Bus and Coach Industry Submission on the National Electric Vehicle Strategy Consultation Paper

November 2022

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1. About the Bus Industry Confederation

The Bus Industry Confederation (BIC) is an organisation uniting bus and coach operators, bus and coach chassis suppliers and manufacturers, bus and coach body manufacturers and associated suppliers and professional services. The BIC's vision is to enhance the sustainability and liveability of Australia's cities and regions by *moving people* using bus and coach transportation. We aim to do this by representing the collective interests of our members and to assist them in promoting the safety, efficiency and effectiveness of bus and coach transport in Australia.

1.1. Our Moving People Objectives

- Promoting policies and actions that are environmentally responsible.
- Promote the development of a viable and improved bus and coach industry in Australia.
- Foster and promote a viable Australian bus manufacturing industry.
- Promote public understanding of the contribution made by the bus and coach industry to Australia's economy, society and environment.
- Ensure the accessibility and mobility needs of Australians are met, regardless of where they live or their circumstances.
- Promote the use of public transport as a viable alternative to the car.
- Coordinate and make more effective existing Federal, State and Local Government policies and programs that relate to passenger transport.
- Ensure that buses and coaches operate safely and effectively.

1.2. About the Bus and Coach Industry

The bus and coach industry in Australia carry an estimated 1.5 billion urban public transport passengers per year and makes up 4 per cent of the total urban passenger task. The coach sector of the bus industry, comprising long distance, tourist and charter operators moves more than 1.5 million domestic travellers.

Our Industry, which includes bus operators, bus manufacturers and parts and service suppliers, employs more than 85,000 people nationally. Comprehensive data on the bus industry, the fleet, the suppliers, operators and their passengers can be found on the movingpeople.com.au website.

The *Bus Industry Confederation* (BIC) is the federal and peak body of the *Bus Australia Network* (BAN) comprising the state associations of New South Wales, Queensland, Tasmania, South Australia and Western Australia.

1.3. The Bus and Coach Industry Suitability for EV's

The bus and coach industry in Australia is uniquely placed to be an exemplar of how to transition heavy vehicles to zero emissions operation. The public transport tasks (including school bus services), which the industry undertakes daily are so configured that the vast majority of these operations are ideally suited to adopt dedicated battery and hydrogen technology.

Specificality, route and school bus and some coach operations include:

- **Back to base operations:** This allows for effective and efficient utilisation of depot based recharging or refuelling systems and critically thee transport operations are structured to allow the time required to charge or refuel the buses or coaches (typically off-peak timings can be employed).
- **A known task (distance and time):** This enables any limitations in relation to EV's to be catered for, for example tasks allocated to zero emission buses can be specifically tailored to suit defined operating ranges and can also carter to a EV's preferred operating conditions.
- **We are early adopters of technology:** The bus and coach industry are proven early adopters of new technologies, for example Euro VI buses have been in service since the mid 2000's.
- **We do not mass load:** As opposed to trucks, buses and coaches are only fully loaded a small percentage of the time (for example a bus will start a service trip empty and will progressively pick up passengers such that they are only fully loaded towards the end of each trip). Such loading cycles mean that EV buses and coaches can achieve extended operating range.
- **Operate on Government contracts:** Nearly all commercial bus services (and an increasing number of coach services) are operated under state government contracts and such arrangements can consider the benefits of reduced emissions *"as a public good"* as opposed to being purely governed by cost.
- **Demonstrated Ability to Work with Governments:** The bus and coach industry has worked positively with governments on a range of issues and continues to do so at both a state and federal level. The bus and coach industry have proven excellent community relations that can be called upon to help promote these new technologies.

Given the above, the BIC sees that the take up rate of zero emissions buses and coaches is critical in supporting the whole EV implementation process in that buses and coaches are a proven and effective way to promote these new technologies in a real world and high-profile manner.

A fleet of battery or hydrogen powered route buses is a great advertisement for EV technologies as the public can not only travel on such buses and experience these new technologies first hand, but one the public see operating on an ongoing daily basis which is a positive way of removing any stigma or uncertainty with such technologies.

Critically, the major transition challenge for the bus and coach industry comes not from the new technology buses, but the uncertainty around the supply and cost of green power and the associated new technology infrastructure. The transition to zero in our Industry will be severely hampered unless this is addressed.

2. Purpose of Document

The purpose of this document is to provide a response to the National Electric Vehicle Strategy Consultation paper released in September 2022. Queries or feedback relating to this submission can be directed to Roz Chivers Executive Director – Bus Industry Confederation via email to admin@bic.asn.au or by phoning 02 6247 5990.

2.1. BIC's Approach to this Response

The BIC supports the intent of the National Electric Vehicle Strategy Consultation paper which covers a range of goals and although the bus and coach industry are broadly supportive of these goals, we do have two main concerns with the strategy.

Firstly, the strategy paper is focused on implementing fuel efficiency standards for heavy vehicles in

Australia and the BIC contends that the setting of such efficiency standards is not a workable method to increase EV take up,

Secondly, the critical issues inhibiting EV take up in the bus and coach industry is not the new technology itself, it is the lack of enabling policy for charging and refuelling infrastructure plus the uncertainty around the supply and cost of green energy from the grid.

