

**Submission  
No 25**

## **EMISSION FREE MODES OF PUBLIC TRANSPORT**

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Transport  
for NSW

# TfNSW submission

Legislative Assembly Committee on Transport and  
Infrastructure

*Inquiry into Emission Free Modes of Public  
Transport*

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OFFICIAL

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# Introduction

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The transport sector accounts for approximately 20 per cent of the greenhouse gas emissions in NSW. This includes emissions from cars and light vehicles, medium and heavy trucks, aviation, shipping and public transport. Transport for NSW (TfNSW) has a key role in leading and influencing the entire transport sector to reduce emissions.

Under the Future Energy Strategy, TfNSW is committed to securing transport energy needs from sustainable sources and supporting the transport sector's transition to net zero emissions by 2050. The TfNSW sustainability vision is to create a State where every journey is people and planet-positive.

The Strategy aims to reduce emissions through actions such as:

- transitioning the state's 8000-strong public bus fleet to zero-emission buses powered by net-zero energy
- transitioning the electrified rail network, including Light Rail, to net-zero electricity by 2025
- increasing the TfNSW electric passenger vehicle fleet and adopting digital technologies to improve services while achieving operational efficiencies.

TfNSW is developing a Net Zero Cities Action Plan. This will provide a spatial lens to city-wide, precinct-level, neighbourhood and household opportunities to move towards net zero emissions. The Net Zero Cities Action Plan complements core transport initiatives by promoting precinct-level projects and targeted infrastructure to encourage electric vehicle uptake and active transport solutions. The Plan will support the NSW Government's broader commitment to reduce emissions by 50 per cent by 2030, and to achieve net zero emissions by 2050.

TfNSW is also exploring several emerging technologies which may enhance public transport modes and the integrated transport network. Advances in technology, including batteries, hydrogen fuel cells and electric trains, are likely to result in the emergence of zero emission alternatives in most transport modes in the medium to long term. TfNSW will continue to collaborate with researchers, industry and other jurisdictions to understand emerging technologies and how their integration may enhance or complement existing modes of public and private transport.

More broadly, the NSW Government is committed to supporting liveable communities, healthy environments, and the NSW economy by reducing the adverse effects of air pollution on human health. The NSW Government Clean Air Strategy 2021 outlines five priority action areas for mitigating community exposure to poor air quality including 'cleaner transport, engines and fuels'. The Clean Air Strategy integrates with other major strategies, including the Net Zero Plan, Hydrogen Strategy, Future Transport Strategy and Electric Vehicles Strategy and highlights key actions for reducing harmful emissions. The Clean Air Strategy also commits to integrating air quality into future strategic transport decision making, including strategies to support electric and hydrogen vehicles.

## **(a) The capacity and capability for industry to provide emission free modes of public transport**

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### ***Zero Emission Buses***

TfNSW is currently planning for the full fleet transition of diesel and compressed natural gas public transport buses, to zero emissions technology across the State. At present, around 120 buses across the State are zero emission buses.

Insights from industry consultation are helping determine the best pathway for transitioning to an emission-free public bus fleet. Industry analysis has shown that the current range of battery electric buses will allow for zero emission buses to replace existing diesel or compressed natural gas buses across Greater Sydney routes with some operational adjustments. In regional NSW, alternate zero emissions technology, such as hydrogen, or battery range advancements, may be required to enable a one-for-one bus replacement.

Key requirements to enable a successful transition of the bus fleet include:

- Specification diversity of zero emission buses to suit various operational needs and environments across NSW
- Accessible and adequate supply of renewable energy sources
- Skilled staff to operate and maintain the new zero emission buses
- New and upgraded infrastructure to support the new technology
- Sustainable approach to the retirement of existing diesel and compressed natural gas public transport buses.

As part of the transition to net zero emission technology, the state's first trial of a hydrogen-powered electric bus will begin on the Central Coast later this year. The NSW Government is partnering with local and national industry suppliers to test the future fuel source and identify the most suitable form of zero emissions technology and infrastructure for use in regional and outer metropolitan areas of the state.

