Transport and Infrastructure Net Zero Consultation Roadmap

Take the survey

Department of Climate Change, Energy, Environment and Water

Response received at:
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3 Published name
Volvo Group Australia

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Yes

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9 Who are you answering on behalf of?

Organisation

10 Organisation name

Volvo Group Australia

11 What best describes you or your organisation?

Industry

12 What sector do you represent?

Maritime
Heavy road vehicles (trucks, buses etc.)
Public transport

13 What state or territory do you live in?

Queensland

14 Postcode

4076

15 What area best describes where you live?

City

16 1. Do you support the proposed guiding principles?

Not answered

17 1.1 Please add details to your response.

Not answered

18 2. Do you support the use of the avoid-shift-improve framework as a

tool to identify opportunities for abatement?

Not answered

19 2.1 Please add details to your response.

Not answered

20 3. Do you agree the development of a national policy framework for active and public transport will support emissions reduction?

Not answered

21 3.1 Please add details to your response.

Not answered

22 4. What should be included in a national policy framework for active and public transport and how should it be developed?

Not answered

23 5. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to ensure the movement of people contributes to transport emissions reduction?

Not answered

24 6.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to ensure that the movement of goods contributes to transport emissions reduction?

Not answered

25 6.2. How would these actions address the identified challenges and opportunities for emissions reduction in the movement of goods?

Not answered

26 7. Do you agree with the proposed net zero pathway for light road

vehicles?

Not answered

27 7.1 Please add details to your response.

Not answered

28 8. The Australian Government is currently developing an Australian New Vehicle Efficiency Standard and has already begun to implement actions in the National Electric Vehicle Strategy.8.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce light vehicle emissions?

Not answered

29 8.2 How would these actions address the identified challenges and opportunities to reduce light vehicle emissions?

Not answered

30 9. Do you agree with the proposed net zero pathway for heavy road vehicles?

Not answered

31 9.1 Please add details to your response

Not answered

32 10. The proposed pathway for heavy road vehicles relies on a mix of battery electric, hydrogen fuel-cell and low carbon liquid fuels.Rank from 1 to 3, the order in which these should be prioritised for emissions reduction.

Not answered

33 10.1 Please add details to your response. Why did you rank them in that order?

Not answered

34 11. What role should low carbon liquid fuels play in the heavy vehicle decarbonisation?

Not answered

35 12. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce heavy vehicle emissions?

Not answered

36 13. Do you agree with the proposed net zero pathway for rail?

Not answered

37 13.1 Please add details to your response.

Not answered

38 14. The proposed pathway for rail relies on a mix of battery electric, hydrogen fuel-cell and low carbon liquid fuels.Rank from 1 to 3, the order in which these should be prioritised for emissions reduction.

Not answered

39 14.1 Please add details to your response. Why did you rank them in that order?

Not answered

40 15. What role should low carbon liquid fuels play in rail decarbonisation?

Not answered

41 16. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce rail emissions?

Not answered

42 16.1 How would these actions address the identified challenges and opportunities to reduce rail emissions?

Not answered

43 17. Do you agree with the proposed net zero pathway for maritime?

Not answered

44 17.1 Please add details to your response.

Not answered

45 18. The Australian Government is engaging in consultation as part of the development of the Maritime Emissions Reduction National Action Plan and those consultations will also inform the final Roadmap and Action Plan. 18.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce maritime emissions?

Not answered

46 18.2 How would these actions address the identified challenges and opportunities to reduce maritime emissions?

Not answered

47 19. Do you agree with the proposed net zero pathway for aviation?

Not answered

48 19.1 Please add details to your response.

Not answered

49 20. The Australian Government has already engaged in consultation on aviation decarbonisation through the development of the Aviation White Paper and those consultations will also inform final Roadmap

and Action Plan.
Not answered

50 20.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce aviation emissions?
Not answered

51 21. Do you agree with the proposed net zero pathway for transport infrastructure?
Not answered

52 21.1 Please add details to your response.
Not answered

53 22. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce transport infrastructure emissions and ensure that transport infrastructure is ready for and enables low-emission transport modes?
Not answered

54 22.1 How would these actions address the identified challenges and opportunities to reduce transport infrastructure emissions?
Not answered

55 23. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to ensure the energy mix is ready to support transport emissions reduction?
Not answered

56 24. How should the use of low carbon liquid fuels (LCLFs) be prioritised across different transport modes over time to achieve maximum

abatement?
Not answered

57 25. What are the best ways for the Australian Government to work collaboratively with industry, business, governments and communities to implement the proposed pathways?
Not answered

58 25.1 What are good domestic or international examples of partnership and collaboration on transport and transport infrastructure emissions reduction that could inform the final Roadmap and Action Plan?
Not answered

59 25.2 What opportunities can Government leverage to show leadership in Australia and internationally?
Not answered

60 26. What measures and metrics should be used to evaluate the final Transport and Infrastructure Net Zero Roadmap and Action Plan?
Not answered

61 26.1 What other data and evidence could governments use and how could this offer further insights on the pace, scale and location of transport emissions reduction pathways?
Not answered

62 27. Do you have any feedback on the proposed review process?
Not answered

63 28. Do you have any further feedback on the Consultation Roadmap and proposed pathways?
Not answered

64 28.1 Is there anything missing? Are the sections appropriately integrated? Is the Roadmap appropriately ambitious?

Not answered

65 29. Is there any further information or documentation that you wish to be considered with your submission?

Not answered

66 Would you like to upload a document?

Yes

67 Have you removed any identifying information from your submission?

Yes

68 Upload a submission

210
Volvo_Group_submission_to_Transport_Net_Zero_Consultation_Roadmap_July_2024.096ef913.pdf

69 Upload a submission

Not answered

70 Upload supporting file

Not answered

71 Upload supporting file

Not answered

26th July 2024

Volvo Group Australia submission to

Transport and Infrastructure Net Zero Consultation Roadmap

For more information please contact

[redacted]

Table of contents

1.0 Introduction

Volvo Group Australia (VGA) would firstly like to commend the Department of Infrastructure, Transport, Regional Development, Communications and the Arts (the Department) for its excellent proposed Net Zero Roadmap – the vast majority of which VGA agrees with and supports.

We have therefore kept our response relatively concise and have focused on -

- The areas of the Paper that we have extensive knowledge and experience in – namely moving people, moving goods, road transport and maritime.
- Highlighting the areas we view as critical to the decarbonisation of the transport sector, and where relevant have provided examples and/or further information from our experience.
- Detailing where there is some discrepancy to what the Department have included in its Roadmap and providing feedback and recommendations for changes.

This response has been structured under the same section headings used by the Department in the Roadmap Consultation Paper (the Paper) shared, answering the specific questions where relevant.