Although these two points are currently the most significant factors limiting the take up of battery and hydrogen powered vehicles in the heavy vehicle space, other areas that are also creating roadblocks to the take up of Zero Emission Buses (ZEB's) can be summarised as:

- The rapid deployment of these new technologies, has resulted in these new vehicles and their supporting systems, being implemented ahead of appropriate Australian regulatory controls.
- The areas where BIC members, who are implementing these new technologies, have identified gaps in regulation and standards range from the new technologies buses themselves through to recharging or refuelling systems plus other supporting infrastructure.
- Specifically in relation to vehicle design both the rapid adoption of these new technologies and the regulatory implementation processes that government must undertake, means that as of November 2022 there are no Australian Design Rules (ADR's) that directly apply to the specialised drive systems and the associated componentry found in ZEB's. This applies to all ZEB's either in diesel hybrid, battery electric powered or hydrogen powered form.
- Additionally, the current Australian Standards framework is weak in these areas, particularly regarding both the high voltage areas applicable to all EVs, as well as the high-pressure storage systems associated with hydrogen fuel cell systems.
- Issues such as a lack of standardisation in operational and maintenance processes as well as variations in workforce licencing and safe work parameters are also inhibiting take up.
- To add to the issue of staffing, there is currently no national approach to training programs which adds to the lack of suitably qualified trades people to safely maintain the current ZEB fleet.
- There is also a lack of appropriate national in-service safety standards for ZEB's and infrastructure. For example, there are no specific fire standards for EV's nor are there fire and ventilation standards for road traffic tunnels to cater for these new technology vehicles. This issue means that in some states ZEB's are being treated in the same manner as dangerous goods transport and this is resulting in restricted access to some tunnels until standards and potential effects of a fire or other vehicle type failure is determined.
- And critically, there is a lack of information related to charging and refuelling infrastructure requirements, plus uncertainty around the availability of green energy from the supply grid.
- Members who are implementing depot based recharging and refuelling systems are experiencing excessive costs, complexities and delays due partly to a lack of accepted regulations and standards, but also due to restrictions in supply from the grid. For example, in Queensland members are unable to recharge buses from 2:00 pm to 6:00 pm in the summer months.
- These types of restrictions are creating uncertainty such that operators are questioning if they can purchase the amounts of electricity they require to keep their expending ZEB fleets in service (plus what the long term costs of this power will be).

In a broader context, BIC members have also cited a lack of a national framework to incentivise increased commuter use on zero emission public transport. Increasing travel via zero emission public transport

decreases demand for private transport, reduces network energy demand and would accelerate the transition to zero emissions.

Given that the issues above are currently inhibiting the uptake of ZEB's, the approach the BIC has taken in responding to this National Strategy is to provide the details of these issues and where appropriate provide what the BIC sees as workable strategy to address such limitations.

3. Numbers of ZEB's in Australia

Currently there are around 130 battery powered large buses (ZEB's) in use in Australia, (around 110 in operation in NSW and smaller numbers are operating in Qld, WA, SA, and the ACT). There are also a small number of hydrogen powered buses in Qld and NSW. These numbers will climb as each of the state governments release additional plans for their respective transition to ZEB's. As at the time of writing, government announcements across several states are outlined in brief below.

- The current Qld policy is that new buses in southeast Qld will be zero emission from 2025 and then for the remaining fleet in Qld from 2030.
- NSW expect to be ordering 1000's of electric buses in order to meet their previously announced 8,000 target by 2045.
- In Victoria, five bus operators have been selected to trial 41 electric buses on existing bus routes in Melbourne, Seymour and Traralgon as part of the $20 million trial program and leading to all new buses being zero emissions from 2025.
- And the recent Federal Government Announcement to invest $250 million to deliver a local electric bus manufacturing facility and more than 130 new, locally manufactured buses.

It needs to be noted that these planned increases in ZEB's are the result of trials which have shown that these new technology vehicles work, but such trials have also reinforced the lack of green power platforms, as well as the lack of critical infrastructure to support this new technology.

The BIC believes that State's commitments are unlikely to be met unless there is explicit Federal Policy regarding power and infrastructure for ZEB's.

The BIC sees that a national approach must be taken on a range of issues to allow this transition to occur in an effective manner and that a National ZEB Roadmap needs to be co-developed by both government and industry to not only address these issues, but also to set timeframes for such actions.

4. Consultation Questions and BIC Responses

The BIC responses to the questions in the National Strategy are provided in the following.

Section 2.2 Goals

The proposed objectives are to:

- *Encourage rapid increase in demand for EVs*
- *Increase supply of affordable and accessible EVs to meet demand across all segments*
- *Establish the systems and infrastructure to enable the rapid uptake of EVs.*

***Question 1:** Do you agree with the objectives, and do you think they will achieve our proposed goals? Are there other objectives we should consider?*

We agree with the current three goals and note that the bus industry is currently acting on the first two goals, but these measures are being hampered by a lack of action from previous federal governments in relation to the third goal.

The BIC also sees that we are unlikely to meet the goal of reducing emissions if zero emission vehicles are being recharged and refuelled using non-renewable energy sources. If renewable energy infrastructure for recharging and refuelling is not brought online simultaneously, or prior to, the anticipated increase in EVs we may end up with the unintended outcome that our emissions increase in the short to medium term.