### ***Sydney Light Rail***

The Sydney Light Rail, consisting of the Inner West Light Rail (L1 Dulwich Hill) and CBD & Southeast Light Rail (L2 Randwick and L3 Kingsford) aims to transition to net zero emissions for its electricity usage by 2025 in line with TfNSW's Future Energy Strategy.

Several initiatives are being investigated by the operator to reduce electricity consumption, such as augmenting solar panels, which have already been installed at the Pyrmont Light Rail Depot and offices, along with Randwick and Lilyfield depots, and replacing halogen with LED lighting at stops and offices.

### ***Sydney Trains and NSW TrainLink***

Sydney Trains has committed to reducing its rate of energy consumption by at least 10 per cent by 2025, through solar energy installations, lighting upgrades and improvements in train operations.

Sydney Trains and NSW TrainLink have offset their electricity use from FY21/22, equating to approximately 708,203 tonnes of CO<sub>2</sub>-e each year and reducing the Sydney Trains' total emissions footprint by 98 per cent.



As of July 2021, all NSW TrainLink (NSWTL) operated stations and electric rolling stock are powered by renewable energy. In 2022-23, NSWTL will continue to work to develop a pathway to achieve net zero emissions for the regional rail and coach operations by 2050, in line with the TfNSW target.

The new regional rail fleet will be bi-modal – able to operate on both electricity and diesel. It will operate with renewable energy once the rolling stock enters the Sydney Trains electrified network.

Sydney Trains has achieved net zero emissions through the addition of renewable energy certificates to the base electricity contract.

Sydney Trains has also procured 60 per cent of ongoing renewable requirements to the end of 2030. A tender process to maintain the net zero position from July 2024 to the end 2030 for the remaining 40 per cent of renewable requirements has recently been completed.

## ***Sydney Metro***

The Sydney Metro network is powered by electricity, with only minor and intermittent emission of fuel combustion products in maintenance activities and maintenance vehicles. Reducing and offsetting greenhouse gas emissions associated with the use of electricity is a key focus area for Sydney Metro.

In terms of greenhouse gas emissions, Sydney Metro has committed to reducing electricity used during operations by embedding energy efficiency initiatives into the design of stations, infrastructure and systems, and incentivising energy efficient operations. Sydney Metro has also committed to offsetting greenhouse gas emissions associated with the electricity used during the operation of its network, so that electricity consumption is carbon neutral. The offsetting commitment neutralises more than 90 per cent of the greenhouse gas emissions associated with operating the Sydney Metro network, with residual emissions being due to minor use of fuels, refrigerants, insulants and maintenance materials.

Since the commencement of operations in May 2019, greenhouse gas emissions associated with the operation of the Metro North West line have been offset by the purchase of renewable energy certificates from the Beryl Solar Farm in Gulgong, NSW.

A similar offsetting strategy is under development for the Sydney Metro projects which are still under construction and have not yet commenced operations – Metro City & Southwest, Metro Western Sydney Airport (WSA), and Metro West.

The Sydney Metro WSA project has committed to achieving Carbon Neutral Service certification under Climate Active, meaning that when operations commence, every trip on the Metro WSA line will be certified carbon neutral.

Sydney Metro is currently developing plans to offset the residual greenhouse gas emissions associated with operating the North West line and those lines which are currently under construction.

## ***Ferry network***

### **Sydney Ferries**

Transdev Sydney Ferries is the operator of the Sydney Ferries. Transdev has committed to reducing carbon impact through the introduction of more efficient ferries and promoting environment sustainability.

Transdev has achieved carbon neutral certification for its business operations and service, including the operation of its fleet of vessels, its CBD administration centre, the Balmain shipyard, and utilities at the Circular Quay, Manly and Barangaroo wharves.

The organisation's emissions reduction strategy focuses on:

- Reducing fuel use in their vessels to reduce the amount of CO2 produced
- Investing in new vessels with cleaner and more efficient engines
- Optimising hull clean frequency, to minimise drag and consumption
- Energy efficiency building options
- Managing waste to maximise recycling and reduce landfill.

### **Electric ferry trial in Darling Harbour**

TfNSW and Manly Fast Ferry, an NRMA subsidiary, have entered into a Collaboration Agreement, to facilitate operation of an electric ferry trial in Darling Harbour. It is understood this service is the first battery-electric ferry to operate a passenger service in Australia.

