



# Heytesbury Underground Gas Storage (HUGS) Pipeline

## Attachment H



Climate Change Act Assessment



# HEYTESBURY UNDERGROUND GAS STORAGE PROJECT

CLIMATE CHANGE ACT 2017 ASSESSMENT

UGS-HE-0044

Rev 1

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## 1. ABBREVIATIONS, TERMS AND ACRONYMS

**Table 1: Terms & Abbreviations**

Abbreviation or Term	Description
2P	Proved and Probable
AEMO	Australian Energy Market Operator
bcf	Billions of Cubic Feet
CLC	Community Liaison Committee
D&C	Drilling and Completion
DD	Directional Drilling
DEECA	Department of Energy, Environment and Climate Action
EMP	Environment Management Plan
EPA	Environment Protection Authority
ERP	Emergency Response Plan
ERR	Earth Resources Regulation
GHG	Green House Gas
HUGS	Heytesbury Underground Gas Storage
G	Giga
GSOO	Gas Statement of Opportunities
HSE	Health, Safety and Environment
IGSF	Iona Gas Storage Facility
LULUCF	Land Use, Land Use Change, Forestry
MFCT	Mylor, Fenton Creek and Tregony
mmscf	Million standard cubic feet
NGERS	National Greenhouse and Energy Reporting Scheme
Obs	Observation
PJ	Peta Joule
PPL	Petroleum Production License
tCO <sub>2</sub> -e	Tonnes carbon dioxide equivalent
TJ/d	Terra Joule per day

## **2. INTRODUCTION**

### **2.1 ABOUT LOCHARD ENERGY**

Lochard Energy are energy storage and infrastructure specialists who own and operate the Iona Gas Storage Facility (IGSF) near Port Campbell, Victoria and have headquarters in Southbank (Melbourne), Victoria. Lochard Energy plays a vital role in maintaining reliable gas (and energy) supply to Australia's east-coast gas market.

Lochard Energy is majority owned by Australian superannuation funds and our investment managers currently manage a combined portfolio of more than \$150bn. Lochard Energy is acting, in respect of the HUGS Project and HUGS Pipeline, in its capacity as trustee of the Lochard Energy (Iona Operations) Trust ABN 25 151 811 449.

Lochard Energy supports Australia's net zero emissions targets and are committed to supporting the transition towards a more sustainable energy future.

### **2.2 ABOUT THE IONA GAS STORAGE FACILITY**

The Iona Gas Field was first discovered in 1988 and subsequently drilled for natural gas before being converted into a gas storage facility in 1998. The Iona Gas Storage Facility (IGSF) was officially commissioned and began operations in July 1999.

The IGSF is the largest independent provider of gas storage services to the east-coast gas market and is a gas processing and compression facility connected to a series of underground storage reservoirs (depleted gas fields). Iona comprises the following infrastructure as shown in figure 1:

- The Iona Facility and associated wells;
- Wellsites at North Paaratte and Wallaby Creek and a Gathering Line hub at North Paaratte Production Station (NPPS);
- A Gathering Line network comprising:
  - DN300 NPPS – Iona Gathering Line;
  - DN300 Wallaby Creek to NPPS Gathering Line;
  - DN150 North Paaratte wellsite to NPPS Gathering Line.

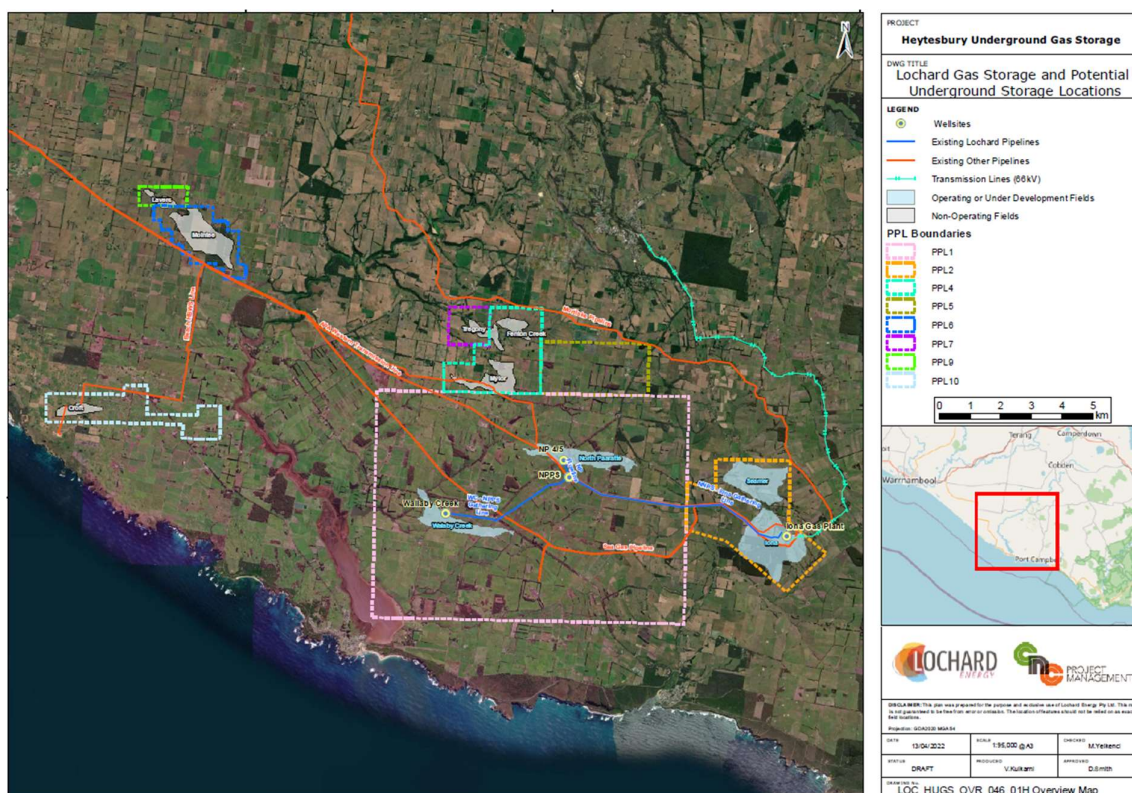


Figure 1 : Overview of the IGSF network and gas storage fields

## 2.3 HUGS PROJECT OVERVIEW

The HUGS Project is the expansion of the IGSF underground storage capacity to help ensure there is adequate winter gas for generation, provide additional security of supply and reliability to the market, and support Victoria's transition away from coal.

Underground storage capacity the IGSF will be increased through the development of the existing Heytesbury depleted gas fields. The Heytesbury depleted gas fields are all natural sandstone formations that have had pre-existing natural gas extracted and are therefore ideal as a natural geological reservoir for the storage of gas.

The HUGS Project will develop a new wellsite which will access three depleted gas fields being Mylor, Fenton Creek, and Tregony (referred to as the MFCT wellsite). The current plan is to develop the Mylor field with 2 new gas storage well(s).

The new development is expected to provide a further ~7.5% increase in the capacity of the IGSF which will increase from 570 TJ/d to 615 TJ/d. By increasing this capacity, the HUGS Project will help keep the supply of gas secure, reliable and safe for Victoria.

The proposed new wellsite and pipeline are shown in figure 2.