Our research has revealed the power required to make trucks and buses zero emissions is approximately 100TwH per annum. Australia currently produces around 70TwH of renewable energy annually, therefore the BIC sees that an added objective should be:

- *To promote renewable energy sources so to ensure that the Australian EV fleet is powered by green energy at a sustainable price.*

The BIC also recommends the inclusion of objectives specifically related to the ongoing operation of EVs. For example, an objective that relates to addressing the lack of an appropriately skilled workforce and service networks in Australia.

In addition, an objective related to the phase out of ICE vehicles, particularly Euro II, III and IV vehicles would be valuable in achieving emissions reductions over the whole Australian fleet. The longer we have these high emission vehicles on the road the longer it will take the industry to reduce our fleet emissions and the increased take up of Euro VI diesels (in either traditional or hybrid configuration) over the short term cannot be overlooked as a way to achieve fleet emissions reductions.

Section 2.3.2 Global action

Countries around the world are also implementing effective policy measures to support EVs.

***Question 2:** What are the implications if other countries accelerate EV uptake faster than Australia?*

Suppliers across the EV industry, whether locally or internationally based, will naturally focus supply and support on the largest accessible markets. If Australia's EV take-up does not lift in line with global peer countries, the ability for Australia to attract suppliers will lag and hence the possible rate of change does as well. Government investment and clear policy support for EV uptake is a critical market signal for suppliers.

In addition, the BIC notes that the National Strategy states on page 8:

> *Countries around the world are also implementing effective policy measures to support EVs. Many countries have adopted various forms of vehicle fuel efficiency standards (see section 3.2 below). Like Australia, many countries are investing in EV charging and hydrogen refuelling infrastructure. They are also offering subsidies, tax incentives and a range of financing for EVs. Many countries are setting ambitious targets for EV uptake or introducing specific measures to electrify heavy vehicles, such as setting emissions targets.*

While the BIC supports fuel emissions standards which in turn drive fuel efficiencies, to allow the industry to accelerate the uptake of ZEB's, a current and real issue is the increased whole of life cost of ZEB's. For example, a typical large Euro VI city route bus costs around $560 k, whereas an equivalent pure battery powered, or hydrogen powered bus costs around twice this amount. Plus, these new technology vehicles currently have less passenger carrying capacity and hence have higher per passenger operating costs.

A common notion is that savings in fuel costs would help to address these differences, but recent experience within the bus industry is that due to both the cost of electricity as well as limitations in accessibly, that such savings could be illusory.

In addition, the greatest effect on bus and coach whole of life costs is an anticipated reduced operating life of these new technology buses when compared to the current diesel fleet. For example, a typical large Euro VI city route bus has an operating life of up to 25 years, whereas any type of ZEB, that is either battery or hydrogen, have an expected maximum operating life of 15 years (this is due to the technology used and how these technologies age over time).

It also needs to be noted that the long term maintenance costs of ZEB's is still unproven. One of the major uncertainties is the life cycle of the battery power packs (as fitted to either hybrid, pure battery powered, or hydrogen powered ZEB's) which is anticipated to vary between 6 to 10 years. The costs to replace bus compatible 400 Kw battery packs (that also have extended warranties) are estimated at around $300 to $450 K, therefore depending on actual life cycles, a ZEB could require 2 battery changeouts over its shortened operating life (that is 15 years compared to 25 years for a Euro VI).

Specifically in relation to hydrogen buses, other cost unknowns are the mid-life refurbishments that are required of the fuel cell systems on the ZEB's and the electrolysers used to manufacture the hydrogen. Suppliers are already stating that these mid-life refurbishments will be required, but at this stage, the cost of such works is undetermined.

The differences in purchase price, along with reduced vehicle operating life, battery pack life and the mid-life refurbishment requirements, result in significant increases in the whole of life costs for ZEB's. Therefore, the BIC totally endorses the actions of other countries that have offered subsidies, tax incentives and a range of financing for EVs.

The BIC would be happy to discuss the effects of these whole of life issues and ways the Government may be able to offset such effects.

Section 2.4 Ongoing periodic review

The Strategy will need to be dynamic and adaptive. Ongoing reviews to measure and inform adjustments are needed to meet our goals.

***Question 3:** What are suitable indicators to measure if we are on track to achieve our goals and objectives?*

A specific indicator on uptake of EVs in the heavy vehicle fleets, that is buses, coaches, and trucks, would be an appropriate inclusion as these rates are seen as critical in supporting the whole EV take up process. New technology heavy vehicles are an effective way to promote these new technologies in a real world and high profile way.

A fleet of battery or hydrogen powered buses is a great advertisement for EV technologies as the public can not only travel on such buses and experience these new technologies firsthand, but one the public can see operating on an ongoing daily basis which is a positive way of removing any stigma or uncertainty with such technologies.

In addition, electric vehicles are reliant on the electricity network, and this is especially true of bus, coach and truck depots which represent large scale localised loads on the grid. Tracking metrics from the electricity sector including renewable generation and storage utilised for EV charging and accessibility and cost of network upgrades are key also contributors to meeting the goals and objectives.

A further and significant contributor to reductions in greenhouse emissions of the bus fleet is the use of diesel hybrids. These types of buses are being implemented at similar rates to ZEB's and although some see these as a supporting or incremental technology step, they are proving to be effective in terms of greenhouse emission reductions as well as being direct replacements of existing diesel buses in terms of operational performance.

