

Submitted via Engage Victoria  
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## **Gas Substitution Roadmap**

### **Overview**

I am a community representative from Latrobe Valley active in advocating for mining reform and rational planning. My interest and concern originated from Gippsland's legacy impacts of onshore aquifer depletion and subsidence from both offshore oil and gas extraction and dewatering of Latrobe Valley coal mines.

Recently, I have been an active advocate against Victoria's CarbonNet project facilitating the committee, *Ninety Mile against Carbon Storage Action Group*. This committee existed to ensure transparency and accountability between the government, project and community. The website is no longer active but can be accessed via website archive - <https://web.archive.org/web/20200314050128/https://www.ninetymileagainstcarbonsstorage.org.au/>

My submission is focused on challenges and concerns with a hydrogen future based on coal.

In this submission I have chosen to focus on projects I have been involved with examining serious concerns with transparency and accountability from project developers but also the relevant agencies tasked with assessing and approving projects and their ability to ensure compliance and enforcement.

My interactions and involvement have revealed deep flaws in project assessment based on misleading data which give great concern about governments ability to reduce emissions and EPA's effectiveness as a regulator in preventing environmental harm.

I will only focus on some questions related to -

- **Substituting natural gas with hydrogen**
- **Emerging technologies**

### **SUBSTITUTING NATURAL GAS WITH HYDROGEN**

If fossil fuels were considered for hydrogen production, it could only be sourced from LoyYang coal in the Latrobe Valley. Whilst the Hydrogen Energy Supply Chain (HESC) pilot plant is to scale up the possibility that hydrogen can be safely produced and transported to Japan on a commercial scale, it is entirely dependent on CO2 storage. The commercial phase will not go ahead without a Carbon Capture and Storage (CCS) solution which is where CarbonNet have not been transparent with

actual capacity, nor the risks involved with transporting the supercritical CO<sub>2</sub> fluid in the purpose-built pipeline.

I have worked on the CarbonNet project over the last couple of years and provide relevant issues of concerns and barriers to this particular project being successful.

[What are the roles to be played by government, industry and how will consumers preferences be accounted for in the transition?](#)

For consumers to have a preference Government and Industry must be transparent and accountable from project development design, risks and associated costs first. Example is the mistake State Government made with the vision for Latrobe Valley Regional Rehabilitation of coal mines. Departments encouraged unachievable visions for the community that were gold plated rather than state the constraints up front. This must be first priority for Government to know what can and can't be done then present to communities.

[What are the best ways to maintain social acceptability and consumer confidence?](#)

Simply state the facts as presented. The community crave the truth. This would also include water entitlement for energy production if not for Australia's use as the HESC is for export to Japan. Where is the information that hydrogen from coal in Victoria will/could be for Victoria's needs.

[What are the key uncertainties and potential for unintended consequences?](#)

CarbonNet still have significant milestones to reach as it transitions to the private sector that is -

- evaluation of transport pipeline routes to the selected injection site along with and an appropriate regulatory framework.
- attracting private investment which appears the federal government have come to the party with as their financial commitment ends.
- suitable potential carbon capture plants, which, ironically, are reducing but are needed to share the costly pipeline infrastructure.

## **EMERGING TECHNOLOGIES**

### **Carbon capture and storage**

As a background, Bass Strait oil and gas extraction in Commonwealth waters has drained the groundwater and depleted the aquifer from onshore State jurisdictional control. But, for some reason, only known to government and industry, it does not *inform 'resource managers and planning in making responsible rational decisions.'* In fact, even though Gippsland is known for the subsidence impacts worldwide, why has it failed to inform any other significant report/study relevant to overdraw of groundwater in Australia? You cannot remove a mass volume be it groundwater, oil

or gas without creating a void that either causes compression (subsidence) by the weight of overlying sediment layer or a reduction in formation pore pressure.

What are the key technical, regulatory and economic barriers?