**Figure 2: HUGS Project Site and Pipeline Route**

The Mylor field operated from 1999 to 2005 with 9.3 PJ produced as part of the Heytesbury fields development. The field has been shut in since 2005 with the surface production facilities decommissioned. The Mylor-1 well was retained for monitoring and observation post field production. Following the production period, the pressure in the field has increased towards the original field pressure. As part of the conversion to gas storage, it may be necessary to withdraw some remaining native gas (up to a maximum of 1 PJ) so as to depressure the field ahead of the first injection cycle. It is planned to transfer this gas to other fields that are part of the IGSF to use as “cushion gas” to provide pressure support for existing gas storage operations.

### 3. PURPOSE

The purpose of this report is to address the consideration of climate change impacts, where relevant, of the proposed HUGS Project as per the *Climate Change Act 2017* [Ref: 4]. This report will accompany approvals being sought from Earth Resources Regulation (ERR) for petroleum activities covered by the *Petroleum Act 1998* [Ref: 1], *Petroleum Regulations 2021* [Ref: 2] and from the Department of Energy, Environment and Climate Action (DEECA) in support of the application for a Pipeline Licence under the *Pipelines Act 2005* [Ref:21] and the *Pipelines Regulations 2017* [Ref:22].



The Victorian *Climate Change Act 2017* provides the legislative foundation for the Victorian long-term target of net-zero emissions by 2045 and the Victorian Climate Change Strategy [Ref: 8] sets the targets and pathways to achieving this goal, including sector-based emission reduction pledges as required by the *Climate Change Act 2017*.

Through Section 20 of the *Climate Change Act 2017*, the Victorian government makes a commitment that decision-makers will endeavour to appropriately consider climate change, where relevant, for any decision made. Decision-makers are provided with guidance by the policy objectives and guiding principles of the Act, outlined in Part 4, Division 2 and 3.

The overarching focus of these objectives and principles are to minimise further contribution to climate change, to assess and minimise the risk of impacts from climate change and to enhance the resilience and adaptation capacity of communities, infrastructure and the environment to the impacts of climate change in the short, medium and long-term future.

This report may be updated progressively throughout the life cycle and/or execution of the project as further details of the design and execution methodology are developed.

## **4. DISCUSSION**

### **4.1 ASSESSMENT AGAINST CLIMATE CHANGE ACT (2017)**

provides a response to each policy objective from Part 4, Division 2 and 3 of the *Climate Change Act 2017* that describes how the requirements of each objective has been met by the HUGS Project.

This information has been obtained from a number of sources including – the HUGS Preparatory Works Operations Plan, the Victorian Gas Program – Risks, Benefits and Impacts Assessment Report [Ref: 6], Gas Substitution Roadmap [Ref: 13], Victoria's Climate Change Strategy [Ref: 19] and the Pipeline Licence Application [Ref: 7].

**Table 2: Responses to Part 4, Divisions 2 & 3 – Policy Objectives**

Division 2 – Policy Objectives	How the requirements have been met
(a) to reduce the State's greenhouse gas emissions consistently with the long-term emissions reduction target and interim emissions reduction targets; and	<p>Additional gas storage capacity provided by this project could support the phase out of coal fired energy sources during the transition to renewable energy, helping to meet the Victorian Climate Change Strategy [Ref: 8] energy sector pledge and the transition to net zero emissions.</p> <p>In addition, the HUGS pipeline has been designed to be suitable for 100% hydrogen to enable future use of the pipeline for hydrogen [Ref: 10].</p> <p>Lochard Energy has commenced a \$6.3M Feasibility Study to assess the technical and commercial viability for Underground Hydrogen Storage (UHS) in depleted gas reservoirs in the Otway Basin. This study received \$2M of funding from ARENA as part of the Advancing Renewables Program. This project has the potential to provide deep seasonal energy storage. In the future, there is potential that the HUGS project infrastructure (pipeline and the Mylor depleted gas field) could be repurposed to hydrogen transmission and storage. This project is called H2RESTORE with further information available at Lochard Energy's website  <a href="https://www.lochardenergy.com.au/our-projects/h2restore/">https://www.lochardenergy.com.au/our-projects/h2restore/</a></p> <p>A finding of the Victorian Gas Program – Risks, Benefits and Impacts Assessment Report [Ref: 6] (p336) was that exploration and development of the Otway Basin was not expected to significantly alter Victoria's trajectory to achieving net-zero by 2045 due to no expected changes in consumption patterns, and the replacement of high-emitting fuels with gas in the transition to renewables is considered to offset absolute GHG emissions.</p>
(b) to build the resilience of the State's infrastructure, built environment and communities through effective adaptation and disaster preparedness action; and	<p>The Victorian Gas Program – Risks, Benefits and Impacts Assessment Report [Ref: 6] recognises the increasing reliance of Victoria on the Iona Gas Storage Facility (p94) due to a drop in the adequacy of annual gas supply from Victorian sources. The report also recognises the increasing interdependency between gas and electricity markets. Increasing the capacity and reliability of the gas network could support the resilience of electricity markets in Victoria and other States.</p> <p>The HUGS project will support the resilience of Victoria's gas infrastructure during the energy transition through greater storage capacity, allowing the management and 'smoothing out' of peaks and troughs in demand and building greater ability to deal with potential higher and more frequent peaks in demand for gas for electricity use due to more extreme weather and increased reliance on gas firming of electricity due to the exit of coal as forecast by AEMO (refection section 4.5).</p> <p>As noted in the Gas Substitution Roadmap, Victoria has over 2 million homes and businesses with a gas connection [Ref: 13]. The Roadmap noted that these customers need to be supported with a reliable source of gas during the transition. Increasing gas storage capacity of the IGSF will support the adaptation of communities to the predicted effects of climate</p>

Division 2 – Policy Objectives	How the requirements have been met
	<p>change – particularly frequent and more intense periods of extreme heat that can have a severe impact on community health. Through these periods of extreme heat, communities will look to cooling as one means to mitigate effects, in parallel with the implementation of other adaptation actions. Reliable availability of gas for electricity production will support this as the transition to renewables occurs. This has been confirmed in the Victorian Gas Program – Risks, Benefits and Impacts Assessment Report [Ref: 6] (p99) which states that <i>“Onshore conventional gas exploration and development in the Otway region is expected to increase gas supply available for direct use and peaking generation in Victoria. This may support the energy transition and energy security in Victoria as it recognises gas as an important “bridging fuel” to support the energy transition”</i>.</p>
(c) to manage the State's natural resources, ecosystems and biodiversity to promote their resilience; and	<p>The addition of the HUGS project will increase Lochard Energy's contribution to managing Victorian gas resources in a manner as optimal as possible, balancing energy demand and efficient energy supply. Gas storage supports the transitional use of gas to support intermittent renewable energy, replacing higher emitting fuels (i.e. coal) and subsequently supporting the resilience of a lower carbon energy market.</p> <p>The biodiversity assessment for the HUGS project [Ref: 11] enabled Lochard Energy to apply the principles of avoidance and minimisation to prepare a pipeline route that minimises impact to native vegetation and fauna habitat.</p> <p>The majority of the pipeline route is already cleared with a residual area of 0.131 ha of native vegetation to be cleared by the project.</p>
(d) to promote and support the State's regions, industries and communities to adjust to the changes involved in the transition to a net zero greenhouse gas emissions economy, including capturing new opportunities and addressing any impacts arising from the need to reduce greenhouse gas emissions across the economy; and	<p>The HUGS project will supplement the current Iona gas storage infrastructure and provide ongoing support to the economy and communities in the area during the transition to a net zero greenhouse gas emissions economy.</p> <p>As noted previously, there is potential that the infrastructure developed for the HUGS project could be repurposed in the future for large scale renewable hydrogen storage and transmission which would involve significant investment in the southwest Victorian region.</p>
(e) to support vulnerable communities and promote social justice and intergenerational equity.	<p>Increased gas storage capacity, allowing gas to be stored at times of low demand for direct use or electricity generation during peak demand periods supports a more economically efficient energy supply, supporting communities to take steps to mitigate impacts of climate change, such as periods of extreme heat.</p> <p>It has the potential to provide downward pressure on energy prices to reduce the potential for 'energy poverty', where vulnerable members of communities are unable to afford energy costs and therefore minimise or cut off energy use, exposing them to the effects of extreme temperatures.</p>