For example, hybrid buses are operating in a number of city bus fleets and such fleets are seeing up to 30% reductions in diesel fuel usage, with no disadvantages in terms of limited operating range nor do they require specific infrastructure. Recent developments in hybrid technologies include buses that can be recharged from the power grid and then can be operated with less reliance on diesel fuel.

Therefore, the BIC recommends that the numbers of hybrid buses should also be included as an indicator to support the greenhouse emissions reductions for the heavy vehicle fleet.

Section 3 What more can we do to meet our goals and objectives?

3.1 Encourage rapid increase of demand for EVs

***Question 4:** Are there other measures by governments and industry that could increase affordability and accessibility of EVs to help drive demand?*

The BIC welcomes the Albanese Governments actions to encourage the rapid increase in demand for EVs and specifically the recent support for the manufacturing and operation of 130 zero emission buses in Perth.

The BIC also supports other commitments such as investments in EV charging and hydrogen refuelling networks but note that for such investments to support buses and coaches, these infrastructure need to be compatible with heavy vehicles plus such infrastructure needs to reach regional and rural Australia including significant tourism destinations.

Apart from these types of investments, the Federal Government also needs to take the lead in addressing other areas that are adversely affecting the efficiency and useability of ZEB's particularly when compared to international regulations and allowances. Specifically, zero emission buses and coaches do meet the relevant international standards for safety and efficiencies, but Australia lags way behind places like the European Union (EU) in terms of allowable vehicle operating mass (that is the maximum gross weight that a bus or coach can operate with on public roads).

With the introduction of both zero emissions buses, as well as new generation Euro VI and beyond diesel buses, buses are getting heavier. This effect is well known, and the EU have long recognised this such that they have provided for increases in operating mass allowances for zero emission buses and coaches of up to 2.5 tonne per bus type and that such allowances have been in place since 2015.

Such allowances were provided so that the new technology buses could achieve equivalent passenger carrying capacity when compared to diesel powered buses. And although buses are typically only fully loaded a small percentage of the time (such as towards the end of a trip), reductions in passenger capacity (per bus) typically requires an additional bus, or coach, to address such shortfalls.

In Australia, two axle buses are limited to 18 tonne, three axle buses are limited to 23 tonne and articulated buses are limited to 26 tonne. Although these Australian mass limits worked with traditional diesel type buses, such limits do not work with the heavier zero emission bus technologies.

Again, the BIC would be happy to discuss this issue with the Federal Government with the view to align with the allowances granted in the EU. It should be noted that the BIC sees that any mass increases for ZEB's should also include the use of vehicle telematics to continually monitor bus operating mass (and to align with current National Heavy Vehicle Charging Pilot as discussed in the response to Question 18).

In addition to the above, the BIC also believes that small scale, long term (life of the vehicle and infrastructure) EV operations are needed to provide a road map for operators to transition to ZEB's. This process also informs State and Federal Governments of the "real" costs and frameworks required for transition.

Question 5: *Over what timeframe should we be incentivising low emission vehicles as we transition to zero inform Australians about EVs?*

The Government has recently announced tighter noxious emissions standards for new trucks and buses, with the Euro VI standards being phased in over 12 months from 1 November 2024. This transition is already well underway in the bus and coach industry. In 2018-2019, Euro V comprised of 72.70% of new bus and coach deliveries with 20.02% of new deliveries being Euro VI was well before the standard was introduced.

There is a need however to incentivise removing older buses and coaches from the fleet. 23% of Australia's bus fleet is over 17 years old meaning they are meeting Euro III or less emission standards. Contracts and regulations vary across the states and territories, but for the whole Australian "commercial" fleet our modelling indicates that for large buses (over 26 seats) there is an average fleet age of 12 years and a maximum age of 25 years. For medium sized Buses (16 to 25 seats) there is a maximum bus age of 15 years.

We recommend that the Australian and state and territory government work towards reducing the overall age of the fleet through a mix of Euro VI diesel, Euro VI hybrid and ZEB's in the short to medium term while infrastructure is developed and upscaled to provide for larger fleets of zero emission buses across the country.

Question 6: *What information could help increase demand and is Government or industry best placed to inform Australians about EVs?*

For the bus and coach industry, well known early adopters of new technology, there are several barriers to adoption. Critical barriers include:

- Lack of a formal framework for charging and refuelling infrastructure for depots and including details on the availability of appropriate levels and cost of green energy from the grid over time.
- Information in relation to the processes required for grid connection upgrades and the real cost of such upgrades is also lacking.
- Lack of suitable national standards for vehicle and infrastructure design to support zero emission vehicles. Examples include fire standards for vehicles as well as fire and ventilation standards for tunnels.
- No framework is in place to incentivise increased commuter use on zero emission public transport. Increasing travel via zero emission public transport decreases demand for private transport, reduces network energy demand and accelerate the transition to zero emissions.
- And from a state level, there is a lack of detail on how operators transition fleets from diesel to EV, and how contractual arrangements with state and territory governments will change to accommodate such transitions. This issue is time critical as first adaptors of these new technologies are taking significant contractual and financial risk, especially where operational contracts tend to be short term (2 to 3 years). To allow companies to take on the added capital cost and current increased risk associated with EV's, contracts need to be long term (10 year terms for example).

