Response to the Transport and Infrastructure Net Zero Consultation Roadmap

July 2024

EXECUTIVE SUMMARY

The Bus Industry Confederation (BIC) welcomes the opportunity to respond to the Australian Government's Transport and Infrastructure Net Zero Consultation Roadmap. As the peak body for the bus and coach industry in Australia the BIC represents bus and coach operators, vehicle, and equipment manufacturers as well as other suppliers and responds on their behalf.

Attached to this submission please find our Zero Emissions Bus (ZEB) policy paper which sets out our recommendations for the transition as well as describing the challenges that Industry and governments needs to overcome in order for the transition to be successful.

The consultation roadmap clearly sets out most of the technology that could be used to reduce transport emissions but neglects to mention hybrid and continued use of diesel in more efficient, new vehicles such as Euro 7. Both of these are medium term interim measures that should be included for completeness.

The industry is agnostic about the technologies listed in the consultation paper and believes that all technologies should be on the table and would like to point out that the suitability of ZEB electric solutions are highly contextual (that is, dependant on the task the vehicle has to undertake plus considerations such as climate, grid capacity and proximity of transmission infrastructure).

Because of the fundamental change involved in low and zero emissions all technologies should be assessed on a "total cost of ownership" basis by collecting and analysing operational data. This is a first step in creating a regime where the results will inform Government and Industry on which technology best suits a particular application.

Low carbon liquid fuels (LCLFs) are a useful interim technology that will assist in the emissions reduction of hard to abate Industries such as heavy freight, coaches, and aviation. It would also assist in reducing emissions from diesel buses that will be operating for decades. The assertion that this new Industry can be created in a decade should be measured against the failure of Australian Governments to support hydrogen vehicles over the last decade.

Industry cannot respond more holistically to the consultation paper because we do not know the "total cost of ownership" of fuel cell electric and battery electric buses in the contexts they are required to operate in Australia. We have some knowledge of battery electric vehicles as there is some rollout in Australia, but fuel cell vehicles only have some "trials" that do not provide the data needed to assess the technology (including supporting infrastructure).

All technologies should have a number of "whole of life" projects that can be exemplars to Industry and Government by showing how to do it, where it is the best option and where other options should be considered.

Any roadmap to transition will not succeed if we do not have the knowledge provided by these projects and, in order to create the roadmap, we need the data.

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INTRODUCTION

1.1 The Bus Industry Confederation

The Bus Industry Confederation (BIC) is the national peak body for the Australian bus and coach industry. We represent bus and coach operators, body, chassis and complete bus manufacturers and suppliers, parts and service providers, professional services, and state bus associations on issues of national importance. Our membership is becoming increasingly diverse as key energy and infrastructure partners join as we transition the fleet to low and zero emissions.

Our vision is an innovative and thriving bus and coach industry that moves people safely and sustainably. Our objectives are as follows:

- Encourage investment in public transport infrastructure and services.
- Promote 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.
- Protect the business interests of operators, manufacturers, and suppliers.
- 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 The Bus and Coach Industry

Buses and coaches in Australia travelled 16 billion passenger kilometres (bpkm) in 2022-23. This is significantly higher than rail at 13 bpkm. There are 97,469 registered buses in Australia.

The bus and coach industry is predominantly based around the provision of school bus and public transport (route) services that are provided under state and territory government contractual arrangements. These contracted services are primarily provided by privately owned bus and coach businesses, with a small percentage of bus fleets being government owned and operated.

The industry also provides contracted government services such as special school transport for children with disabilities and coach services to support the rail network. The industry is also becoming involved in other emerging markets such as aged care, health, and paratransit. Moreover, the industry provides services in what might be termed the ‘deregulated’ market providing charter, tourism, long distance, mining, correctional services, airline and airport services and specialised services that support other industries.

Over several decades, the bus and coach industry has consolidated, with a fundamental shift from generational family-based bus companies in our cities to national and multinational businesses (including two Australian companies now operating internationally), especially in metropolitan areas. With contract reform, many smaller players have shifted their focus to being sole providers of charter service, no longer continuing route (public transport) work.

The largest operators (in terms of fleet size and number of depots) are concentrated amongst metropolitan Australia. Five operators are now responsible for approximately 80% of public transport trips under contract to state and territory government. These organisations bring with them extensive experience and learnings on the transition to zero from their operations overseas.

In 2020, 88.9% of public transport passenger route service buses and 59.6% of school buses were manufactured in Australia, the majority built by Australian body manufacturers on a European or Asian chassis; the remainder being fully imported buses and coaches primarily from Asia, with some from Europe and South America.

The bus and coach industry are early adopters of new technologies. For example, Euro VI was first introduced into buses in Australia in 2014. By 2018-19 20% of all buses delivered were Euro VI despite this emission standard not being mandated until 1 November 2024 for newly approved heavy vehicle models and 1 November 2025 for existing vehicles. The proportion of Euro VI buses in the fleet has continued to increase alongside the introduction of hybrids, and zero emission buses (ZEBs), both battery electric and hydrogen fuel cell.

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 our website.

1.3 The bus and coach industries suitability for low and zero emissions operations

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 many 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 these 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 for a decade already.
- **Minimal effect to road infrastructure:** Route buses, school buses and to a lesser extent coaches do not mass load (meaning they do not load up to their allowable weight for their operating time). This means that the extra weight imposed by electric technology on road infrastructure is not as much an issue as it can be in the freight sector. Industry is comfortable that, with the

proposed changes to mass and width limits, we can successfully roll out both Fuel cell electric vehicles (FCEV) and battery electric vehicles (BEV) that can meet the demands required.

- **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 firsthand and can see the technology 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 and complexity 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.

1.4 Jurisdictional announcements

Most buses in Australia are part of the public transport and school bus fleet owned or operated on behalf of the state and territory government. These governments consequently have significant sway over the timing and type of transition.

The state and territory governments have been progressively announcing the transition of the public transport fleet. The level of ambition varies and the speed of the transition in some jurisdictions has declined due to a range of factors including financial constraints and complexity in transitioning depots and accessing the grid.

Note that most announcements relate to zero emission buses rather than low emission buses. It is BICs contention that the selection of zero-emission technology is highly dependent on specific circumstances. Electricity is not always the best solution, due to cost and infrastructure requirements. Governments should not attempt to pick winners. If there is adequate green power and infrastructure, electric vehicles become a viable option if not governments should adopt hybrid and low emission diesel e.g., Euro 7.

The abandonment of zero emission mandates would make the transition much smoother and cost effective as Industry would be able to select the best technology for each individual application. States are beginning to realise the challenges involved as the mandate dates loom closer. As there are no roll outs of FCEVs with the required infrastructure this means the only ZEB solution is BEV which highlights the short-sightedness of current government policy.

RESPONSE TO CONSULTATION QUESTIONS

We would like to highlight that the bus and coach industry are almost completely overlooked in the consultation paper. The active and public transport section is heavily biased towards active transport and the heavy vehicle section is almost exclusively focussed on trucks. Buses and transport via bus will have a significant role in helping Australia to meet its emission reduction targets.

BIC have only responded to specific questions relevant to the bus and coach industry and the broader heavy vehicle industry. If you would like additional information or have any questions regarding our submission please contact Glen Bortolin, National Operations and Policy Manager on (02) 6247 5990 or glen.bortolin@bic.asn.au

The approach

1. Do you agree with the proposed guiding principles?

1.1. Please add details to your response.

The Bus Industry Confederation supports the proposed guiding principles, however, would like to provide some overarching comments.

Maximising Emissions Reduction: From a transport perspective the path to maximising emissions reduction should not solely focus on new vehicles and/or the substitution of low carbon liquid fuels for petrol and diesel. It should also focus on effective ways to remove older higher emission vehicles from fleets. We need to maximise emissions reduction by addressing both ends of the life cycle of vehicles. This will also have other benefits such as increased vehicle safety. In addition, focus should be on promoting, incentivising, and encouraging use of public transport as well as improving infrastructure, resources, and access to public transport.

Value for Money: There is significant cost involved in transitioning a heavy vehicle fleet to zero emissions. This is not only the increased cost of the vehicle but also the supporting infrastructure. The real cost is yet unknown over the life span of a vehicle or the infrastructure. We need to be wary about picking and promoting winners e.g., hydrogen fuel cell or battery electric without relevant data to support decision making.

Incentivising the private sector must allow the removal of current constraints, including to funding programs, that limit innovation.

Maximising Economic Opportunity: There are economic opportunities associated with transitioning to a net zero economy in the transport sector. This includes job creation through the development and deployment of new technologies and infrastructure. For the bus industry these opportunities are hindered by the current disparity in local content requirements in state and territory government procurement and lack of a stable procurement pipeline.

Regional and industry-specific initiatives should be considered to capitalise on the transition to a low-carbon transport sector, ensuring that workers in emissions-intensive industries are supported through this transition.

A 10-year national bus procurement plan supported by a nationally harmonised local content policy must be considered, detailing the forward procurement intentions of each state and territory government to 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.

Inclusive and Equitable Approach: There should be policies to decarbonise the transport sector by considering the diverse needs of communities and demographic groups including diesel mechanics and other specialist roles. There needs to be government support, training programs, and industry collaboration to ensure a just transition to net zero emissions, particularly for those directly impacted by changes in the transport sector. Further, there needs to be equitable community access to zero emission public transport. There are already significant public transport deserts in our capital cities which typically coincide with low socio-economic areas.

Evidence-Based Decision Making: We support the government's commitment to evidence-based policy and program development. This includes the need for comprehensive collection and analysis of data and consideration of different technologies and pathways. To avoid 'reinventing the wheel' we must look to examples overseas, where the adoption of low-emissions solutions and policy is more advanced. Building on lessons learned internationally will help the Australian transport sector save time and money while leveraging the momentum of overseas initiatives.

We must have a balanced approach that considers the specific needs and characteristics of different transport modes, recognising that there is no one-size-fits-all solution to achieving net zero emissions.

The widespread use of electric buses (whether battery electric, hydrogen fuel cell or some other technology) will take some time to achieve based on the key facts that we are still buying diesel buses today because they are economic, emission efficient, there are no infrastructure requirements and we have been using this fuel source for 100 years.

The take up of electric 'alternative propulsion' buses by states and territories requires a transitional approach taking into consideration a few key issues.

- The existing Australian bus fleet has an average age of 12 years or less in most states and territories with an expected full bus life of 20 to 25 years.
- Modern diesel is extremely competitive in a whole of life and emissions sense, especially when compared to the cost of new electric buses.

Furthermore, it is important that any transitional approach in the adoption of fully electric bus technology should consider:

- the current historical investment in the diesel bus fleet and whole of life asset values.
- existing government fleet replacement programs which continue based on whole of life cost efficiency.
- acceptance that clean diesel and self-charging hybrid electric/diesel buses continue to provide positive outcomes in terms of transport and energy security.
- the ability of existing depots to be transitioned to electric.
- the availability of sufficient quantities of green electricity at a reasonable cost.
- investment in transmission and distribution infrastructure, to power low-and zero-emissions vehicles, buildings, and factories.

2. Do you support the use of the avoid-shift-improve framework as a tool to identify opportunities for abatement?

2.1. Please add details to your response.

The Bus Industry Confederation supports the use of the avoid-improve framework.

For sustainable, vibrant, and productive cities and communities, we need to increase patronage on buses and raise buses mode share. We can only do this by ensuring that buses are an attractive alternative to private vehicles and become the transport mode of choice, for any trips not able to be undertaken by active transport.

Reducing reliance on private car use involves a strategic approach encompassing planning, alternative transportation modes, and lifestyle adjustments. Efficient planning and preparation are crucial, which includes optimising bus routes to provide convenient, frequent, and direct services, utilising technology for real-time updates on traffic and routes and prioritising bus movement through intersections and coordinating schedules to minimise idle time and increase efficiency.

