Submission No 23

ELECTRIC BUSES IN REGIONAL AND METROPOLITAN PUBLIC TRANSPORT NETWORKS IN NSW

Organisation: Gemilang Australia

Date Received: 20 December 2019

16 December 2019

To Whom it May Concern

RE: Legislative Assembly, Committee on Transport and Infrastructure - Electric Bus Market Sounding

Below is information relating to the submissions sought by the above government body on electric buses, due to close on 20 December 2019.

We have attached a number of documents also, which demonstrate what is outlined below. We are committed to assisting the Australian market to transition to zero emission buses, and as the largest supplier of electric buses into the Australian market, we consider we are leading the way in this space. We are happy to assist where we can.

About Gemilang Australia

Gemilang Australia (**GMLA**) is a 100 per cent Australian owned, private company who is Australia's fourth largest bus body builder. GMLA have been building aluminium frame low floor city and double deck buses for the Australian and New Zealand market since 2010. We have supplied buses to various state governments and many bus fleet operators in Australia. GMLA has also supplied the largest fleet of electric buses in Australia to date, with 23 vehicles currently in operation on the Chinese model BYD K9 electric chassis.

GMLA has assembled an enviable team of engineers, auto-electrical specialists, bus body builders and business professionals covering all aspects of bus design, electrical and control systems integration, quality bus build and management expertise. GMLA's executive team has been involved in the bus industry for over 18 years and has over 100 years combined bus industry experience.

We have delivered city buses to various large and smaller Australian bus operators, and built on almost all major OEM chassis, including:

- 38 x MAN A95 diesel double deck city buses for TfNSW (November 2018)

- 28 x Scania KUB 310 Euro 5 diesel 12.12m low floor city buses for Transit Systems West NSW (2018)
- 50 x Scania KUB 310 Euro 5 deisel 12.12m low floor city buses for Transdev Victoria (November 2019)
- 4 x BYD K9RA electric buses for Transit Systems West in NSW – the first public fleet of electric buses in Australia (July 2019)
- 12 x BYD K9RA electric buses for Carbridge (airport buses) in Brisbane (January 2018)
- 1 x BYD K9 electric low floor city bus for Action Canberra as a trial vehicles (2017)
- 6 x BYD K9 electric low floor city buses for Carbridge Sydney Airport (2016)

GMLA has operations in Sydney and has recently established a facility in Ballarat, Victoria which will become a bus assembly plant.

GMLA has comprehensive after-market support and spare parts covering all states with an on-line after-sales portal to access manuals, maintenance information, parts catalogues and order spare parts. We have spare parts available on overnight freight directly into the depot or repairer, wherever it is required.

Benefits of electric buses and factors that limit their wider uptake

Electric buses are zero tail pipe emission vehicles and offer many benefits, including but not limited to the following:

1) Quiet – less noise pollution when on the road
2) Zero tail pipe emissions
3) Cheaper to maintain and service compared to fossil fuel vehicles
4) Viable and safe option of zero emission vehicles to suit decarbonization requirements of State and Federal government targets
5) Batteries can be repurposed at the end of their optimum operational life

There are numour factors which need to be considered when considering the uptake of electric vehicles, including but not limited to the following:

a) Access to adequate power at recharging points – ie. Depots, workshops, along vehicle routes
b) Availability of adequately trained staff to maintain the workshops, depots and vehicles
c) Adequate safety training, in line with European, international and Australian safety standards are yet to be fully developed and implemented
d) Operational life of batteries can differ depending on their chemical composite, which affects range and, charging and reliability
e) Influx of new battery manufacturers, component suppliers, infrastructure companies may be at risk of over-saturation of the market and long term suppliers may fall away as the market becomes competitive
f) Vehicles and charging infrastructure are expensive comparative to fossil fuel vehicles (approx. double the price of diesel bues)