In addition to preparing this feedback, VGA has also worked closely with the Heavy Vehicle Industry Australia (HVIA) in the formation of its response, and therefore also endorse their submission to the Department.

We have also contributed submissions to the following consultations related to broader net zero efforts:

- *House of Representatives Standing Committee on Climate Change, Energy, Environment and Water inquiry on the transition to electric vehicles*
- *Enabling supply of renewable diesel in Australia,* Department of Climate Change, Energy, the Environment and Water, Fuel Quality Section

Please do not hesitate to reach out to us if you require any further information or wish to discuss any of the feedback provided in more detail. We look forward to working with you and industry in **shaping the world we want to live in together.**

2.0 Background

2.1. About Volvo Group Australia

Volvo Group Australia (VGA) has more than 1,600 local employees, and manages the manufacturing, distribution and operation of Volvo Trucks, Mack Trucks, UD Trucks, Volvo Bus, Volvo Penta marine and industrial engines, Volvo Construction Equipment and Volvo Financial Services. Volvo Penta also offer Battery Energy Storage Systems (BESS) through the industrial arm of its business.

Since 1972 VGA has produced more than 80,000 Australian Made Volvo and Mack trucks, and today are Australia's largest vehicle manufacturing powerhouse. Every truck built at our Wacol, Queensland facility carries official 'Australian Made' certification. These operations proudly support a local supply chain of more than 120 suppliers and injects more than $400m annually into the Australian economy. Last year this figure was in excess of $600m.

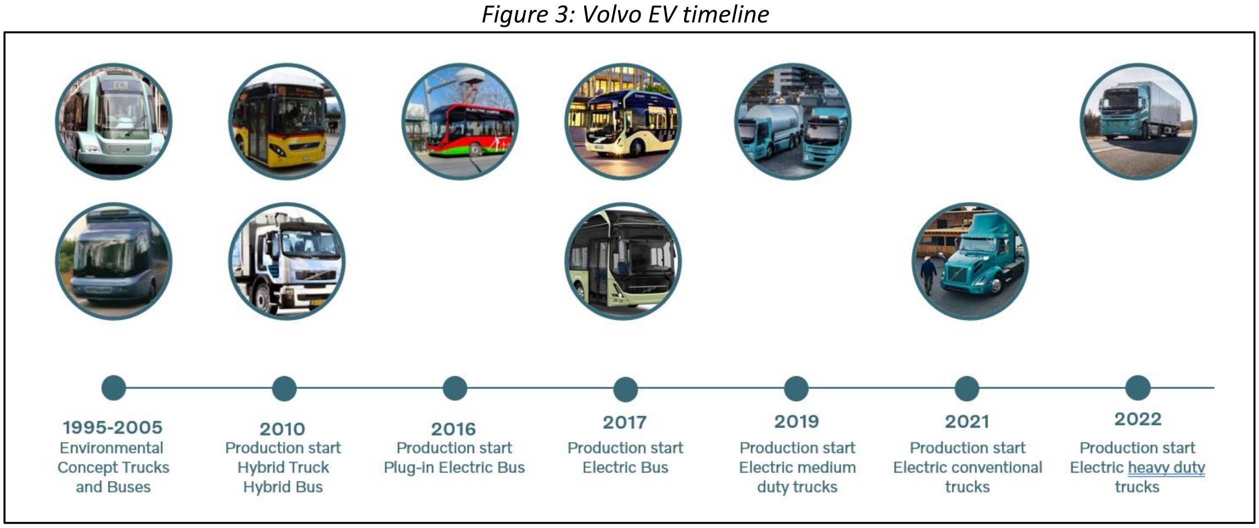
We also work extensively with local body manufacturers – including both truck and bus body builders, and with local boat builders for ferries, leisure craft and more.

Globally **Volvo Group has a target of net zero value chain emissions by 2040** - ten years earlier than the Paris Agreement and Science Based Targets initiatives (SBTi) commitments. This will enable our customers to have zero emission fleets by 2050, which is also essential on the journey for achieving Australia's targets of reducing greenhouse gas emissions to 43 per cent below 2005 levels by 2030.

2.2. Volvo experience with electric vehicles

Electric heavy vehicles are not a new technology for the Volvo Group, who has been designing, testing, producing, and putting electric buses and trucks into operation for a number of years now – with the first full electric bus production commencing in 2017, following years of hybrid and electric hybrid technology operations even earlier - as shown in the Figure 3 below.

Figure 3: Volvo EV timeline



CAST is an abbreviation that stands for Common Architecture & Shared Technology, and this concept can be seen with the sharing of the same battery electric technology and drivelines between Volvo

Buses and Volvo Trucks. The learnings that were gained from buses in operation in the early days of Volvo EV production are therefore now shared between not only Volvo Buses and Trucks, but also Volvo Penta and Volvo Construction Equipment.

2.3. Volvo development of Hydrogen powered vehicles

The Volvo Group is also investing heavily in Hydrogen powered solutions including both Hydrogen Fuel Cell Electric Vehicle technology and Hydrogen into Internal Combustion engine technology. At Volvo, we often say that partnership is the new leadership since no one can do the journey to net zero alone. We are therefore working together with partners on the development of these technologies, as detailed below.

Hydrogen Fuel Cell Electric Vehicles (FCEVs)

FCEVs use a hydrogen fuel cell to power an electric motor. Instead of storing energy in a battery, FCEVs store hydrogen gas in tanks and convert the gas into electricity using a fuel cell and a smaller battery for energy recovery and acceleration support. This process is efficient and clean, with water vapor being the only emission. FCEVs can be refueled quickly, much like conventional vehicles, and offer a longer range than most battery electric vehicles (BEVs).

The work for this technology is being done under the banner of Cellcentric, which is a 50:50 joint venture between Volvo Group and Daimler Truck AG. The challenges of higher axle weights currently being experienced on BEVs will continue, if not increase in the move to HFCEVs.

Hydrogen into Internal Combustion Engines (H2ICE)

Hydrogen combustion engines work by burning hydrogen in a conventional internal combustion engine, changed to manage the high-speed combustion of hydrogen. They run on similar principles as diesel engines but require specific technologies, such as specialized fuel injectors and ignition systems. These help to manage the distinct characteristics of hydrogen.

We believe that hydrogen combustion engines have the potential to offer a competitive total cost of ownership and could prove a great complement to other propulsion technologies.

In March this year, Volvo Group and Westport Fuel Systems established a joint venture for high-pressure gas injection fuel systems (HPDI) for long haul and off-road applications. HPDI enables the world's trucking and off-road equipment manufacturers to address the challenges of meeting the regulatory requirements of Euro 7 and the US EPA while offering end users affordable options that are powered by carbon neutral fuels like biogas, zero carbon fuels like green hydrogen and other renewable fuels. The HPDI fuel system consists of a fully integrated "tank to injector" solution, based on diesel technology.