Promoting alternative transportation modes is also essential. Encouraging the use of buses for longer journeys offers a sustainable and efficient alternative to private cars. Emphasising the benefits of bus travel, such as cost-effectiveness, reduced congestion, and environmental impact, encourages greater adoption among commuters.

Furthermore, lifestyle adjustments play a significant role. Encouraging residential development in areas well-served by public transportation encourages residents to rely less on private cars for daily commuting. Providing access to car-sharing services for occasional needs complements public transit options, offering flexibility without the need for individual vehicle ownership. Considering the adoption of electric buses further enhances environmental sustainability, aligning with broader goals of reducing carbon emissions and promoting cleaner transportation options.

Leveraging integrated land-use planning will optimise bus routes and schedules, therefore, reducing the need for unnecessary car travel. Implementing effective transport demand management techniques, such as promoting shared mobility solutions will minimise commuter trips and alleviate congestion in urban area, actively promoting the use of public transport as a viable alternative to private vehicles.

We refer you to our submission on the consultation draft on the National Urban Policy for further information related on how the avoid, shift, improve framework can be implemented for buses.

Rethinking our transport networks and systems

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

3.1. Please add details to your response.

We support a national policy framework overseen by National Cabinet, acknowledging the impacts of the frameworks goes beyond transportation and emissions—such as health, social inclusion, and access to education and employment. To ensure its effectiveness, this framework should be closely linked to government investment and leverage opportunities for private sector investment. It should influence broader investment considerations, such as the assessment frameworks for infrastructure

projects which should be amended to prioritise support for public transport and take into account the ability of all projects to support active and public transport.

Similarly, land use planning decisions, including rezoning and densification, should align with the objectives. Emphasising public transport solutions that facilitate efficient mass transit over longer distances is crucial, recognising their potential to deliver the greatest societal, environmental, and economic (productivity) benefits.

The transition to decarbonise travel is crucial for reducing emissions nationally. The Framework must go beyond mere promotion of sustainable transport; there is a need to actively incentivise its use and prioritise funding and development of mass transit options, including bus rapid transit systems that leverage existing road infrastructure.

Measures like establishing mode share targets are essential to create cleaner and more sustainable cities and regions. This can only be achieved by promoting greater use of active and public transport by improving safety, connectivity and convenience of walking and cycling infrastructure and public transport options and end of journey facilities. It should cover all public transport options not only those that are electrified. Any mode shift to public transport has emission benefits.

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

A comprehensive national policy framework for active and public transport should encompass several key elements to effectively support and promote sustainable transportation options like bus travel.

The framework should articulate clear goals for enhancing mobility and accessibility, improving access to public transport, and increasing the modal share of public transport, including buses. This should include goals related to an increased level of investment in public transport and particularly bus transport which is the easiest, quickest, and cheapest ways to improve surface transport. While building a new railway, light rail line or road takes years, if not decades, better bus services can be delivered in months. Relatively small investment, by the standard of transport spending can deliver significant benefits. The overall cost of providing bus services is 70 to 80 percent less than rail services.

The investment is particularly important in under serviced areas in our capital and regional cities including outer suburbs, new growth areas and areas subject to densification. However, the expenditure is not occurring. For example, Infrastructure Victoria1 noted that many parts of Melbourne have no access to the city's higher frequency tram and train network, particularly in the suburbs of middle and outer Melbourne, including the growth areas. The only public transport service in many of these locations is the bus with buses playing a vital role in enabling access to employment, education, health, and social opportunities for the community. However, bus services in these areas can be infrequent and have limited operating hours. If the bus service is not convenient, families can be forced into car ownership. This lack of choice adds to the cost of living and contributes to locational transport disadvantage.

The NSW Bus Industry Taskforce[2] highlighted that in large parts of west and south-west Sydney buses are the only available form of public transport –and service coverage and frequency are poor.

[1] Infrastructure Victoria (2022) Get on Board. Making the most of Melbourne's buses – discussion paper.
[2] NSW Bus Industry Taskforce (2023) First Report

Further, these areas have the highest levels of socioeconomic disadvantage in Greater Sydney and even the state. Groups disproportionately impacted include people with disabilities, Aboriginal and Torres Strait Islanders, people from culturally and linguistically diverse (CALD) backgrounds, people who are unemployed, single parent households and a growing number of people in the private rental market. The Taskforces second report3 revealed that the Bus Priority Infrastructure Program (BPIP) of $20M per annum recurrent funding is the only constant funding source for bus priority and it has remained the same for some 20 years, not increasing with inflation and failing to keep up with the rising cost of infrastructure projects. The report also revealed that just 2.6% of capital expenditure in transport was bus related between 2019-2027 (forward estimates) despite buses carrying more than 40% of passengers.

The framework should also include provisions for integrated land-use and transport planning that optimise bus routes, transit corridors, and infrastructure development. This ensures that public transport networks are efficient, accessible, and well-integrated with other modes of transport.

Adequate funding mechanisms should be established to support the development, maintenance, and expansion of public transport infrastructure, including buses and bus rapid transit systems.

The framework should include supportive policies and regulations that prioritise public transport over private vehicle use. This could include measures like congestion pricing, low-emission zones, preferential treatment for buses (e.g., dedicated bus lanes, priorities at lights), and incentives for transitioning to cleaner and more efficient bus fleets.

We should encourage innovation in bus technology, such as electrification and smart transit systems. This promotes the adoption of cleaner and more sustainable bus fleets while improving operational efficiency and passenger experience.

A fundamental principle of the national framework is to actively encourage the shift from private vehicles to public and active transport options. Achieving this balance requires a strategic mix of incentives and disincentives that effectively promote sustainable modes of transportation. While it's crucial to support advancements in active transport technologies, we must ensure that our approach does not disproportionately favour active transport over other key solutions like enhanced public transit.

It is vital to consider legislative changes at the Federal level to enable investment in essential infrastructure like rolling stock for public transport systems. These measures are critical for addressing the barriers and impediments that currently hinder widespread public transport use and adoption of low and zero emission vehicles by the broader bus and coach industry.

Furthermore, the national framework must also align with urban policy responses that tackle the complex challenges of mobility and accessibility in urban areas. By integrating these elements, we can create a comprehensive approach that not only supports environmental sustainability but also enhances overall mobility, economic opportunity, and community well-being.

Development of the Framework should involve input from various stakeholders, including government agencies, transport operators, transport peak industry bodies, urban planners, environmental organisations, accessibility experts and the broader community. The Urban Policy

[3] NSW Bus Taskforce (2023) Second Report

Forum will not be an effective mechanism as it does not encompass the relevant expertise. However, something similar could be considered but needs equal representation from public and active transport advocates.

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?

Governments currently have a preoccupation with decarbonising private vehicles rather than mode shift, perpetuating the notion that cars are supreme, despite their negative externalities such as congestion and impacts on health. As the Climate Council so eloquently stated in their report Next Stop Suburbia:

At the moment, our car-centric transport system leaves too many Aussies with little choice in how to get around. For decades, governments have prioritised the use of private cars in transport planning and investment. Too often, this means people have no other way to get around. This is driving harmful climate pollution while also making our streets more congested, dangerous and polluted. Australian families are paying more than they should for petrol and maintenance costs, particularly in the outer suburbs of our biggest cities where people often have to drive further and more often. We can change this by stepping up the availability, frequency and reliability of shared and active transport. Greater uptake of electric vehicles is important, but by itself this won't reduce climate pollution at the speed we need, nor deliver other benefits in improved safety and less traffic. Using shared and active transport for more trips, more often isn't possible for many people because they don't have access to transport that meets their needs[4]

Our response to question 4 details the need for greater investment in public transport as does our response to the consultation draft of the National Urban Policy. In summary, governments need to invest in bus transport to ensure that they are a more attractive alternative to the car for most people – the mode of choice. To achieve this means that the governments must:

- Make buses more frequent.
- Make buses faster and more reliable.
- Make buses more convenient.
- Make buses more comfortable.

Recommendations to government to improve bus services and achieve mode shift.

- Increase the frequency of bus services, beginning with outer and growth area suburbs.
- Optimise the bus network through bus rapid transit and fast, direct routes.
- Speed up buses through on-road priority and smarter technology.
- Extend operating hours to match passenger demand and improve timetable integration.
- Improve onboard comfort by modernising the fleet.
- Improve the bus stop and interchange experience.
- Give bus transport an attractive identity by using slick and intelligent public relations campaigns

[4] Climate Council (July 2024) Next Stop Suburbia: Making Shared Transport Work for Everyone in Aussie Cities - https://www.climatecouncil.org.au/resources/next-stop-suburbia/

Governments need to actively promote the benefits of active and public transport by emphasising the economic savings and convenience associated with sustainable transport, such as reduced fuel costs and stress-free commuting.

Collaboration between governments, educational institutions, businesses, and community organisations can amplify these efforts. Programs in schools and workplaces can educate future generations and employees about sustainable transport options, influencing lifelong habits and fostering a collective commitment to environmental stewardship.

Road – heavy vehicles

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

9.1. Please add details to your response.

The bus industry is disappointed by the almost complete exclusion of buses in the section of heavy vehicles. There are 97,469 registered buses in Australia and the industry is at the forefront of the transition to zero emissions heavy vehicle transport but barely rate a mention. As highlighted elsewhere in this submission we also are uniquely placed to be the Australian exemplar of how to transition heavy vehicles to zero emissions operation.

A viable net zero pathway must acknowledge the role of hybrids and ultralow emissions heavy vehicles (HVs) such as Euro 6 and the recently approved Euro 7 standards in Europe, alongside Low Carbon Liquid Fuels (LCLFs). While advancements in Battery Electric Vehicles (BEVs) and Fuel Cell Electric Vehicles (FCEVs) are promising, the immediate availability and proven efficacy of Euro 6 and upcoming Euro 7 HV technologies are crucial. These standards offer a pragmatic bridge in our journey towards sustainable transport, particularly as we continue to develop and validate the potential of LCLF, BEV, and FCEV technologies.

As previously discussed, the existing Australian bus fleet has an average age of 12 years or less in most states and territories. There are however considerably older buses with lower emission standards (Euro III or lower) still in operation as there is an expected full bus life of 20 to 25 years in Australia. This means that existing diesel buses will remain in service for many more years including high emitting buses which will create a continued need for diesel. Government must implement a strategy to transition existing fleets more rapidly by replacing older buses at an earlier age thus paving the way for low and zero emission buses.

We note that the pathway includes scaling up of charging and refuelling infrastructure occurring from 2030-2040. Charging and refuelling infrastructure is already the main impediment to the transition to zero emission buses. Capacity of the grid is a critical issue. A fleet of electric buses requires a vast source of energy. Our research has revealed the power required to make all trucks and buses zero emissions (i.e., electric) is approximately 100TWh per annum. Australia currently produces around 70TwH of renewable energy annually. Consequently, bus depots and other commercial fleets will become large consumers of energy if fully electrified.

Charging one or two buses maybe within the current capacity of the substations. However, as we move to charge an entire fleet of buses, energy companies will need to produce more electrons or hydrogens. Due to the quantum required, new power stations or other energy sources generating renewable energies (not coal or gas) will be needed if the energy is to be green. Current substation

may then require an upgraded assuming the network can handle the increase of electricity demand to charge an entire fleet as well as other competing demands and uses.

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.

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

The bus industry is uniquely positioned to lead the transition to zero-emissions technologies within the heavy vehicle sector, and as early adopters, it is the ideal industry for demonstrating the viability of battery electric and hydrogen fuel cell electric buses, low carbon liquid fuels (LCLFs), low emission diesels and hybrid diesel.