The trial involves two 16-seater slow speed ferries.

### ***Freight Sector***

TfNSW is currently developing a Towards Net Zero - Freight Emissions Policy. TfNSW will work with government agencies and industry to identify the key actions TfNSW can take to support the freight industry to reduce emissions, particularly in the road and rail freight transport sectors.

TfNSW is also working on refreshing its Heavy Vehicle Access Policy Framework to support access for high productivity vehicles.

Moving more freight with less vehicles offers productivity, safety and economic benefits as well as environmental benefits from reduced fuel and tyre use.

## **(b) Benefits and costs to taxpayers**

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Net zero initiatives across the transport sector are expected to lead to improved public health and broader socio-economic benefits. Without intervention, emissions from transport will continue to rise as the NSW population and economy grow with great cost to future generations.

### ***Zero emission bus benefits***

While the purchase price of a new zero emission bus is approximately 30 to 50 per cent higher than the diesel equivalent, there are indications that zero emission buses have lower whole-of-life costs when both operational expenditure and capital expenditures are considered. This is expected to continue to improve with advancements in battery technology and increase in bus production.

With the inclusion of economic externality values in cost-benefit analyses, the benefits from zero emission buses are further strengthened. A transition to zero emission buses will result in the following socio-economic benefits for the NSW community:

- Significantly lower and avoided greenhouse gas emissions from public transport
- Improved air quality and human health outcomes
- Reduced energy and resource consumption
- Reduced noise, especially in local neighbourhoods and around bus stops
- Quieter, smoother and more comfortable bus journeys for customers
- Skills growth in emerging technologies and potential boost to the NSW economy and regional industry development
- An opportunity for improved amenities and social benefits around bus depots
- Smarter technology for bus operations
- Lower life-cycle operating costs of battery electric buses compared to diesel buses.

Further economic benefits of a large-scale transition to a zero-emission bus program include:

- Potential to leverage vehicle-to-grid capabilities of electric vehicles to act as virtual power plants, which will significantly support grid firming and grid decarbonisation, and will likely provide additional sources of revenue for electric vehicle owners
- Supporting investment and availability of electric vehicles, electric vehicle infrastructure, and local supply chains
- Signalling increased long-term, large-scale market demand for green energy, which will further incentivise investment in grid decarbonisation, and support NSW's transition to net zero emissions
- Reducing risks from potential supply disruptions and security of imported petroleum and other vehicle fuels.



## **(c) The opportunities for, and impact to, local manufacturing operations**

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### ***Local zero emission bus manufacturing***

As part of the 2022-23 Budget, the NSW Government committed \$218.9 million over seven years to support the transition to a low-emission bus fleet. This builds on the \$70m announced previously. The funding will go towards electrical grid upgrades at 11 depots in Greater Sydney, construction of a new depot and initiating the procurement process of approximately 1,100 electric buses and renewable energy infrastructure to charge the buses. Furthermore, the NSW Government will set aside almost \$2 billion to contribute to the zero-emission bus transition and to invest in local jobs, subject to consideration of a final business case, ensuring the State has a fully transitioned fleet by 2047.

This investment will help stimulate the local manufacturing and renewable energy industries and provides an opportunity for local component supply and workforce skills development. Regional NSW has world-class modern manufacturing, minerals and agriculture and is home to the skills, infrastructure and resources needed as the demand increases for low emissions technologies like batteries and hydrogen. The entire state will benefit from the economic and employment opportunities in low carbon technologies.

In consultation with other Australian transport authorities and suppliers, the project is developing a 'Local Content Framework', which will help with understanding the following:

- Local content definition and measures
- Supplier benchmarking
- Cost and schedule implications for incorporation of local content
- Approach for inclusion of local content targets in bus tender documentation, to ensure a fair and equitable bus procurement process.

Opportunities for new social enterprises, improved diversity within the bus and construction industries and greater participation from our Aboriginal community are also being explored as part of the project.

Western Sydney based company Custom Denning was recently awarded a contract to design, manufacture and assemble 79 new electric buses destined for the Inner West region of Greater Sydney. This is in addition to the current order being finalised for 22 new electric buses.