At the heart of the engine is a revolutionary patented injector with a dual concentric needle design. A small amount of pilot fuel (which can be HVO, or diesel fuel) is injected into the cylinder prior to the gas, to initiate the ignition resulting in a reduction of almost 97% of CO2 emissions, and only a small amount of NOx and particles, in-line with the existing Euro 6 and proposed Euro 7 emission regulations.

Timeline and availability

Testing of hydrogen powered vehicles is currently underway in Sweden, with the availability of in production vehicles available in the second half of this decade towards 2030. This timeline is aligned with the technology roadmap proposed in the Paper for this technology.

2.4. Volvo a large supporter of Hydrotreated Vegetable Oil (HVO)

While there are many different LCLF available, VGA in particular promotes the use of HVO fuel, due to its chemical composition and having the same attributes as regular diesel – this includes no negative impact of engine and driveline, and no change servicing requirements, unlike some bio-fuels which greatly increase servicing requirements and therefore operating costs.

The Volvo Group has approved the use of neat and blended HVO (under the EN 15940 fuel quality standard) in all its diesel engines since 2016, across all business areas including trucks, buses, construction equipment and Volvo Penta marine and industrial engines.

At our Volvo and Mack truck factory in QLD, from November this year the first fill for all vehicles coming off the production line will be with 100% HVO.

The key benefits of HVO include -

- **Lower greenhouse gas emissions –** HVO reduces CO2 emissions between 30% and 90%, depending on the feedstock used, compared to regular diesel. It can be produced from a broad range of raw materials including a lot of low-quality waste products that cannot be used in biodiesel. It has the same, or similar, climate benefits as biodiesel and depending on the materials used in its production – for example bio-oils – its wheel-to-wheel carbon emissions can be even lower still.
- **Higher cetane number** - Which translates to better combustion and less pollution.
- **Same attributes -** HVO has many of the same attributes as regular diesel meaning it can be used under the same conditions, in the same climates, and handled in the same way.
- **Easy to handle -** HVO fuel can be distributed, handled, and stored as traditional diesel fuel. This means it can be distributed from the same depots, tanks and pumps as diesel is today.
- **Same performance** – It performs the same as regular diesel and drivers will notice no difference in response, power output or torque. This was validated in extensive field tests carried out by Volvo Trucks.
- **Can be freely mixed with regular diesel -** It is also possible to freely mix and blend HVO with regular diesel, without the need to flush tanks or worry about cross contamination between regular and HVO diesel. Until the cost of HVO fuel is reduced, i.e., when supply and availability increase, the ability to blend HVO and regular diesel can also assist in making carbon reducing fuels more commercially viable - noting the environmental benefits are reduced in line with the percentage blend.
- **Stable and no additional service requirements or technical limitations -** It is a stable fuel, which does not require any engine modifications or any additional maintenance to the engine, unlike biodiesel which requires major changes to servicing plans. It can be used in vehicles as a direct replacement for regular diesel. No modifications are required, and it is free of biodiesel's technical limitations – such as solidifying in cold weather or producing harmful organisms in the fuel tank.

3.0 Movement of people (2.1 in the Paper)

3. **Do you agree the development of a national policy framework for active and public transport will support emissions reduction?**
4. **What should be included in a national policy framework for active and public transport and how should it be developed?**
5. **What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to ensure the movement of people contributes to transport emissions reduction?**

VGA is extremely supportive of the Department's proposal to promote active and public transport to ultimately reduce the number of private vehicles on the road as a way to decarbonised the road transport sector. This also has the added benefits of reducing congestion, reducing pollution, improving health, and contributing to more livable cities.

The points raised by the Department on better planning, Intelligent transport systems, electric, connected and automated vehicles are also what we see as critical to achieving the behavioral change required.

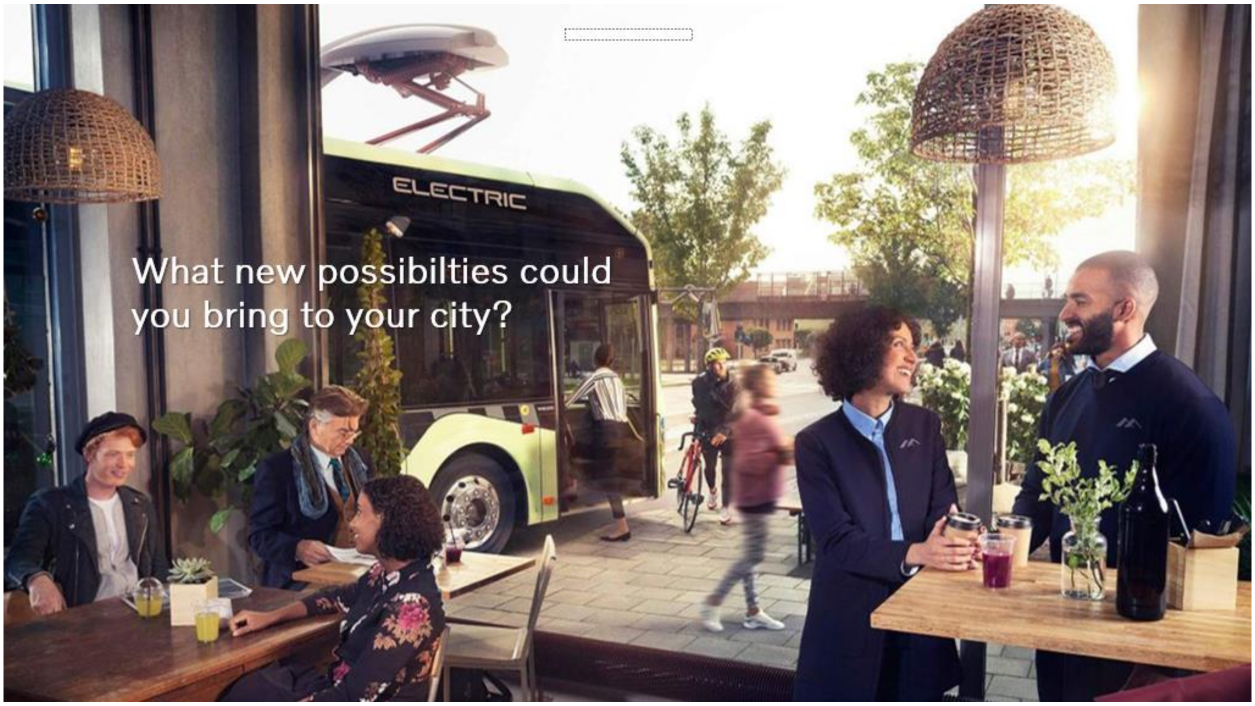
3.1. Government as a leader

The points raised in the consultation paper under Government as a leader will be critical for this change to occur, albeit some of the changes may be unpopular initially they are key success factors to ensuring change. In cities around the world where there has been a reinvention of the transport network, a strong political will and lead has been one of the most important critical success factors. This is visible in almost all Bus Rapid Transit (BRT) systems implemented across Europe and Latin America as examples.