3.2 Increase supply of affordable and accessible EVs to meet demand across all segments

Question 7: *Are vehicle fuel efficiency standards an effective mechanism to reduce passenger and light commercial fleet emissions?*

Nil response

Question 8: *Would vehicle fuel efficiency standards incentivise global manufacturers to send EVs and lower emission vehicles to Australia?*

The bus and coach industry responds proactively to emission standards but for a range of reasons, we do not see that fuel efficiency standards are an effective or efficient way of reducing bus and coach emissions.

Question 9: *In addition to vehicle fuel efficiency standards for passenger and light commercial vehicles, would vehicle fuel efficiency standards be an appropriate mechanism to increase the supply of heavy vehicle classes to Australia?*

Due to the complexity and diversity of bus operations, the BIC sees that the setting of vehicle fuel efficiency standards for buses and coaches would not increase the diversity of supply of these heavy vehicle's classes into Australia. The BIC sees that setting of such fuel efficiencies would only complicate the market and

would not achieve the required outcome. Instead, the BIC sees that the setting of emissions standards, such as the recent Euro VI and potentially set percentages of zero emission buses, is a far more effective tool to increase uptake.

Therefore, the BIC sees that specific percentage targets for zero emission buses and improved emissions standards are the best way to encourage heavy vehicle diversity.

Question 10: *What design features should the Government consider in more detail for vehicle fuel efficiency standards, including level of ambition, who they should apply to, commencement date, penalties and enforcement?*

As stated above, fuel efficiency standards are too complex to apply to heavy vehicles such as buses and coaches due to the variations in bus types, combinations of chassis and body types and the varying operating environments. For example, a specific car model can be tested for fuel efficiency over a specified course and then be allocated a repeatable efficiency rating.

But for a bus there are no such thing as a specific or standard model bus. For example, there are specific chassis models with explicit engines and drivetrains etc, but a wide range of body types can be built on any specific chassis model. For example, one chassis model (engine and drivetrain) can be fitted with a city route bus body, a school bus body or even a coach body. Each of these body types have differing masses, wind resistance effects, and accessory loadings (such as air-conditioning duty cycles) therefore each will produce differing fuel efficiencies for the same engine and driveline system.

Therefore, the BIC recommends that specific percentage targets for zero emission buses and vehicle emissions standards are the best way to encourage heavy vehicle diversity.

Question 11: *What policies and/or industry actions could complement vehicle fuel efficiency standards to help increase supply of EVs to Australia and electrify the Australian fleet?*

Transition of the bus and coach fleet is already well underway driven in part by the state and territory governments who are announcing the introduction of ZEB's into the public transport fleets which are typically operated under contract by the private sector. The level of ambition varies somewhat from the announcement of trials in some jurisdictions to the electrification of the entire bus fleet of 8000 in NSW. Non contracted private sector operators are also transitioning their fleets to ZEB's – either battery electric or hydrogen fuel cell but at a slower speed of uptake.

The transition to ZEB's brings opportunities and challenges. Many of these are outside of the control of the bus operator or manufacturers such as the capacity of the energy grid to support heavy vehicle charging in and away from depots. Others, if the right levers are applied would allow for innovation, job creation and increased onshore manufacturing. However, without a full picture of the scale and speed of the transition the opportunities may be missed or as is currently the case we will have ZEB's on the road without appropriate policy frameworks such as Australian Design Rules and training programs to ensure the safe manufacture, operation, and maintenance of ZEB's and other heavy vehicles.

A Zero Emissions Buses Roadmap is critical to identify the challenges, maximise opportunities and outcomes, ensure a smooth transition to ZEB's and create Australian jobs and stimulate innovation. This roadmap will include a 10-year national bus procurement plan detailing the forward procurement intentions of each state and territory government. This would provide certainty to operators, bus and

chassis manufacturers, bus body builders and auxiliary equipment suppliers (including energy providers) who need to invest significantly in infrastructure, training, and recruitment of appropriately skilled workers to facilitate the transition to ZEB's.

Question 12: *Do we need different measures to ensure all segments of the road transport sector are able to reduce emissions and, if so, what government and industry measures might well support the uptake of electric bikes, micro-mobility, and motorbikes?*

Nil response

Question 13: *How could we best increase the number of affordable second hand EVs?*

From a bus and coach perspective second hand ZEB's are unlikely to be generated via the domestic market as operators of such buses and coaches will need to utilise each vehicle for its full economic life. Such is already the case with the current diesel powered buses and coaches.

Question 14: *Should the Government consider ways to increase the supply of second hand EVs independently imported to the Australian market? Could the safety and consumer risks of this approach be mitigated?*

Refer to our response to Question 13.

3.2.1 Strengthen Australia's competitiveness in the EV value chain

Question 15: *What actions can governments and industry take to strengthen our competitiveness and innovate across the full lifecycle of the EV value chain?*

As discussed in response to Question 19, the BIC proposes that a national working group with representation from government, industry, and operators of EVs, with input from other interested parties, could be used to develop a detailed roadmap for the implementation of EVs. In addition, the experience of early adopters running life cycle operations using ZEB's will inform industry of the initiatives or changes required to grow/modify and support supply chains.

These processes could be used to identify full lifecycle issues such as battery pack reconditioning, hydrogen electrolyser mid-life reconditioning and or upgrading, such that these tasks could be undertaken within Australia.

Question 16: *How can we expand our existing domestic heavy vehicle manufacturing and assembly capability?*

Currently around 90% of all city buses and 60% of school buses are manufactured in Australia.