### **Legal liability** –

Who bears the legal costs and liability for pipeline leaks or failures on sharing a pipeline from multi-user CO<sub>2</sub> emitters in the Latrobe Valley or from ESSO if the HESC project falls over. Who takes legal responsibility with 'problems', (who put the greatest amount of impurities in the pipeline that caused the corrosion, for example.) These are critical issues for the commercial development of carbon capture and storage.

### **Two projects in one formation** –

The HESC project is to use the same Golden Beach geological formation for storage of CO<sub>2</sub> with the recent State Government approved GB Energy project to extract and store natural gas. CO<sub>2</sub> storage will be in the lower formation. If both projects proceeded there would be pipeline crossover at some point along GB Energy's proposed pipeline route.

How would the constant changes in formation pressures from extraction and reinjection of gas in upper formation and injection of CO<sub>2</sub> in lower formation impact hydraulic pressure for beneficial bore users onshore or contribute to ground movement associated with subsidence. The area that GB Energy want to extract gas from does have interconnectivity with the middle and shallow aquifer systems with the shallow aquifer experiencing serious depletion. The government need to be aware that further offshore extractions will not exacerbate groundwater depletion and impacts to beneficial users and natural values. The importance of this knowledge is the potential for pressure impacts decreasing rapidly and/or the potential for saline formation water displaced vertically into overlying freshwater aquifers if leakage pathways through the intervening aquitards are present.

### **Leaks** –

Whilst CO<sub>2</sub> has been successfully injected around the world, it can be argued there is no certainty that injected and long-termed stored CO<sub>2</sub> will remain insitu in perpetuity in appropriate geological formations. Complete assurance about the risk of leakage does not exist because of the absence of long-term CCS projects in Australia and elsewhere. Re-injecting liquefied CO<sub>2</sub> under pressure to not over-pressurise the pore space leading to increase in seismic

movement is a touchy subject but is real given the movement and subsidence along the margins of the Gippsland Basin.

### **Monitoring** –

Long term monitoring will be required with CO2 storage from CCS. What information exists to understand the costs and risks and will the public bear those costs. Full cost benefit analysis needs to be as transparent as possible.

**What are the roles to be played by government, industry and how will consumers preferences be accounted for in the transition?**

If CO2 is required to be captured for the HESC project and other CO2 emitting industries would there be a need to introduce a carbon tax otherwise what is the incentive. Creating new jobs just doesn't cut it when the legal, social and economic cost for these projects are significant.

**What are the best ways to maintain social acceptability and consumer confidence?**

Don't do what is represented below. There are also mixed messages being exposed because the cost of the pipeline is not viable for one CO2 project and Government are still considering a transport hub of other CO2 emitters. To raise public confidence in CCS technology, a clear regulatory process and legal liability regime needs to exist to address or remediate harm or costs.

**What are the key uncertainties and potential for unintended consequences?**

### **CO2 transport pipeline**

There are two relevant documents which expose the lack of transparency for the public and pipeline costs/risks for government and industry. I have actually mentioned and provided these two documents to Minister Lily D'Ambrosio showing the true state of concern for CCS. She did ask if they were in the public domain which they are.

At one of CarbonNet's community engagements at Golden Beach the team presented a simplistic 3 page version of the project's cost analysis, *CarbonNet –The Relative Costs for Providing a CCS Transport and Storage Service*<sup>1</sup> noting,

*Establishing the initial infrastructure for CCS is challenging as sources of CO2 and the transport and storage service need to be developed in parallel. Globally the role of government is increasingly being acknowledged as required to assist the development of CCS hubs to lower the barrier for entry for*

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<sup>1</sup> [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3365597](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3365597)

industries that may utilise the service. However, obtaining economies of scale is required to enable cost effective CCS to be deployed and **having multiple potential CCS service users is key**. There are a range of factors that impact the cost of providing a CO<sub>2</sub> transport and storage service. The factors that were explored in the CarbonNet financial model included the CAPEX, OPEX, finance arrangements, service interface points (eg A,B,C,D), pipeline route, volume scenarios, MMV costs, decommissioning costs and long term monitoring and insurance costs. One of CarbonNet's strengths is the storage basin which enables relatively high rates of injection per well.