We are unable and unwilling to prioritise the emissions reduction technology. The right technology depends on a range of factors including the task (e.g., route, school, long distance, tour, charter or other), the route, infrastructure access, regional climate, and terrain.[5] The conditions under which buses and coaches operate in Australia are diverse both in terms of task and location. Battery and hydrogen are not always the best solutions, due to cost and infrastructure requirements. Governments should not attempt to pick winners.

The selection of low and zero-emission technology is highly dependent on specific circumstances. The decision between technologies should be tailored to the vehicle's operational needs, particularly considering the speed and distance of its routes. For instance, stop-and-go city routes at lower speeds consume less energy, whereas operations at speeds above 80 km/h significantly increase energy consumption. Operations in dusty desert environments are impacted by different conditions than coastal cities.

The BIC notes that there are no metrics available for FCEVs and few for BEV. As stated elsewhere in this response, if technology is to be introduced it should be on the basis that it meets the requirement to reduce emissions and is capable of carrying out the task required. Without performance data over a full range of applications any transition will not be successful. International examples illustrate that mixed fleets are more common than single-technology options. This is because a mix of different technologies is required to meet the various services, locations, and operational requirements.

The Department could be tasked with gathering data from the States and co ordinating its analysis.

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

The Bus Industry Confederation have published a new policy position paper titled Driving Towards Zero Emissions detailing an industry strategy for transitioning to zero emissions. LCLFs are a key aspect of the BIC Policy Position Paper based on the premised that the market (i.e., bus operators) should be able to choose the right technologies depending on the route and task (e.g., public transport versus long distance, tour, and charter), infrastructure access, regional climate, and geophysical characteristics.

BIC and its members recognise that achieving net zero carbon output is a complex challenge that cannot be addressed with a 'one size fits all' solution, therefore, a multifaceted approach that

[5] Bus Association Victoria (n.d). Transitioning Victoria's bus industry to zero emission buses

incorporates various innovative and sustainable strategies should be considered. This includes, supporting initiatives to integrate locally produced low carbon liquid fuels (LCLFs) as one key element in the transition to a net zero carbon future. We note however that LCLF is a "new "industry and as such is likely to need government support to develop and scale up. Users may also require support for example tax credits, due to the likely cost differential between standard diesel and LCLF.

As previously discussed, the average life of a bus in Australia is 25 years and in many cases for urban transport these buses are still on the road after 25 years of service. Consequently, any buses purchased today will still be on the road in 2049 including low emission Euro 6 Diesel bus or Diesel / Electric Hybrid bus.

Recognising the likely 25-year transition period and fuel supply standards, locally produced LCLFs offer a practical longer-term solution to reduce carbon emissions in the bus and coach sector while simultaneously supporting existing and ageing fleets. This not only makes the transition more feasible but also supports local economies and reduces dependency on imported fuels as LCLF can be produced in Australia.

Using LCLF in some areas offers the best option for transitioning to a net zero fuel solution, especially in rural and remote Australia where increased and reliable electricity supply will require enormous infrastructure upgrades to support other zero or low emission industries and modes of transport at scale.

Furthermore, the adoption of LCLFs complements other solutions such as diesel electric (hybrid) buses, battery electric buses and hydrogen-fuelled electric buses. This diversified strategy assists industry address various operational needs and constraints, providing a robust and resilient pathway to zero emissions.

LCLF also help to address the issue of contingency and redundancy. 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.

What this practically means is that bus depots will need back up power generation (potential LCLF generators) to ensure operations in the event of a power failure.

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?

12.1. How would these actions address the identified challenges and opportunities to reduce heavy vehicle emissions?

Australian Design Rule changes

With the introduction of both zero emissions buses, as well as ultra-low emission Hybrid, Euro VI and beyond diesels, buses are getting heavier. This effect is well known, and recognition of this at every level of government is critical to the successful transition to zero emission buses. The EU have long recognised this and have approved increases in operating mass allowances for zero emission buses

and coaches of up to 2.5 tonne per bus type. These allowances have been in place since 2015 in Europe and are significantly above the current Australian limits.

The EU allowances were allowed so that the new technology buses could achieve equivalent passenger carrying capacity when compared to diesel powered buses. 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. (Note: the positive emissions effect of a new ZEB, which has reduced passenger capacity, are reduced if additional buses are needed for peak service times).

In Australia, two axle buses are limited to 18 tonne, three axle buses are limited to 22 tonne and articulated buses are limited to 26 tonnes. Although these Australian mass limits worked with traditional diesel type buses, such limits restrict the maximum efficiencies to be gained from heavier zero, and ultra-low, emission bus technologies as seen in other countries. In recent times, chassis suppliers have raised issues where they are having difficulties with the supply of new technology chassis that meet the current Australian 2.5 m width requirement.

To facilitate the widespread adoption of zero emission buses in Australia the BIC is seeking an Australian Design Rule Change that allows buses or coaches to be built to 2.55 m body and axle width (in conjunction with an ADR change to allow for the external addons such as cameras and sensors to go to 2.6 m) as part of a package that would not only ensure the ongoing high level of bus and coach safety, but also to address known operating mass issues for both increased bus mass but also the increasing per passenger mass (population getting heavier).

Mass: Implement a modular axle mass approach, that being:

- **Two axle rigid:** 7 tonne front axle, 12.5 tonne rear axle, gross 19.5 tonne for ZEB's, or Ultra Low Emission buses being Euro VI and above.
- **Three axle rigid:** 7 tonne front axle, 6.5 tonne tag axle and 12.5 tonne drive axle for tonne for alternative fuelled and 25 tonne GVM for ZEB's, or Ultra Low Emission buses being Euro VI and above.
- **Articulated:** 7 tonne front axle, 12.5 tonne centre and 12.5 tonne rear axle, but 30 tonne gross (floating 2 tonne), for ZEB's, or Ultra Low Emission buses being Euro VI and above.
- **Axle widths:** Chassis with 2.55 m axles can be used with either a 2.5 or 2.55 m bus body.
- **Use of Wide Tyre Sections:** Wide 315 section type tyres, for example 315/80R22.5 on all steer and tag axles (min 295/80R22.5 on duals).
- **Increase tyre pressures:** From 825kPa to 900kPa in alignment with global standards.

Power supply

One of the critical issues constraining the transition to zero emission buses and coaches is the lack of enabling policy for charging and refuelling infrastructure (including ensuring harmonisation) plus the uncertainty around the supply and cost of green energy from the 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 which are creating uncertainty so that operators are questioning if they can purchase the amounts of electricity they require to keep their expanding ZEB fleets in service (plus what the long term costs of this power will be). These issues would also impact other sectors of the heavy vehicle industry. It is an issue that all governments need to act upon as a matter of urgency.

Financial impacts

The high upfront capital costs of vehicles and energy infrastructure can act as a barrier to the rapid adoption of zero emission buses. Zero-emission buses currently cost around $840,000 to $1.4 million, compared to around $735,000 for a diesel bus. Electric buses manufactured in Australia are currently more expensive due to the small scale of production relative to international counterparts. To justify investing in the higher levels of production needed to capture greater cost efficiencies, manufacturers need a more certain procurement pipeline from Australian state and territory governments, along with targeted financial incentives.

Operators, depending upon the jurisdiction and how buses are procured and who owns the depot also need financial support to transition their operations and depots to zero emissions.

The UK Government, in 2021 launched the Zero Emission Bus Regional Area (ZEBRA) scheme to 'support the purchase of at least 4,000 new zero emission buses by, bringing together Local Transport Authorities, bus operators, energy companies and other stakeholders to develop financial and commercial models of delivering zero emission buses at scale, with government and nongovernment funding to scale up the transition to zero emission buses. This unprecedented investment, the single biggest of its kind for zero emission buses in the UK, also helped safeguard thousands of jobs in Britain's bus manufacturing industry. The scheme provides funding to meet up to 75% of the difference between the price of the electric bus and its diesel equivalent, and up to 75% of the agreed infrastructure costs. This has been an effective tool in incentivising investment in zero emission buses. The Australian Government and states and territories should consider adopting a similar scheme.

The state and territory governments who procure bus services from the private sector must also amend the contracting arrangements to consider the differences between operating a diesel fleet and electric fleet.

Supply chains

The Australian bus market has seen notable change over the past decade from 100% Australian manufactured to less than 65% Australian manufactured in the period 2017-2020. This trend is continuing with 36% of all bus deliveries in 2023 being fully imported vehicles. The Australian based industry is in crisis due to a broad range of primarily external factors. 2023 saw two bus manufacturers cease operations in Australia and another three are unlikely to survive the 2023-24 financial year. We now have only 11 bus manufacturing sites left in Australia spread over 6 businesses of which only 5 are Australian owned companies. This number is likely to decline in the near future without government intervention.

It is vital if we are to meet demand for zero emission buses that we stabilize the existing industry that consists of a balanced mix of numerous established Australian bus manufacturers and bus importers. Once stabilised and with growth in demand and levelling of the boom-and-bust cycle of state government bus purchases we then have an opportunity to grow Australia's sovereign manufacturing ability for buses. Adoption of a national local content approach with consistency in terminology, including the definition of local and calculation methodologies is also critical.

Implementation Plan

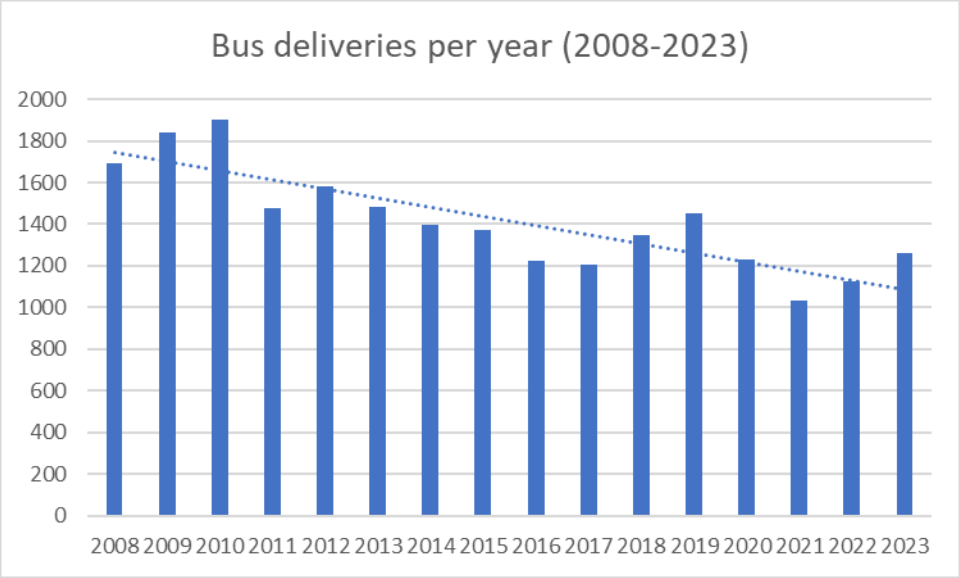
Not all states have bus supply arrangements in place which provide longer term certainty to offset the required capital investment needed to design and manufacture buses. Western Australia has such contracts in place, but this is not the case in all other states. The wider use of longer-term supply arrangements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

The BIC contends that the development of an implementation plan including 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 commitments 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. Without forecasting and regularity of orders our industry is unable to get into international production lines for components such as batteries. These production lines require orders to be placed from 18 to 24 months prior to the component being required on the factory floor (up from 3 months previously).