Most Australian buses are of a body-on-frame construct method usually with separate chassis and body manufacturers. Splitting body and chassis construction allows businesses to specialise in different fields and offers customers greater choice in chassis/body combinations. Most buses are built in Australia on a European chassis (and increasingly Asian chassis). In recent years, there has been a growth in monocoque buses, manufactured locally and abroad.

When using ZEB type drive componentry, similar systems can be used to build either body-on-frame construct or monocoque type buses. Therefore, in terms of capacity, experience, or technology there are

no impediments to the ongoing construction of ZEB's in Australia. There is, however, a range of parallel issues that are limiting the volumes of available domestic manufacturing and the main issue is the uncertainty regarding longer term supply requirements.

That is not all states have bus supply arrangements in place which provide longer term certainty to offset the required capital investment required to design and manufacture buses. For example, WA has such contracts in place, but this is not the case in all other states. The wider use of such longer term supply arrangements would help to ensure the expansion of existing domestic heavy vehicle manufacturing and assembly capability.

Therefore, the BIC contends that **A Zero Emissions Buses Roadmap** is critical to ensure a smooth transition to ZEB's, create Australian jobs and stimulate innovation. This roadmap should include a 10-year national bus procurement plan detailing the forward procurement intentions of each state and territory government. This will provide certainty to chassis and body manufacturers and auxiliary equipment suppliers (including energy providers) to scale up operations and invest in infrastructure, training, and recruitment of appropriately skilled workers.

We note that the Governments 2022/23 budget includes $14.2 million over 4 years from 2022–23 to develop a National Rail Manufacturing Plan to ensure more trains are built in Australia, support skilled manufacturing, and expand the local rail industry. It is recommended that an equivalent plan be developed for the heavy road vehicles.

Question 17: *Is it viable to extend Australian domestic manufacturing and assembly capability to other vehicle classes?*

There are already various classes of buses being built in Australia for our market and as stated in the response to Question 16, longer term supply contracts are required to justify the private sector capital required to continue such domestic manufacturing.

3.3 Establish the systems and infrastructure to enable rapid uptake of EVs

Question 18: *Are there other proposals that could help drive demand for EVs and provide a revenue source to help fund road infrastructure?*

We note that the Heavy Vehicle Road Reform is investigating more direct user charging options for heavy vehicles, including electric heavy vehicles. As such, BIC operator members are currently taking part in the National Heavy Vehicle Charging Pilot via the use of telematics to provide input for proposed direct road user charging models based on mass, distance, and location. It should also be noted that our proposal for increased operating masses for ZEB's would also include the use of telematics to continually monitor the weight of each ZEB in service.

Question 19: *What more needs to be done nationally to ensure we deliver a nationally comprehensive framework for EVs?*

The BIC see that the following issues need to be part of any national approach for EVs:

<u>ZEB Deployment Policy</u>

It is critically important for the bus industry to have some input into state governments transition planning

and timelines for ZEB deployment. Completing large scale replacement of buses with ZEB's in a single geographical region rather than smaller deployments across several regions could result in major network disruptions within a single region as new products are developed and tested. It is likely the next few years will be spent improving the reliability of vehicle and charger equipment as with any new technology we should expect teething problems.

A key goal of any national strategy needs to include transition to ZEB's without adversely impacting services. That is any roll out plans need to consider risks associated with these new technologies. To control risk, the BIC believes that small scale, long term (life of the vehicle and infrastructure) EV operations are needed to provide a road map for operators to transition to ZEB's. This process also informs State and Federal Governments of the "real" risks associated with these transitions.

Provision of sufficient quantities of reliable green energy:

Accelerating the uptake of EVs, including ZEB's, needs to be well planned at the national level to ensure the benefits and opportunities from the transition are fully realised. National planning, coordination, and effectively integrated infrastructure and systems are needed to accelerate up take. Critically the timely provision of sufficient quantities of reliable green energy to power rechargeable buses and also to allow of the effective generation of hydrogen, is required if real emission reductions are to be achieved.

Reliability of the Power Gird:

It is critical that any ZEB operator has both reliable and timely access to enough electricity to either recharge, or for hydrogen, refuel their bus or coach fleet.

Bus operations are such that they must be provided daily and in accordance with public transport timetables. Buses are not like a truck where, due to a truck's unavailability, a specific goods delivery can be deferred to a later time, buses must operate in accordance with their respective timetables or passengers will be left stranded.

As such it is critical that all active ZEB's are able to be recharged or refuelled when required. For example, if a ZEB depot did not have access to grid power for any extended period of time (or even if power was not available for example overnight when such buses are meant to be undergoing recharge), buses would not have the power (or fuel) available to operate and hence the bus operator would be unable to provide the required public transport services.

For larger bus depots that use diesel powered buses, diesel fuel stocks are maintained within the depot itself and such fuel stocks include contingency such that if there is a disruption in fuel supplies, the buses can still be refuelled for an extended period (in accordance with the amount of contingency of fuel the depot holds). This is done to ensure that reliable public transport services can continue to be provided.

Although it is possible to store some contingency of hydrogen fuel, for battery powered buses, there is no contingency for supply of the power needed to recharge these buses, that is a grid supply disruption would likely result in direct loss of public transport services. As such the BIC sees that electricity supplies for ZEB usage will need to be considered as being part of an essential service and processes will need to be in place to ensure uninterrupted grid supply in some form.

