternative energy solutions. Importantly, diversification of the Geelong Refinery site would underpin the future viability of the refinery, protect local jobs, generate new jobs and skills and support economic development for the region.

Other initiatives which are being considered include a solar energy farm, alternative fuels production such as hydrogen, and the opportunity to develop strategic storage to help support Australia's fuel supply security. It is important to note that the Gas Terminal Project has no inter-relationship with, or reliance on these other projects being considered for the Energy Hub. Other potential Energy Hub projects would be subject to different approvals processes in the event that they are progressed by Viva Energy and are not the subject of this EES.



2.2 Energy policy context

2.2.1 National energy policy

The Australian Government has three pillars for its Energy Policy Blueprint, which set out objectives and policies for energy in Australia (Australian Government, 2019). These pillars are:

- Reliable, secure and affordable energy supply
- Putting consumers first
- Meeting our international commitments.

A key aspect of this blueprint is the need to increase the supply of gas for domestic use.

National Gas Infrastructure Plan

The Australian Government has released a National Gas Infrastructure Plan (NGIP) (Australian Government, 2021). The Plan identifies that gas supports the reliability and security of Australia's electricity system and plays a critical role in complementing increased uptake of renewable energy technologies.

The NGIP acknowledges that supplies of gas to the domestic east coast gas market are forecast to fall short of residential, commercial and industrial demand by the mid-2020s. To address this, it has identified the role LNG import terminals can play as a flexible source of supply able to meet seasonal demand variations.

2.2.2 Victoria's energy policy

The Victorian Government's energy policy is guided by four key objectives (Victorian Government, 2021a). These key objectives are to ensure:

- An efficient and secure system
- That supplies are delivered reliably and safely
- That consumers can access energy at affordable prices
- That our energy supplies and the way we use them are environmentally sustainable and less greenhouse intensive.

The Victorian Government is seeking to achieve its energy policy objectives in a number of ways, including through investing in new energy supplies and the efficient use of those supplies.

2.2.3 Climate policy

The Victorian Government has set a Victorian Renewable Energy Target of 50% by 2030 (Victorian Government, 2021b). This will contribute to Victoria's long-term target of net zero emissions by 2050.

To support the transition to net-zero emissions, Victoria's Climate Change Strategy (Victorian Government, 2021e) states the Government's commitment to ensuring gas reliability and security. This is further highlighted in A Gas Substitution Roadmap, currently being developed by the Victorian Government. A Gas Substitution Roadmap will detail potential transition pathways and policy mechanisms to support Victoria's emissions reduction targets. The Government's Roadmap recognises the important role gas has played in Victoria's energy mix and in the state's economy. The Roadmap highlights the role of gas and the importance of maintaining a reliable supply of affordable gas during the transition to renewable and zero emissions alternatives. The Roadmap identifies that the potential to import LNG directly to Victoria may play an important role in securing Victoria's gas supply (Victorian Government, 2021f).

In relation to climate policy at the national and state level, Viva Energy has recently announced its plans to reduce carbon emissions. This includes a net zero target for Scope 1 and 2 emissions for nonrefining operations by 2030, and for all operations by 2050. The company has also committed to offset Scope 1 and 2 emissions for the life of the Gas Terminal Project addressed in this EES (see Chapter 9: *Greenhouse gas emissions* and Chapter 15: *Sustainability* for further details). This commitment sits within climate change policy (at all levels of Government) with offsets being an element of overall strategy in the transition to renewable energy.

Viva Energy contends that there is a balance to be struck. The balance should recognise the importance of action on emissions within evolving Government policy settings. It should also account for well-documented medium term energy security and supply needs, in particular, the well documented gas shortfall predicted for southeastern Australia in coming years.

2.3 Natural gas use in Victoria

This section provides an overview of how natural gas is consumed in Victoria and the outlook for future gas demand and supply constraints. Supply and demand analysis shows that at least 2 LNG regasification facilities are required in south-east Australia to address gas shortfalls in the short to medium term.

2.3.1 The Victorian natural gas market and transmission network

Victorian businesses and households have relied on natural gas as a major source of energy since the late 1960s. More people in Victoria access natural gas than in any other state. Reticulated natural gas is available in most Victorian cities and large towns (Victorian Government, 2021c).

