



Decarbonising transport with zero emission vehicles

[EXPERTISE](#) | [TOOLS](#)

| [CONTACTS](#)

WSP brings together experts to achieve our client's decarbonisation ambitions, supported by our own commitment to halving the carbon emissions of our designs and advice by 2030. Zero emission vehicles and their supporting infrastructure are an important piece of the journey, and we guide clients through the complexities of the transition using our cross-discipline experience.





WSP is assisting clients locally and globally in transitioning to zero emission vehicles, with comprehensive planning, design and delivery expertise on zero emission vehicles and their charging infrastructure.

Transport is currently the second largest source of emissions in Australia, and total emission levels from transport are increasing. With 85 per cent of transport emissions generated from road transport, transitioning to zero emission vehicles (ZEVs) - powered by green energy - is essential for Australia to meet our net zero targets, as well as reaping substantial environmental and community benefits.

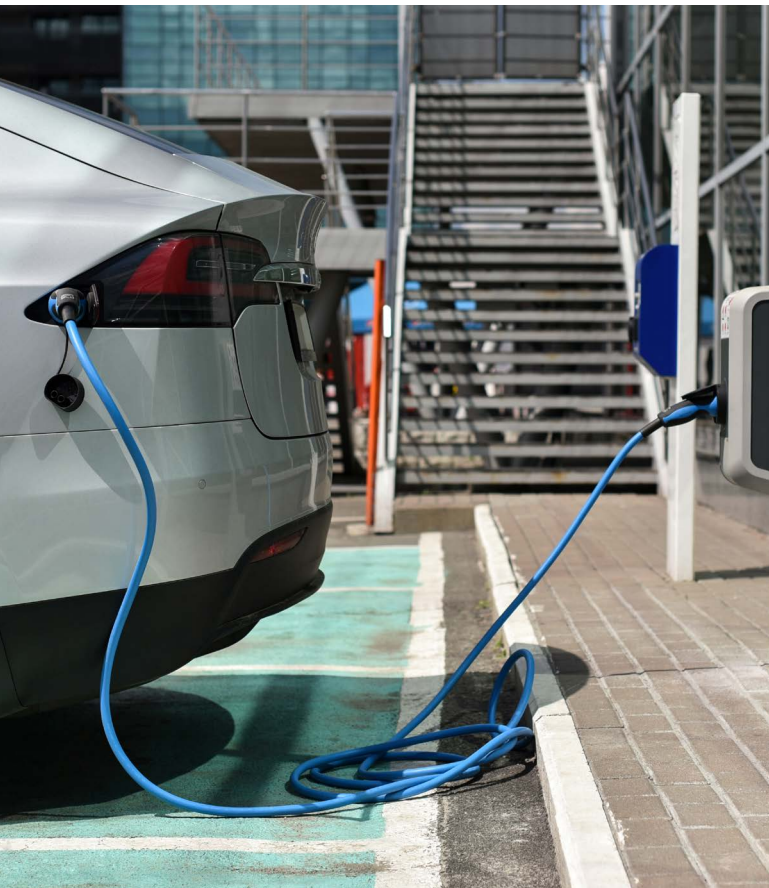
For transport agencies, fleet operators and owners, making the transition to zero emission vehicles can be complex, with vehicles, chargers, supporting infrastructure, financial implications, and operational constraints all requiring careful consideration and planning. Our team is helping Australian clients learn from other cities' experiences in this rapidly evolving field.

Our local and international experts understand global trends and are helping cities around the world transition their diesel, gas and petrol fleets to cleaner zero tailpipe emission alternatives, using both battery electric vehicles (BEV, or EV for short) and hydrogen fuel-cell vehicles (FCEV).

WSP is experienced in providing support services to the corporate fleets of government transit agencies, state operators, and local councils, as well as private fleet owners engaged in delivery, postal, ridesharing or operation and maintenance. This includes a diverse range of vehicle types and purposes, such as light-duty vehicles (utilities, SUVs, cars and cargo vans), heavy-duty trucks (garbage trucks and vacuum/sweeper trucks), or other vehicles or equipment including, buses, tractors, ambulances, emergency response, airport vehicles (airside and landside vehicles) and construction vehicles.