In addition to the road pricing reforms, reducing the amount of parking in cities and introducing tolls to drive into city centers can also be used as additional deterrents for people to keep using their private car for their entire journey. In doing this however, Government needs to ensure that attractive alternatives are ready and available. For example, ample parking stations for access to bus or train interchanges, with high frequency of services running. Modern, quiet electric bus fleets with real time passenger information systems will also enhance this experience.

3.2. New possibilities for city planning

Furthermore, the introduction of electric buses with zero tailpipe emissions also opens up new possibilities for cities planners such as taking electric bus operations directly into hospitals, shopping centres, aged car homes, dining precincts and more. Again, this is an important factory to increase the livability of cities and the attractiveness of public transport.



4.0 Movement of goods (2.2 in the Paper)

6. The Australian Government has already engaged in consultation on the 2023 review of the National Freight and Supply Chain Strategy and those consultations will also inform the final Roadmap and Action Plan.
6.1 What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to ensure that the movement of goods contributes to transport emissions reduction?
6.2 How would these actions address the identified challenges and opportunities for emissions reduction in the movement of goods?

Again, VGA largely agrees with everything that has been included in the Paper for this section. In particular, VGA would like to highlight the importance of the following points –

4.1. Productivity will be key to meet the future freight task

As detailed in the Roadmap Paper, road freight is projected to grown by 77% between 2020 and 2050. This increasing freight task coupled with both the current and expected future driver shortage, magnifies the fact that implementing strategies, policies and regulations that prioritise productivity are critical. For example, reviewing and updating current Heavy Vehicle General Mass Limits and Heavy Vehicle Dimension (length) Limits to enable optimal vehicle configurations, efficiency, and productivity.

Increasing productivity, and as a by-product reducing the number of heavy vehicles required to perform the freight task, would also deliver safety benefits to the freight industry and other road users.

4.2. Importance of seamless intermodal connectivity

While the Roadmap outlines the plan to shift a percentage of freight from road to rail, for this to work successfully a focus on **seamless intermodal connection** is necessary to avoid bottlenecks and congestion in the supply chain network.

Furthermore, while the paper calls out the need for small freight movements, we would like to emphasize the continued need for medium to large freight vehicles for the connecting movements. For example, the large grocery freight vehicles for the likes of Coles, Woolworths and Aldi from their supply hubs and/or intermodal transfer hubs to their delivery points.

For efficiency, these trucks should be able to transfer and carry freight containers direct from the rail network. With the shorter distances required, these trucks can absolutely be electrified.

4.3. National harmonisation of regulations is required

Our industry needs a harmonised approach from the states and territories, supported by national leadership. Uniform policy positions and regulations will support the acceleration of the transition, creating certainty and allowing for seamless operation across borders. Our freight and logistics industry by its very nature operates across borders, yet differing regulations and policies between the various jurisdictions is creating them.

VGA supports that the Infrastructure and Transport Minister's Meeting (ITMM) is the forum for decisions to be made regarding developing shared principles, policies, and regulations for national transport decarbonisation and a national transport decarbonisation work plan but stress the need to speed up the implementation of decisions in the jurisdictions.

4.4. Heavier trucks do not always equal safety implications

VGA would like to question the statement made by the Department on page 31 of the Roadmap Paper that "*the heavy batteries in electric trucks cause them to be heavier than trucks powered by fossil fuels, which has added safety implications…".*

VGA would like to stress that with all of the safety advancements made on heavy vehicles in recent years, all of which have been included on the latest Volvo electric truck range, that this overarching statement and view of the Department is not true. In fact, the heavier electric trucks are often safer than many other heavy vehicles legally in operation today.

For example, all of the new and amended Australian Design Rules that make up the Government's Safer Freight Vehicles package released in October 2023 come as standard on the Volvo electric truck range including the new ADR features -

- ADR 14/03—Devices for Indirect Vision
- ADR 99/00—Lane Departure Warning Systems
- ADR 105/00—Blind Spot Information Systems

Further to ADR mandated requirements, Volvo electric vehicles comply and exceed European ECE and General Safety Rules (GSR) including electric vehicle requirements of Acoustic Vehicle Alerting System (AVAS). On our Volvo heavy duty battery electric vehicles, the Volvo active steering system is also standard.

Braking performance and efficiency have also advanced significantly over recent years. The Volvo electric range meets all ADR and EU braking requirements. The technical capacity of the Volvo electric range is designed for greater axle weights than permitted here in Australia (even more than the EV access map permits in some states) meaning the brakes have been designed as such.

Even with the heavier axle weights, the braking performance and efficiency is equivalent to, and in some cases better than, some less advanced heavy vehicles with lower axle weights currently on the road.

5.0 Net Zero Pathways: Road – heavy vehicles (3.2 in the Paper)

9. Do you agree with the proposed net zero pathway for heavy road vehicles?

10. The proposed pathway for heavy road vehicles relies on a mix of battery electric, hydrogen fuel cell and low carbon liquid fuels. Rank from 1 to 3 the order in which these should be prioritised for emissions reduction.

11. What role should low carbon liquid fuels play in heavy vehicle decarbonisation?

12. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce heavy vehicle emissions?

Firstly, VGA would like to commend the Department on a well-researched and thought through proposed net zero pathway for heavy road vehicles and would like to confirm that we largely agree with what has been included in the Paper.

Some key areas we would like to highlight and/or flag a different viewpoint to are outlined below -

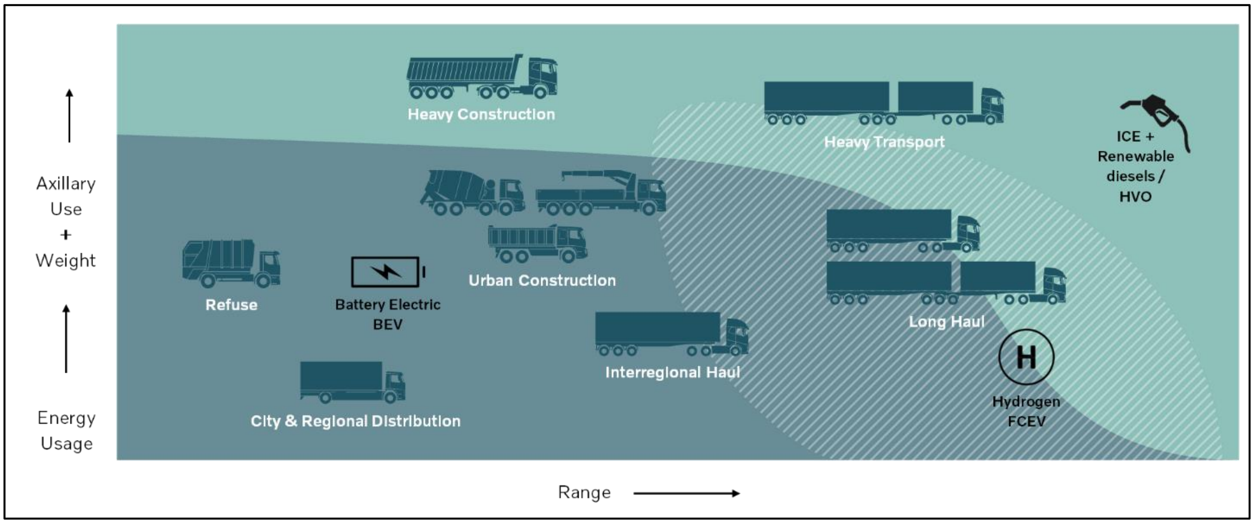
5.1. Three-pronged approach to decarbonisation – no silver bullet