Division 3 – Guiding principles	How the requirements have been met
<b>23 Principle of informed decision making</b>	
It is a guiding principle of this Act that a decision, policy, program or process—	
(a) should be based on a comprehensive analysis of the best practicably available information about the potential impacts of climate change that is relevant to the decision, policy, program or process under consideration; and	Section 4.2 of this document discusses the Project's climate resilience. The Project is robust and has been designed to incorporate modest increase in intense rainfall events and hot days during its design life of 25 years.
(b) should take into account the potential contribution to the State's greenhouse gas emissions.	<p>As discussed in the response to 22(a) above, a finding of the Victorian Gas Program – Risks, Benefits and Impacts Assessment Report [Ref: 6] was that exploration and development of the Otway Basin was not expected to significantly alter Victoria's trajectory to achieving net-zero by 2045.</p> <p>The proportion of Mylor gas contribution (if utilised) relevant to the overall Otway gas reserves is negligible – refer to the HUGS Project Greenhouse Gas Emissions Assessment.</p> <p>The Victorian 2021 GHG emissions levels of 80.1 Mt tCO<sub>2</sub>-e<sup>1</sup> as reported by DEECA [Ref: 15], the HUGS project will make a comparative annual contribution of 0.025%.</p> <p>It is worth noting that any remaining native gas produced during an initial period of production to reduce the pressure in the field ahead of the first injection cycle will be used by Lochard Energy to support reservoir management activities and provide 'cushion' gas (gas to support reservoir pressure) for gas storage customers. The decision as to whether this gas is ultimately processed or not at the end of the HUGS project life will be made by the operator at that time with a possibility it could remain in the reservoir.</p>
<b>24 Principle of integrated decision making</b>	
It is a guiding principle of this Act that a decision, policy, program or process should integrate the competing long-term, medium-term and short-term environmental, economic, health and other social considerations relating to climate change to ensure that—	
(a) all relevant issues relating to climate change associated with the decision, policy, program or process are taken into consideration during the decision making process; and	<p>Lochard Energy has integrated issues relating to climate change into decision making in the following ways:</p> <ul style="list-style-type: none"> <li>• Peak demand for gas is forecast to increase by AEMO primarily related to use for GPG to firm renewable energy (refer section 4.5). The HUGS project supports this change through increasing IGSF export capacity from 570 TJ/d to 615 TJ/d and increasing the volume of gas stored by 1.8PJ (modelled capacity);</li> <li>• The HUGS project's relatively low incremental emissions will contribute 0.0055% of the Victorian emissions budget over its lifetime</li> </ul>

<sup>1</sup> Total emissions exclusive of LULUCF considerations

Division 3 – Guiding principles	How the requirements have been met
	<p>whilst creating security of supply and reliability to the market that will support Victoria's energy transition towards net zero; and</p> <ul style="list-style-type: none"> <li>The impact of Climate Change on the project has been assessed as having a low risk (refer Section 4.3).</li> </ul> <p>The Victorian Gas Program – Risks, Benefits and Impacts Assessment Report [Ref: 6] has examined economic, social, health and environmental considerations in detail in the overall context of exploration and development of the Otway Basin. Conclusions relevant to climate change were that a slight increase in absolute greenhouse gas emissions as a proportion of Victoria's net 2017 greenhouse gas emissions would be expected (but no significant impact to Victoria's trajectory to achieving net-zero by 2045) and that there is a low impact on native flora and fauna as a result of the project [Ref: 11].</p> <p>No significant impacts on flora, fauna or ecological communities are envisaged through construction and operational phases [Ref: 11] of the project.</p>
(b) there is a proper examination of all the issues which are relevant to climate change; and	See 24(a) above.
(c) any measures adopted as a result of the decision, policy, program or process are cost effective and in proportion to the problems relating to climate change that are relevant to the decision, policy, program or process.	<p>Section 3.4 and 4.7.1 of the HUGS Preparatory Works Operations Plan describes the environmental risk and impact assessment methodology employed to identify and assess impacts and risks to and from the project associated with climate change. Section 4.9.1 describes the risk controls adopted for management of greenhouse gas emissions.</p> <p>The design of the final MFCT wellsite utilises renewable energy (solar) and batteries to provide the majority of the required power. A back-up diesel generator will be installed so as to provide back-up power in the event of prolonged period of poor renewable energy generation but will not be the primary source used for electricity [Ref: 12]. These features are efficient, cost effective and proportionate for the proposed works.</p>
25 Principle of risk management	
(1) It is a guiding principle of this Act that a decision, policy, program or process should be based on—	
(a) careful evaluation of the best practicably available information about the potential impacts of climate change to avoid, wherever practicable, serious or irreversible damage resulting from climate change; and	<p>Section 4.4 of this document describes the potential impacts of climate change on the project.</p> <p>The risk assessment conducted has determined that the risks and impacts of climate change during the project development and operational phases are low.</p>
(b) an assessment of the consequences of each of the options in making a decision having regard to the risks of each of those options; and	See 25 (1)(a) above.
(c) managing and allocating the risks associated with the potential impacts of climate change in a	See 25 (1)(a) above.