Cybersecurity

The power supply reliability issue that is being addressed in other countries is Cybersecurity for Electric Vehicle Charging Infrastructure. A recent US government funded research paper stated:

As the U.S. electrifies the transportation sector, cyberattacks targeting vehicle charging could impact several critical infrastructure sectors including power systems, manufacturing, medical services, and agriculture. This is a growing area of concern as charging stations increase power delivery capabilities and must communicate to authorize charging, sequence the charging process, and manage load (grid operators, vehicles, OEM vendors, charging network operators, etc.).[1]

Although recharging stations are an example of vulnerable infrastructure, the BIC proposes that this cyber issue can and will affect all aspects of EV operations (including the vehicle themselves). As such EU ECE Regulation R155, *Uniform provisions concerning the approval of vehicles with regards to cyber security and cyber security management system*, needs to be addressed as part of any EV take up plan.

Cost of Electricity:

In conjunction with the need for a fully reliable power supply, the cost of electricity over both the short and longer term is critical for the uptake of ZEB's. Bus and coach operators are already experiencing issues with not only the cost of electricity, but also the complexity of negotiating longer term supply arrangements. To address this there have been some discussions about having government or industry negotiated power supply arrangements for ZEB depots.

The BIC sees that the Federal government could form policy to address both of these electricity issues at a national level and such would remove a major hurdle for increase EV take up.

Use of Existing Infrastructure

A key issue in the expansion of ZEB's is the availability of opportunity recharging which is where buses can be charged whilst in-service or when located at terminal or layup area.

Such recharging systems can take the form of traditional plug-in recharging points, pantograph recharging (pantograph charging uses roof-mounted equipment to make an electrical connection between the bus and an overhead power supply) or inductive or wireless charging (which uses coils installed under the road surface that can transfer energy to matching coils fitted beneath the floor of the bus, two types are available: stationary and dynamic).

Regardless of the system, the BIC recommends that existing infrastructure (for example light rail or tram systems) may be able to provide opportunities to provide cost effective ZEB opportunity charging systems. Note apart from extending operating ranges, opportunity charging reduces reliance on any depot based systems which reduces risk and improves efficiencies.

All of these uses will, however, depend on adequate availability of green power and that the cost of such power is commercially viable.

[1] Cybersecurity for Electric Vehicle Charging Infrastructure SANDIA REPORT SAND2022-9315 Printed July 2022

Bus Industry Confederation

Address existing and emerging skills shortages

There is a critical need to address existing and emerging skills shortages in the transport industry. The transition to ZEB's has outstripped the Governments development of a policy and regulatory framework that incorporates training and skills development. For example, there are currently no formal qualifications, except in the ACT, for mechanics who will be servicing ZEB's despite these vehicles having high voltage power systems and in the case of hydrogen, extremely high-pressure storage tanks and distribution systems. The ACT Governments training is focussed on battery electric and there is currently a lack of formal hydrogen fuel cell qualifications although these are being consider by a consortium of TAFEs as an add on to a battery electric course.

It is not simply a matter of retraining existing mechanics as zero emissions vehicles have fewer moving parts than an internal combustion engine. EV technicians require skills that are closer to an IT professional or software engineer than a traditional mechanic, including coding and reprogramming vehicle software and diagnosing and repairing high voltage rechargeable energy storage systems. It is imperative that the Australian Government take leadership in this area and develop an appropriate national qualification framework and incentives for new technology apprenticeships and traineeships in the heavy vehicle industry.

Modelling conducted by the Victorian Automotive Chamber of Commerce (VACC) shows Australia will need about 7300 Electric Vehicle (EV) technicians by 2030 to maintain the growing fleet of small vehicles. Additional training and workers will be needed to maintain the heavy vehicle fleet. It is generally accepted in most jurisdictions that as heavy diesel vehicles transition to zero emission vehicles (battery or hydrogen fuel cell) that there will be less demand for diesel mechanics and more demand for mechanics with electrical expertise.

There is also a need to ensure national consistency in who is qualified to maintain and repair electric heavy vehicles. In Queensland under the Queensland Electrical Safety Regulation 2013 (current as of 1 July 2021) Part 6, Division 1, Section 73:

> *(1) A person must not perform work on an electric motor forming part of a [heavy] vehicle unless—*
> *(a) the person is a licensed electrical worker;*

Queensland's current position of requiring qualified electricians to undertake the maintenance and repairs of zero emission buses is inconsistent with the position of the other states and territories and based on our research, is also inconsistent with other nations transitioning to zero emission heavy vehicles. Plus, it does not align with other states automotive based licencing and qualification requirements when working on road registered heavy vehicles.

Other state licencing requirements apply to both staff and premises to ensure that road going vehicles are serviced and maintained safely and in accordance with the vehicle registration requirements. Allowing a licensed electrical worker who is not also qualified and licenced and experienced in an automotive sense, could create a range of other safety issues related to the roadworthiness of the vehicles.

The Queensland Governments current position makes EV transition less clear and harmonisation more difficult. It undermines the ability to provide nationally consistent training and reduces the ability of both trainers and employees to move between jurisdictions. This is important as OEM's typically offer bespoke

training when new vehicle types are deployed. This training complements and builds upon standard qualifications.