The natural gas market in Victoria is managed by the Australian Energy Market Operator (AEMO), including both the Declared Wholesale Gas Market (DWGM) and the Victorian Transmission System (VTS). AEMO undertakes transmission planning for the Victorian gas market, including monitoring and forecasting supply and demand, and assessing system constraints, capabilities and development proposals.

The VTS network is shown in **Figure 2-1**. Gas is transported from Longford and Lang Lang gas plants in the east to and from Culcairn in the north (connecting to the NSW transmission system) and lona in the west (connecting to South Australia, Otway gas production and underground gas storage facilities).

Operating the Victorian gas market

The Declared Wholesale Gas Market (DWGM) is a wholesale market which enables the sector to trade imbalances between gas consumption (withdrawal) and supply (injection).

The Victorian Transmission System (VTS) is the transmission pipeline infrastructure which transports natural gas from the suppliers to customers. The VTS service provider, APA Group, owns and maintains the VTS assets.



Figure 2-1 The Victorian Transmission System (VTS) Source: AEMO VGPR (2021b)

2.3.2 Current gas consumption

Natural gas currently meets around 22% of Victoria's total energy needs (around 208PJ in 2020). The AEMO Victorian Gas Planning Report (VGPR) reveals that most of this usage is driven by light commercial and residential users (around 60%), followed by industry (35%) and electricity generation (gas-powered generation [GPG]) (5%) (AEMO VGPR, 2021b, p24). There are over two million gas connections in Victoria for heating, cooking and industrial uses. Over 80% of Victorian households are connected to gas. This number is forecast to increase with population growth.

Victorian households are more reliant on gas than other south-eastern states, with usage driven by winter heating demand. In 2020, Victorian gas demand ranged between a winter peak monthly average of 928 terajoules per day (TJ/d) in July to a summer low in January of 274TJ/d. **Figure 2-2** demonstrates the seasonality of gas use in Victoria, with the peaks in winter clearly shown. Gas is also a key input for manufacturing, which is essential to some industries and not easily replaced.



Figure 2-2 Actual daily gas demand in Victoria since January 2019. Source: AEMO GSOO (2021a)

In Victoria, gas currently plays a minor role in overall electricity generation, although it plays an important role in peaking generation when there is a high demand for electricity. Gas will continue to play an important support role in electricity generation as well. Currently, Victoria relies on brown coal to generate most of its electricity (see **Figure 2-3**). With the closure of Hazelwood coal-fired power station in 2017 and the increase in renewable energy sources, Victoria's electricity generation mix is changing. In 2019, renewables share of the total generation was 21% and gas generation was 8%. Between 2018 to 2019, there was a 31% increase in gas generation for electricity in Victoria.





2.3.3 Future gas demand

In the south-eastern Australian region, demand for gas across electricity generation, industrial and residential and commercial sectors is expected to be relatively stable (see **Figure 2-4**). It is expected that in the short to medium term in south-eastern Australia:

- Gas-powered generation (GPG) for electricity is forecast to be the most variable demand as renewables gain market share and coal-fired supplies shut down
- Industrial demand is forecast to be relatively variable, with large loads reconsidered with plant refurbishments, higher gas prices and contracting supply uncertainty
- Residential and commercial demand is forecast to be flat with population gains (an additional 1.6 million households and commercial businesses forecast to be connected with gas by 2040) partially offset by more efficient appliances (for example, home heating using reverse cycle air conditioning) and loss of market share to electricity
- Some large gas users may decide to close or switch out of gas, causing demand to dampen.

According to the AEMO Gas Statement of Opportunities (GSOO), the Victorian winter maximum demand is projected to decline until 2025, due to improvements in energy efficiency and implementation of energy saving schemes (AEMO GSOO, 2021a). From the mid-2020s onwards, maximum gas demand is expected to increase, as new gas connections are forecast to continue to grow with population growth (contributing to roughly a 0.5% increase in daily peak demand each year), while new investments in energy efficiency in gas-fueled appliances is assumed to slow.

The requirement for gas in Victoria remains significant until 2040 and beyond. For example, the volume of gas expected to be required for residential and small commercial customers is expected to grow in regional Victoria over the next 5 years (AEMO VGPR, 2021b, p25). Even under AEMO's lowest gas demand scenario, there is still over 400PJ of gas needed in south-eastern Australia including approximately 200PJ for Victoria every year until at least 2040 (AEMO GSOO, 2021a, p22).





