JOLT

University of Sydney Business School
Case Competition 2022

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LETTER FROM THE CEO

Dear teams,

The transition to Zero Emissions technologies to aid in reducing the impacts of climate change is the challenge of our generation. The shift which is underway will not be one company nor one country's responsibility to solve. Rather, it will be a collective effort of governments, private-sector investment and the development of technologies which will dramatically improve the way we do things.

JOLT is a fast-charge EV Charging network provider. We develop technologies for the construction, deployment, and operation of EV Charging networks. We are working to innovate within a sector which is experiencing some of the largest positive and negative impacts we have seen since its inception.

JOLT is pleased to be building and impacting the existing EV Charging infrastructures in Australia, New Zealand, UK and Canada. Our approach sees JOLT use advertising funding to reduce the barriers to EV ownership. This has been achieved through the reduction of cost and range anxiety as well as the provision of accessible EV Charging infrastructures.

We are excited to hear your amazing ideas on how JOLT can work with governments to speed up the transition of EVs.

Thank you teams and best of luck.

Doug McNamee
Founder & CEO
JOLT

JOLT

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ABOUT JOLT

JOLT is a Sydney-based electric vehicle (EV) charging start-up using innovative technology to build a large-scale network of EV charging stations. Its mission is to make electric transport more accessible to Australians through zero cost and fast charging capability.[1]

Their on-street chargers are carefully designed to provide drivers with fast charging capability while complementing urban city centres, with each charger 100% powered by GreenPower. This means JOLT uses a combination of green-certified wind and solar energy to power their chargers and fulfil its renewable energy commitment.

Key to JOLT's success is their model of zero-cost fast charging, providing the public with access to its network to give each driver 7kWh of free electricity per day. This equates to about 45km of range, and only requires 15 minutes of charging time when plugged in at a station.

JOLT first launched their charging stations in Adelaide, South Australia, in early 2021, and only expanded to Sydney in September 2021. This has been bolstered by both private and public funding, including government grants and a $100M capital injection from BlackRock Real Assets in August 2021.[2]
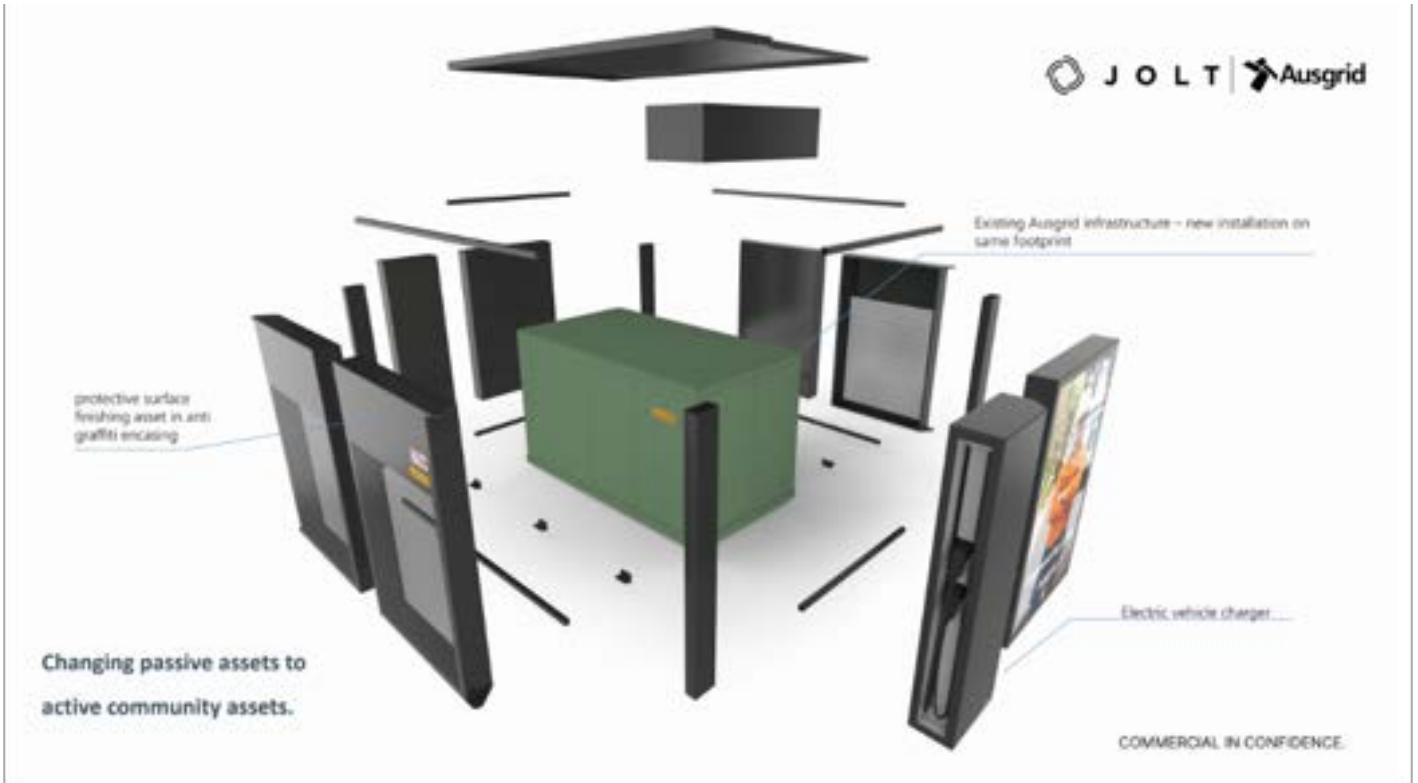