After extensive studies on various technology types and energy efficiencies, the Volvo Group concluded that no single heavy vehicle technology or fuel type will provide the total solution for decarbonisation and increased efficiency. Just as heavy vehicles are used for a diverse range of applications and freight tasks, multiple technologies and fuels will be required for the transport sector's decarbonisation journey, including battery electric, hydrogen fuel cell, hydrogen ICE and traditional ICE vehicles operating on low carbon liquid fuels such as hydrogenated vegetable oil (HVO), which is consistent with the roadmap shared in the Paper.

We stress that it is important to understand that no single vehicle / energy technology type should be viewed as the best or only solution, but rather one key and important technology to be used in combination with the others. Each has its own advantages and limitations when it comes to development, infrastructure, cost, productivity and life cycle environmental impact and efficiency.

Figure 1 below illustrates how the energy usage and range required in operation influences the likely best technology type, highlighting that one fuel/energy type will not be the optimal or possible for all.

Figure 1: Energy type by range and energy usage



- **Battery Electric** – Suitable for city/regional distribution, intrastate, refuse, some urban construction, and urban, city and school buses.

- **Hydrogen Fuel Cell and Hydrogen ICE** – Suitable for applications requiring larger energy usage and range such as interstate and intrastate haul, long distance tourist coaches and some constructions and mining applications.

- **Internal Combustion Engine (ICE) vehicles operating on low carbon liquid fuels (LCLF) such as hydrogenated vegetable oil (HVO)** – Will be required for some heavy transport, demanding haul, and heavy construction applications where neither battery electric or hydrogen fuelled vehicles will be viable due to their range and energy limitations. They similarly provide a suitable alternative for decarbonisation where the required infrastructure in not available.

  While not yet used in scale in Australia, it is also worthwhile flagging that in Europe there is a growing trend of using **Liquified Natural Gas (LNG),** which while a fossil fuel can provide between 10-20% less CO_2 emissions compared to diesel, and **BioLNG,** which reduces CO2 emission further.

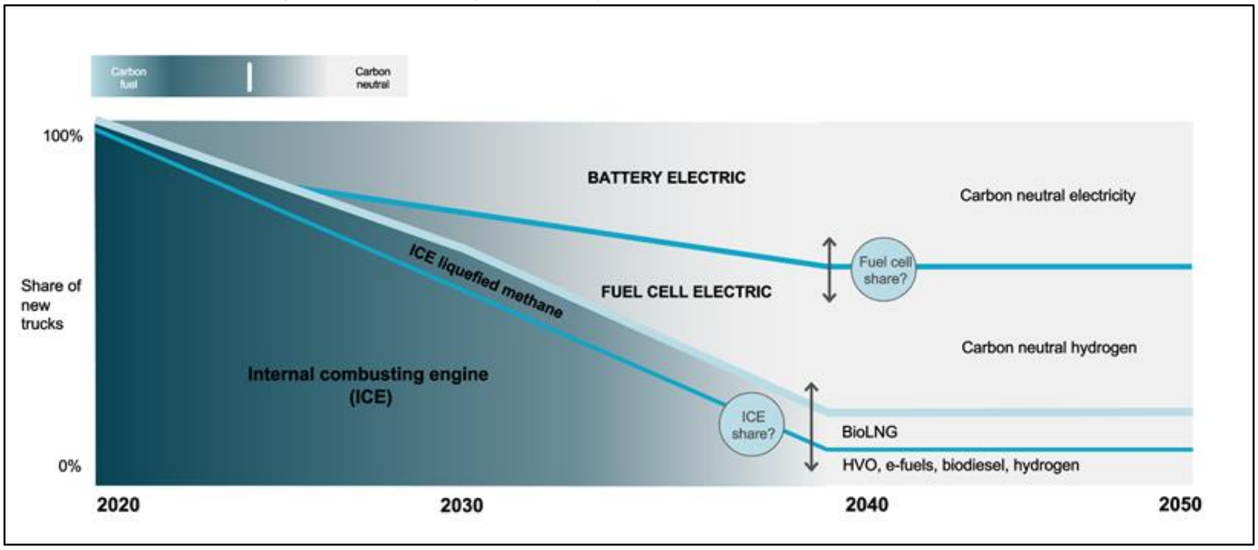
  Bio-LNG, otherwise known as liquefied bio methane (LMB) has the same chemical formula as LNG. It is produced through a process where biogas from organic waste such as animal manure, sludge and waste, is converted to high-quality bio methane and liquefied. Compared to LNG, Bio-LNG emits less CO_2. It also has higher fuel potential (the ability to replace diesel) than other alternatives like biodiesel.

Technology will evolve over time

Figure 2 below shows Volvo Group's estimate of how heavy-duty vehicles globally will be decarbonized over time, showing that besides the full battery-electric vehicles that are available now, fuel-cell/hydrogen electric vehicles and trucks running Low Carbon Liquid fuels such as Hydrotreated Vegetable Oil (HVO) will contribute to transport decarbonisation over time. This also considers the development and advancements of each of the technology types and of course may differ country to country according to availability of resources.

As can be seen in Figure 2 below, this is also very consistent with what the Department has included in its proposed roadmap.

Figure 2: Estimate of how heavy vehicles will decarbonise over time



Based on the above, VGA would suggest the following prioritisation by government –

1. **Battery Electric Vehicles (BEVs)**

BEVs are available now in Australia. While there are still a number of challenges and barriers to the acceleration of their uptake in Australia, as detailed in the Roadmap Paper, there are also some barriers that simply require some low hanging fruit items such as education, coordination and cooperation - for example, regulation changes.

In many cases, much of the work is already done and it just requires the last 10-20%. For example, expanding the already announced EV access maps in a number of jurisdictions.

It would therefore be a missed opportunity to not prioritise BEVs in the first instance, as the abatement potential is significant, as well as the societal health benefits that would be delivered. Think of all metro deliveries and waste vehicles being electric.