The role of gas in the energy transition

While gas has played a relatively small part in the National Electricity Market's (NEM) generation mix, its ability to deliver quick and reliable supply when needed has been important for the stability of electricity supply. Along with hydro-electricity and battery storage, gas generation will continue to play a crucial role in managing the variability of wind and solar power (Australia Energy Council, 2020). As more coal-fired power plants retire and renewable projects come online, Australia will need to rely on gas generation to support renewables for the next 10 to 20 years and potentially for up to 30 years (Finkel, 2020).

South Australia is leading the way in the energy transition to renewables. In 2019, South Australia had increased their solar and wind electricity to 50%, up from 40% in 2015. Natural gas has played a complementary role in this transition, accounting for almost 49% of electricity generation in 2019 compared to 38% in 2015.

By 2030, following the proposed closure of Yallourn coal-fired power station in 2028, it is anticipated that 50% of Victoria's electricity will be generated by renewables. With increasing amounts of renewable generation in the NEM, fast start GPG would be required to run when there is high demand and/ or low renewable generation due to lack of a combination of solar and wind availability. The amount of gas required will be dependent on variations in weather conditions, and also likely be impacted by new transmission lines, the role of batteries as well as the availability of plant and overall level of energy demand.

Transition to hydrogen

Hydrogen can be produced as a gas or liquid fuel source, and if produced using renewable energy for the electrolysis process (where electricity is used to split water into hydrogen and oxygen molecules), is a zero emissions alternative fuel source. This could be blended with or could replace natural gas in pipelines.

The Victorian Government has released a Victorian Renewable Hydrogen Industry Development Plan, which sets out the blueprint for how the Government will lead and support a suite of outcomes to drive the development of a renewable hydrogen sector (Victorian Government, 2021d). As renewable energy becomes more widely available and affordable, renewable hydrogen production will become a more attractive investment in the transition to a net zero emission future. Viva Energy has a long-term vision to develop hydrogen as a possible alternative energy source at the Geelong Energy Hub and participated in the development of the National Hydrogen Strategy. This could see the Geelong Energy Hub produce hydrogen and export it both to the VTS and to other markets by ship. The final design of Viva Energy's connection into the VTS is expected to be suitable to accept hydrogen blends as the technology, scale and economics develop.

The Australian Hydrogen Centre is currently assessing the feasibility of blending renewable hydrogen into gas distribution networks in Victoria, and also the feasibility of a transition to 100% hydrogen networks. Current research suggests that hydrogen can be blended with natural gas up to a concentration of 10% without the need for significant modifications to distribution pipelines or most household appliances.

The development of renewable hydrogen technology and the use of 10% blended hydrogen (if feasible) in the gas network would be expected to displace natural gas consumption, with a projected rapid acceleration of change forecast for the 2040s under a more aggressive hydrogen scenario (see **Figure 2-5**).

It is anticipated that in the short to medium term, south-eastern Australia will continue to require flexible and reliable natural gas to meet demand up to 2040 and beyond. The point in time where hydrogen may displace natural gas remains uncertain due to current feasibility, cost and existing infrastructure capabilities.



Figure 2-5 Assumed hydrogen impact on natural gas consumption under an aggressive hydrogen scenario, 2021-2051 (petajoules [PJ]) Source: AEMO GSOO (2021a)

2.3.4 Where do we get gas from?

The majority of Victoria's natural gas is sourced from the Bass Strait's Gippsland Basin and is produced at the Longford processing plant. Victoria's gas is also sourced from other gas fields in the Otway Basin, offshore from the Bass Coast area and interstate, via the Culcairn interconnect in NSW. In addition to the Gippsland Basin, the Cooper Basin in South Australia has been a gas supplier to South Australia, NSW, Queensland and Victoria. The gas network and key facilities are shown in **Figure 2-1**.

Victorian gas production from legacy fields such as Gippsland Basin is in decline, meaning Victoria will need to find alternative sources of gas supply to meet its needs. The Cooper Basin is also in decline. There are currently no proven and probable (ready for imminent development) onshore conventional gas reserves in Victoria (Victorian Gas Program, 2020). For 2020, seasonal swing gas supply in Victoria was primarily provided by the Gippsland Basin, and to a much lesser extent from the Culcairn interconnect. The daily peak supply was provided primarily by the Iona gas plant near Port Campbell in south-west Victoria which receives gas and delivers gas from its underground storage facilities.