The implementation plan should also seek to ensure harmonisation of standards and specifications for the manufacture of buses across Australia. This would guarantee that jurisdictions agree on the same type of specifications for components and localise their production where possible. It could generate economies of scale and drive domestic volumes, creating local manufacturing opportunities and making us less reliant on international supply chains or at risk of not having access to components that meet standards in one jurisdiction only. Further it should result in the adoption of a national local content approach with consistency in terminology, including the definition of local and calculation methodologies.

There can be up to 40 manufacturing and parts supply companies (local and international) that contribute to the final assembly of a single bus. On average 1414 buses a year are delivered (*Note the graph below doesn't include figures for December 2023*). Annual total deliveries vary based on a few external factors including:

- government procurement of buses for route and school services
- increases in demand for bus passenger services caused by increases in fuel and living costs.
- electoral cycle priorities
- regulated vehicle replacement programs
- average age of fleet and maximum age regulations
- rise and fall of the Australian dollar.



As can be seen above the industry has a history of scaling up or down production. According to Beyond Zero Emissions (2023)[6] if Australia is to reduce our commercial vehicle emissions by 50% by 2030, we will need 61,000 electric buses – ramping up overtime, averaging 8,700/year for the next 7 years. If this came to fruition it would require a mix of Australian manufactured and assembled buses and fully imported buses. They highlight that as "the global Commercial Electric Vehicle (CEV) manufacturing sector is in its infancy; Australia has the opportunity to embed itself in the global supply chain. Australia can be an appealing supplier to Asia, the USA and Europe with high environmental, social and governance (ESG) standards, and the opportunity to use low-cost renewable energy to create zero-emission components. There is significant potential for Australian manufacturers to meet domestic demand and grow export market capability if we act fast and scale our onshore manufacturing capability."

Skills and workforce

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. Harmonisation of state-based skills and training programs is essential. For example, there are currently no nationally consistent formal qualifications 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. Most training, where available, is focussed on battery electric and there is currently a lack of formal hydrogen fuel cell qualifications.

Retraining existing mechanics is not a simple issue and cannot be done entirely in house. 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.

[6] Beyond Zero Emissions (2023) Commercial Electric Vehicle Supply Chains.

Consideration should also be given as to whether these mechanics/technicians should be licenced as is the case with licensed plumbers and gas fitters.

Furthermore, while there is increasing collaboration amongst national TAFEs to share resources, increase national consistency and avoid duplication, vocational training relevant to zero emissions vehicles and related infrastructure should be better supported at a national level to ensure:

- training facilities are well equipped to deliver training.
- organisations are supported to attract, train, and retain teaching staff.
- where possible, Australian training leverages existing international programs to expedite development and uptake of training.

Transport Infrastructure

21. Do you agree with the proposed net zero pathway for transport infrastructure?

21.1. Please add details to your response.

The Bus Industry Confederation appreciate the proactive approach outlined in the proposed net zero pathway for transport infrastructure. It is essential to align infrastructure development with ambitious emissions reduction targets and to broaden the scope of this section so that it ensures that the use of the infrastructure facilitates low emission activities. For example, prioritising investments in infrastructure that support the deployment of zero-emission buses, such as charging and refuelling stations, dedicated bus lanes, and integrated transport hubs over infrastructure that prioritises private vehicle use.

The pathway should include clear mechanisms for funding and incentives to facilitate the transition to cleaner technologies and operational practices within the public and heavy vehicle transport industry. This will help ensure that our sector can continue to innovate and lead in sustainable transport solutions, while also meeting the evolving demands of passengers and communities.

We also note that active and public transport is not mentioned on the net zero pathway for transport infrastructure (refer to Figure 20 on page 74 of the consultation paper). It is essential to incorporate these modes to ensure they are not overlooked in the framework development process.

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?

22.1. How would these actions address the identified challenges and opportunities to reduce transport infrastructure emissions?

If Australia is to transition our economy to cleaner energy – across all industries – there a number of major challenges that need to be addressed. These are outlined in our policy paper and include:

Supply	Reliable Infrastructure	Supply Chain and Manufacturing
Rapid growth in renewable energy, batteries, and new generation technologies means that the electricity system in Australia will look dramatically different in the years ahead. Australia must produce enough green energy to transition all sectors of the economy without compromising grid reliability or dramatically increasing energy prices.	Australia needs to efficiently 'pipe' our green energy to where it is needed, including to bus depots. This requires smart investment in transmission and distribution infrastructure, to power low- and zero-emissions vehicles, buildings, and factories.	Key industries need support along the supply chain and for manufacturing to ensure the availability of a range of low- and zero-emissions technologies. Lead times are currently long, and costs too high, for the production, delivery and installation of zero-emissions vehicles and infrastructure.
Nationally Harmonised Policy	**Workforce Development and Upskilling**	**Community Engagement**
Unified policy frameworks across federal, state & territory governments will ensure the energy transition can be efficient, safe, and technically successful. For example, Australia needs a national local content policy that respects all aspects of the supply chain to allow for a unified playing field for both local manufacturers and importers.	Training and education institutions and industry must partner to upskill our workforce in both zero-emissions vehicles and infrastructure, in order to meet the demands of our greener future. We must make the right investments in vocational training programs and apprenticeships.	Proactive community engagement is required to build 'social license' for the energy transition. We need the buy-in of all Australians, particularly those from local communities who would be home to clean energy projects.

Other actions could include fast tracking some "whole of life" Future Cell Electric Vehicles (FCEV) projects (bearing in mind the lead times are over two years) ensuring that effective data capture and analysis is commenced Australia wide. These early 'whole of life' projects should be established or encouraged to allow data and lessons learned to be publicly shared for others to follow suit more easily.

Build fewer roads for cars and prioritise more dedicated bus lanes. Dedicated bus lanes such as those used for Bus Rapid Transport can enhance public transportation efficiency, reduce congestion, and promote sustainable travel. By investing in dedicated bus infrastructure, we can encourage more people to use public transport, leading to a cleaner, more accessible urban environment. One full city bus can take more than 50 cars of the road, a large articulated public BRT bus such as the Brisbane Metro can carry 150 people (and 170 in event mode), replacing over 100 cars.

Prioritising infrastructure should favour public transport as a cornerstone of sustainable urban development. By prioritising public transport infrastructure, governments can actively promote a shift towards more efficient, environmentally friendly, and socially equitable transportation solutions.

Investing in the expansion and improvement of public transport networks, including buses, trains, trams, and metro systems, enhances their reliability, frequency, and coverage. Such enhancements

not only encourage greater ridership but also reduces congestion and emissions associated with private vehicle use.

Allocating resources towards integrating different modes of public transport facilitates seamless and convenient transfers for commuters. Intermodal connectivity between buses, trains, and other transit options ensures that passengers can travel efficiently across different parts of cities and regions.

Implementing dedicated bus lanes, priority signalling, and infrastructure upgrades such as bus rapid transit (BRT) systems can significantly improve the speed and efficiency of public transport services. These measures make public transport a more attractive option compared to private vehicles, particularly during peak hours. They also allow asset owners to "sweat" their asset reducing embedded carbon.

23. The Australian Government invited views on aspects of the energy transformation that represent the most material challenges and opportunities for the electricity and energy sector. Submissions closed on Friday 12 April 2024 (AEDT). This feedback will be used to inform the development of the Electricity and Energy Sector Plan and Net Zero Plan.

The Australian Government will be undertaking targeted consultation to identify options for production incentives to support the establishment of a made in Australia low carbon liquid fuel industry, including through the release of a low carbon liquid fuels consultation paper.

Feedback heard through this process will also inform development of the final Transport and Infrastructure Net Zero Roadmap and Action Plan.

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

Converting Australia's entire bus and truck fleet to zero-emissions (i.e., electric) would use the equivalent of 100% of current renewable generation. Australia will need costly grid upgrades and coordinated action from electricity network suppliers. Transport authorities must work closely with operators and infrastructure providers to forecast both depot and power requirements, so that infrastructure and energy providers can include these needs in their planning. In the first instance, we should prioritise energy to bus depots that can be electrified at the lowest cost.

Rushing the energy transition will put pressure on the grid. We must recognise that technologies other than electric can provide acceptable outcomes. In addition, new or upgraded bus depots are subject to land availability and lengthy construction periods, requiring significant site planning and carefully calibrated design and performance specifications. Zero-emissions bus depots will require more space and costly infrastructure upgrades, as well as maintenance facilities for electric buses.

24. How should the use of low carbon liquid fuels be prioritised across different transport modes over time to achieve maximum abatement?

Low carbon liquid fuels (LCLFs) are likely to be a relatively scarce resource and will still be emitting carbon. It should therefore be used solely for hard to abate transport sectors – including heavy bus and coach. This means that light commercial vehicles and utes should be excluded – particularly those used for vanity purposes in urban areas.

LCLFs should be prioritised where there is benefit to the wider public (i.e., public good) such as heavy vehicle transport. Public transport carries people to and from their destinations and trucks carry

goods for use by the public. Prioritisation in these areas further incentivise industry to uptake these initiatives whilst larger 'pick-ups' and cars should be encouraged where possible to mode shift to public transport or battery electric vehicles.

Buses and coaches can carry many passengers simultaneously, which amplifies the benefits of using low carbon fuels. Each bus can replace multiple cars on the road, leading to fewer vehicles, reduced congestion, and lower overall emissions.

By focusing on public and freight transport, the benefits of LCLFs can be maximised, reaching a broader segment of the population, and contributing to public health and environmental goals. Additionally, integrating LCLFs with existing public transport infrastructure may also create synergies that enhance overall ability to reach emission targets. This strategic prioritisation not only accelerates the transition to cleaner fuels but also supports broader sustainable objectives.

The introduction of LCLFs needs to adhere to international standards (e.g.: EN15940 class B and EN 590) to ensure that operational compatibility with existing vehicle fleets and vehicle reliability and warranties are not affected.

25. What are the best ways for the Australian Government to work collaboratively with industry, business, governments, and communities to implement the proposed pathways?

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?

25.2. What opportunities can the government leverage to show leadership in Australia and internationally?

We note that the Australian Government is already seeking strategic direction through established actions plans and advisory groups for other transport modes i.e., the Jet Zero Action Plan (JZAP), National Rail Manufacturing Plan (NRMP) and the Maritime Emission Reduction National Action Plan (MERNAP).

There does not appear to be an equivalent framework for the Heavy Road Vehicle sector, and we would strongly recommend that one is rapidly established. Without a dedicated framework like those in other transport sectors, the heavy road vehicle industry may struggle to achieve the same level of recognition and support and miss opportunities to innovate and learn from best practice. This gap can lead to challenges in securing funding for infrastructure improvements, developing new technologies, or implementing robust safety measures.

The BIC recommends that the Australian Government work through National Cabinet to collaborate with state and territory governments on establishing a harmonised framework allowing bus industry participants to operate seamlessly across the country. Unified policy settings across the country would support the development of a safe, efficient, and technically successful energy transition along with a number of other dimensions, including upskilling Australian workers, nationwide infrastructure, and a national industry power purchasing agreement.

To do this, the Australian Government should fund a new Office of National Heavy Vehicle Industry Coordination (ONHVIC) to facilitate the development and implementation of a National Heavy Vehicle Transition Plan harmonising the nation's regulations and guiding the investments needed for the heavy vehicle industry to lead the energy transition.

Funding to support the transition is also critical. As highlighted earlier in our submission the UK Government, launched the Zero Emission Bus Regional Area (ZEBRA) scheme to 'support the purchase of at least 4,000 new zero emission buses by, bringing together Local Transport Authorities, bus operators, energy companies and other stakeholders to develop financial and commercial models of delivering zero emission buses at scale, with government and nongovernment funding to scale up the transition to zero emission buses. This unprecedented investment, the single biggest of its kind for zero emission buses in the UK, also helped safeguard thousands of jobs in Britain's bus manufacturing industry. The scheme provides funding to meet up to 75% of the difference between the price of the electric bus and its diesel equivalent, and up to 75% of the agreed infrastructure costs. This has been an effective tool in incentivising investment in zero emission buses.