g) Various States and Territories require diesel buses to operate between 15 to 25 years (average operational life is 18 years and average age of fleet tends to be approx. 12). It is unknown how long electric batteries last and whether a new model of operational life needs to be considered when integrating electric buses into fleets
h) Space at depots needs to be considered – electric buses should have a dedicated bay or space for parking, charging and maintenance. Many Australian bus depots are already tight for space and integrating a large fleet of electric buses into the existing space can be difficult
i) Procurement steps should consider ensuring adequate power is able to be supplied to the depot first, then ascertain the routes the electric buses are likely to travel on so that charging profiles can be determined. Only then should the type of electric bus and vehicle procurement begin.
j) Electric buses are not a like for like replacement of diesel and CNG buses. Diesel buses can travel long distances far exceeding that of even the longest range buses.
k) Batteries are very heavy – Europe has increased its road TARE weights to 19t in order to accommodate the extra weight of the batteries.
l) Extra weight of the batteries, and where they are placed, can reduce seats on the bus – therefor reducing the overall safe carrying capacity of the vehicle

Other renewable, emissions neutral energy sources

GMLA is not a provider of renewable energy, but we have been in contact with many who are. There are a number of different, emerging technologies for renewable energy generation, as well as storage, including:

- Tube trailers – carrying H2
- Solar panels on bus depot roofs which are able to supplement draw from the general grid, or be stored in on-site battery packs for usage at peak times
- Behind the meter H2 generaiton from wind farms – such as Meridian Energy Victoria
- Injeciton of H2 into the gas network – see project by Jemena in NSW with ARENA support
- Bio-methane production of H2
- Pilot project in WA of H2 production using cracking of methane into H2 and carbon – Hazer Group
- Zenobe Energy UK have successfully launched electric bus projects where charging infrastructure and battery storage were part of project roll out a whole end to end solution.
- Electromotive, based in Canberra, also have the ability to lease or fund bus assets,

Ways to support manufacture and assembly of electric buses in NSW

GMLA use an aluminium bolted bus body that does not require welding to assemble. Many of the components used in our buses are sourced from Australia and New Zealand, while others

are sourced overseas. Due to the lack of welding required to assemble our buses, skilled labour is not necessarily required to assemble our buses.

In 2019, due to strict local content requirements, we partnered with a Ballarat-based business who assisted with the delivery of our largest single project to date – 50 buses for Transdev Melbourne. After some training, new staff were able to be upskilled in order to fit the components required to assemble the bus; including seats, hand poles, electric equipment etc.

NSW can support manufacturing of electric buses in NSW by first of all ordering electric buses. The buses that are in service at the Leichhardt depot were introduced by Transit Systems West and the gap in the capital investment was also paid for by them. Many depots in NSW are older and are in already built up areas which require a substantial draw on the grid to power homes and businesses. One of the greatest hurdles is not the generation of power, but the access of power to charging stations, at the times of day when buses need to be charged.

Governments should actively seek advice and guidance from Australian and overseas bus operators who have successfully launched fleets of electric buses – ie. Jive Project in Europe, and the Jive 2 Project in Europe, Auckland etc.

Experience with introducing electric bus fleets in other jurisdictions.

Gemilang has delivered the largest fleet of electric buses in Australia, being 23 BYD-Gemilang low floor city buses.

Six buses were built in 2016 for Carbridge and began operation in 2017 at Sydney airport moving passengers from the long-term carpark to the terminal.

These buses are an earlier Mk 1 version BYD chassis and do not have the current Mk2 version water cooled battery pack. The general running of the buses is a lot of stop-start work, which creates regeneration of the battery pack from braking, one of the features of electric buses. The buses are getting around 31 hrs or 500 kms operation from an 8hr charge.

Another twelve buses were built in 2017; eleven were BYD Mk2 chassis and one a Mk1 chassis. All were built with Gemilang bus bodies. These are currently in operation with eleven at Brisbane airport and one at Perth airport.

All buses are performing well and getting around 350km per charge.

A performance trial of four buses BYD (Mk2)-Gemilang electric buses was conducted in 2018 with a summary of the results shown below.

- Trail range was 50,000km per bus per year
- For comparison current diesel buses use 45 litres per 100km

- Over 200km the CO2 reduction compared to a diesel bus was 242kg. This represents a reduction of over 60 tonnes of CO2 per bus over the 50,000km trial. Over 240 tonnes for the four buses.
- Over 200km the NOx particle reduction compared to a diesel bus was 8g. This represents a reduction of over 2 kg of NOx particles per bus over the 50,000km trial. Over 8kg for the four buses.
- The saving in diesel fuel was 22,500 litres over the 50,000km trial per bus. Total diesel saving of the four buses was 90,000 litres.
- Regeneration of energy while driving from brake and deceleration was well above 30%.
- Reports from passenger surveys were positive with passengers enjoying a ride far better than in a diesel bus.