Division 3 – Guiding principles	How the requirements have been met
manner that is easily seen and understood and endeavouring to achieve best practice.	
(2) It is a guiding principle of this Act that a decision, policy, program or process should not rely on a lack of full scientific certainty as a reason to postpone appropriate measures to prevent serious or irreversible loss or damage as a result of climate change.	<p>The Precautionary Principle has been applied to the Project's assessment of impacts and preparation of the Project's Environmental Management Framework.</p> <p>The existing environment is well understood and the aspects and impacts relating to construction and operation of the Project have been comprehensively assessed.</p> <p>Residual uncertainties have been incorporated into the Wellsite and Pipeline Environmental Management Plans and will be managed by the preparation and implementation of site-specific management plans.</p>
26 Principle of equity	
It is a guiding principle of this Act that a decision, policy, program or process should have regard to the following—	
(a) opportunities should be created by the present generation to increase the capacities within that generation and future generations to adapt to climate change;	<p>An increase in gas storage capacity provides additional supply in times of high demand and builds greater resilience to deal with higher and more frequent peaks as the adverse effects of climate change are felt. Additional gas supply supports a cleaner alternative fuel source to coal during an overall transition to a net zero greenhouse gas emissions economy.</p> <p>Providing additional gas storage will support reliable and consistent gas supply for electricity production and will support the mitigative and adaptive capacities of current and future communities to the current and predicted effects of climate change – particularly extremes in temperature - as the transition to renewables occurs.</p> <p>As noted previously, the potential for the HUGS infrastructure to provide future large scale renewable hydrogen storage provides the opportunity to transition from gas firming of the NEM to hydrogen firming of the NEM in the future. The project is providing infrastructure and optionality for future generations.</p>
(b) in particular, the present generation should consider the opportunities to increase the capacities to adapt to climate change of those people most vulnerable to the potential impacts of climate change;	Increased gas storage capacity and supply for direct use of electricity generation supports more reliable energy to members of communities. Without it, these members may be exposed to the effects of extreme temperatures and may be vulnerable to the potential impacts.
(c) the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations and that any adverse impacts of climate change are minimised for future generations;	<p>Section 4.9.1 of the Operations Plan discusses risk controls for the project including those relating to minimising greenhouse gas emissions.</p> <p>The HUGS Project is located in a disturbed, agricultural landscape. Environmental impact has been thoroughly risk assessed.</p> <p>Residual uncertainties have been incorporated into the Wellsite and Pipeline Environmental Management Plans and will be managed by the preparation and implementation of site-specific management plans to</p>

Division 3 – Guiding principles	How the requirements have been met
	maintain compliance and ensure that the General Environmental Duty to protect the environment and human health is achieved.
(d) the present generation should consider the long-term, medium-term and short-term consequences of decisions, policies, programs and processes that may impact on climate change.	<p>Over the medium and long-term gas substitution for higher-emitting fuels (i.e. coal) helps to reduce adverse consequences through a less disruptive transition towards higher use of renewable resources and towards net-zero emissions.</p> <p>The HUGS Project Greenhouse Gas Emissions Assessment[Ref: 23] provides information on expected emissions resulting from the HUGS project whilst the EMP documents describe associated control measures to minimise emissions.</p>
27 Principle of community engagement	
It is a guiding principle of this Act that community involvement in decisions, policies, programs or processes relating to climate change that may affect members of the community or members of the community in future generations, especially members of vulnerable or marginalised communities, should be facilitated and this includes—	The HUGS Project Stakeholder Engagement Plan [Ref: 5] provides overarching guidance for the processes of engagement with all stakeholders including the community.
(a) providing appropriate information to the community; and	<p>Information is provided through preparation of project documentation and disseminated through various communication methods in accordance with the Pipeline Consultation Plan. [Ref: 5].</p> <p>Operational and project information is provided to a regular forum of community members during triannual Community Liaison Committee (CLC) meetings. Lochard Energy has briefed the CLC on the HUGS project each meeting since September 2021 and provided a “Notice of Operation” to relevant people and organisations in regards to the project.</p> <p>The HUGS Pipeline has an approved Pipeline Consultation Plan (PCP) [Ref: 10]. The PCP has been developed to provide a comprehensive overview of how Lochard Energy will consult with impacted landowners, occupiers, stakeholders and the broader public regarding the proposed HUGS Pipeline.</p>
(b) providing opportunities for the community to be involved in the decision, policy, program or process; and	<p>CLC meetings provide an opportunity for involvement of community members. Those that can’t attend are provided with copies of presentation materials and meeting minutes.</p> <p>The “Notice of Operation” (NOO) invites contribution from the community which Lochard Energy must consider and address. No responses were received from the community as a result of the NOO.</p> <p>The HUGS Pipeline PCP [Ref: 10] describes the consultation methods that will enable meaningful engagement with landowners, occupiers, stakeholders and the broader public.</p>



Division 3 – Guiding principles	How the requirements have been met
(c) providing for appropriate and adequate public consultation with the community.	<p>In addition to the regular CLC meetings, formal engagement with the local community has been undertaken via the issue of the Notice of Operation for the Preparatory works [Ref: 7] and the planning permit advertising which included information included in the planning permit report [Ref: 12].</p> <p>An option deed to lease the part of the property for the proposed MFCT wellsite is in place with the landowner and near neighbours have also been consulted on this development.</p> <p>Overall consultation has been undertaken in accordance with the HUGS project Stakeholder engagement Plan [Ref: 5].</p> <p>Consultation for the HUGS pipeline has been in accordance with the approved Pipeline Consultation Plan [Ref: 10].</p>
28 Principle of compatibility	
It is a guiding principle of this Act that a decision, policy, program or process to address issues relating to climate change should—	
(a) seek to promote a coherent policy framework within the State; and	This project supports the intent of the broader climate change policy of Victoria. The low emissions identified for this project are compatible and consistent with Victoria's goal of net zero by 2045 [and are consistent with Victoria's Climate Change Strategy [Ref: 19], and Victoria's Gas Substitution Roadmap [Ref: 13].]
(b) seek to achieve cohesion the policies, programs, initiatives, standards or commitments relating to climate change of— <ul style="list-style-type: none"> <li>• other States or Territories; and</li> <li>• the government of the Commonwealth; and</li> <li>• governments of other countries; and</li> <li>• international bodies and organisations.</li> </ul>	N/A

## 4.2 PROJECT GREENHOUSE GAS EMISSIONS

Scope 1, 2 and 3 quantities in tonnes equivalent carbon dioxide (tCO<sub>2</sub>-e) have been estimated for the HUGS Project covering, construction and operational phases project and are included in Table 3. The last six years of NGERS scheme have been provided in Table 4 for Iona Gas Plant to provide context of additional carbon contribution.

Key assumptions and methods in preparing this information is presented for transparency purposes:

- Calculations have been split into the project stages as per Regulation 22(1)(a)(ii) of the Petroleum Regulations 2021 [Ref: 2];
- Each stage was assessed based on Lochard Energy's current plans for development of the HUGS project. Subsequent sections provide further details of the assumptions and information used for the calculation of the emissions for each stage;

- For consistency purposes, calculations were performed using the same processes that Lochard Energy utilise in preparing their annual NGRS report;
- Downstream emissions from the use of any produced native gas (Nil) are classified as Scope 3 with the assumption of combustion via gas powered generation. In the absence of calculated Scope 3 emissions, the emissions calculated for Scope 1 and Scope 2 cover the potential wider emissions anticipated for Scope 3.