26. What measures and metrics should be used to evaluate the final Transport and Infrastructure Net Zero Roadmap and Action Plan?

This should be evaluated on its success i.e., rolling out a low emission result for the transport industry efficiently and effectively.

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?

The BIC reiterates that we need nationally consistent data on the performance of each technology (including diesel and hybrid) so that we can properly assess when and where to use each solution.

27. Do you have any feedback on the proposed review process?

The Bus Industry Confederation has no further feedback on the review process.

28. Do you have any further feedback on the Consultation Roadmap and proposed pathways?

No further comments.

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

What is missing is action by Governments to introduce ZEB technology in a strategic and measured way so that Industry can advise on the optimal use of that technology. While this would seem to be the aim of the roadmap, we have been talking about FCEVs for over a decade and industry has not advanced very far.

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

Thank you for the opportunity to provide feedback on the consultation roadmap and for your continued engagement with the bus and coach industry. As always, we stand ready to provide you with assistance and advice to ensure a pragmatic, feasible and ambitious roadmap can be developed and implemented. I draw your attention to our Bus Industry Policy Position Paper at attachment 1.

It may also be valuable reviewing the National Transport Commissions Electric Bus Evaluation. While it did not consult extensively with the industry it is a useful resource outlining many key issues.

Attachment 1

BIC
BUS INDUSTRY CONFEDERATION
moving people

Bus Industry Policy Position Paper

Driving Towards Zero-Emissions

June 2024

Table of Contents

Executive summary

Buses can lead the transition

- The Australian bus industry is uniquely positioned to lead the transition to zero-emission technologies for heavy vehicles.
- As an industry, we can significantly reduce transport emissions, while helping Australia meet its climate targets and creating new economic opportunities.
- But the transition must be carefully managed to ensure the best outcomes while protecting our economy, including jobs and essential services.

Key challenges

- Key challenges to transitioning the bus industry to zero-emissions include:
  - Inadequate electricity grid capacity.
  - High upfront costs for depot upgrades and infrastructure. The capital cost of buses is also higher but insignificant compared to other capital expenditure to support the transition.
  - Fragmented state and territory policies, including worker training and local content policy.
  - A lack of social license for the transition.
- Mandating aggressive timelines and specific technologies will lead to higher cost and potential failure.
  - Australia should ensure a gradual and effective transition to meet our ambitious environmental targets.

Recommendations

- Federal, State and Territory governments should partner through National Cabinet to build a harmonised national framework based on seven pillars:

1. Generate more renewable energy.
2. Build the infrastructure needed to charge and fuel zero-emissions heavy vehicles.
3. Support the zero-emissions heavy vehicle supply chain and manufacturing.
4. Provide targeted financial support for the heavy vehicle industry.
5. Ensure nationally recognised and harmonised workforce training and credentials.
6. Introduce nationally harmonised local content policy that is fair to both manufacturers and importers.
7. Foster social license for the transition in the Australian community.

- The Australian Government should fund a new Office of National Heavy Vehicle Industry Coordination to facilitate the development and implementation of a National Heavy Vehicle Transition Plan.
  - Include a national heavy vehicle manufacturing plan and long-term procurement roadmap which clearly identifies the timing and scale of procurement by state and territory governments.
- The Australian Government could tie future federal grants that are negotiated with the states and territories to commitments that those jurisdictions will implement this unified national framework.
- Australia should utilise all technologies that can lower carbon emissions to help Australia meet its emissions targets.
  - We should start by prioritising the replacement of all vehicles that are below Euro 5, rather than mandating a blanket rollout of zero-emissions buses.

Introduction

The bus industry is uniquely positioned to lead the transition to zero-emission technologies within the heavy vehicle sector. The bus industry is an early adopter of technologies and the ideal industry for demonstrating the viability of battery electric and hydrogen fuel cell electric (together 'electric') buses, low carbon liquid fuels (LCLFs), Euro 7 and later diesel, and hybrid diesel.

The bus industry's highly scheduled nature makes it an excellent testing ground for the capabilities and cost-effectiveness of a range of low- and zero-emissions technologies. We can provide a roadmap to decarbonisation for other heavy vehicles fleets.

A low carbon heavy vehicle industry is possible in Australia over the next 25 years and is one of the simplest ways to reduce national emissions. However, the BIC is concerned that unless there is meaningful progress in reducing existing roadblocks, Australia will not meet its emissions reduction targets. Some state mandates on zero-emission buses have already been amended, and others will need to follow.

We emphasise the need to avoid mandated timelines for adopting zero-emissions technologies. Aggressive and inflexible timelines put optimum options at risk because we do not yet fully understand the advantages, disadvantages, and supply chain issues with each technology.

All potential technologies must be part of our low- and zero-emissions energy mix. The real cost, advantages and challenges of each technology can only be assessed by whole-of-life projects that incorporate all the required infrastructure. While early zero-emissions projects will be expensive, there is no other way to build industry capability and demonstrate how to create scale that reduces cost. A diverse mix of technologies can ensure that we do not disrupt the economy while we reduce emissions. If we rely exclusively on electric technologies, we lack a 'pressure valve' to effectively manage demand in the event that we fail to secure enough green power and infrastructure.

Government funding will be essential since these technologies are costly. We must also identify and deliver the right support for the supply chain and manufacturing of this mix of low and zero-emissions technologies. The BIC's Zero Emissions Bus committee is working to estimate the necessary vehicle supply to meet Australia's emission targets, but the optimal mix of technologies will ultimately be driven by factors such as cost, availability of power, and specific operational contexts.

Governments must also expend political capital to increase green power generation. This will take political courage, leadership, and the ability to bring communities along – to help Australians embrace solar and wind infrastructure. Without popular support, Australia will risk its 2050 net zero commitment.

Exploring all available technologies is the best way to maintain our economic capabilities and grid supply while meeting our emissions targets and setting a benchmark for the broader heavy vehicle sector, which can dramatically reduce emissions over the next 25 years and assist Australia to meet its obligations. This transition is already starting with buses and should be accelerated.

Australia's energy transition

Australia is undergoing a massive energy transition, committing to reduce greenhouse gas emissions by 43% from 2005 levels by 2030 and achieve net zero by 2050. To transition our economy to cleaner energy – across all industries – we will need to navigate a number of major challenges, as outlined in Figure 1.

Figure 1: Major Challenges for Australia

Supply	Reliable Infrastructure	Supply Chain and Manufacturing
• Rapid growth in renewable energy, batteries, and new generation technologies means that the electricity system in Australia will look dramatically different in the years ahead. • Australia must produce enough green energy to transition all sectors of the economy without compromising grid reliability or dramatically increasing energy prices.	• Australia needs to efficiently 'pipe' our green energy to where it is needed, including to bus depots. • This requires smart investment in transmission and distribution infrastructure, to power low- and zero-emissions vehicles, buildings, and factories.	• Key industries need support along the supply chain and for manufacturing to ensure the availability of a range of low- and zero-emissions technologies. • Lead times are currently long, and costs too high, for the production, delivery and installation of zero-emissions vehicles and infrastructure.

Nationally Harmonised Policy	Workforce Development and Upskilling	Community Engagement
• Unified policy frameworks across federal, state & territory governments will ensure the energy transition can be efficient, safe, and technically successful. • For example, Australia needs a national local content policy that respects all aspects of the supply chain to allow for a unified playing field for both local manufacturers and importers.	• Training and education institutions and industry must partner to upskill our workforce in both zero-emissions vehicles and infrastructure, in order to meet the demands of our greener future. • We must make the right investments in vocational training programs and apprenticeships.	• Proactive community engagement is required to build 'social license' for the energy transition. • We need the buy-in of all Australians, particularly those from local communities who would be home to clean energy projects.

The BIC has sought, in developing this Industry Policy Position Paper, to align with the direction of the range of national strategies and targets that Australia has adopted:

Strategies	Targets
Net Zero Plan[1]	The Net Zero Plan will guide the transition to the target of net zero greenhouse gas emissions by 2050.
Transport and Infrastructure Net Zero Roadmap and Action Plan[2]	The Transport and Infrastructure Net Zero Roadmap and Action Plan, aims to: 1. Reduce emissions in the transport and infrastructure sectors. 2. Support national and international commitments to reduce greenhouse gas emissions. 3. Maximise economic and productivity opportunities. 4. Provide investors with future investment certainty. 5. Deliver a nationally consolidated approach to accelerate decarbonisation for key sectors.
National Electric Vehicle Strategy[3]	The National Electric Vehicle Strategy is part of the Australian Government's Powering Australia Plan to improve affordability, create jobs, and reduce emissions. It offers a consistent framework to transition Australia's road transport sector to net zero emissions.

[1] Department of Climate Change, Energy, the Environment and Water. (n.d). Net Zero
[2] Department of Infrastructure, Transport, Regional Development, Communications and the Arts. (n.d). Towards net zero for transport and infrastructure
[3] Australian Government. (n.d). National Electric Vehicle Strategy

Strategies	Targets
Australian New Vehicle Efficiency Standard[4]	From January 1, 2025, all vehicle importers in Australia must achieve a fleetwide average emissions intensity of 141 gCO2/km for passenger vehicles and 210 gCO2/km for light commercial vehicles.
A Future Made in Australia[5]	The Australian Government has announced the Future Made in Australia program, a $22.7 billion investment over the next decade to attract private investment into five priority industries: 1. Renewable hydrogen 2. Critical minerals processing 3. Green metals 4. Low carbon liquid fuels 5. Clean energy manufacturing, including battery and solar panel supply chains
Infrastructure Policy Statement[6]	The Australian Government's Infrastructure Policy Statement sets out three strategic themes that guide infrastructure investment decisions: 1. Productivity and resilience 2. Liveability 3. Sustainability
National Hydrogen Strategy[7]	Australia's National Hydrogen Strategy sets a vision for a clean, innovative, safe and competitive hydrogen industry that benefits all Australians. It aims to position our hydrogen industry as a major global industry by 2030.
National Energy Performance Strategy[8]	The National Energy Performance Strategy will coordinate efforts to improve energy performance for all Australians, including: 1. Energy efficiency: using less energy to achieve the same results. 2. Demand flexibility: varying when and how energy is used. 3. Electrification or fuel switching – adopting electricity-powered technologies or other cleaner energy sources. The Australian Government is investing $15.2 million until 2026 to develop, evolve and deliver the Strategy.

[4] AEVA. (May 18, 2024). Australia legislates a New Vehicle Efficiency Standard!
[5] Budget 2024-25. (n.d). Future Made in Australia
[6] Australian Government. (n.d). Infrastructure Policy Statement
[7] Department of Climate Change, Energy, the Environment and Water. (n.d). Australia's National Hydrogen Strategy
[8] Department of Climate Change, Energy, the Environment and Water. (n.d). National Energy Performance Strategy

Strategies	Targets
National Energy Transformation Partnership[9]	The National Energy Transformation Partnership is a framework for the Australian Government and state and territory governments to collaborate on reforms to help transform Australia's energy system to achieve net zero by 2050.
National Partnership Agreement on Land Transport Infrastructure Projects[10]	The National Partnership Agreement on Land Transport Infrastructure Projects is an agreement between the Commonwealth and the States and Territories. The agreement facilitates investment in land transport infrastructure to deliver a national transport system that is safer and more secure for users, drives national productivity and economic growth, accommodates Australia's growing population and supports competitive markets and employment opportunities.
National Energy Productivity Plan[11]	Australian Government set a National Energy Productivity Target to improve Australia's energy productivity by 40% between 2015 and 2030.
National Battery Strategy[12]	Australia's first-ever National Battery Strategy aims to make the country a globally competitive producer of batteries and battery materials by 2035.
Renewable Energy Superpower[13]	The Australian Government has committed to a national renewable electricity target of 82% by 2030.
Rewiring the Nation[14]	Rewiring the Nation is investing $20 billion to modernise the electricity grid and upgrade transmission infrastructure. The program offers concessional financing to minimise investment costs and lower infrastructure costs for consumers.
Paris Agreement[15]	The Paris Agreement has the overarching goal of holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. However, in recent years, world leaders have stressed the need to limit global warming to 1.5°C by the end of this century.