BYD-Gemilang electric buses operating at Sydney Airport

We also manufacutered the four BYD K9RA buses with Gemilang bodies which have been in operation since 1 July 2019. The buses are operated by Transit Systems NSW (**TSA**) in their Leichhardt depot in metro NSW, being the first Australian operator to operate public route buses in Australia. Initial performance data, which is commercial in confidence, shows:

- The buses are able to operate over 15 hours per day
- Maintenance cost is much lower than a diesel or CNG bus
- Buses are to travel over 500km before having to recharge at the depot
- Average recharge time from 40% back to to 100% charge is under 2.5 hours
- Vehicle servicing cost and time is much lower – ie. Diesel bus takes 4-5 hours to perform a service on mechanical items such as timing belts, oils etc. Electric bus only take 45 minutes

<u>Opportunities and challenges of transitioning the entire metropolitan bus fleet to electric</u>

There are a number of challenging factors to consider when procuring, integrating and maintaining an electric bus fleet, including but not limited to the following:

a) Traditionally in existing workshops, the drivers who drive buses do not refuel the buses – so two teams are needed to do different things in depots
b) Workshop space to maintain and repair electric buses is required

c) Adequately trained staff in high voltage safety needs to be considered
d) Special computer tracking systems needs to be integrated in order to monitor battery heat, performance and operation
e) Electric buses can operate over long distances, but not as far as traiditonal diesel buses can. Routes were electric buses will operate needs careful planning
f) Redundancy needs to be accounted for – will redundancy be with other new electric buses or supplemented with diesel buses?
g) Who will pay for the extra capital cost of the buses, the charging infrastructure and any depot upgrades required to charge electric buses? At the moment State governments are not in a position to commit to the gap funding and other sources, such as ARENA and CEFC are not in a position to fund more than one type of project like this – so mass uptake of electric buses will be difficult without supplemented funding or a new way of funding buses – such as leases or purchase agreements.

Gemilang Australia is keen to assist wherever possible. If you require further information, please contact us below:

Peter Murley – Managing Director and Founder
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Sarah Forbes – Executive Manager
[redacted] / [redacted]

Regards

[redacted]

Sarah Forbes
Gemilang Australia

GEMILANG AUSTRALIA PTY LTD
ECO RANGE CITY E-BUS

Body
- Overall dimensions: L 12.32m W 2.5m H 3.5m
- Tare weight estimate 13,000kg
- GVM 18,000kg
- Passengers 35 seats plus driver, 31 standees – based on 85kg per passenger running 18,000kg on NSW roads as a complying bus

Aluminium Body Frame
- Aluminium clad outer skin with Fibreglass corners
- 4mm thick toughened side glass
- 7mm think laminated front windscreen
- 12mm Composite Floor
- Lightweight Vogel Seats
- Formica internal siding to customer specification
- Vinyl flooring from Tarabus
- Stainless steel polished hand poles
- Ventura entrance ramp at front
- Full Hanover destination sign system
- Reverse camera standard
- DTI camera system with options for Poseidon or Thoreb systems
- Full multiplexed Bus electrical system
- LED lights external and internal

Option for bus tracking and power monitoring through Viriciti or other system at request

Chassis

Length/Width/Height	12,050/2,500/see body GA	mm
Wheel Base	6,100	mm
Front/Rear Overhang	2,700/3,450	mm
Turning Circle	23.5	m
Floor Height	380	mm
Doors	2-2-0	
Clear Door Width	1,200/1,200	mm
Boarding Height	320-410	mm
Approach/Departure Angle	7/7	·
Tyres	275/70 R22.5	
Interior Headroom	2,400	mm
Passenger Seats	See body specification	
Standee	See body specification	
G.V.W	18,000	kg

Motor Power	90/150 kW x 2	kW
Speed Limited	70/80	km/h
Charging Power	AC 40 kW	kWh
Charging Time	4	h
Gradeability	15/17	%