2.3.5 South West Pipeline capacity

The South West Pipeline (SWP) capacity is currently 426TJ/d eastbound. This means gas from Iona/Port Campbell in Victoria's west can travel up the SWP at 426TJ/d towards Melbourne. This is expected to increase to 468TJ/d once the Western Outer Ring Main (WORM) Project takes effect in 2023. There are also plans (via the VTS Access Arrangement) to further expand the SWP to accommodate greater storage at Iona.

Modelling undertaken for Viva Energy by APA and confirmed by AEMO in the 2021 Victorian Gas Planning Report (AEMO VGPR, 2021b), indicates that the SWP capacity would increase by approximately 273TJ/d due to additional hydraulic injection pressure introduced into the pipeline system by an LNG import terminal in Geelong.

AEMO states in the 2021 Victoria Gas Planning Report that "The SWP can support large injections from the western LNG terminal, even without additional compression, due to its location close to the Melbourne demand zone and high injection pressure. This increases the SWP transportation capacity up to 741TJ/d on a 1 in 20 system demand day" (AMEO VGPR 2021 p 62) (refer to **Figure 2-6**). As the maximum average production rate for this project is 500TJ/d, the projects production rate would not be limited or constrained by the capacity of the SWP.



2.3.6 Gas supply constraints and opportunities

The south-eastern Australian states are approaching a shortfall period when local gas supply cannot meet expected demand. A decline in gas from existing sources and the difficulties in transporting requisite volumes of gas south from distant northern Australian locations could result in peak day gas shortfalls by the mid-2020s (AEMO GSOO, 2021a, p5). Traditional southern gas supplies are declining faster than previously forecast, particularly in terms of maximum daily production "swing" capacity. A major flexible gas supply source at Longford in Victoria's Gippsland Basin is now projected by the producer to be depleted one year earlier than forecast last year (AEMO GSOO, 2021a).

Figure 2-7 shows that Queensland and the Northern Territory have nearly 90% of 2P gas reserves (proved and probable for commercial extraction) and contingent gas resources (discovered in location but not yet proven and cannot be commercially extracted) available for eastern Australia. Of the 2P east coast gas reserves, around 80% are committed to LNG export projects with contracts to 2035-2037. The majority of proved and probable gas reserves are a long distance from south-eastern demand. Geographically, the transportation of available gas is highly constrained by the existing network of gas pipelines. Movement of gas from Queensland to Moomba and onto southern states is increasing - both in terms of overall volume and in terms of daily peak flow. However, current pipeline capacity is close to being full. The existing pipeline network was not designed to carry gas from the north and west of the country in the volumes needed to satisfy large demand centres in the east and south of the country, in particular for peak daily demand periods. Augmenting the existing pipeline system would be costly and take many years, requiring complex landowner and environmental issues to be managed successfully.



Figure 2-7 Natural gas reserves and contingent resources - February 2021 Source: EnergyQuest (2021)

The lack of new gas reserves and resources in south-east Australia, combined with inadequate transmission infrastructure, is expected to a create seasonal gas shortage for domestic customers in the south-eastern states sometime around 2025. The timing depends on when committed exploration projects come online and when LNG regasification facilities are in place. Both AEMO and the Australian Competition & Consumer Commission (ACCC) highlight the importance of LNG regasification facilities as measures to address and mitigate the predicted shortfalls.

LNG regasification facilities would bring gas in from both Australia and overseas. They have been identified by the ACCC as a way of improving competition within the market. Not only do they offer a potentially more cost-effective delivery of gas compared to long distance pipeline transportation (becoming a so-called "virtual pipeline"), but they do so without the uncertainties of contingent resources or the risk of reserves running short. They also introduce the ability to procure gas from the cheapest global sources, improving price competition options for customers.

EnergyQuest predict three phases to the gas supply and demand picture over the next 20 years (EnergyQuest, 2021). The first phase until around 2025 is where demand and supply are balanced (albeit finely). The next phase from 2029 sees overall demand outstripping supply even with LNG regasification facilities. The third phase from 2037 sees existing LNG export contracts in northern Australia finishing up and LNG export activity dropping with fewer processing trains in use. Given the difficulties in transporting gas south from existing sources in northern Australia and considering the decline in gas from existing sources in south-eastern Australia, there would still be a need for an LNG regasification facility. These facilities would be required transport gas to south eastern Australia if additional gas supply was to become available from northern reserves. The three phases are shown in Figure 2-8 and Figure 2-9 below and highlight how important LNG regasification facilities will be for south-eastern Australia and Victoria in particular.