We know from our extensive experience that the purchase of vehicles is only one part of the transition. There are many other factors to consider, including power and other infrastructure, operational changes, financial considerations, scheduling, systems and staff training and accreditation. We are experienced in navigating the technical, operational, and local challenges to plan, manage, and finance a large-scale transition to zero emission vehicle technology.

We draw on WSP's global expertise, bespoke tools, and design solutions to solve our clients' complex transition challenges, including defining transition strategy, determining technology choices, developing and modelling the investment case, retrofitting and expanding facilities and systems, procuring zero-emission fleets and chargers, securing substantial energy supplies, and optimising end-user services.



This flyer focuses mainly on light vehicles and buses. We also have expertise in heavy fleets, rail and the property sectors.

OUR EXPERTISE

WSP provides comprehensive planning, design and delivery expertise on zero emission vehicles and their charging infrastructure, across the full breadth of the inter-related transport and energy disciplines. We support clients looking to electrify their own fleets, as well as operators and agencies responsible for providing charging infrastructure to be used by other EV users. Our clients include the World Bank, transport agencies, local authorities, fleet operators, property managers, fund managers and investors, and energy providers.

EV strategy and planning

- Development of strategies and policies
- Options assessment and appraisal
- Baseline and global benchmarking

EV infrastructure planning and design

- Transition plan development including staging and prioritisation
- EV infrastructure planning
- EV service planning
- Technology advice and comparisons
- Depot and facilities design
- Power advisory services
- Fleet electrification support - including vehicle selection and transition support
- Electrical infrastructure provision, maximum demand load calculation and utilities reticulation
- Best practice in public deployments, and managing urban place impacts

EV Fleet investment cases

- Whole of life cost assessments and comparisons
- Economic and financial modelling
- Business case development

Wider decarbonisation of transport - advisory services

- Organisational net zero health checks
- Carbon baselining, measurements and assessments
- Climate change risk assessments and resilience planning
- Transport planning

Modelling and forecasting to assess operational compatibility and deployment

- Battery Optimisation and Lifecycle Tool (BOLT)
- EV:Ready



ELECTRIC VEHICLE STRATEGY AND PLANNING

To help ensure that the transition to zero emission vehicles is in line with the transition to a net zero economy, WSP can undertake greenhouse gas (GHG) modelling for an emissions baseline and reduction scenarios. Beyond tailpipe emissions, considering scope 2 and 3 emissions such as the upstream emissions associated with energy production are critical to a science-based net zero strategy. Scenario analysis can be undertaken to assess upscaling or full roll out across fleets and operations. When the GHG assessment is combined with a financial appraisal, the levelised cost of carbon abatement (\$/tonne CO₂-e) can be used to assess the cost effectiveness of each option, under a broader organisational decarbonisation strategy.

We can also support the development of sustainability strategies to support zero emission vehicle transitions, considering a broader alignment with environmentally and socially sustainable development. This can help plan for a range of risks and opportunities such as climate change adaptation, ethical procurement, and waste issues with batteries.