[9] Dept of Climate Change, Energy, Environment and Water. (n.d). Australia's Energy Strategies and Frameworks
[10] National Partnership Agreement on Land Transport Infrastructure Projects. (n.d)
[11] Department of Climate Change, Energy, the Environment and Water. (n.d). National Energy Productivity Plan
[12] Andy Colthorpe, 2024, National Battery Strategy: Australia targets 'globally competitive producer' status by 2035
[13] The Hon Chris Bowen MP, Minister for Climate Change and Energy, Speech on Australia as a Renewable Energy Superpower, Australian Embassy, Japan, 26 July 2023
[14] Department of Climate Change, Energy, the Environment and Water. (n.d). Rewiring the Nation
[15] Paris Agreement, United Nations, 2015

Buses can help drive the energy transition

Australia's bus and coach industry is uniquely placed to help lead the transition of heavy vehicles to low- and zero-emissions energy sources. Public transport buses and school buses run predictable routes and routinely return to a central depot, which simplifies the infrastructure requirements for refuelling or recharging.

Buses do not mass load and cover fewer kilometres per year compared to trucks in Australia. The bus industry's lower overall electricity demands to decarbonise make it a more manageable sector for testing and proving new energy solutions.

Chart 1: Annual distance travelled (in billions of kilometres)

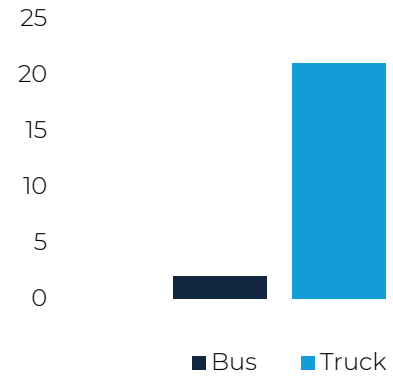
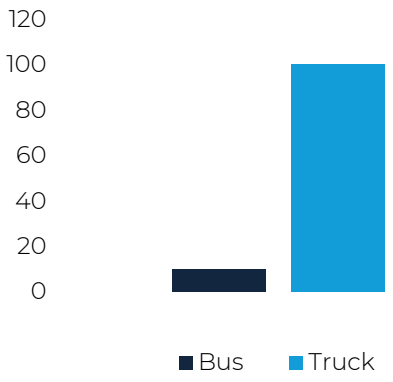


Chart 2: Annual electricity demand (in terawatt-hours)



The bus industry's successful transition could provide a blueprint and inspire confidence in decarbonising heavier forms of transport such as the truck industry, which is currently looking to the bus industry for advice. Buses also generally run under state government contracts, have back-to-base operations and operate on set routes which means that the bus industry offers a clear pathway to demonstrate the transition.

The transition must be carefully sequenced in order to be technically successful and avoid impacting the critical services that Australians rely upon buses to provide. The Australian bus industry has been working on the energy transition for **15 years** and can serve as a thought partner for Australian governments as they map out the policy framework that will guide the transition.

As Australia's national peak body for the bus and coach industry, the Bus Industry Confederation (BIC) represents operators, manufacturers, suppliers, and service providers on policy issues of national importance. We are instrumental in shaping policies and regulations that impact the industry's operations and growth. The BIC is working to support the development of policies that will facilitate a smooth transition to low- and zero-emission technologies.[16]

Nearly **1,500 buses** in Australia are already low- or zero-emissions.

[16] Bus Industry Confederation. (September 2023). When Green isn't Green.

In response to the urgent need for climate action, several state programs have been introduced to decarbonise transportation. Projects that demonstrate whole-of-life costs in each technology are required to show how – and with what technologies – we should decarbonise our industry. Initially, these projects will require government funding, but seeing projects through their whole life is the only way we can understand the costs, advantages, and challenges of each technology.

The Australia Institute concluded that well-serviced electric bus routes can promote greater use of public transportation, offering affordable and accessible transit, and reducing household transportation costs.[17]

Infrastructure Australia estimates that Australia can avoid **$38.8 billion** annually in congestion costs by shifting from private vehicles to a well-managed public transport network.

Critically, the Australian bus industry must be able to see at least a **10-year pipeline** of procurement demand from state and territory governments in order to justify making the investments needed to reach our zero-emissions future. Our bus manufacturing sector and supply chain will also require increased government support to successfully deliver the necessary zero-emission buses and associated infrastructure. Other countries are already mapping out their procurement pipelines:

Germany

Transport companies in Germany have clear line of sight to procurement plans requiring around **6,600** more electric buses by 2030. This would put a total of nearly **8,500** electric buses on German roads by the end of the decade.

The central pillar of a successful energy transition, however, will be to create sustainable markets. Dr Alan Finkel's observation relating to hydrogen technologies has broad application to all low- and zero-emissions technologies[18]:

'Governments have provided substantial financial support to nurture their early hydrogen industries. While this support is invaluable, ultimately the global hydrogen industry will only flourish if there are sustainable markets. Sustainable markets are built on scalable technology, cost effectiveness and above all, trust.'

– Dr Alan Finkel
Special Adviser to the Australian Government on Low Emissions Technology

The BIC is pleased to share our learnings to help inform the creation of sustainable markets for all low- and zero-emissions bus technologies – built on mutual trust.

[17] Audrey Quicke, Sienna Parrott. (May 2022). The Australia Institute. Next stop - Zero-emission buses by 2030
[18] Dr Alan Finkel, Keynote Address to APEC Low-Carbon Hydrogen International Standard Workshop, 2022

Challenges in transitioning buses

An aggressive transition to zero-emission technologies will disrupt the diesel bus supply chain that has existed for the last **100 years** and require a complete upheaval of vehicle production and operation. Several state governments have announced bus electrification targets for 2030 that are not feasible due to supply chain issues, the availability of power and infrastructure.

Early experience from initial transition projects has identified several challenges in converting traditional bus fleets to zero-emission buses[19]:

1. **Inadequate Electricity Grid Capacity:** Converting Australia's entire bus and truck fleet to zero-emissions would use the equivalent of **100%** of current renewable generation. Australia will need costly grid upgrades and coordinated action from electricity network suppliers. Transport authorities must work closely with operators and infrastructure providers to forecast both depot and power requirements, so that infrastructure providers can include these needs in their planning. In the first instance, we should prioritise energy to bus depots that can be electrified at the lowest cost. Rushing the energy transition will put pressure on the grid. We must recognise that technologies other than electric can provide acceptable outcomes.
2. **Depot Upgrades:** New or upgraded bus depots are subject to land availability and lengthy construction periods, requiring significant site planning and carefully calibrated design and performance specifications. Zero-emissions bus depots will require more space and costly infrastructure upgrades, as well as maintenance facilities for electric buses.
3. **Tax Implications of Federal Funding:** Projects funded by the Australian Renewable Energy Agency (ARENA) are subject to tax on their funding, which discourages potential transition projects. This is particularly true for fuel cell electric vehicle (FCEV) projects with high infrastructure costs; there are hardly any FCEV projects ready for approval that can provide the whole-of-life data we need to assess cost and effectiveness. Permitting accelerated depreciation of assets funded by ARENA would help to overcome this challenge.
4. **Contractual Structure:** State government contracts fund most bus operations in Australia. Data on moving to zero-emissions buses (especially FCEVs) shows that the current contractual requirements of state governments are not fit for purpose. The sheer scale of ancillary infrastructure costs, plus the variability and complexity of power costs, indicate that a new approach is necessary. The BIC recognises the challenge this poses for states, but when state governments seek to limit their own risk, industry operators are put in an untenable position, and this hinders projects that could otherwise inform our transition (especially FCEV projects).
5. **Battery Recycling:** The demand for batteries at power generation and during transport will grow significantly, increasing the need for future recycling or recovery. This issue cannot be overlooked, and any roadmap should incorporate technical assessments of potential solutions.
6. **Worker Upskilling:** Australia's existing vehicle workforce still requires extensive training, development, and experience with zero-emissions vehicles – on everything from operation to maintenance. There are acute skills shortages across the automotive industry in all states and territories, and the problem is worse in regional areas.

[19] L.E.K., Arup. (February 2021). UITP International Association of Public Transport Australia New Zealand. 2020 Zero-Emissions Bus Forum.

Automotive repair and maintenance are amongst the occupations that are hardest to fill.[20] There is also a national shortage of qualified workers to carry out infrastructure upgrades. The Electrical Trades Union has reported that there will be a shortfall of 32,000 qualified electricians by 2030, with another 85,000 electricians needed by 2050.[21] Training must be nationally consistent.

7. Fragmented Policy Design: Training, procurement, and other policies remain disjointed across Australia's states and territories. These must be harmonised to allow the bus industry to efficiently scale low- and zero-emissions technologies without the need to navigate eight different state and territory regulatory regimes.

8. Lack of Social License: Despite world-leading safety practices, bus industry workers and passengers are sometimes still concerned about safety. Communities are concerned about solar panels, wind turbines and energy transmission infrastructure. Government and industry must partner to build the social license required to deploy zero-emissions technologies at scale for buses. This means gaining support from the community, which takes political leadership and national education.

   High upfront costs of zero-emission buses: Battery electric buses currently cost around $840,000 while a fuel cell electric bus costs around $1.4 million. By comparison, a diesel bus costs around $735,000. Electric buses manufactured in Australia are currently more expensive than those fully imported from low-cost countries. To ensure the lowest cost for Australian-built electric buses, state and territory government procurement policies need to change. Australian manufacturers require greater certainty about government demand in order to justify the investments in production capabilities that are needed. A clear line of sight over the future procurement pipeline will enable local manufacturers to unlock new efficiencies in the supply chain and manufacturing.

   Higher costs should not be allowed to drive buyers overseas, where cheaper labour enables the production of lower cost buses at the expense of Australian jobs, know-how and ultimately our manufacturing sovereignty. We must create local jobs through national local content requirements, similar to the U.S. 'Build America, Buy America' program[22], perhaps as part of the Australian Government's Future Made in Australia Act. The BIC appreciates the Prime Minister's commitment to 'look at every measure that will make a positive difference', including 'financing facilities and investor incentives to drive new economic growth'[23]. We believe that far-sighted investments in energy transition for the bus industry – and local jobs – meet that definition.

Our international peers are already making these vital investments:

United States

The Clean School Bus Rebate program allocates **A$7.6 billion** for school districts to convert buses to electric power. The U.S. Department of Transportation also awarded **A$2.6 billion** in grants to facilitate the purchase of zero- and low-emission buses across 46 states and territories.

[20] Deloitte Access Economics (2024) Skills shortages in the Australian automotive industry
[21] Rewiring the Nation? Not without apprentices, sparkies warn, Energy Source & Distribution, 4 October 2023.
[22] What Is Build America, Buy America? Office of Management and Budget, Made in America Office.
[23] 'A future made in Australia', Speech by Prime Minister Anthony Albanese, Queensland Media Club, Brisbane, 11 April 2024.

United Kingdom

The UK Government announced a **A$275 million** investment to introduce nearly **1,000** new zero-emission buses across England, prioritising rural areas. An estimated **4,200** zero-emissions buses will be funded across the UK between 2020 and 2025.