GEMILANG COACHWORK AUSTRALIA

BYD


8104
8106
PLEASE SIGNAL DRIVER
8106


8104
8106


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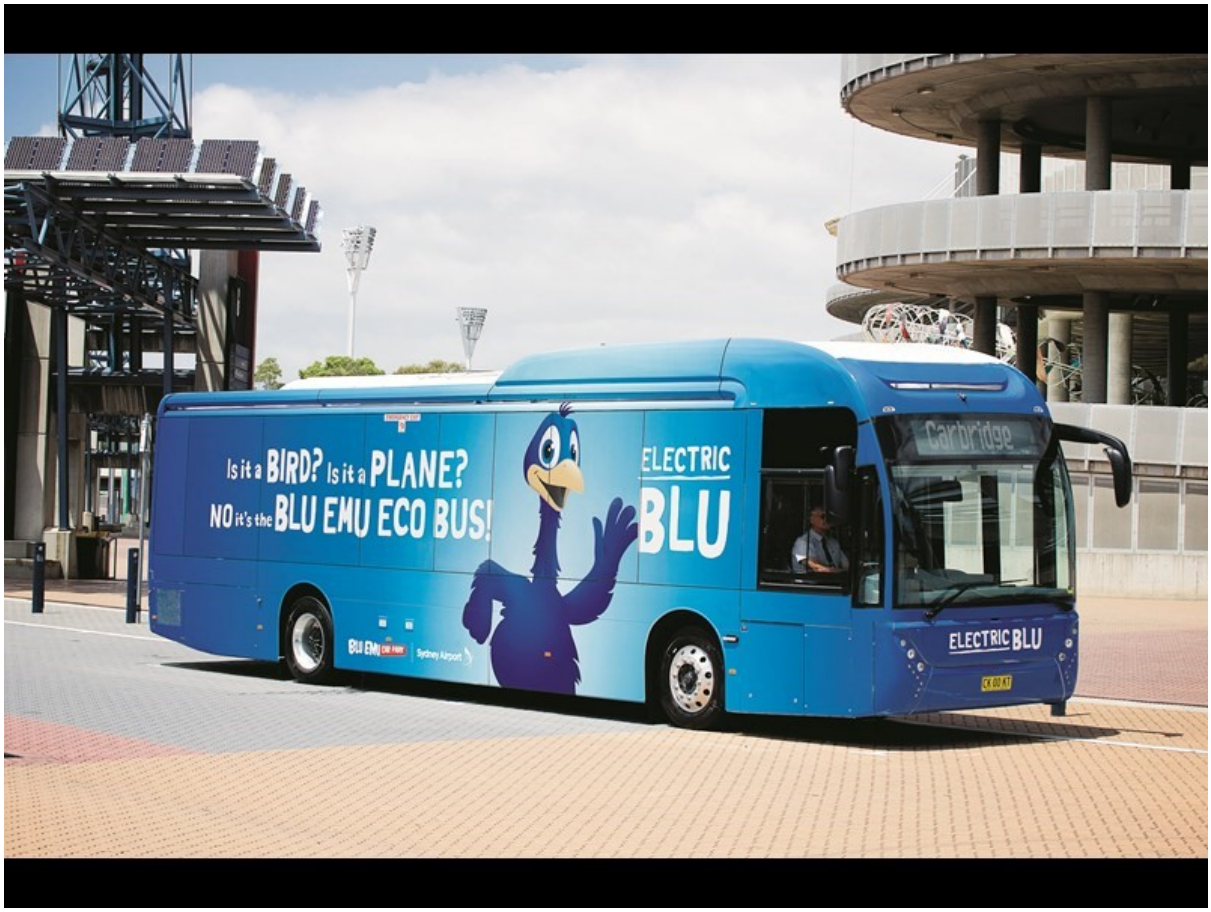
Is it a BIRD? Is it a PLANE?
NO it's the BLU EMU ECO BUS!
ELECTRIC
BLU
Carbridge
ELECTRIC BLU


ELECTRIC BLU
ELECTRIC BLU


TRANSPORT CANBERRA
710
I'M electric


Carbridge
CARBRIDGE
ELECTRIC POWER
BYD


TRANSPORT CANBERRA
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