2. **Low carbon liquid fuels**

With no additional infrastructure being required for operation, this is also an 'easy win' when it comes to abatement returns. The current lack of local LCLF supply, and the high prices as a result is what needs the most urgent action. Similarly, we are aware that the Department are already looking into releasing an Australian renewable diesel standard. Fast tracking this release should be a priority, as the local LCLF manufacturing and subsequent increased usage, depends on it.

While LCLFs seem like a cost-effective solution to decarbonise, which it is, it is also important to stress that it cannot be the primary or sole solution as the correct balance between feedstock for fuel generation and food needs to be determined and respected.

3. Hydrogen Fuel Cell (and Hydrogen Internal Combustion Engines)

Hydrogen vehicle technology is more complex than battery electric. While VGA are investing heavily in the development of Hydrogen Fuel Cell and Hydrogen ICE vehicles, we do not expect operations to begin in Australia until 2030, after which there would most likely be the usual slow adoption curve for new technologies. Additionally, the relatively small product availability, extensive infrastructure, local green hydrogen manufacturing and re-fueling networks required, is why we put this as the third priority for medium to longer term abatement wins.

5.2. Changes proposed to table on pages 42-43 of the Roadmap Paper

In the table summarizing the low emission technology and fuel likely required to decarbonise transport on pages 42-43, VGA would like to point out –

- **Hydrogen Fuel Cell Vehicles (HFCEVs) will not be the only solution for Hydrogen powered heavy vehicles**.

While they will have a role to play, research shows that Hydrogen Internal Combustion Engines (H2ICE) will also be one of the solutions. Therefore, both HFCEVs and H2ICE Vehicles should be included in the Department's net zero roadmap.

- **Battery Swapping technologies can cause safety implications**

VGA do not endorse or recommend battery swapping solutions of any nature since frequent swapping increases the chances of mechanical damage to the batteries. Dropping, puncturing, or improperly connecting batteries during the swap process can lead to internal short circuits, resulting in fires or explosions. Frequent handling, increased exposure of swap and go batteries to the elements, and maintenance monitoring challenges all pose increase safety risks.

5.3. Further reforms to mass limits will be necessary to achieve necessary productivity

General Mass Limits (GML) under the Australian Heavy Vehicle National Law (HVNL) restrict, and in many cases prevent, the operation of Zero Emission Vehicles (ZEV) that are required for the decarbonisation journey of the medium and heavy-duty transport sector.

Australia faces unique legal constraints regarding axle limits, unlike many other countries globally that permit significantly higher limits to counterbalance the impact of battery tare weight. The European Council Directive 96/53/EC allows 10t on the front axle for example, compared to Australia's 6.5t, and are currently reviewing their policies to increase this further.

Front Axle Limits

Australia's current 6.5t steer axle mass, otherwise known as Front Axle Limit (FAL), is not enough to enable the legal operation of Heavy Duty zero emission vehicles, including both Battery Electric Vehicles (BEV) and Hydrogen Fuel Cell Electric Vehicles (HFCEV), when carrying the same payloads as done today with internal combustion vehicles. This is due to the increased tare vehicle weight of at least 1.0t of these new technology vehicles. In some models and applications this weight increase can be up to 2.0t.

Today one battery for ZEVs for example weighs on average upwards of 500kg. A common specification of a heavy vehicle would require 4 to 6 of these batteries to deliver the required viable power and range capability.

Ideally the current 6.5t FAL would be increased to 8.5t FAL, which would future proof for the next generation BEVs, and future Hydrogen Fuel Cell EVs as well. An increase to 8.0t FAL however would be sufficient for most BEVs in the interim today.

8.0t FAL today would enable comparable change from diesel equivalent i.e. optimal efficiency, payload and productivity, including for rigid vehicles such as refuse trucks and up to 16 pallet box bodies as examples.

Rear Axle Limits

In addition to the FAL, ideally the Tandem Axle Drive Group, otherwise known as the Rear Axle Limit (RAL) will also be increased at the same time to enable a higher overall Gross Vehicle Mass (GVM) and payload.

In Australia the current national RAL is 17.0t. Ideally this would be increase to 19.0t, which would again future proof for future generation BEVs and Hydrogen Fuel Cell EVs. 18.5t RAL however would be sufficient for most BEVs in the interim today.

Recommended future Mass Limits

Volvo recommends that the current GML for heavy vehicle is increased as per the below table.

If the proposed higher limits that will be required for future technologies, including Hydrogen Fuel Cell EVs are not yet possible, we would recommend increasing limits to those shown in the interim column below.

Axle	**Current**	**Interim solution**	**Future requirement**
Front (steer) Axle Limit	6.5t	8.0t	8.5t
Real (tandem drive) Axle Limit	17.0t	18.5t	19.0t

5.4. Unlikely battery weights will decrease in the short to medium term

While battery technologies are advancing at a rapid pace, VGA would like to warn that there is a high chance that decreasing battery weights won't be seen in the short to medium term. Out to 2030 for example, it is thought that the same battery chemistry we see today will still be utilised, varying depending on application.

The advancements seen in batteries will most likely occur in relation to different packaging strategies, improved battery capacity, outputs and charging rates. Batteries are expected to get more complex, as will ECUs. All of these advancements will be greatly advantageous to electric transportation, but the Department should not delay or avoid addressing the weight and payload challenges posed by current battery weights in the hope they will get lighter.

It is also important to note that heavy vehicle weights are expected to increase further with the introduction of Hydrogen Fuel Cell Electric Vehicle (HFCEV) technology. The challenges and barriers of axle weights and regulations will therefore continue for the long term.

5.5. Regulation permanency

While we have seen a couple of jurisdictions over the past year announce increases to their axle weight limits, these have unfortunately been largely limited to state roads only and in some cases valid for a 1-2year trial period only.

The lack of long-term certainty and flexibility of routes and operations make investment decisions and business cases for electric trucks difficult for operators and local manufacturers alike, despite the desire for many to accelerate their own decarbonization journeys.

Example recent regulation 'trial' announcements include –

- Low and Zero Emission Heavy Vehicle Trial Scheme in South Australia
- Towards Net Zero Emissions Freight Policy in New South Wales

5.6. National harmonization of regulations

In addition to the above challenges related to GML regulations, another closely related barrier is the lack of national consistency. The national harmonization of heavy vehicle standards, weights and dimensions is critical to ensure the maximum efficiency, productivity and decarbonization of the industry. The freight and logistics industry by its very nature is not bound by borders or boundaries, but as a result of the differing regulations between the jurisdictions unfortunately we are creating them. Again, this significantly hampers the productivity potential electric heavy vehicles, which in turn impacts the commercial viability for many operators.