**Table 3: HUGS Project Climate Change Assessment: Assessment Results [Ref: 14]**

Wellsite Stage	Scope 1	Scope 2	Scope 3	Total
	tCO <sub>2</sub> -e	tCO <sub>2</sub> -e	tCO <sub>2</sub> -e	tCO <sub>2</sub> -e
<b>Construction</b>	12,760	Nil	598	13,358
<b>Operations (25yr design life)</b>	3,055/yr Total operational life: 76,375	296/yr Total operational life: 7,400	108/yr Total operational life: 2,700	3,459/yr Total operational life: 86,475
<b>Decommissioning</b>	2,786	Nil	110	2,896
<b>Rehabilitation</b>	695	Nil	32	727
<b>Total</b>	<b>92,616</b>	<b>7,400</b>	<b>3,440</b>	<b>103,456</b>
Pipeline Stage	Scope 1	Scope 2	Scope 3	Total
	tCO <sub>2</sub> -e	tCO <sub>2</sub> -e	tCO <sub>2</sub> -e	tCO <sub>2</sub> -e
<b>Construction</b>	486.2	Nil	439	925.2
<b>Operations (25yr design life)</b>	62/yr Total operational life: 1,550	Nil	Nil	62/yr Total operational life: 1,550
<b>Decommissioning</b>	845	Nil	9	854
<b>Rehabilitation</b>	40	Nil	6	46
<b>Total</b>	<b>2,921.2</b>	<b>Nil</b>	<b>454</b>	<b>3,375.2</b>

**Table 4: Iona Gas Plant NGRS Submission – Last 6 years**

Year	Scope 1	Scope 2	Total
Per annum	tCO <sub>2</sub> -e	tCO <sub>2</sub> -e	tCO <sub>2</sub> -e
<b>FY17</b>	73,393	4,300	77,693
<b>FY18</b>	65,830	4,504	70,334
<b>FY19</b>	65,909	4,289	70,198
<b>FY20</b>	63,031	4,056	67,087
<b>FY21</b>	65,577	3,169	68,746
<b>FY22</b>	73,342	3,326	76,668

Total average of 71,788 tCO<sub>2</sub>-e over the FY17-FY22 years.

**Table 5: HUGS Project Climate Change Assessment: Statement and Assumptions**

Project Stage	Description	Gas Volumes & Sources	Other Sources	Scope 1	Scope 2	Scope 3
				GHG emission from direct activity at site	GHG emission at other location due to supply energy to site or Lochard Energy gas used at other location	Indirect greenhouse gas emissions other than Scope 2 emissions that are generated in the wider economy
<b>Construction</b>	Mobilisation, Wellsite construction, Drilling & Connection, Demobilisation (2024/2025)	57 mmscf flared	Liquid fuels for motors, transport	Site clearing and site establishment within construction corridor  Gas Flared	Nil – No Electricity Usage	Fuels associated with construction activity Embodied emissions associated with construction materials (steel and concrete)
<b>Operations</b>	Gas Storage Operations (2026-2051)	Gas storage cycling, fugitive plant pipelines	Electricity, fuel gas compressors engines, fugitive	Fuel gas compressors associated with storage cycling.	Nil – Lochard Energy purchases 100% renewable electricity	Fuels associated with pipeline awareness and operational activity.
<b>Decommissioning</b>	Well & Site decommissioning (2052)	Minor gas flared with well decommissioning	Electricity, fuel gas compressors, fugitive	Minor emissions associated with decommissioning works	Nil – No Electricity Usage	Not calculated or reported by Lochard Energy under NGERs.
<b>Rehabilitation</b>	Final rehabilitation of MFCT site (2052-53)	Nil	Fuel for rehabilitation vehicles & machinery	Fuel for rehabilitation vehicles & machinery	Nil – No Electricity Usage	Nil

### 4.3 CONTRIBUTION OF THE PROJECT TO CLIMATE CHANGE

Lochard Energy has considered the contribution of HUGS to climate change in two respects: the expected greenhouse gas emissions, as well as the potential contribution to electricity sector decarbonisation. This section outlines the expected greenhouse gas emissions.

As demonstrated in Table 3, the scope 1, scope 2 and scope 3 emissions for the construction of the Project (MFCT wellsite and Pipeline) is 14,283.2 tonnes of CO<sub>2</sub> equivalent over a 2 year period.

The Project (Wellsite plus Pipeline) will produce 3,521 tonnes of CO<sub>2</sub> equivalent per annum, a total of 88,025 tonnes of CO<sub>2</sub> equivalent over the pipeline's design life of 25 years.

Decommissioning and rehabilitation at end of life constitute 4,523 tonnes of CO<sub>2</sub> equivalent.

Lochard Energy will apply the following systems and processes for the drilling and construction phases to either prevent or minimise greenhouse gas emissions during this phase of the Project:

- Flaring operations will be kept to a minimum (1-2 days per well conducted during daylight hours to minimise noise impacts);
- A 24 hour/ 7 day a week drilling operation will minimise down time periods where generators may need to be kept running and fuel consumed when there are no activities taking place;
- Maintaining equipment in good working condition and conducting servicing as per manufacturer servicing schedules to ensure optimal performance;
- Shutting off diesel powered equipment when not needed; and
- Training and induction processes to raise awareness of switching off equipment when not in use.

Lochard Energy acknowledges that the HUGS project will have a net contribution on a total lifecycle basis however the overall contribution from the addition of the Mylor field on an overall site operational perspective is considered minor. The current estimate is that emissions will increase by 3,521 tCO<sub>2</sub>-e per year during the operational phase versus a total site contribution of 71,788 tCO<sub>2</sub>-e averaged over the FY17-FY22 reporting period. The increase emissions are mainly due to additional fuel gas and electrical energy as a result of increased transfers of gas into and out of storage which requires compression.

Lochard Energy also wishes to note the following points:

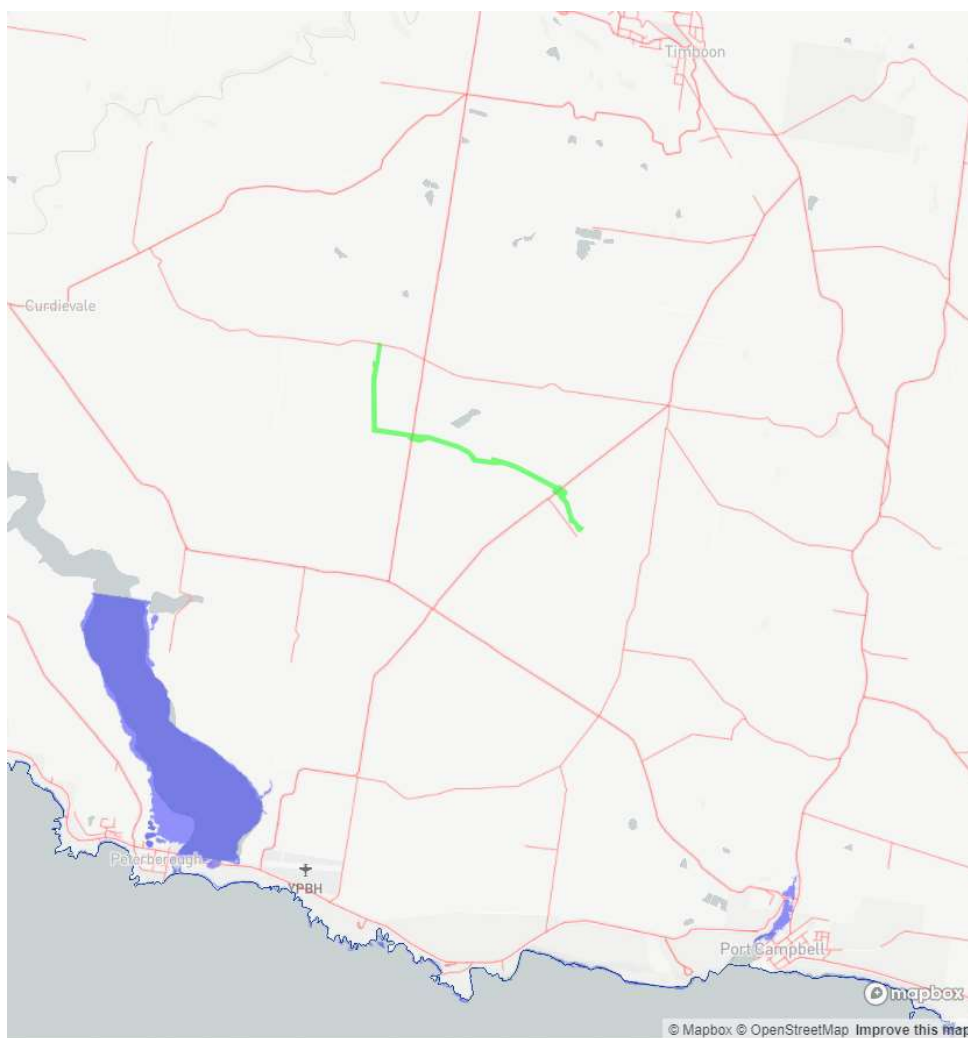
- Development of natural gas reserves assists in transitioning away from alternative energy forms (i.e. coal) which have a more intensive greenhouse gas profile;
- Lochard Energy recognises the importance of ultimately transitioning away from carbon based fuels. Lochard Energy is actively investing in a project to commercialise underground hydrogen storage, and where possible, aspects of the project (such as the pipeline) are being designed to be “hydrogen ready”;
- Lochard Energy’s goal is to be net zero greenhouse gas emissions by 2045. We have a Sustainability Action Plan in place and are actively pursuing a carbon abatement program for opportunities to reduce emissions associated with the IGSF.
- Gas storage has the potential to be used by biomethane which has been identified as part of the Gas Substitution Roadmap [Ref: 13].