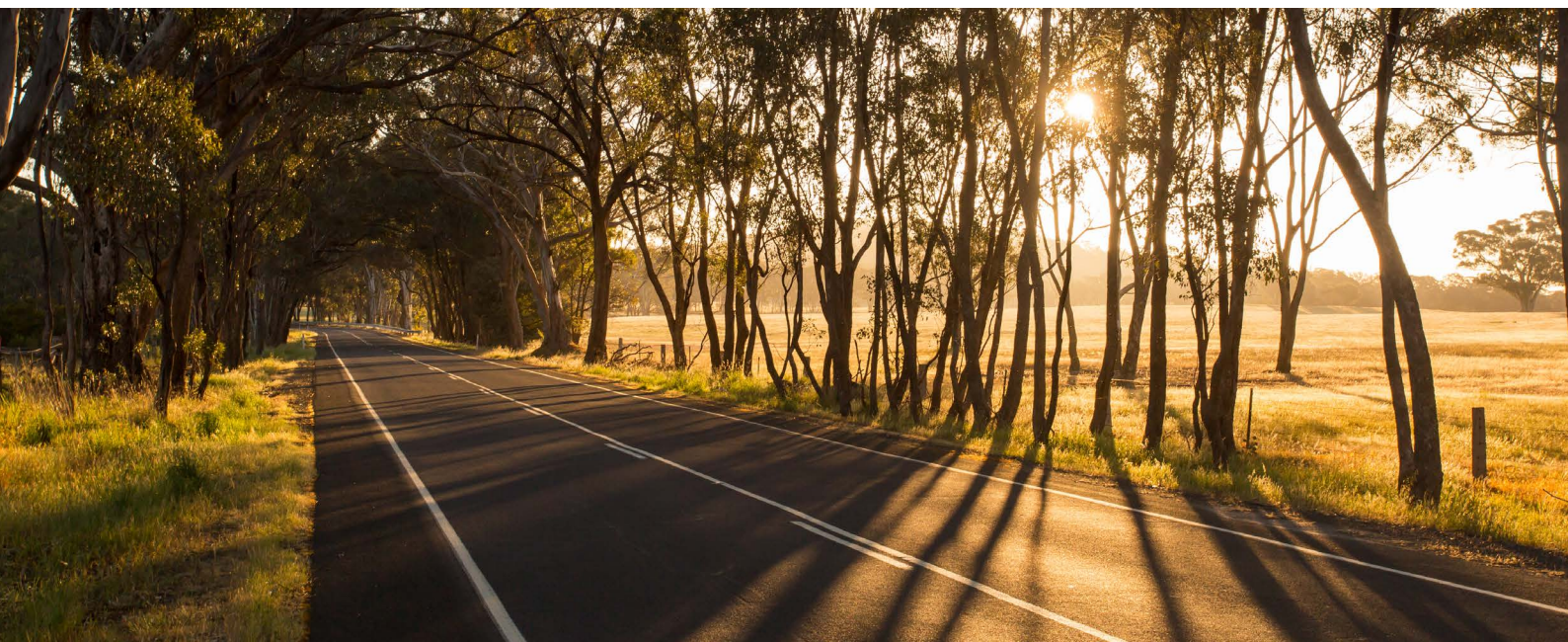


ELECTRIC VEHICLE INFRASTRUCTURE PLANNING AND DESIGN

We can model EV uptake and forecast demand for charging using our bespoke EV:Ready tool. This helps to understand potential charging infrastructure requirements to support and enable EV uptake, where the private sector may deliver these and what gaps may emerge. We work with clients to understand their objectives and help them to identify the most suitable deployment models for EV charging infrastructure such as full public ownership, concession approaches and private sector led. We have completed an international review on the features of a well-designed EV charging network and have a sound understanding of the key challenges and best practice expertise.

We also have experience in site specific infrastructure planning and delivery, including design, procurement and trial monitoring. Our multidisciplinary teams of transport and power specialists support on energy assessments, power infrastructure and connection processes.

WSP has worked directly with mixed fleets, across local and global operations. Building on the strategy and investment case, we work with clients to understand their operational requirements and apply our EV selection tool and EV database to identify the most appropriate vehicles to meet their needs.





ZERO EMISSION FLEET INVESTMENT CASES

The transition to zero emission vehicles requires careful consideration of the economic and financial impacts of the change. While there is a carbon reduction imperative to transition vehicles, understanding the capital and operational expenditure implications is also vital, particularly due to the significant supporting infrastructure required for effective operations. WSP has extensive experience developing business cases for government and private clients and in building economic and financial models to inform these critical decisions. Our economic analysis is grounded in deep technical experience. This includes understanding the capital cost for the vehicles themselves and supporting infrastructure requirements, as well as economic benefits such as reduced operating expenditure through lower fuel and operations and maintenance costs. Additionally WSP can quantify the economic benefits of reduced carbon dioxide emissions, noise, amenity, and other pollutants when transitioning from hydrocarbons.