Figure 2-8 South-east Australia gas demand and supply, Source: EnergyQuest analysis (2021)



Figure 2-9 Victoria and Tasmania gas demand and supply, Source: EnergyQuest analysis (2021)

2.3.7 Proposed projects to address the gas shortfall and summary of project benefits

A number of gas projects in south-eastern Australia have been proposed to address the near-term shortfall forecasts of AEMO's most recent GSOOs, including the Port Kembla Gas Terminal in NSW, which is an LNG terminal expected to inject up to 500TJ/d into the domestic market. While the development of the Golden Beach and new gas fields in the Gippsland Basin represent small incremental volumes, all of these anticipated projects would help manage operational risks associated with unplanned outages and defer shortfall forecasts in the near-term (AEMO GSOO, 2021a).

Supply and demand analysis (see Figure 2-8 and Figure 2-9) shows that at least 2 LNG regasification facilities are required in the south-east of Australia. Locating these import terminals near the two largest demand centres on the east coast of Melbourne and Sydney would optimise flexibility and cost.

The gas terminal project at the Geelong Refinery has a number of benefits for the gas market. It could:

- Add to supply options in order to meet seasonal shortfalls
- Provide very good flexible capacity for meeting daily peaks and seasonal swings in Victorian demand
- Supply under contracts without the risk of reserves running short
- Lower reliance on long distance pipelines decreasing stakeholder and environmental impact risk
- Compete with monopoly pipelines and avoid long-distance pipeline tariffs and expensive pipeline augmentations
- Provide access to globally competitive gas markets and prices.

2.4 Additional project benefits

Siting the project at the Geelong Refinery would provide benefits over and above those outlined in **Section 2.3.7**. By virtue of its position at Corio in Geelong (only 70 kilometres from Melbourne), the terminal would be the closest source of gas for the biggest demand centre in south-east Australia.

The project is close to Victoria's gas transmission network. As such, long and complex connecting pipelines are not needed for the project. A short gas transmission pipeline (approximately 7 kilometres) would be constructed, largely following existing pipeline corridors, with approximately 2 kilometres running through land owned by Viva Energy.

A short gas pipeline would minimise landholder impacts and keep the cost of injecting gas into the network low. Both of these factors further underpin the rationale for the project's potential to provide secure and cost competitive gas for consumers.

2.4.1 Synergies with current refinery operations

In addition, siting the project at Viva Energy's Geelong Refinery affords both the project and the refinery benefits which would not be possible to the same extent with other LNG terminal projects in other locations.

The Geelong Refinery already facilitates the import and export of bulk liquid fuels with over 200 shipping movements per year through the existing Port of Geelong shipping channel. The project would represent a relatively minor extension of these activities where up to 45 LNG carriers each year would similarly access the same channel and core Refinery Pier infrastructure.

The area has been and remains, an industrial port and heavy-industry land use setting. This offers significant opportunity to minimise visual, noise and other environmental impacts with extensive buffer zones already in place around the refinery. There is also potential to leverage a number of synergies between the proposed project and the existing refinery.

A key synergistic benefit would be reuse of the FRSU regasification cold water discharge in the refinery's cooling water system. This would largely replace the current cooling water needs of the refinery and would reduce the temperature of the existing refinery discharge which is an environmental benefit.

A key operational synergy would be the refinery's existing status as a licensed Major Hazard Facility (MHF) and the likelihood of the FSRU also being designated as an MHF. The same track record of managing safety and risk to high regulatory standards at the refinery could be brought to the project.

2.4.2 Supporting economic development for the region

The refinery has been part of the Geelong community since 1954 and has a long history of co-existing with its neighbours and investing in the local community.

The project, as well as Viva Energy's broader Energy Hub vision, would strengthen the viability of the refinery site into the future and protect and generate local jobs, supporting economic development for the region. Over the 18-month construction period, the project would provide up to 150-200 jobs and 50-70 ongoing Australian jobs once the terminal is in full operation.