

**Submission  
No 18**

**ELECTRIC BUSES IN REGIONAL AND METROPOLITAN PUBLIC  
TRANSPORT NETWORKS IN NSW**

**Organisation:** Local Government NSW

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# **Draft LGNSW Submission on *Electric Buses in Regional and Metropolitan Public Transport Networks in NSW***

December 2019

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## 1. Opening

Local Government NSW (LGNSW) is the peak body for local government in NSW, representing NSW general purpose councils and related entities. LGNSW facilitates the development of an effective community-based system of local government in the State.

LGNSW welcomes the opportunity to make a submission to the NSW Legislative Assembly Committee on Transport and Infrastructure Inquiry into Electric Buses in Regional and Metropolitan Public Transport Networks in NSW.

This is a draft submission awaiting review by the LGNSW Board. Any revisions made by the Board at that time will be forwarded to the Committee in the form of an updated submission.

## 2. Background

The NSW Legislative Assembly Committee on Transport and Infrastructure has established an Inquiry into Electric Buses in Regional and Metropolitan Public Transport Networks in NSW. The Committee is seeking public feedback about the benefits of electric buses and factors that may limit their wider uptake. The Committee's terms of reference are at Attachment 1.

The latest data from the Australian Department of Energy shows that the transport sector produces around 21 percent of the total greenhouse gas emissions in NSW annually<sup>1</sup>, or around 27.5 million tonnes of carbon dioxide equivalent (CO<sub>2</sub>-e). As a result, there is a strong argument for transitioning the NSW public transport bus fleet from primarily diesel and natural gas to electric. This is why LGNSW welcomes the NSW Government announcement that it is seeking to shift Sydney's entire bus fleet of 8,000 buses to zero emissions in the next round of tendering for public transport contracts.<sup>2</sup>

While it makes sense to start with the Sydney-based bus fleet, LGNSW also supports the equitable rollout and distribution of these solutions to rural and regional areas. Rural and regional areas are invariably disadvantaged by inferior public transport solutions and the slower distribution of newer transport technologies. We strongly urge the inquiry to investigate ways in which a similar strategy can be adopted, at least in major regional towns and cities.

## 3. LGNSW and ALGA Advocacy Priorities

This submission aligns with current LGNSW and the Australian Local Government Association (ALGA) Advocacy Priorities.

LGNSW [Policy Platform](#) (June 2019) details three Position Statements relevant to this submission. These are:

- Position Statements 10 (Climate Change) and 11 (Sustainability) which are both focused on reducing carbon emissions and identifying sustainable solutions; and
- Position Statement 4 (Services in Rural Communities) which includes providing improved services to rural communities as well as enabling innovative approaches to public transport.

ALGA's 2019 Federal Election Initiatives<sup>3</sup> details two ways to deliver for Australian communities relevant to this submission:

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<sup>1</sup> <https://climatechange.environment.nsw.gov.au/About-climate-change-in-NSW/NSW-emissions>

<sup>2</sup> <https://thedriven.io/2019/10/28/nsw-transport-minister-wants-all-of-sydneys-8000-buses-to-go-all-electric/>

<sup>3</sup> <https://alga.asn.au/alga-2019-federal-election-initiatives/>

- Initiative 4 calls on the federal government to 'Promote equitable access to community services' which includes innovative and increased access to public transport services;
- Initiative 6 calls for the government to 'Support communities with their climate response' which aligns with the expected environmental benefits from introducing electric buses.

**Recommendation 1:** That the Committee recognises the importance of equitable access to public transport services in regional NSW and investigates the feasibility of electrifying bus fleets in regional and rural NSW to ensure fair distribution and access to new, more sustainable transport technologies.

#### LGNSW position on sustainable transport and carbon emissions:

In 2017, LGNSW noted the importance of prioritising energy performance of the government bus fleet in our submission on the Environmental Future Funding Package<sup>4</sup>:

The NSW Government's aspiration for reducing carbon emissions from its transport fleet is supported. However, this should not be limited to passenger and commercial vehicles. Energy consumption of recently procured rail rolling stock does not appear to have been a consideration. This leaves NSW with a long legacy of poor energy performing rolling stock given its long asset life. Consideration of the energy performance of the government bus fleet should also be a priority.

Additionally, a resolution of the 2018 LGNSW Annual Conference<sup>5</sup> (Resolution 59 on Climate Change) calls on the NSW Government to:

...deliver on their climate change policy framework and develop programs with tangible outcomes to meet the aspirational long-term objectives of achieving net-zero emissions by 2050 and a community more resilient to a changing climate.

**Recommendation 2:** That the Committee consider investigating (possibly at a later date) the introduction of low to zero emissions public transport solutions for other transport modes, including heavy rail, to help meet the aspirational long-term objective of net-zero emissions by 2050.