Under the current Bus Procurement Panel, six of the new prime bus suppliers have subcontracting arrangements in place with Custom Denning. Private bus operators have ordered one hundred and thirty-one buses through the Custom Denning sub-contractor bus prime arrangements.

In addition to supporting local jobs and innovation, locally made buses allow for ease of access to the manufacturer for any repairs or replacement parts.

### ***Parramatta Light Rail Stage 2***

TfNSW is investigating Australian manufacturing opportunities in the Parramatta Light Rail Stage 2 Final Business Case.

Briefings are being held with experienced local manufacturers, to understand their capacity and capability to provide rolling stock and equipment locally.

## (d) Other jurisdictions that have emission free modes of public transport

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Approximately 17 per cent of the world's buses are estimated to be electric. Many European cities have launched small e-bus fleets to gain experience with zero emission bus operations. In the US, 2,800 zero emission buses were delivered or on order in 2020, which represents a 24 per cent increase from the year prior.

Across Australia and New Zealand, jurisdictions have made commitments to transition their fleet or to introduce trials for zero emission buses. The global trend towards zero emission buses indicates market confidence and a surging marketplace for this emerging technology.

### ***National Low and Zero Emission Vehicles Work Plan***

To support the uptake of Low and Zero Emission Vehicles (LZEVs) in Australia, Infrastructure and Transport Ministers agreed on the National LZEVs Work Plan in 2020. The Work Plan commits the Commonwealth and States and Territories to a series of actions to address the following key challenges impeding the uptake of LZEVs in Australia:

- leadership
- infrastructure availability
- upfront purchase costs and model availability
- a lack of public information.

The delivery of the Work Plan is overseen by a national working group, comprised of representatives from the Commonwealth, States and Territories.

### ***Zero emission bus projects across Australia***

**Transport Canberra (Australian Capital Territory):** The ACT Government will commence the procurement of zero emission buses, subject to the findings of the market soundings. The first of the 90 buses are expected to start operation in 2021/22 with the remainder to be delivered no later than 2024.

The ACT Government advises it is aiming to achieve a complete 560 zero emission bus fleet by 2040. The ACT Government action plan includes a delivery and interim infrastructure solution for the first tranche of zero emission buses, completing a depot feasibility study to identify the timing and scope of future needs, building a new zero emission bus depot by 2026, and converting remaining depots to zero emissions.

**Department of Transport and Main Roads (Queensland):** The Queensland Government has announced all buses purchased by 2030 will be zero emission buses. Private bus operator TransLink has committed to fund a complete zero emission bus fleet from 2025 in South-East Queensland and between 2025-2030 across regional Queensland. Several electric bus trials have been announced, including 10 new electric buses to be operated in South-East Queensland in 2021.

**Public Transport Victoria (Victoria):** From 2025, all new buses in Victoria will be zero emission buses. Zero emissions across the State's 4,000-strong bus fleet is critical to Victoria meeting its legislated commitment of zero net emissions by 2050.

As part of a three-year trial of electric buses, five Victorian bus operators were selected to trial 41 electric buses on existing bus routes. Most of the electric buses being introduced through the trial are being built in a local manufacturing facility, supporting local jobs and skills development, and helping to build Victoria's engineering, design and manufacturing expertise in emerging technologies.

**Adelaide Metro (South Australia):** The South Australian Climate Change Action Plan (2021-25) includes a commitment to transition the State's entire public transport fleet to low and zero emissions vehicles powered by hydrogen and battery-electric technologies.

**Transperth (Western Australia):** The Western Australian Government has announced battery-electric buses and a high-voltage EV charging system for the bus depot on one of its services from early 2022.

### ***Global zero emission bus initiatives***

**Transport for London (United Kingdom):** More than 650 zero emission buses joined the Transport for London bus network of 9,000 buses as of February 2022, with Transport for London aiming to convert the entire fleet to zero emission by 2034.

**Il de France (Paris):** The Paris public transport network is pursuing the target of converting its 4,700 bus fleet to low and zero emission buses by 2025. Il de France, TfNSW's equivalent in Paris, requires that Contracted Bus Services have two thirds of the bus fleet electrically powered and the remaining one third biogas powered by 2025.