To launch in Sydney, JOLT partnered with Ausgrid, the largest electricity distributor on Australia's east coast by converting Ausgrid's existing streetside kiosks ("green boxes") to double up as charging stations.[3] JOLT plans to roll out 500 such kiosks across the Ausgrid network, simultaneously improving the street aesthetic through its use of advertising panels and sleek design. In the future, JOLT could adapt the 2,000 Ausgrid boxes across the east coast.[4]

[1]https://jolt.com.au/about-jolt-electric-charging-stations
[2]https://www.afr.com/policy/energy-and-climate/blackrock-funds-to-supercharge-jolt-20210823-p58l6u
[3]https://jolt.com.au/sydney
[4]https://www.smh.com.au/national/nsw/the-plan-to-turn-street-side-power-boxes-into-charging-stations-for-cars-20201011-p563z0.html

Similarly, in June 2022, JOLT partnered with Endeavour Energy to install 230 EV charging stations on existing street side substations by 2025,[5] with plans to grow to more than 1,000 stations over the next decade.

JOLT has also launched internationally, with operations in New Zealand, the United Kingdom, the United States and Canada. JOLT began rolling out fast chargers from July 2022 in New Zealand, and has plans to have 500 chargers in four years. It is looking to challenge the market dominance of ChargeNet, and has used a partnership with building products and DIY goods retailer Mitre 10 to install chargers at their stores, starting in Auckland, Christchurch and Wellington.[6]

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[5]https://www.afr.com/companies/energy/jolt-endeavour-to-install-up-to-1000-ev-charging-stations-in-sydney-20220626-p5awod
[6]https://www.rnz.co.nz/news/business/467368/australian-company-to-offer-free-charging-for-electric-vehicles-in-new-zealand

HOW JOLT WORKS

The process to charge an EV using a JOLT station is simple.[7]

1. Users can quickly install the free JOLT App on their mobile device through the App Store or Google Play
2. Using the JOLT App, users can view or search for a nearby charger
3. When a user parks at a station, they scan the QR code or search for the station ID
4. Users then select their connector (plug) to start the fast charge, choosing between the CSS2 or CHAdeMO connectors. The vehicle can be charged for free up to 7kWh in any 24-hour period.
5. The app keeps users up to date with the charging status of their vehicle. If users only want to get the free 7kWh, they should stop the charge session from within their car by keeping an eye on their car's progress.
6. If users are looking to charge their battery completely, the app will notify them when they have reached maximum capacity. Pricing for energy above the free limit is displayed in-app before the charge begins. In 2021, a charge of 42c/kWh was applied to JOLT's chargers in Adelaide, with pricing closer to 40c/kWh for stations in Sydney.[8]

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[7]https://jolt.com.au/how-it-works-charge-your-electric-vehicle
[8]https://www.ecogeneration.com.au/ev-network-jolt-plans-5000-chargers-with-100m-capital-injection/

JOLT CHARGE

JOLT'S ADVERTISING MODEL

JOLT has created an additional revenue stream by integrating street-side advertising billboards into its charging stations, benefitting from being located in high-pedestrian, high-traffic areas with either 55-inch or 75-inch inbuilt panels that deliver static advertising.[9]

JOLT's CEO Doug McNamee noted that their "goal as a business is about making zero emission mobility much more accessible. So, delivering a service to people that is subsidized by advertising is sort of the core tenet of our business".