Between 50 and 60 percent of the total project costs for providing the CarbonNet service are capital costs that will be incurred before any CO<sub>2</sub> is injected. Therefore, **the price of CO<sub>2</sub> required to recover the investment cost is very dependent on the financing costs for the project as well as volumes of CO<sub>2</sub> being stored and/or whether the pricing structure is capacity or volume based.** The volume of CO<sub>2</sub> to be stored is significant, with a system of 5 mtpa providing the required scale for a competitive transport and storage service. **The price escalates significantly if less CO<sub>2</sub> is stored than the design network rate.**

Therefore the ramp rate of injection becomes a very important factor.

The recovery price when only 1.5 mtpa is injected for the first five years and then increases to 5 mtpa is 33 percent greater than the case for that when 5 mtpa is injected from the first year.

Yet, the 2016 original document, *Development of a CO<sub>2</sub> Specification for a CCS Hub Network*<sup>2</sup> better and truthfully details the real significance of the cost/risks. But what is more worrying is the consideration of trade-offs for quality of components which is unacceptable in view of geochemistry changes that could be problematic for the pipeline integrity on planned (venting) or unplanned events (emergency).

In consideration of multiple user hydrogen hub, including the HESC project, this document is a serious game changer and needs to be called out as they have presented one document to the community but the expanded document with risks and cost consideration was not.

*The CO<sub>2</sub> captured from potential source projects will contain minor components which may affect the physical properties and phase envelope of the stream, impact environmental and regulatory requirements, set the transportation and storage design and influence the storage site capacity and geochemistry.*

*...The CO<sub>2</sub> specification developed from consideration of limitations imposed by the subsurface, pipeline design and health and safety, reviewing business as usual and technically achievable limits of potential source proponents and*

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<sup>2</sup> <https://www.sciencedirect.com/science/article/pii/S1876610217320039>

*considering future acceptance of the proposed specification by targeted assessments.*

*Trade-off studies were completed on the water content, operating pressure and purity requirements. Commercial considerations were reviewed for cost recovery of increased transport and storage owner during the next stage of the project. CarbonNet adopted a risk based approach to develop the preliminary CO2 specification as the project is a hub based network that intends to minimise the barriers for entry for prospective sources. The specification provides a basis for potential sources to analyse and discuss technical and commercial implications for their CO2 stream feeding into the network. The preliminary specification will require refinement at later stages of project to meet the requirements of regulators, design limitations and/or commercial arrangements between source proponents and the transport and storage owner in the next stages of the project.<sup>3</sup>*

Chervon's failed CO2 project '*found leaking valves, valves that could corrode and excess water in the pipeline from the LNG plant to the injection wells that could cause the pipeline to corrode.*'<sup>4</sup> The best engineers in the world will not stop corrosive if the wrong welding material was used on the valves.

### **Offshore storage capacity in Bass Strait**

This site chosen is the near shore area off Golden Beach because it provided the least cost option and any further out could impact on existing hydrocarbon production. So, is CarbonNet serious with CCS to mitigate greenhouse gas emissions or is this just a very expensive research and development program.

Likewise, given the above information from the research article, *Development of a CO2 specification for a CCS hub network*, there is an increased concern with the potential for reduced storage capacity because of the geochemistry complications.

CarbonNet project director, Ian Filby, has already stated to ABC Gippsland<sup>5</sup> at the 22 January 2019 community consultation that the coal to hydrogen will be the only project using the pipeline. This is a huge cost burden just for the transport aspect of CO2 from the coal to hydrogen project. Can it be justified so plans for increased hydrogen production related with CO2 storage appears to be unrealistic.