**Germany:** BVG, the public transport operator in Berlin, is required to electrify their current fleet of 1,500 buses to zero emission by 2030.



## **(e) Any other related matters**

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### ***Bus depot ownership and zero emission buses***

The transition to electric buses requires infrastructure upgrades to bus depots and other strategic locations, to provide sufficient power to site to incorporate electric charging units.

Zero emission bus operations require capital investment in depot infrastructure where the asset life is beyond typical contract terms. In the 2022-23 Budget, the NSW Government has committed \$218.9 million over seven years for transitioning to a low-emissions bus fleet. This builds on the \$70m announced previously. It will go towards converting 11 depots in Greater Sydney to allow for the operation of batteries for electric buses and the construction of one new depot.

### ***Emerging Technologies***

TfNSW is exploring and investing in several emerging technologies which may enhance public transport modes and the integrated transport network. Many of these initiatives are being delivered in strong collaboration across government agencies and industry.

### **Electric Vehicles**

The NSW Government has introduced several initiatives to increase the uptake of electric vehicles (EVs):

- removing stamp duty
- introducing a \$3,000 rebate on eligible EV purchases
- transitioning the Government passenger fleet procurement to EVs by 2030
- Investing in a world class EV charging network
- Implementing changes to legislation to allow EVs to be driven in transit lanes, such as T2 and T3 lanes
- Promoting mining and processing of EV battery minerals.

TfNSW is working on several charging infrastructure programs to help the EV transition including:

- A \$20 million program targeted in or near commuter car park and other popular TfNSW sites
- Up to 23 EV fast chargers in regional NSW in partnership with NRMA
- New commuter car parks with EV charging capabilities at Rooty Hill, Leppington and Edmondson Park train stations
- TfNSW transitioning its own corporate passenger fleet to EVs by 2030.

These initiatives will allow more people to benefit from the cheaper running costs associated with EVs and a cleaner, quieter, and more sustainable broader transport network. Investment in EVs will also build capacity and capabilities across NSW, with greater investment in manufacturing, training, operations, maintenance and repairs.

## Hydrogen

The NSW Government released the NSW Hydrogen Strategy in October 2021, with a goal to attract investment, reduce the cost of hydrogen, and drive decarbonisation in sectors including transport.

TfNSW is exploring the potential role of green hydrogen as a fuel source, particularly for heavier transport use cases where battery electric technology may not effectively meet operational requirements.

While largely proven as a technology, current deployments of hydrogen vehicles have been small scale and in limited applications. The industry is maturing rapidly and initiatives such as the NSW Government Hydrogen Hubs and Hume Hydrogen Highway will support the establishment of green hydrogen production and refuelling networks to enable larger scale deployments.

TfNSW has partnered with the NSW Office of Energy and Climate Change (OECC), local bus manufacturer ARCC, Central Coast bus operator Red Bus, and Origin Energy to trial the state's first hydrogen-powered electric bus on the Central Coast later this year. The trial will provide learnings of how hydrogen buses perform in local conditions, as well as the infrastructure needed to support them. Trial results will be compared against battery electric buses to understand any key differences, including fuel economy and refuelling times.

To capitalise on government and industry-based net zero strategic initiatives, TfNSW has led an initiative to assess and test the use of hydrogen fuel cell technology for rolling stock in NSW.

TfNSW is also future proofing the design of all of its Highway Service Centres to include EV and hydrogen fuel requirements.

## New and enhanced modes of transport

TfNSW will continue to collaborate with researchers, industry and other jurisdictions to understand emerging technologies and how their integration may enhance or complement existing modes of public and private transport. Examples of emerging modes of transport which could play a future role in the NSW transport network include:

- Connected and automated vehicles, which are likely to be electric and may enable sustainable delivery of transport services. TfNSW is currently working with other jurisdictions to develop and implement a national regulatory framework to enable the safe commercial deployment and operation of these vehicles.
- Electric aviation, with various electric and hydrogen aircraft types likely to complement and extend current intrastate aviation networks.
- Electric micro mobility, including e-scooters and e-bikes to reduce congestion on our road network.