Closely related, concerns of pavement and structural damage is also leading to a number of jurisdictions restricting access to key freight routes and assets such as toll roads, bridges and tunnels, which again has a major impact of the operational productivity, commercial viability and attractiveness of heavy vehicle EVs.

Examples of such restricted assets can be seen in the low and zero emission network maps released by the New South Wales, South Australian, Queensland and Victorian governments.

5.7. Government to mandate the necessary changes – down to local government level

Even within single jurisdictions the lack of harmonisation across state-owned and local government roads is again extremely problematic. The lack of desire from most local government engineers to allow higher axle limits is proving a major deterrent and barrier.

For example, in many jurisdictions the current EV access maps only include the state roads, which do not allow the movement of freight to the required pick up and end point destinations – essentially making the access maps unusable.

Clear funding allocations for local governments and relevant communications are necessary.

In this case, we see a real need for the Commonwealth, and state and territory governments, to mandate the changes, assist in sharing pavement and asset wear studies, as well as appropriate funding for road and maintenance. Waiting for permit approvals by each individual Local Council and road owner is proving not to have the urgency and buy-in required for change. Local government road managers do are often not aware of the 'bigger picture' benefits, cost impacts of climate change and the correct information to make informed decisions.

5.8. Pavement wear concerns can be overcome with wide tyres and road friendly suspension

Currently we see that many state departments have a strong desire to make the necessary regulation changes for their state roads but are dependent on local governments to individually approve the changes for their own local roads. One barrier inhibiting their approvals is their concern around the impact increased axle weights will have on road infrastructure and pavements, and the associated costs.

Pavement wear is a common concern worldwide, and as such, significant testing and studies have been conducted. Most countries have many years of experience allowing higher axle weight limits, long before new technologies were introduced, that we could learn from.

While there is increased pavement wear, studies and experience indicate the impact is not as great as often assumed. In fact, when wide tyres (super single 385/65) are used on the steer, coupled with road friendly suspension the impact on pavements from the greater axle weights can be largely overcome.

A recent study showed for example that use of super single 385/65 tyres can reduce road pavement wear by 11% statically, and then then depending on the road profile, will further reduce pavement wear by up to 30% for poorly maintained roads or 17% for well-maintained roads. This in some cases, means that the pavement wear caused from a higher mass electric vehicle is the same, or very close to, its diesel equivalent without super-single tyres or road-friendly front suspension that are allowed legally on roads today. In some cases, the EV vehicles actually resulted in less pavement wear due to suspension advances.

A recent study was also recently performed by Ausroads in Victoria, which also supported this view. VGA would be happy to discuss this further with the Department.

5.9. A total cost assessment is required including severe weather & healthcare

Although the barriers facing the industry on its path to net zero emissions are real and will take collaboration and investment to overcome, the cost of not reducing emissions is more daunting.

We note the House of Representatives Standing Committee on Regional Development, Infrastructure and Transport's recent Inquiry into the implications of severe weather events on the national regional, rural, and remote road network. The experiences relayed in that inquiry show the consequences of delays and damage to Australia's delicate supply chain. The massive costs caused as a result of climate change have not yet been compared to the cost of accelerating decarbonisation.

Furthermore, while often the cost of pavement wear and infrastructure are raised as barriers to the acceleration of BEVs, a total cost assessment has not yet been done taking into consideration the benefits BEVs offer, and the health care costs caused by diesel heavy vehicles (in addition to rising costs caused by increasing extreme weather events due to climate change).

For example, diesel exhaust emissions are classified as a **Group 1 carcinogen** by the International Agency for Research on Cancer (IARC)[1]. This means they are definitively linked to an increased risk of **lung cancer** in humans, which would have a major cost impact on the nation's healthcare system.

As a result, on 7 September 2023, SafeWork Australia members agreed to add a workplace exposure limit (WEL) for diesel particulate matter (DPM) at 0.01 mg/m3 (elemental carbon) to the list of Workplace Exposure Limits for airborne contaminants (WEL list).

The World Health Organization (WHO) have also published studies into the health impact and cost on society from noise pollution, which again electric vehicles would help alleviate and reduce.

5.10. Cross departmental collaboration is required

The transport sector supports and touches multiple areas of government, and not just those in the Department of Department of Infrastructure, Transport, Regional Development, Communications, and the Arts' wheelhouse. For example, the transport sector supports, is a major contributor to, and is reliant on effective policies by departments, regulators, and agencies such as, but not limited to the below list. Cross collaboration between these departments and groups is essential for progress on the transition to EVs.

- Department of Climate Change, Energy, the Environment and Water
- Department of Education
- Department of Foreign Affairs and Trade
- Australian Renewable Energy Agency
- Australian Transport Safety Bureau
- Clean Energy Regulator
- Climate Change Authority
- Australia Skills Quality Authority (National Vocational Education and Training Regulator)
- Australia Trade and Investment Commission (Austrade)

[1] www.iarc.who.int/news-events/iarc-diesel-engine-exhaust-carcinogenic/

In many jurisdictions the department responsible for freight and transport is not the department responsible for infrastructure and roads, which again adds further complexity to getting alignment of key regulations and policies. For example, new axle weight limits for zero emission vehicles. Increased axle weight regulations in most jurisdictions are reliant on increased funding for road infrastructure, but in some jurisdictions no single department has control over both, or the scope to do the total cost benefit analysis considering → Cost of increased road infrastructure and impact of health care system vs. Benefits of zero emission vehicles and reduced carbon emissions and diesel particulates

6.0 Net Zero Pathways: Maritime (3.4 in the Paper)

17. Do you agree with the proposed net zero pathway for maritime?

18. The Australian Government is engaging in consultation as part of the development of the Maritime Emissions Reduction National Action Plan and those consultations will also inform the final Roadmap and Action Plan.

18.1. What additional actions by governments, communities, industry and other stakeholders need to be taken now and, in the future, to reduce maritime emissions?

18.2. How would these actions address the identified challenges and opportunities to reduce maritime emissions?

VGA largely agrees with the proposed net zero pathway for maritime and agrees that it is a harder to decarbonise sector compared to some of the other transport sectors, especially road.

VGA also supports the approach to take action through the MERNAP, which is being developed through excellent consultation. VGA commends the Department for recognising the need and importance of future proofing the domestic maritime industry such that we can benefit from the global net zero maritime transition.

Some of the critical points we would like to highlight are detailed below.

6.1. Emission standards for maritime

VGA is very supportive of the introduction of emission standards, similar to heavy vehicle road transport solutions, in the maritime space.

As detailed in the Paper, the larger shipping sector of maritime transport will largely be influenced by international standards, so a progress should start to be seen in this space, as guided by the IMO.