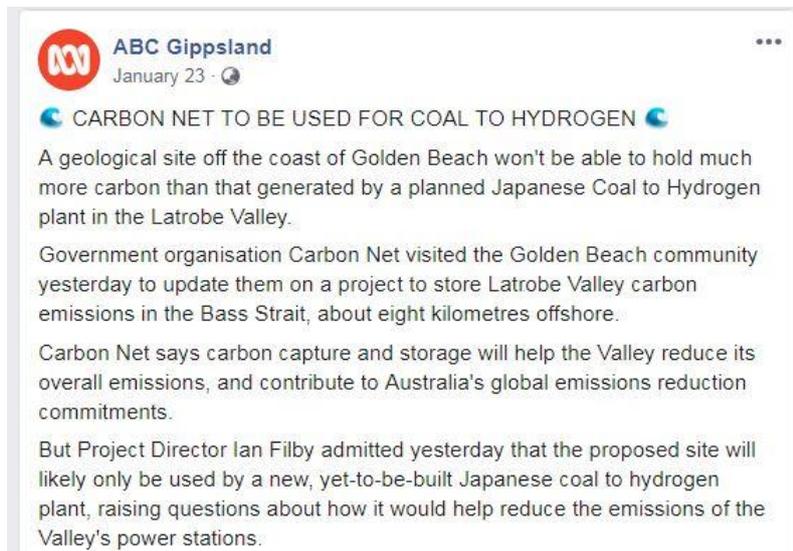
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<sup>3</sup> Third iteration on costs/risk

<https://www.globalccsinstitute.com/archive/hub/publications/199363/carbonnet-project-development-co2-specification-ccs-hub-network.pdf>

<sup>4</sup> <https://thewest.com.au/business/oil-gas/carbon-hiccup-for-chevron-with-5-million-tonne-greenhouse-gas-problem-at-gorgon-lng-plant-ng-b88694565z>

<sup>5</sup> <https://www.facebook.com/ABCGippsland/posts/-carbon-net-to-be-used-for-coal-to-hydrogen-a-geological-site-off-the-coast-of-g/10156426285394825/>



## Transitioning to more sustainable gaseous fuels with minimal disruption to end-users

**Key questions** - What are the key technical challenges in converting existing gas networks to accommodate more sustainable gaseous fuels?

### Design and construction to Australian standards

Both the ineffective EES process (discussed further) and EPA approval and management of discharges highlights the inability to enforce adoption of best practise technology or design management and construction.

No one department or agency appears to ensure project plant design and construction is actually built to appropriate standards to prevent degradation and/or poorly installed and fitted components.

On building ESSO's Gas Conditioning Plant at Longford, shortcuts and price considerations were prioritised with ESSO sourcing equipment components from different Asian suppliers. Surprise, surprise when the individual components were not compatible needing further engineering works from local company in Sale. Imagine my non-surprise when I received a personal phone call from EPA Traralgon office to inform me that *the oil and gas company has applied to the EPA for temporary approval to exceed its licence discharge limits until the thermal oxidiser can be repaired.*<sup>6</sup>

What's more frustrating was my question to EPA asking who is responsible for ensuring sourcing of equipment for construction is based on Australian standards. A very indignant reply – 'NOT OURS.' Yet it is EPA who then tick and flick an approval to exceed those emissions. This is relevant to my previous comment on Chervon's pipeline construction using inferior welding material leading to corroding valves.

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<sup>6</sup> <https://www.abc.net.au/news/2017-06-27/esso-emissions-limit-breached-epa-investigates/8655082>

- Who (which department/agency) will be overseeing or making conditions that purchasing plant equipment and engineering works will not compromise integrity of works.

## Managing uncertainty in the transition

### Key question

What key uncertainties should the Roadmap take into account, and what is the government's role in reducing these uncertainties?

### Water Value and Consumption

There needs to be greater transparency on water use consumption if using coal to hydrogen at LoyYang in Latrobe Valley.