#### **4.4 CLIMATE RESILIENCE**

The HUGS Pipeline design life is 25 years which requires the HUGS Pipeline to be resilient to the effects of climate change. It is expected that the HUGS pipeline will be operated to 2051 as a minimum and it is not unreasonable to consider life extension studies will be completed to further extend the pipeline operation. The selected geographical location of the HUGS Pipeline provides design resilience to the effects of climate change.

##### **4.4.1 RISING SEA LEVELS AND TIDAL FLOODING**

The pipeline’s distance from the coastline and elevation (lowest point 45-50m above sea level) prevents the proposed pipeline route from being inundated by the effects of rising sea levels and 1 in 100 year tidal storm events. shows DEECA’s Victoria Future Climate Tool projection overlay for 2070 1 in 100 storm tide and sea levels for 2070 in relation to the HUGS Pipeline location (highlighted in green).



**Figure 3: DEECA's Victoria's Future Climate Tool: 1 in 100 Storm Tide & Sea Level Projected in 2070**

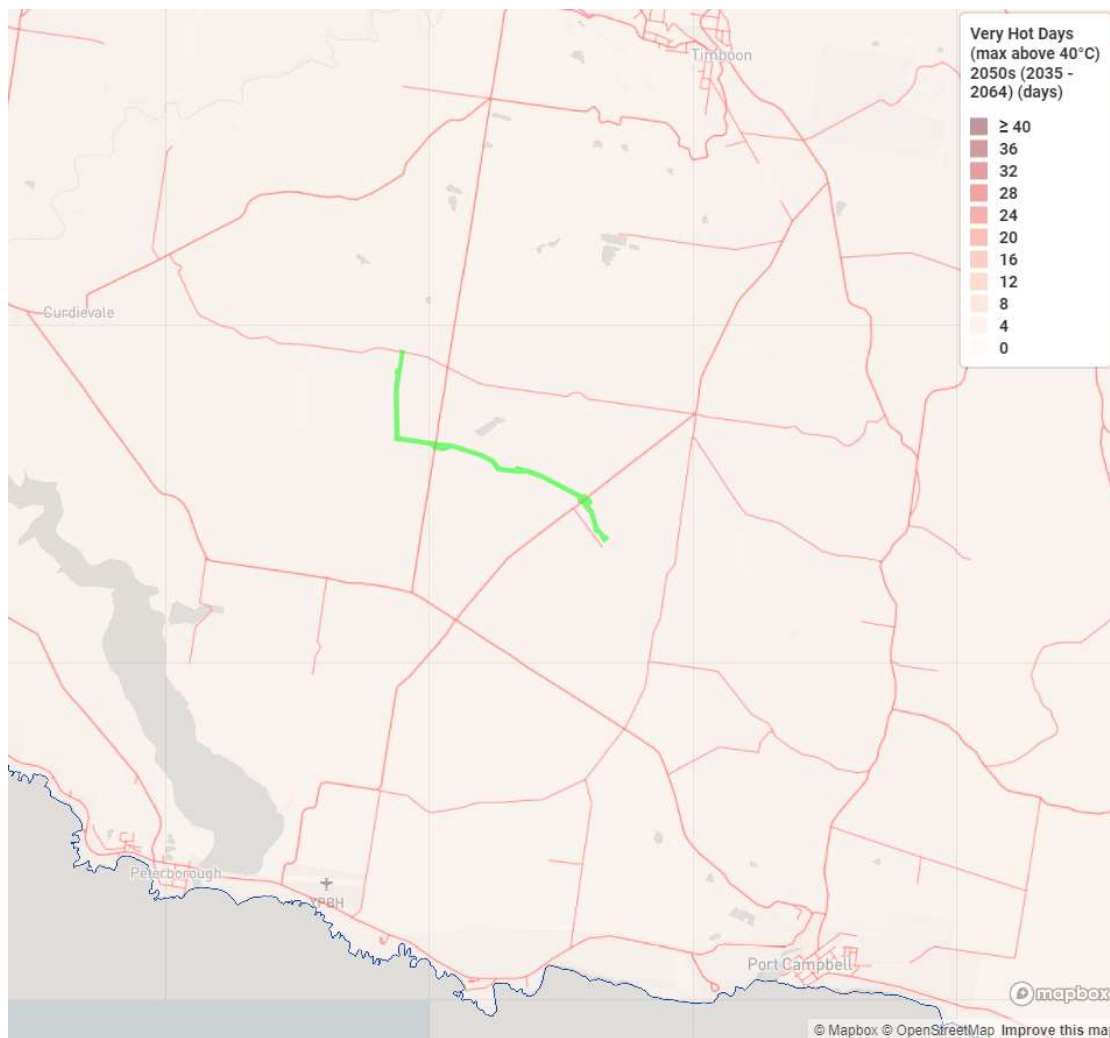
#### **4.4.2 EXTREME TEMPERATURE AND BUSHFIRE RISK**

The majority of the pipeline is below ground with the above ground sections located within facility compounds. The pipeline design temperature considers current weather events for the geographical location, in particular a safety factor is provided on black bulb temperatures of the above ground sections in the operating case where gas is not flowing.

Final stress analysis shall occur during detailed design, which shall include consideration of soil types and maximum and minimum operating temperatures, to ensure the effects of increased metal thermal expansion affecting the pipeline restraint and facilities support structures are controlled.

Figure 4 shows DEECA's Victoria Future Climate Tool projection overlay for the number of extreme temperature days  $>40^{\circ}\text{C}$  per year from 2035-2064. It is projected that on average 4 to 8 days of temperature  $>40^{\circ}\text{C}$  per year could be possible, which may not have a significant effect on the pipeline due to the design temperature of the pipeline.