Zero-Emission Bus Regional Areas (ZEBRAs)

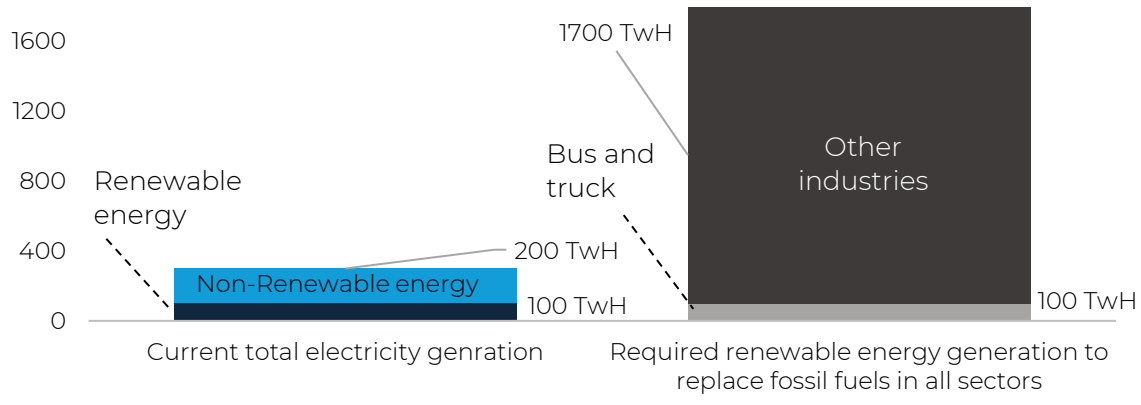
- The UK introduced 'Bus Back Better' in 2021 as its national bus strategy. The ZEBRA 1 program allocated funding for **1,300** zero-emission buses, supporting everything from technological development to rollout. Now, the ZEBRA 2 program will provide **A$248 million** to further support the introduction of zero-emission buses.[24] The ZEBRA grant covers up to **75%** of the cost increase between a diesel and zero emissions vehicle (together with necessary infrastructure).
- In Latin America, ZEBRA is a partnership led by the C40 Cities Climate Leadership Group and the International Council on Clean Transportation. A coalition of international investors committed to invest over **A$1.5 billion** to support the deployment of electric buses across Latin American cities.[25]

Australia must generate sufficient renewable energy

While Australia has made progress in expanding renewable energy sources like solar and wind power, we have much more work to do as a nation. A smooth transition requires a coordinated effort between federal and state governments, the power generation sector, and industrial users of green energy. Bus operators report difficulty in securing long term power agreements with suppliers. This is a new area of expertise, for which industry needs support.

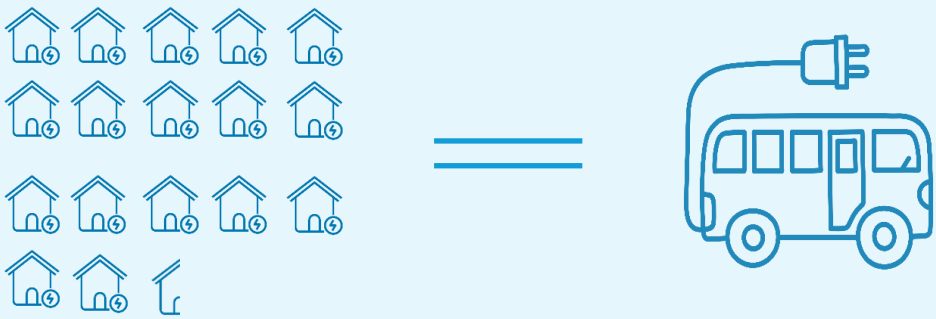
As Chart 3 illustrates, if Australia were to decarbonise, it would need to generate many times more green energy than our electricity grid currently produces.[26] This seems unachievable and reinforces the need for alternate, complimentary low-carbon solutions while Australia builds grid capacity.

Chart 3: Renewable energy required to decarbonise entire Australian economy[27]



[24] Department of Transport UK. (November 20, 2023). Apply for zero-emission bus funding (ZEBRA 2).
[25] C40 cities. (November 11, 2021). New $1 Billion dollar commitment from investors to deliver zero-emission buses in Latin America.
[26] Stephen Lucas. (November 16, 2022). Bus Industry Confederation. Why a ZEB is not diesel.
[27] Stephen Lucas. (November 16, 2022). Bus Industry Confederation. Why a ZEB is not diesel.

State governments have already made plans to transition to zero-emissions buses from 2025. As this transition gathers momentum, energy companies will need to produce many more green electrons. Once fully electrified, bus depots and other commercial fleets will become substantial energy consumers. The average bus uses energy equivalent to **17.7** houses worth of energy per day.[28]



The average bus uses energy equivalent to **17.7 houses** per day

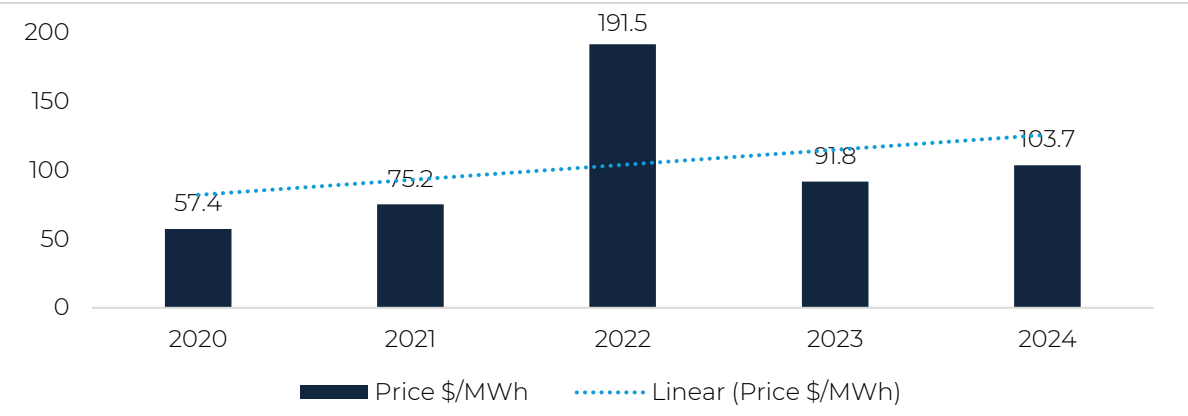
The BIC strongly supports the Australian Government's announced $1 billion investment in solar panel manufacturing but notes that a single battery-electric bus charged using solar panels would require all of the power generated by **320** solar panels – every day.[29]

Overloading the electricity grid will lead to rolling blackouts, which can severely disrupt economic activity and the daily lives of all Australians. Buses and coaches provide essential transport services for millions of Australians, promoting economic and social inclusion through access to employment, education, healthcare, and social opportunities – particularly for Australians on lower incomes. Protecting vulnerable communities from disruption must be a core priority for the energy transition.

Increasing the use of electric buses will increase demand for electricity, meaning higher electricity prices, unless supply is dramatically increased. As seen in Chart 4, electricity prices have already increased by **81%** over the last five years alone, and many Australians cannot afford further increases.

[28] CSIRO. (n.d). Typical House Energy Use.
[29] Department of Climate Change, Energy, the Environment and Water. (n.d). Solar Panels. On average, a single solar panel produces 1kWh of electricity daily. Each electric bus consumes 320kWh of electricity per day.

Chart 4: Electricity prices up 81% in 5 years ($ per megawatt-hour)



To achieve zero emissions for the heavy vehicle industry, all of the energy required to power zero-emissions trucks and buses must come from green power. Including low-carbon liquid fuels (LCLFs), Euro 7 and later diesel, and hybrid technologies in the energy mix will alleviate the demand on power and power infrastructure while still reducing carbon emissions. This strategy will enable Australia to:

- Provide a 'release valve' against grid overloads, mitigating the risk of blackouts.
- Reduce the near-term need for manufacturers to produce a high volume of zero-emissions buses.
- Ensure a gradual and effective transition to meet environmental targets.

To build the green energy generation capacity we need, governments and industry must also earn 'social license' from Australian communities who are being asked to make room for more solar panels, wind turbines and transmission lines and towers.

Getting renewable energy from generator to depot

As Australia's bus depots transform to station zero-emissions buses, we will require a nationally coordinated electricity grid upgrade. The federal and state governments must develop a long-term national depot upgrade strategy to identify sites that should be electrified first based on energy availability and grid connection opportunities. Next, a feasibility study can show the potential order and locations requiring urgent action to upgrade the grid, plus associated transmission requirements.

There is some spare capacity for upgrades across certain parts of our electricity grid, but more investment will be required to cover the entire grid. New transmission towers, poles, and wires have long been a contentious issue for regional and metro communities alike. Again, building social license is key.

Government funding and long-term planning are vital to give the bus industry the confidence it needs to invest in transitioning depots and fleets to zero-emissions technologies. Australia needs a comprehensive national plan that includes:

- Enabling renewable energy to flow to depot charging points: Australia has 40,000 km of electricity transmission lines and cables, but expanding this distribution capacity is hindered by lengthy planning processes, community opposition, and rising construction costs. The Australian Energy Market Operator (AEMO) published an Integrated System Plan outlining the lowest-cost pathway for energy generation, storage, and transmission infrastructure to meet consumers' needs for secure, reliable,

and affordable energy and achieve net zero-emissions targets. It provides a comprehensive roadmap for the national production of electricity for the next 20 years.[30]

- **Government funding for bus depots:** Given the substantial cost of upgrading depots, it is essential that governments support industry to make the transition. A strong example is the Transgrid/Zenobe joint venture in Leichhardt to power Australia's largest single fleet of electric buses – installing the infrastructure needed to support 40 electric buses with batteries, stationary storage, depot conversion, and charging. The project appropriately received strong financial support from the Federal Government[31] via ARENA and the Clean Energy Finance Corporation (CEFC).[32]

The BIC Council has established an Energy and Infrastructure Group to work with governments and energy distribution companies to identify the energy supply needed to transition Australia's buses and coaches to zero-emissions. In the meantime, we agree with the Australian Government that low-emissions technologies – such as renewable and low carbon fuels – must continue to play an important role.

Hydrogen fuel-cell buses will require the development of hydrogen refuelling infrastructure. Each refuelling station may cost over $5 million. The bus industry also plans to build and operate hydrogen production and storage infrastructure. These initiatives will require targeted government financial support and assistance in streamlining regulatory approvals.

Australia's approach to rolling out charging and refuelling infrastructure is currently piecemeal, with regulations and investment varying by state and territory. Our country will benefit from a unified national strategy, with significant government investment in charging and refuelling infrastructure.

Support for supply chain and manufacturing

Our zero-emissions bus supply chain is under pressure. Bus operators seeking to run vehicles powered by electricity report lead times of years to upgrade power infrastructure. Operators also report that some providers are unable or unwilling to commit to necessary upgrades at any price. The way infrastructure providers are funded and the length of time they are funded for remain impediments to the transition. If vehicle and infrastructure procurement can be reformed so that our manufacturers can optimise efficiency it will enable us to roll out the volume of zero-emissions vehicles needed.

The Australian Government must provide appropriate support to the supply side of the bus industry so that the supply chain is capable of delivering the required number of zero-emissions buses – and the refuelling and charging infrastructure – that the bus industry needs to transition.

Already, the Victorian state government has had to push out its previously mandated deadline for cessation of new diesel bus sales from the original 1 July 2025 deadline, now allowing delivery out to 2028 provided orders are placed before the original 1 July 2025 deadline. States are struggling to roll out zero or low emission buses because of the cost and lead times for infrastructure and an unwillingness to fund solutions other than battery electric vehicles.