## **4. The Benefits of the Introduction of Electric Buses into the Public Transport Fleet**

The benefits of moving to a zero-emissions bus fleet are primarily environmental, but also include improved passenger comfort, reduced noise impacts on communities, as well as total cost of ownership when considered over the long term.<sup>6</sup>

Environment Benefits: China is acknowledged as the most prolific adopter of electric bus fleets globally. This is because of the significant problem that Chinese cities face with harmful fossil fuel emissions combined with government incentives to increase the uptake of technologies to combat this. It is estimated that its electric bus fleet will have saved the equivalent of 98.55

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<sup>4</sup> [https://www.lgnsw.org.au/files/imce-uploads/122/Submission\\_Environmental\\_future\\_funding\\_package.pdf](https://www.lgnsw.org.au/files/imce-uploads/122/Submission_Environmental_future_funding_package.pdf) (page 3)

<sup>5</sup> <https://www.lgnsw.org.au/files/imce-uploads/90/LGNSW-2018-Annual-Conference-Carried-Motions.pdf>

<sup>6</sup> <https://www.wired.com/story/electric-buses-havent-taken-over-world/>

million barrels of diesel by the end of 2019.<sup>7</sup> This equals a saving of over 42 million tonnes of CO<sub>2</sub>-e. The Chinese experience of the environmental benefits of electric buses is supported by a 2018 US study that found electric buses are 2.5 times cleaner in terms of lifecycle emissions than diesel buses.<sup>8</sup>

Improved Passenger Comfort and Reduced Noise for Communities: One of the highlights of riding on electric buses over traditional diesel or internal combustion engine (ICE) buses is the significantly reduced noise and vibration. This results in a more comfortable commute for passengers which studies have shown<sup>9</sup> report that they find the experience of travelling on an electric bus significantly more comfortable as a result. Secondly, communities also report significantly improved amenity due to the reduced noise, particularly those that live in close vicinity to bus stops who have otherwise reported sleep disturbances from ICE bus noise.<sup>10</sup>

Reduced Total Cost of Ownership: The implementation costs for electric bus fleets are high in the initial phase, which can be problematic. This is because it is not just the purchase cost of each electric bus that must be factored in, but the cost of setting up an entire system to support such an electric bus fleet.<sup>11</sup> Additionally, the cost of batteries that power these buses has also been high to date, while the technology is still being refined. However, recent studies have shown that once the initial set up costs have been factored in, as well as the overall extended lifespan of electric buses and the ongoing cost reductions in battery prices, electric buses are cost competitive with diesel fleets when total cost of ownership is calculated.<sup>12</sup>

## 5. The Barriers to the Introduction of Electric Buses into the Public Transport Fleet

Barriers to the introduction are not inconsiderable and due planning and consideration needs to be given before transport authorities embark on the replacement of existing diesel fleets. The relatively slower rollout of electric bus fleets more widely provides ample opportunities to learn from electric bus fleets where they have been trialled or implemented around the globe, to better understand their suitability for local operating conditions and any adjustments that need to be made to mitigate potential downsides. Chief among the concerns listed include high initial upfront costs, variability of performance dependent on climatic and topographic conditions, 'range anxiety', and the need to increase renewable energy sources. These are discussed below.

High Initial Upfront Costs: The upfront costs of introducing electric buses compared with diesel buses, can be considerable. Due to the size of the batteries that electric buses need to have fitted, the charging infrastructure needed to support them is more complex and hence expensive than the infrastructure required to set up charging networks for privately owned passenger vehicles. Estimates have put the upfront costs of electric bus fleets to be as much as 40 percent higher than diesel buses.<sup>13</sup> Once invested, however, there is evidence that savings can be found through the reduced maintenance requirements of electric buses,

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<sup>7</sup> <https://singularityhub.com/2019/04/22/chinas-electric-buses-save-more-diesel-than-all-electric-cars-combined/>

<sup>8</sup> <https://www.smartcitiesdive.com/news/study-quantifies-battery-electric-bus-environmental-benefits/528224/>

<sup>9</sup> <https://www.diva-portal.org/smash/get/diva2:911643/FULLTEXT01.pdf>

<sup>10</sup> <https://www.volvobuses.com/en-en/news/2019/sep/electric-buses-can-address-noise-pollution.html>

<sup>11</sup> <https://www.wired.com/story/electric-buses-havent-taken-over-world/>

<sup>12</sup> <https://chargedevs.com/newswire/new-report-some-electric-buses-are-already-cheaper-to-run-than-legacy-buses/>

<sup>13</sup> <https://nextbillion.net/electrifying-transportation-electric-buses/>

significant savings through zero diesel fuel consumption and the longer life expectancy of electric buses.<sup>14</sup>

Effects of Climatic and Topographic Conditions on Performance: Electric buses achieve optimal mileage in moderate weather conditions. This is because in either cold conditions or hot conditions, electric buses still need to power air conditioning systems in addition to the electric motors that propel them. There have been multiple reports of electric buses suffering from reduced performance including reduced mileage per charge due these factors.<sup>15</sup> This includes considering the local topography, as electric buses can also suffer reduced performance when required to repeatedly climb hilly terrain.<sup>16</sup> The potential challenges will need to be considered in designing and deploying an electric bus fleet to ensure that its specifications will suit the local climate.