Bushfire impacts onto the above ground piping sections is minimal as the facility compounds are located within cleared farmland. Grassfires and small vegetation fires, which typically have short exposure times, will be addressed in the detailed design AS 2885 Safety Management Study. The gas inventory in the pipeline and facility compounds have the ability to be blown down under emergency scenarios via vent facilities at the Iona Gas Plant.



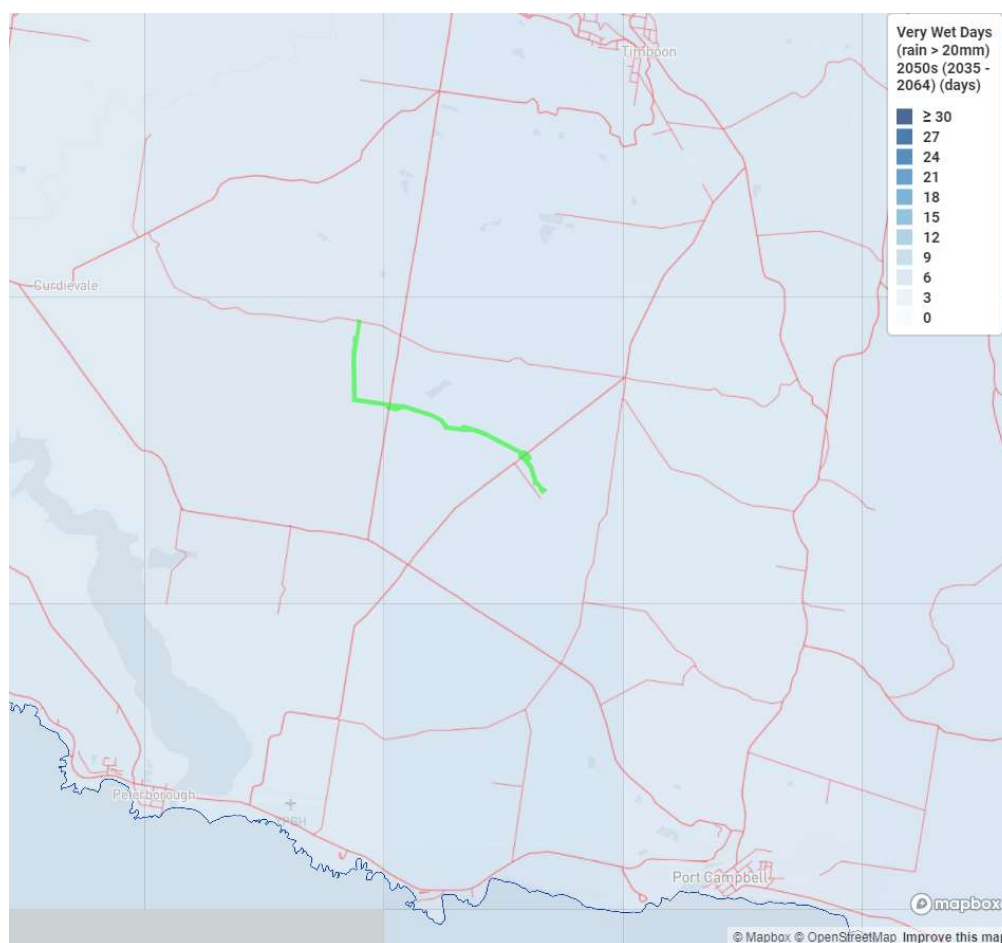
**Figure 4: DEECA's Victoria's Future Climate Tool – Number of Extreme Temperature Days >40°C per year from 2035-2064**

#### 4.4.3 RAINFALL EVENTS

The region of Port Campbell is subjected to high rainfall with an average monthly maximum rainfall of 110 mm. The HUGS Pipeline route is currently not known as an area susceptible to land slips caused by extreme rainfall events.

Figure 5 shows DEECA's Victoria Future Climate Tool projection overlay for the number of days per year with a rainfall of >20 mm from 2035 – 2064. The projection is predicting approximately 3-6 days per year with greater than 20 mm rainfall expected, which may result in increases of extreme rainfall events from current weather patterns.





**Figure 5: DEECA's Victoria's Future Climate Tool – Number of >20mm Rain Days per year from 2035-2064**

Overall, modelling predicts a modest increase in rainfall intensity and the frequency of very hot days in the region over the next 40 years. Current design controls for existing infrastructure are in place to enable continuity of pipeline safety and operation during extreme weather events and during extended periods of hot conditions.

Bushfire or grass fire risk and pipeline scour from possible future extreme weather conditions will be incorporated into the Pipeline Safety Management Study assessment process.

The ability to remotely control the blow down of gas through the HUGS Pipeline from the Iona Gas Facility during an emergency scenario adds further robustness and resilience to the pipeline's safe continued operation.

## **4.5 OTHER POLICY AND ENERGY CONSIDERATIONS**

### **4.5.1 GAS SUBSTITUTION ROADMAP**

The Victorian Government have released a Gas Substitution Roadmap [Ref: 13]. This roadmap recognises that to reach net zero by 2045, it will be necessary to transition away from the use of gas and it notes the role that alternative gases such as hydrogen and biomethane can play in this transition.

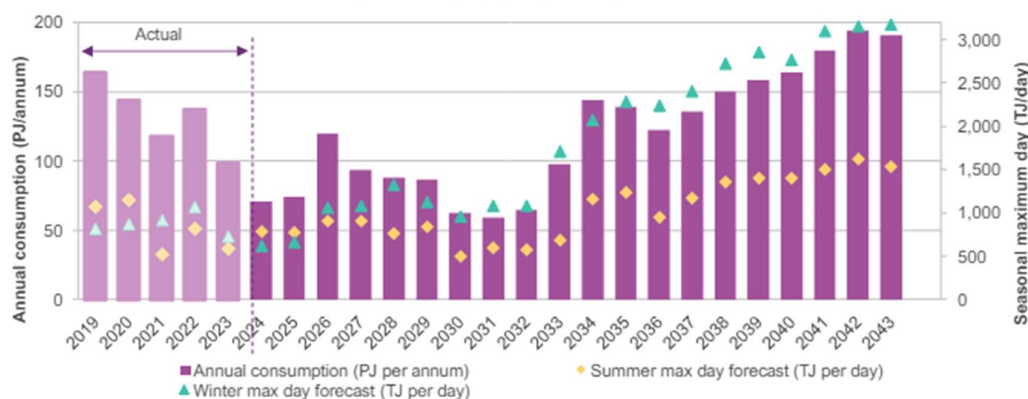
The IGSF provides energy security and reliability to Victorians and currently has an energy storage capacity of 24.4 PJ (~6800 GWh). It is expected that the HUGS project will add a modelled 1.8PJ of extra storage capacity as well as take the nameplate capacity from 570 TJ/d to 615 TJ/d to meet peak heating demand and to support electricity firming. In this way, the HUGS project will further support energy security and reliability for Victorians and also help avoid any gas supply emergencies (refer Part 9 of the Gas Industry Act 2001). HUGS can help position Victoria to adequately respond to coal generator closures and support increased variable renewable energy generation.