The current Queensland licencing also inhibits OEMs to provide fly in-flyout experts to trouble shoot any issues local teams cannot not resolve. This ability to fly in experts is particularly important as new technology is deployed.

Policy and regulatory framework

The lack of a policy and regulatory framework means that there is no Australian Design Rules that specifically address the unique characteristics of ZEB's, or zero emission trucks. Given the timeframe of putting a regulatory response in place the BIC, with funding from the Government, is working to develop national industry advisories related to ZEB's which would assist manufacturers and suppliers, operators, and infrastructure providers, first responders and all levels of government.

Industry developed and supported national advisories and guidelines such as the BIC fire mitigation advisory[2] and the BIC Bus Fire Evacuation protocol[3] have been used effectively in the past to deal with emerging issues at a national level. The advisories are prepared by the BIC and promulgated by the Australian Government to the states and local governments act as a precursor to regulation in many instances. These advisories are also widely adopted by the heavy vehicle freight sector.

Summary

To address the issues raised above the BIC sees that a national working group with representation from government, industry, and operators of EVs, with input from interested parties, could be used to detail a roadmap for the implementation of EVs. This process would provide the bus and coach industry, who are the early implementors of these technologies in the heavy vehicle space, a process to have its specific issues addressed, provide known timings and reduce uncertainty.

Question 20. *How can we best make sure all Australians get access to the opportunities and benefits from the transition?*

Encouraging and incentivising more people to utilise public rather than private transport can ensure that all Australians can benefit from the transition to zero emissions. Modal shift has multiple benefits not just a reduction in emissions. These include reduced pollution and congestion and improved amenity and social inclusion. Campaigns to encourage the transition to EVs such be accompanied by campaigns to encourage mode shifts including the wider use of dedicated public transport corridors (as is used very successfully in Brisbane).

Another common but overlooked effect is that any bus type takes up to 40 or 50 cars off the road. All well-utilised buses, regardless of which type of powertrain is used, offer an efficient public transportation method when compared to car usage. Buses are space, energy and emissions efficient.

For example, a diesel bus at 20% capacity produces approximately one-third of the CO_2 emissions per passenger kilometre compared to the equivalent number of private vehicles required to transport the same

[2] https://movingpeople.com.au/published-september-2014-fire-mitigation-advisory-industry-advisory/
[3] https://movingpeople.com.au/published-march-2019-bus-fire-evacuation-protocol/

number of people. When the bus is at full capacity, the reduction in CO_2 emissions increases to more than 90%.[4]

This is based on passenger cars having an assumed efficiency of 8 litres/100km and an average occupancy of 1.2 passengers. The gCO_2/km emissions for the differing modes of transport are given in Table 4. As is seen, buses offer reduced emissions when compared to cars by approximate a factor of 10.

Table 4 – Emissions for different forms of transport[5]

Transport	Average emissions per kilometre (gCO_2 /km)
Metro train systems	3-21 (per person)
Light rail	4-22 (per person)
Bus transport systems	14-22 (per person)
Average car sold in 2015	184

As a reference to the figures provided in Table 4, passenger vehicles (cars) in Australia, in 2014, had an average fuel consumption of 10.7 litres/km (Australian Bureau of Statistics, 2015); new vehicles in the EU require an average emissions level of 130 grams of CO_2 per kilometre (g CO_2/km) – equivalent to a fuel efficiency of about 5.6 litres/100km (Directorate-General for Climate Action, 2016).

Another example of the effect of emissions by modal transfer is proved by the World Bank[6]. They provided an example of a Mexican commuter who chooses whether to ride a bus or drive to work each morning:

> *If (the commuter) drives, her commute will generate 8kg of CO_2, compared to only 1.5 kg when riding a diesel bus (note, Euro III or better). By making the greener choice, she is saving up to 6.5kg of CO_2. With a hybrid bus, that same ride would emit 1kg of CO_2, and zero emission with an electric (assuming zero-emission grid) translating into additional savings of 0.5kg and 1.5kg over a diesel bus, respectively. The extra savings are welcome, of course, but they pale in comparison to the emissions reduction generated by shifting from a private car to a public bus.*
>
> *If we analyse a whole system instead of an individual, technology's potential to reduce emissions gains importance, but is still lower than that of modal shift. That means we first need to focus on providing incentives for drivers to leave their cars behind and turn to public transit. When a bus system with exclusive lanes opens, for instance, 1%-5% of passengers are likely to be new riders who used to drive and made a conscious decision to switch. This proportion can increase to 10-15% with the right ancillary interventions, such as providing non-motorized transport infrastructure, improving accessibility and service quality.* [7]

[4] Buses today and tomorrow, International Association of Public Transport (UITP) 2011
[5] Fact Sheet: Transport Emissions driving down car pollution in cities, climatecouncil.org.au
[6] http://blogs.worldbank.org/transport/are-hybrid-and-electric-buses-viable-just-yet
[7] http://blogs.worldbank.org/transport/are-hybrid-and-electric-buses-viable-just-yet

This type of analysis shows that the new technology zero emission buses are a critical part of any emissions reduction program, but other bus technology such as Euro VI or diesel hybrid, should not be overlooked as a way of replacing large numbers of cars so as to reduce overall fleet emissions.

An added way to achieve city wide emission reductions is to introduce more bus priority such that bus travel times are reduced, provide additional funding for more frequent services and the bus becomes more attractive compared to cars (Brisbane city is an excellent example of this concept).