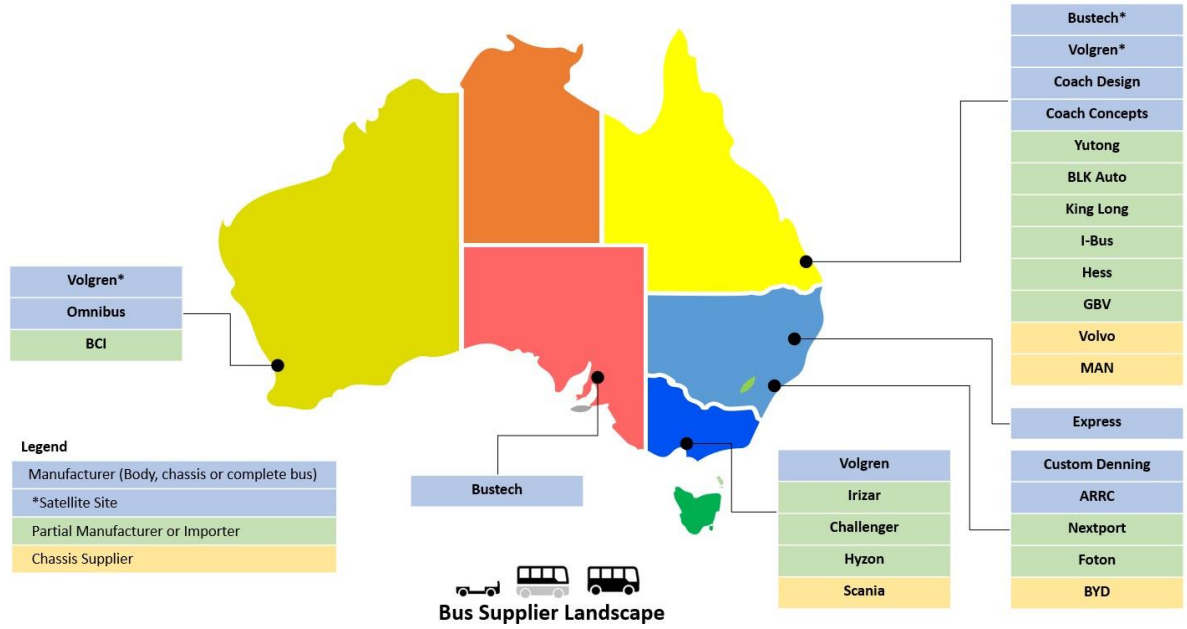
Federal policy needs to support the entire current supply industry through local content policy – including for manufacturers, assemblers, importers, and component suppliers –

[30] AEMO ISP 2024: A roadmap to net zero. (March 1, 2024). AEMO's Draft 2024 Integrated System Plan
[31] Transgrid. (October 21. 2021). Sydney's Big Step to Clean Energy: Largest Electric Bus Fleet.
[32] Amalyah Hart. (January 10, 2023). Australia's biggest electric bus depot offers solar and battery blueprint for future.

ensuring fairness across the industry. There are 11 factories across Australia that assemble, design, and manufacture vehicles, with more to come. We must support the whole industry – as it is today – in order to further grow it. This could include a sensibly calibrated mandate for national local content.

We also need harmonisation of standards and specifications for the manufacture of buses across Australia. This would ensure that jurisdictions agree on the same type of specifications for components and localise their production where possible. It could generate economies of scale and drive domestic volumes, creating local manufacturing opportunities and making us less reliant on international supply chains.

Chart 5: Australian Bus Supplier Landscape



Manufacturers, Chassis Suppliers, Bodybuilders, Complete buses, Importers

Allow the market to choose the right technologies

The right technology depends on the type of bus, the route, infrastructure access, and regional climate.[33] Electricity and hydrogen are not always the best solutions, due to cost and infrastructure requirements. Governments should not attempt to pick winners.

The selection of zero-emission technology is highly dependent on specific circumstances. If there is adequate green power and infrastructure, electric vehicles become a viable option. The decision between technologies should be tailored to the vehicle's operational needs, particularly considering the speed and distance of its routes. For instance, stop-and-go city routes at lower speeds consume less energy, whereas operations at speeds above 80 km/h significantly increase energy consumption. Thus, choosing between electric technologies should be informed by the specific tasks the vehicle is expected to perform.

The BIC recommends that a first step would be to prioritise the replacement of all vehicles that are below Euro V. This has cost/benefit advantages over a blanket zero-emission bus rollout. There is also a substantial safety by-product, with newer buses offering safer technologies for passengers and drivers.

[33] Bus Association Victoria. (n.d). Transitioning Victoria's bus industry to zero-emission buses.

We agree with the Australian Government that renewable liquid fuels like biodiesel and renewable diesel will play a critical role in our journey towards zero-emissions.

> 'There will still be a role for many years to come for Low Carbon Liquid Fuels in the heavy vehicle industry, including renewable diesel and biofuels.'
>
> – Catherine King, Minister For Infrastructure, Transport, Regional Development And Local Government

Governments worldwide are offering technology-agnostic subsidies to push their local industries towards electrification targets. In Australia, the quality of collaboration among government, operators, and suppliers will determine the pace of adoption.

Risks of mandating technologies and timelines

The risk to jobs

85,000 Australian workers rely on the bus industry for their livelihood. If the transition to zero-emissions for buses is mandated on aggressive timelines, or with a lack of coordination, or if particular technologies are mandated even though they may not be the best for the task, Australia risks serious disruption to the industry and workers.

The bus industry adds nearly **$10 billion** annually to our economy. Including companies like parts suppliers, up to **40** local and international companies are involved in bus assembly in Australia.[34] Rushing the transition or mandating specific technologies will mean higher costs that will lead to the closure of businesses and the loss of jobs throughout the bus supply chain. Over the past 12 months, Mercedes Benz, Hino, and Ebusco have closed or paused operations in Australia due to higher costs, the weight of regulation and state government procurement policies.

The risk to community safety

Australia should gradually and carefully roll out zero-emissions technologies to ensure the safety of Australian workers and passengers. Safety must be paramount and should be verified by industry experts at every decision point before broadening the use of these technologies further. To ensure a safe transition to zero emission buses, the following steps are essential:

- **Train first responders:** It is crucial to consider the input of first responders, such as fire departments, before broadly implementing new zero-emissions technologies. Fire departments must be highly trained in the safest way to approach incidents involving zero-emissions vehicles to ensure the safety of personnel and the public. Training programs must be nationally harmonised.
- **Bus-specific safety policy:** Australia must adopt a 'bus-specific' policy rather than relying on generic 'heavy vehicle' factors. This is vital to enhancing passenger safety by ensuring a comprehensive understanding of technical issues related to the construction, operation, and maintenance of zero-emissions buses specifically.
- **Relevant regulations for Australia:** We must continue to update the Australian Design Rules and Heavy Vehicle National Law to include practical provisions on safely designing and operating buses with zero-emission technologies. This is not only for safety but also

[34] Bus Industry Confederation, Bus Manufacturing - 2020 Fast Facts.

to accommodate the specific requirements of each technology – such as allowances to carry the higher weights/masses associated with zero emission technologies.

It is critical that state standards and regulations mirror their federal counterparts. While there is currently a lack of such harmonised regulations – especially for fuel cell electric vehicles – the BIC is producing three industry advisories referencing appropriate international regulations to assist our industry and government.

Australia needs a nationally harmonised policy framework

The BIC recommends that the Australian Government work through National Cabinet to collaborate with state and territory governments on establishing a harmonised framework allowing bus industry participants to operate seamlessly across the country. Unified policy settings across the country would support the development of a safe, efficient, and technically successful energy transition along a number of dimensions, including the following priorities:

Upskilling Australian workers and building social license

New technologies mean new jobs. Whether its dealing with high pressure gas, high voltage, or high-tech charging infrastructure, we will need acceptance of these new technologies by our workforce. Zero emissions vehicles drive differently and our drivers will need to be trained in driving these vehicles.

The transition to electric buses brings a once-in-a-century opportunity to build a new class of skills across the bus supply and operations chain. We must expand our workforce's knowledge of issues like safety protocols, charging capabilities and technical repairs. We will need to sure-up local expertise in every community to enable prompt and skilled servicing of bus fleets. Workers must be trained in how to carefully operate, maintain, and repair electric vehicles, as well as how to produce, handle, store, and use hydrogen.

As we grow the share of green energy on the grid, it is likely that up to **168,000** workers will need training in the new skills required for both vehicles and infrastructure.[35] The BIC has already invested in partnering with vocational education providers, like Ausmasa (the Mining and Automotive Skills Alliance) and the state TAFE system to establish training for battery electric technologies and similar training is under development for fuel cell electric.

Harmonisation of state-based programs is essential; otherwise, the BIC needs to duplicate its efforts up to 8 times for different states and territories in Australia.[36] Government must look to industry to support this workforce transition path, not reinvent the wheel.

Australian governments and industry must earn 'social license' from the community for a wide-scale rollout of zero-emissions technologies for buses. Bus drivers are the face of our industry so they must understand the benefits of zero-emissions buses, support their introduction, and be able to explain their benefits to the public. Communities will need to accept the build-out of renewable generation infrastructure, as well as transmission and distribution infrastructure.

The BIC recommends a nationwide government-funded education campaign to build support for zero-emission technologies. The education campaign could highlight the

[35] Rob Kelly. (February 2023). Accenture. Australian Industry Energy Transitions Initiative.
[36] Transgrid. (August 8, 2023). How upskilling Australians could be the game-changer in accelerating our clean energy transition.

advantages of transitioning to cleaner buses – for both the community and the economy – including the number of clean energy jobs that will be created. Australia must gain the trust and backing of the community, including bus workers and passengers, by bringing them along on the journey towards zero-emissions.

Nationwide infrastructure rollout

Australia needs a harmonised plan to build a nationwide infrastructure network that can seamlessly integrate electric buses into the existing transport system. Australian Government funding could be deployed to fund infrastructure projects, while approval processes related to land use and zoning are streamlined. It is critical that state & territory approaches to these issues are unified – Australian rail productivity is still complicated by significant variations in the width of rail gauges that were laid up to 150 years ago. Whole-of-government solutions are also needed to streamline planning approvals, with priority given to projects that deliver reduced transport emissions.

National industry power purchase agreement

A national industry power purchase agreement (PPA) would allow the bus industry to buy energy in bulk, offering the potential for more stable and possibly lower energy costs. By securing electricity through bulk purchases, the bus industry could more effectively manage the power demands of charging infrastructure for zero-emission buses. Governments could help to facilitate the development of such a PPA.

Recommended next steps

Establish an Office of National Heavy Vehicle Industry Coordination

The Australian Government should fund a new Office of National Heavy Vehicle Industry Coordination (ONHVIC) to facilitate the development and implementation of a National Heavy Vehicle Transition Plan harmonising the nation's regulations and guiding the investments needed for the heavy vehicle industry to lead the energy transition. This would include a national heavy vehicle manufacturing plan and long-term procurement roadmap, which would clearly identify the timing and scale of procurement by state and territory governments.

ONHVIC could convene members from the heavy vehicle industry, scientists, academics, and educators, and would be tasked with delivering a detailed Transition Plan that the Australian Government could, with its amendments, present to National Cabinet. The ONHVIC would work closely with state and territory governments, manufacturers, industry peak bodies, unions, and research organisations.

The Transition Plan could then be formalised in a Memorandum of Cooperation (MoC) between the Australian Government and the States & Territories.

The Australian Government could tie future federal grants that are negotiated with the states and territories to commitments that those jurisdictions will implement this unified national framework for energy transition for the heavy vehicle industry.