This advertising platform aims to speak to a "particularly pioneering, engaged and conscious audience. So, those people who are living in metro markets, they typically live within 20 kilometres of the CBD, and they're in areas where we've got a high proportion of EV uptake, and we have a very premium audience as part of that".

JOLT has already seen strong engagement with advertisers, especially those that align with JOLT's core mission of paving a way to a zero emissions future. Head of Sales and Platforms, Michael Selden, said that "advertisers in telcos and those green energy businesses, retailers and entertainment clients have already jumped on board ... they're all starting to look at how ESG is moving out of the boardroom and into forward facing consumer advertising as well".

JOLT will use a data-led approach to build their 100% digital out-of-home (DOOH) network, and seeks to be "focused on audiences, as opposed to just buying panels and weeks. A big focus of how we're building the network is to move into the digital landscape and the digital world, so trading on audiences, trading on data and CPMs [cost per thousand impressions] is at the forefront". JOLT is uniquely positioned here as its app data provides a full picture of drivers' collective movements, giving a view of the audiences that have seen the programmatic advertisements across JOLT's network of screens. This first-party data can help advertisers deliver deeper targeting opportunities and gives them the ability to better measure their results.

JOLT's H.E.L.I.O system uses mobile data from devices seen at each site, giving a simple demographic snapshot of audiences within their network. It also allows JOLT to place their screens at optimum locations based on first and third party data to optimize audience reach, frequency, dwell time, and visibility.[10]

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[9]https://www.afr.com/companies/media-and-marketing/ev-charging-network-jolt-tries-billboard-advertising-20210811-p58hqc
[10]https://jolt.com.au/brands

CLEAN CHARGING HERE

JOLT
Move Freely.

JOLT

MOVING FORWARD

JOLT

While JOLT has built a strong business model tailored to EV charging for passenger cars, it is now looking to the long-term future of electrification in Australia and wants to see how it can support governments across Australia to lead the transition to electric vehicles. One area of focus for the New South Wales Government's Transport for New South Wales (TfNSW) is the electrification of its bus fleet.
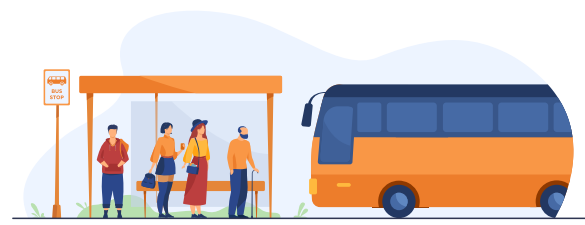
TAKING BUSES ELECTRIC

JOLT

THE BENEFITS OF ELECTRIC BUSES

The electrification of bus fleets will reduce emissions and provide health and economic benefits, acting as a cost-effective way to address the emissions produced by road transport.

EMISSIONS REDUCTION

As exhaust emissions account for almost half of all vehicle emissions, the fact that electric buses do not produce any exhaust emissions presents a compelling argument to implement them to reduce road transport emissions. Electric buses in NSW will also have a lower emission footprint when charging as the NSW electricity grid reduces its reliance on coal power over time.

PUBLIC HEALTH

The Electric Vehicle Council found that vehicle emissions cause 21,000 serious health impacts each year in the state of NSW, and that in the Sydney-Newcastle-Wollongong region alone vehicle emissions have led to $3 billion in annual health costs.

Electrifying buses would have substantial benefit to the health of vulnerable people such as children, the elderly and those with pre-existing respiratory and cardiovascular medical conditions.