We see there is an opportunity for the Department to introduce emission standards on smaller marine vessels and leisure craft. Overseas for example, we have seen for some time now emissions standards being enforced on closer to shore vessels and operations. For example -

- Leisure boats
- Passenger ships and ferries
- Short sea and river transport vessels
- Coast guard and patrol vessels
- Work boats and tugboats

Again, learning from experiences abroad, such emission standards have typically been phased in not only over time, but also by vessel type and size. For example, the EU directive for noise and emission requirements on recreational craft, started with recreational vessels with hull lengths between 2.5m and 24m.

6.2. Three-pronged approach applicable to maritime applications, with addition of Hybrid solutions & Green Methanol

VGA again agrees with proposed net zero pathway in the Roadmap Paper for maritime. As detailed in the Roadmap Paper, there is no single technology type that will be the solution for decarbonisation. Very similar to the three pronged approached shared in section 5.0 of this response, maritime will require LCLFs, electric and hydrogen and hydrogen derived fuel solutions for its net zero future.

VGA also recommends that Green Methanol (e-Methanol) be included in the alternative fuels' roadmap - especially for maritime. e-Methanol is ranked by CIMAC (Conseil International des Machines à Combustion) as one of the two main alternative fuels to meet the IMO 2050 target. They also recognise that it will be one of the available alternative fuels where the technical solutions are most mature. As such, around the world we already see customer requests for e-Methanol solutions increasing.

6.3. Hybrids to be included in the Electrification section of the proposed Roadmap

Maritime is a hard to electrify sector and is unable to be completely electrified in the foreseeable future. VGA would like to highlight that hybrid solutions should also be added under the electrification umbrella in the Roadmap for maritime.

While full electric solutions are available today, their usage is limited to short distance, close to shore operations. We already see excellent examples of this in practice abroad for close to shore, in-river or in-land waterway passenger transport. The Brisbane CityCat and ferry services ahead of BNE2032, and the Swan River ferry services in Perth are example prime candidates where this electrification makes sense.

When the distance increases i.e. greater than 10nm off mainland, hybrid solutions are an ideal solution to offer zero emissions in areas that benefit from the low noise and pollution, but also have a diesel or alternative fuel engine ready as a range extender. Ideally this engine operates using a LCLF such as HVO, in line with the Department's net zero goals.

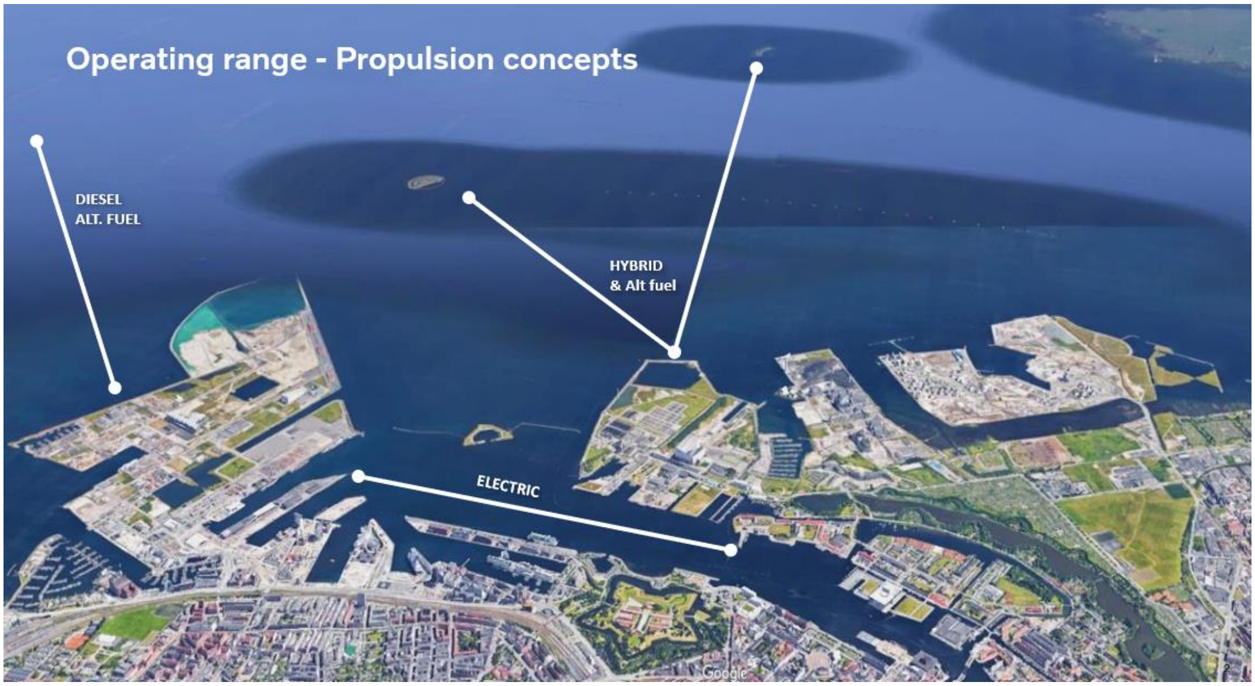
One example in Australia where such a vessel is about to start operations is tourist passenger vessel in North QLD operating out to the Great Barrier Reef. Obviously close to shore and then while in close proximity to the reef full electric mode is greatly advantageous, while the hybrid solution ensures the longer distances are possible.

Volvo Penta already has a rich portfolio of successful hybrid ferry deliveries operating around the world. The first examples were in Oslo, Norway; Kiel, Germany; and Gothenburg, Sweden.

6.4. Retrofitting Hybrid and Electric solutions are available today

As already identified in the Roadmap Paper, marine vessels typically have long asset lives. The ability to retrofit electric, hybrid and LCLF solutions is possible, and happening today.

Electrifying ferry, in-river and in-land waterway passenger transport are a low hanging fruit for Governments to make progress of their decarbonisation targets and offer excellent value for money.



7.0 Travelling in partnership (5.1 in the Paper)

Our industry needs a harmonised approach from the states and territories, supported by national leadership. Uniform policy positions and regulations will support the acceleration of the transition, creating certainty and allowing for seamless operation across borders.

VGA supports that the Infrastructure and Transport Minister's Meeting (ITMM) is the forum for decisions to be made regarding developing shared principles, policies, and regulations for national transport decarbonisation and a national transport decarbonisation work plan. It is fantastic that the ITMM has identified decarbonisation as a national priority and has set up relevant working groups to take forward this collaboration.

In practice however, it is disappointing that national agreement and alignment still does not appear to be progressing, or at least not with the required speed. Firm decisions and faster implementation of actions needs to occur. It is also vital that local governments be included in the decision-making process as they too have responsibility for implementation and can be a roadblock if not on-board. Axle weight regulations is a clear example of this, where local governments reluctant to approve the higher axle weights permits are making state road EV access unusable.

There is perhaps a needs and/or place for Federal Government to step in and hold state and local governments accountable for their decarbonisation targets. Also, to hold the ITMM forum accountable for making decisions and action implementation.