In addition, one of the actions in the Gas Substitution Roadmap [Ref: 16] is to “maintain gas reliability through infrastructure” which aligns with the IGSF and the HUGS Project. It is noted that a key action already undertaken has been the expansion of the Southwest Pipeline which has a direct connection to the IGSF and so expansion through HUGS is aligned with this already sanctioned project.

#### 4.5.2 AEMO GSOO

The 2024 GSOO [Ref: 17] published by AEMO shows falling total gas demand, but increasing peak day gas demand (refer figure 6).

**Figure 2** Actual and forecast NEM and Northern Territory gas generation annual consumption (PJ per year [PJ/y]) and seasonal maximum daily demand (TJ/d). Step Change scenario, 2019-43



Note: Northern Territory GPG consumption is included from 2020 onwards in this chart and any other charts related to GPG in this document.

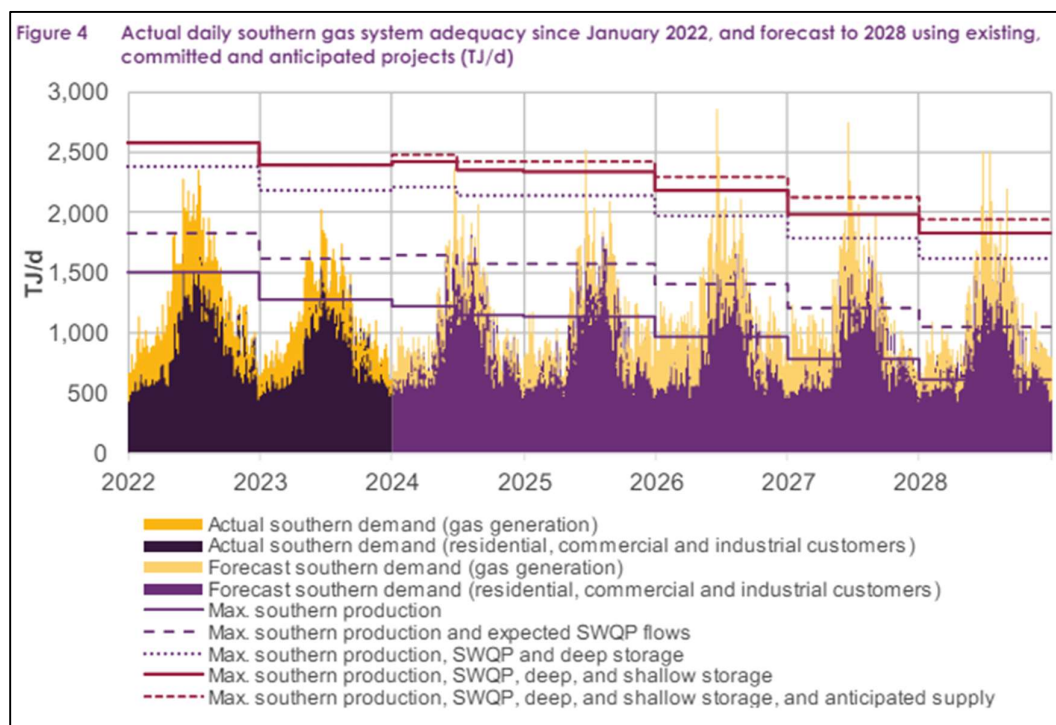
**Figure 6: AEMO GSOO Gas forecast (annual demand and peak demand)**

GSOO notes that

*“Analysis from the Draft 2024 ISP4 reinforces the important role GPG is forecast to play in the NEM by helping manage extended periods of low variable renewable energy (VRE) generation and providing firming support when other dispatchable sources are unavailable. GPG’s role may also extend to providing critical power system services to maintain grid security and stability as the coal generation fleet retires in the NEM”*

AEMO are forecasting increased risk of peak day shortfalls from 2025 with the decline of production from Longford (refer figure 7). It is noted that:

*“In the south, investments in gas production, storage and transport are urgently needed to reduce the risk of peak day shortfalls and to avoid annual supply gaps.*



**Figure 7: AEMO GSOO demand forecast**

The HUGS project includes further augmentation of the IGSF to lift the nameplate capacity from 570 TJ/d to 615 TJ/d which aligns with the increasing seasonality and peaking role gas will play in firming of the NEM as forecast by AEMO. The use of biomethane in this application, coupled with storage capacity at the IGSF, may pave the way for substitution of gas produced from naturally occurring resources for electricity firming.

#### 4.5.3 FUTURE ENERGY CONSIDERATIONS

The HUGS project is aligned with potential future energy developments in the areas of biomethane and hydrogen.

The Gas substitution roadmap identifies the potential for biomethane to part of the energy transition. The IGSF underground storage (and expansion via HUGS) is ideally suited for use by biomethane which can be produced at steady rates throughout the year, stored and then withdrawn to meet these peaks of demand over a relatively small number of days.

Longer term, the H2Restore project is being developed by Lochard Energy which aims to utilise depleted gas fields in the Otway basin for large renewable hydrogen storage that can be used to shift excess renewable energy from summer to winter. Lochard Energy has elected as part of the HUGS project to design and construct the HUGS pipeline to be hydrogen ready to enable this infrastructure to be repurposed. In addition, the development of the Mylor field aims to drill one of the gas storage wells

into the crestal location of the Mylor field which will be important for potential future conversion for underground hydrogen storage.

## 5. CONCLUSIONS

The HUGS project's climate resilience and its potential contribution to climate change have been considered in this document against the requirements of Part 4, Division 2 and 3 of the *Climate Change Act 2017*.

The HUGS project will support Victoria's net zero target and benefit the transition to renewable energy. Gas is recognised as an important "bridging fuel"<sup>2</sup> to aid the transition, and the principal aim of the HUGS project is to provide additional gas storage capacity to meet the energy demands of the future as this transition occurs.

In addition, the HUGS pipeline will be designed and constructed so as to be suitable for future use of hydrogen, with this decision made as Lochard Energy actively seeks to develop underground hydrogen storage as part of the H2Restore Project.

Calculation of emissions over the four project stages (construction, operation, decommissioning and rehabilitation) have found:

- The overall contribution of the whole of Project (Wellsite and Pipeline) across Scope 1, Scope 2 and Scope 3 emissions is 106,831.2 tCO<sub>2</sub>-e; and
- The annual contribution from the addition of HUGS to overall IGSF emissions is 4.90% (additional 3,521 tCO<sub>2</sub>-e versus 71,788 tCO<sub>2</sub>-e averaged over the FY17-FY21 reporting period).

Overall, the Victorian Gas Program – Risks, Benefits and Impacts Assessment report [Ref: 6] concluded that access to gas reserves in the Otway Basin, of which HUGS is a minor part, is not expected to significantly alter Victoria's trajectory to net zero emissions by 2045.

Climate change is predicted to have a modest impact on temperature and rainfall patterns in the locality of the HUGS Project over the next 40 years. The project infrastructure (including the pipeline) is resilient with minimal above ground infrastructure and the ability to shut down remotely should an emergency scenario develop.

The HUGS Project is consistent with the applicable Policy Objectives and Guiding Principles of the Climate Change Act 2017.

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<sup>2</sup> Ernst and Young (2020) page 243

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