When the Chicago Transit Authority analysed its own health savings from adopting electric buses, it found that operating one electric bus was the equivalent of removing 23 cars from the road each year. Over the 12-year bus lifespan, this equated to a US$660,000 saving from reducing incidents of respiratory disease from emissions.[11]

PUBLIC AMENITY

Noise pollution from road transport also has a social cost, with the World Health Organisation ranking noise as the biggest environmental threat to public health, second to air pollution. Transitioning to electric buses would reduce noise pollution as their electric motors are much quieter, especially at low speeds.[12]

ECONOMIC BENEFITS

Electric buses have a lower total cost over their lifetime due to lower recharging costs and lower maintenance costs, saving money for taxpayers and bus operators. In fact, the Chicago Transit Authority found an estimated annual net saving in fuel costs of $300,000 over the expected 12-year lifespan of their electric buses.[13]

GRID INTEGRATION

The addition of electric buses with large batteries into the energy system offers potential for demand-side participation on the electricity grid. Exciting new technologies can allow buses to discharge electricity back into the grid, reduce load during peak periods, and control voltage and frequency. By carefully managing charging times and onsite storage at bus depots, electric bus fleets could potentially use surplus renewable energy.

[11]https://www.transitchicago.com/electricbus/#Benefits
[12]https://acris.aalto.fi/ws/portalfiles/portal/27322839/ENG_Veps_I_inen_Jari_Driving_Style_Comparison_IEEE_Vehicle_Power_and_Propulsion_Conference_2017.pdf
[13]https://www.transitchicago.com/electricbus/#Benefits
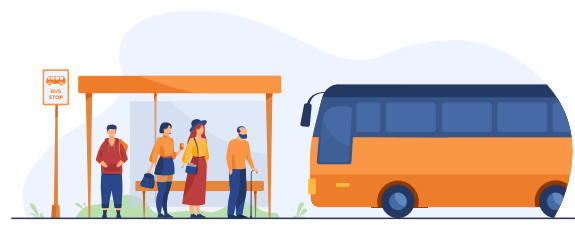
NSW TRANSPORT

Transport for NSW (TfNSW) manages the vast majority of train, bus, ferry and light rail services across New South Wales. Their role as the NSW Government authority covers managing route design, timetabling, branding, fares, fleet specifications, customer service standards and service levels.

SYDNEY'S BUS SYSTEM

TfNSW management of bus services covers the Greater Sydney, Blue Mountains, Central Coast and Wollongong regions.

Specifically in Sydney, customers are serviced by a number of bus operators that are part of Sydney's integrated public transport system. TfNSW issues contracts to metropolitan bus operators in Sydney, known as the Sydney Metropolitan Bus Service Contracts, with the contracts divided into 14 regions that are covered by 10 bus operators. The contracts require that all bus operators use the white and two blues colour scheme prescribed by TfNSW.

With the benefits of electric buses being clear, the NSW Minister for Transport and Roads challenged TfNSW to transition the State's bus fleet by 2030. Early analysis has found that the creation of a net zero emissions NSW bus fleet has an expected 46% reduction in emissions across TfNSW's operations and potential for a $1-2 billion saving in environmental and health costs when compared to diesel buses over 30 years.[14]

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[14]https://www.transport.nsw.gov.au/projects/current-projects/zero-emission-buses

ELECTRIC BUS TRIALS IN SYDNEY

Earlier in 2022, the VEMO project, a cross-industry consortium including bus operator Busways, Australian software company Evenergi and Western Sydney electricity distributor Endeavour Energy, began trialling a software at Busways' Penrith depot to charge 12 electric buses using 6 ABB Terra charging stations.[15] This solution directly integrates Endeavour Energy's distribution network to the depot, allowing for bus charging optimization according to grid usage. Instead of storing a multi-million-dollar large battery at the depot, their software bridges the charging infrastructure at the depot with the energy market to draw power when grid usage is lower. The Busways electric bus depot will now have real-time visibility of the electricity load on the network so that new buses can be charged in off-peak demand periods, smoothening the load on the network and leading to better utilization. Busways' Managing Director Byron Rowe has said that "Since receiving our first electric bus, we've now run over 100,000 electric bus kilometres on Western Sydney bus routes ... we've invested in significant infrastructure works at our Penrith Depot including earthworks, underground cabling, a new transformer, reconfiguring of the depot and trialling our VEMO energy optimization solution to future proof the power supply".[16]

In August 2021, the Next Generation Electric Bus Depot project by Transgrid and Zenobe Energy began.[17]This project aims to build an electric bus depot for 40 electric buses at Transit System's Leichhardt bus depot, using smart charging software, on-site solar PV and battery storage. The project includes:

- 36 electric chargers (AC & DC)
- Solar photovoltaics on the depot's roof
- On-site battery storage system to support bus charging and reduce grid upgrade requirements
- Smart charging software to manage the fleet and electrical assets at the depot

[15]https://www.busways.com.au/news-items/world-first-trial-integrate-electric-bus-charging-grid-sydney
[16]https://www.busways.com.au/news-items/penrith-now-has-six-new-electric-bus-charging-stations-help-power-our-growing-fleet-zero
[17]https://arena.gov.au/news/electric-bus-depot-trial-hitting-the-road-in-leichhardt/

ROLLOUT CHANGES
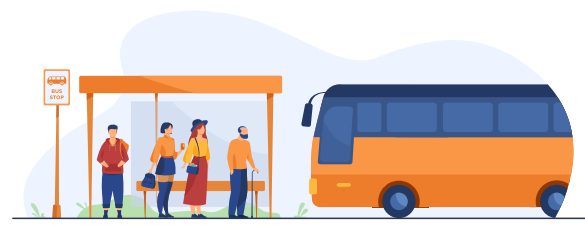
There remain a number of challenges to electrifying bus fleets, requiring collaboration between the NSW Government and a number of industry stakeholders.
As with electric cars, the transition to electric buses requires extensive charging infrastructure. Depot-based charging is the most widely used charging model in cities with electric buses, such as Shenzhen, China.[18] This charging model features chargers installed in depots to charge buses when parked, often overnight.

There are several advantages to depot-based charging, including:

- Most charging can occur off-peak which reduces costs
- Lower upfront capital cost compared to on-route charging
- Generally located on property already owned/leased by the bus operator, so this does not require finding limited street space for chargers.

On-route charging requires the installation of fast chargers along bus routes so that buses can charge if they stop on the roadside for a short period of time. These have a few advantages:

- The buses can have smaller battery packs while they cover longer driving distances, which reduces costs and enables a higher passenger count (as the weight of the bus is reduced compared to a bus using depot-based charging)
- Greater flexibility in bus operations as the buses do not need to return to the depot to charge for an extended period

It is possible that a combined model approach from bus operators is appropriate.
However, buses still present a unique challenge. Due to their high commercial usage rates, they have less downtime to charge and get back on the road. As a result, DC charging stations must be used to reach faster charging rates. As the fleet size increases, managing the electricity load when charging electric buses with large batteries will become more difficult due to the prolonged high-power demands. Technologies like load management can adjust charging rates on different chargers in real-time depending on the total demand on the system.[19]

Grid infrastructure needs to also be considered, and the impact on the grid depends on the type of chargers used, the number of chargers, the level of simultaneous charging and the time of charging.

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[18]https://openknowledge.worldbank.org/bitstream/handle/10986/35935/Electrification-of-Public-Transport-A-Case-Study-of-the-Shenzhen-Bus-Group.pdf?sequence=1&isAllowed=y
[19]https://evse.com.au/blog/electric-buses-what-kind-of-infrastructure-do-they-need-and-how-does-it-work/

THE CHALLENGE

◉ JOLT

Unfortunately, JOLT's existing model is unsuitable to provide the charging infrastructure to support TfNSW's transition of its bus fleet. If charging must happen at bus depots, then JOLT cannot use AusGrid's existing green street-side kiosks or Endeavour's street-side substations. It will also find its DOOH advertising to have a minimal audience at bus depots.

How can JOLT create a new business model to support TfNSW in delivering the charging infrastructure for electric bus fleets? Who should they be working with to rollout electric bus chargers? Are they able to utilise any parts of their current model? Which areas should be prioritised? What else does JOLT need to consider in order to support TfNSW in making electric buses a reality?
JOLT wishes to see creative, detailed and well-researched solutions to this unique problem. Best of luck!