- Will current water entitlements for generation of electricity for Australian use be transferred to an agreed allocation to produce hydrogen for export to Japan for Japan's use as this is the primary aim of the HESC project. There may be some agreement for a domestic amount to be produced but allowing a foreign entity to be given priority use of our potable water in a drying climate will not be acceptable to the public.
- Likewise, Government must ensure the value of water is reflected in the cost price given the current contract price that mine operators pay being considerably undervalued.
- Consideration also needs to be given to ongoing discharge of treated wastewater to already impacted waterways.

### Outdate Environment Effects Statement process

Transparency and accountability needs to be based on independent technical studies.

The current EES process has never been put on the government agenda to update what was clearly identified in the 2011 inquiry as outdated and ineffective.<sup>7</sup>

This is the greatest single failing of successive governments as projects emissions are determined solely on a consultant's report engaged by the proponent to favour the project.

Where the EES process is to test the robustness of the evidence presented, the process is nothing more than a tick and flick for project development based on flawed data lacking total independence.

The current Fingerboards Mineral Sands project is an excellent example of manipulations of the EES process and scoping requirements.

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<sup>7</sup> <https://www.parliament.vic.gov.au/303-enrc/inquiry-into-the-environment-effects-statement-process-in-victoria-sp-515>

- If government were serious about reducing emissions, the EES needs to update the adequacy and effectiveness of the EES process using independent technical studies with terms of reference open and transparent at the least.

### **Is Environment Protection Authority Compromised and/or Competent?**

The ULAB lead smelter in Latrobe Valley is an example where EPA used and believed the consultants data on emissions to the environment for approval of emissions in the absence of an EES process.

Worst is the 2013 EPA approval of the Longford Gas Conditioning plant to emit one million tons of CO<sub>2</sub> to the atmosphere annually in the absence of not requiring an EES as decided in 2007.<sup>8</sup> Whilst CO<sub>2</sub> was to be captured, it was then released. EPA's S20B conference was a lesson in tick and flick approvals with token community engagement.

#### **Decision:**

*The Minister for Planning has determined that an Environment Effects Statement is not required for the proposed gas conditioning plant.*

#### **Reasons for Decision:**

- *Greenhouse gas emissions from different sources within the proposed plant can be readily estimated once the proposed plant design is confirmed.*
- *An EES would not provide a useful assessment of best practice options for carbon capture and storage to inform decision-making, as such technologies are:*
  - (a) neither required nor specifically provided for under applicable legislation and policy;*
  - (b) not evidently within the current capacity of commercial proponents to implement in Victoria, including through the use of either their own or third-party infrastructure.*
- *Applicable legislation and subordinate instruments would require the proponent to apply "practicable" best practice to the design and operation of the proposed plant. More specifically, relevant opportunities to reduce greenhouse gas emissions will be assessed as part of the decision-making process under the Environment Protection Act 1970 for the plant.*
- *Even in the absence of an EES, the proposed plant is likely to be subject to both a future obligation to monitor and report greenhouse gas emissions and incentives to abate these emissions within a legislated framework for emissions trading.*

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*Date of Decision: 22 August 2007*

<sup>8</sup> [https://www.ffm.vic.gov.au/data/assets/pdf\\_file/0015/6423/2007-04-Longford-Gas-Conditioning-Reasons-for-Decision.pdf](https://www.ffm.vic.gov.au/data/assets/pdf_file/0015/6423/2007-04-Longford-Gas-Conditioning-Reasons-for-Decision.pdf)

- To reduce emission, the EPA need to be independent of government influence for project development as well prove they are competent in assessing projects for emissions.

### **Geopolitical shifts and influences**

State Government need to work with the Federal government to embed into legislation ensuring ownership of connecting pipelines and essential infrastructure are not compromised by shifting influences from geopolitical areas. Without this the State is vulnerable to private influence not to our best interest.