'Range Anxiety': A longstanding concern with the adoption of any form of electric vehicle technology has been their mileage range and time required to reach a full charge. This phenomenon known as 'range anxiety'<sup>17</sup> and remains a key factor when considering the procurement of electric bus fleets. Recently, an electric vehicle design and manufacturing company, Proterra, managed to achieve a range of 1,770 kilometres for an electric bus on a single charge<sup>18</sup>. This demonstrates the substantial gains that battery-powered electric buses have made recently. However, in general operation and fully loaded with passengers, the bus will achieve a typical range of around 560 kilometres on a single charge. Barring any climatic and topographical considerations, this would make it more than feasible for operation in metropolitan environments and certainly also in some regional city centres in NSW. Downtime needed to charge buses can be offset by scheduling services to accommodate service for mileage (during the day) and the necessary downtime needed to achieve a full charge (overnight, for example).

Renewable Energy Sources: In Germany, it has been estimated that the impact of electric vehicle growth will require an additional 1 percent of power generation by 2030 and 4 percent by 2050 requiring an additional capacity of 20 gigawatts (GW).<sup>19</sup> Given that most of the power supplied in NSW is produced by either coal or gas power stations, that will undoubtedly have a negative impact on overall emissions offsetting the benefits of moving to electric vehicles, including electric buses. Therefore, to maximise the benefits of introducing electric buses in reducing particulate matter and carbon emissions, consideration should be given to the introduction of renewable energy sources to power electric bus fleets. In fact, Australian research suggests that this is cheaper than many calculate it to be.<sup>20</sup>

## 6. Hydrogen Buses

In relation to the Committee's third term of reference, there may be an opportunity to consider exploring electric buses powered by hydrogen, not just those with batteries that are powered by the grid. There are several European jurisdictions introducing electric buses powered by

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<sup>14</sup> <https://www.eesi.org/papers/view/fact-sheet-electric-buses-benefits-outweigh-costs>

<sup>15</sup> <https://wrirosscities.org/sites/default/files/barriers-to-adopting-electric-buses.pdf>

<sup>16</sup> <https://www.wired.com/story/electric-buses-havent-taken-over-world/>

<sup>17</sup> <https://www.metro-magazine.com/zero-emissions/article/735729/3-things-you-need-to-know-about-electric-buses>

<sup>18</sup> <https://qz.com/1078326/an-electric-bus-just-snagged-a-world-record-by-driving-1100-miles-on-a-single-charge/>

<sup>19</sup> <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-potential-impact-of-electric-vehicles-on-global-energy-systems>

<sup>20</sup> <https://www.busnews.com.au/industry-news/1909/green-energy-for-electric-buses-cheaper-than-thought>

hydrogen fuel cells.<sup>21</sup> Like electric buses using batteries powered by the grid, it is the cost of the upfront infrastructure that would be the biggest hurdle to introducing hydrogen bus technology.

The key advantages of hydrogen powered buses are that they are lighter (as they do not require large batteries) and that they can be refilled, much like diesel buses. This means that they do not need to be out of service for extended periods recharging as do electric buses powered by the grid. The only by-products of hydrogen powered buses are water and steam with zero carbon emissions. The current range of hydrogen powered buses is around 350 kilometres between refills<sup>22</sup> making the technology something that the Committee should consider recommending further investigation in addition to traditional electric bus technology.

**Recommendation 3:** That the committee takes the opportunity to further examine the feasibility of introducing hydrogen-powered buses instead of, or in addition to, battery-powered electric buses.

## 7. Conclusion

LGNSW commends the NSW Government for announcing plans to transition the existing fleet of around 8,000 diesel and natural gas buses in the Sydney public transport fleet to electric in the next few years. Although there are potential drawbacks to the introduction of electric bus fleets, the international experience has shown that potential pitfalls can be avoided with appropriate planning and design that considers the suitability of electric buses for local conditions. Further, the total cost of ownership of electric buses (which continues to improve as the technology is refined) is cost competitive with traditional diesel fleets. The inquiry should also consider examining the recent introduction of hydrogen powered bus fleets in Europe and other jurisdictions. Although newer, and potentially more expensive, there is a growing consensus that hydrogen fuel-cell powered buses (along with similarly powered light vehicles) are ultimately the way of the future.

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<sup>21</sup> <https://www.afr.com/companies/transport/embrace-hydrogen-fuelled-trains-and-buses-20191003-p52xbi>

<sup>22</sup> <https://www.afr.com/politics/transdev-trials-hydrogen-buses-20190321-h1cmfj>



## Attachment 1

### Legislative Assembly Inquiry Terms of Reference

That the Committee on Transport and Infrastructure inquire into and report on electric buses in regional and metropolitan public transport networks in NSW, including:

1. Benefits of electric buses and factors that limit their wider uptake.
2. Minimum energy and infrastructure requirements to power electric bus fleets.
3. Other renewable, emissions neutral energy sources.
4. Ways to support manufacture and assembly of electric buses in NSW.
5. Experience with introducing electric bus fleets in other jurisdictions.
6. Opportunities and challenges of transitioning the entire metropolitan bus fleet to electric.
7. Any other related matters.