THE APPENDIX

APPENDIX

The 14 Sydney Metropolitan Bus Service Contracts

Region	Location	Depot Locations
1	Outer Western suburbs between Blacktown, Penrith, Windsor, and Richmond.	Windsor, Penrith, Blacktown
2	South-Western suburbs between Liverpool, Ingleburn, and Hoxton Park.	Macquarie Fields
3	South-Western suburbs between Parramatta, Liverpool, and Bonnyrigg.	Hoxton Park, Smithfield
4	The Hills District between Parramatta, Pennant Hills, Castle Hill, Rouse Hill, Dural, Blacktown, and Baulkham Hills.	Foundry Road (Seven Hills), Dural, Northmead, Seven Hills
5	South-Western suburbs between Strathfield, Bankstown, and Hurstville. Also has services to Strathfield and Sydney Olympic Park.	Riverwood (x2)
6	Inner-West and Southern suburbs between Burwood, Leichhardt, Rockdale, Sydney CBD, Hurstville, and Miranda.	Burwood, Kingsgrove, Leichhardt, Tempe

APPENDIX

7	North-Western suburbs, including Chatswood, Epping, Macquarie Park, North Sydney, Ryde, and Parramatta, with services extending to the Sydney CBD.	Ryde, Willoughby
8	Lower North Shore and Northern Beaches, including Brookvale, Chatswood, Manly, Mossman, North Sydney, and Palm Beach, with services extending to the Sydney CBD.	Brookvale, Mona Vale, North Sydney
9	Eastern suburbs, including Bondi Junction, Botany, Maroubra, Mascot, Randwick, and Surry Hills, with services extending to the Sydney CBD and Leichhardt.	Port Botany, Randwick, Waverley
10 & 11	Region 10 covers south-western suburbs between Bankstown, Sutherland and Engadine, with services extending to Burwood, Parramatta and Liverpool. Region 11 covers Miranda, Cronulla and Bundeena. The two regions were combined in 2009.	Bankstown, Taren Point
12	Upper North Shore and Hornsby to Hawkesbury River area, covering Chatswood, Gordon, Hornsby, Berowra, and Brooklyn.	Mount Kuring-Gai
13	South-Western suburbs between Lidcombe, Granville, Bankstown, and Liverpool.	Granville
14	The Forest District, including Chatswood, Belrose, Frenchs Forest, Terrey Hills, St Ives, and Gordon, with services also operating to the Sydney CBD.	Terrey Hills
15	South-Western suburbs between Campbelltown and Camden, with services also operating to Wollongong.	Smeaton Grange, Campbelltown

Annual Patronage per Region from 2017 to 2021:

Region	2017	2018	2019	2020	2021
1	12,139,979	13,236,871	13,816,261	8,838,952	6,700,613
2	3,664,100	3,928,593	4,432,147	2,797,068	2,131,462
3	12,173,957	12,879,292	13,245,189	8,128,237	5,985,520
4	22,147,493	24,708,501	24,554,212	12,111,689	9,517,589
5	3,538,852	3,850,045	4,134,186	2,758,716	2,239,215
6	48,246,291	55,169,998	60,451,349	33,740,937	25,600,932
7	29,555,761	31,614,292	34,263,448	18,706,534	14,447,204
8	26,159,684	28,983,479	30,943,722	18,285,044	15,553,334
9	71,684,642	68,363,589	67,869,614	35,720,364	26,054,388
10 & 11	7,777,172	8,196,536	8,672,375	5,549,277	4,178,317
12	3,412,400	3,601,886	3,997,576	2,335,640	1,813,076

13	8,364,105	8,873,353	9,204,134	5,907,729	4,464,843
14	4,851,299	5,169,614	5,632,071	3,360,149	3,023,221
15	3,075,445	3,876,003	3,852,954	2,483,749	1,832,222

Sydney Metropolitan Bus Service Contracts Information

Region	Current Operator	Start date of current contract	Award method	End date of current contract (if known)
1	Busways	6 October 2013	Open tender	
2	Interline Bus Services	1 June 2014	Open tender	
3	Transit Systems	13 October 2013	Open tender	
4	Hillsbus	1 August 2014	Open tender	
5	Punchbowl Bus Company	1 July 2014	Open tender	
6	Transit Systems	1 July 2018	Open tender	30 June 2026
7	Busways	9 January 2022	Open tender	January 2030
8	Keolis Downer Northern Beaches	31 October 2021	Open tender	October 2029
9	Transdev John Holland	2 April 2022	Open Tender	April 2030
10 & 11	Maianbar Bundeena Bus Service Transdev NSW	1 January 2013	Direct award	31 December 2022
12	Transdev NSW	1 June 2013	Open tender	
13	Transdev NSW	1 May 2013	Direct award	30 April 2023
14	Forest Coach Lines	1 April 2013	Open tender	
15	Busabout	1 June 2014	Open tender	