WIDER TRANSPORT DECARBONISATION ADVISORY

To help ensure that the transition to zero emission vehicles is in line with the transition to a net zero economy, WSP undertakes greenhouse gas (GHG) modelling for an emissions baseline and reduction scenarios. This includes scope 2 and 3 emissions - such as the upstream emissions associated with energy production. When the GHG assessment is combined with a financial appraisal, the cost of carbon abatement can be used to assess the cost effectiveness of each option, under a broader organisational decarbonisation strategy.

We also offer a wide range of other services related to the decarbonisation of transport. These include public and active transport planning to support modal shift, development of travel demand management strategies and green travel plans, project level carbon appraisal and organisational net zero health-checks to understand progress and challenges in meeting net zero targets.

We can also support the development of sustainability strategies to support zero emission vehicle transitions, considering a broader alignment with environmentally and socially sustainable development. This can help plan for a range of risks and opportunities such as climate change adaptation, ethical procurement, and waste issues with batteries.



OUR RANGE OF BESPOKE TOOLS

FORECASTING AND PLANNING FOR EVS WITH EV:READY

EV:Ready is WSP's electric vehicle forecasting tool. It helps address increasingly important questions in the adoption of EVs, including: what will EV uptake look like in our cities and neighbourhoods? where and when this will occur? and what will the charging infrastructure requirements be?

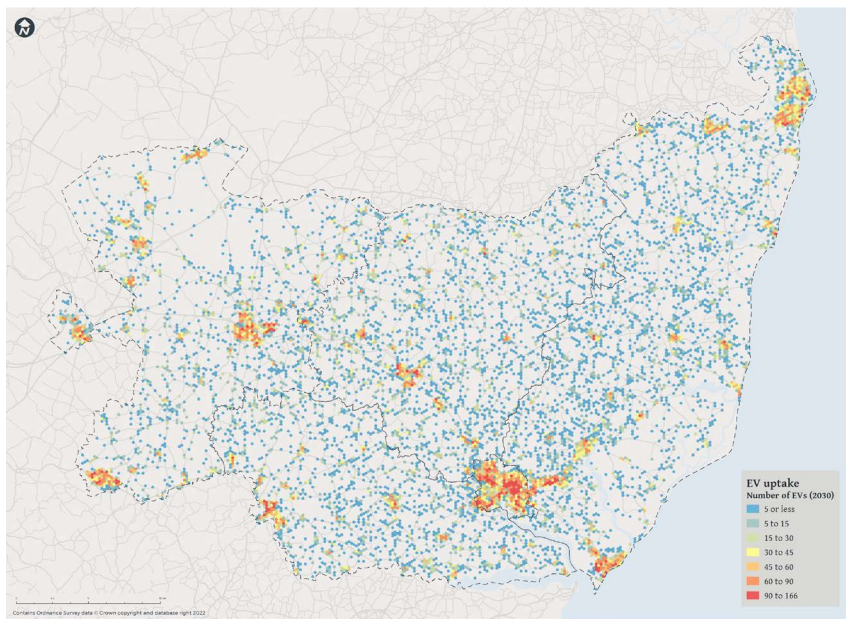


Figure 1 Forecast EV Uptake

EV:Ready enables sophisticated EV uptake forecasting and flexible scenario testing that generates granular forecasts to a neighbourhood level, across the full range of likely vehicle types. It considers key determinants of EV uptake including consumer profiles, socio-demographics, off-street parking availability, vehicle ownership, vehicle sales and turnover to forecast EV ownership in time periods up to 2050. This analysis has been used to promote a coordinated approach across authority boundaries, to enable decisions on measures to reduce uptake barriers, and the identification of key locations to prioritise charging infrastructure.

We have used EV Ready to develop the electric vehicle strategy for Norfolk County Council and Midlands Connect in the UK, as well as numerous other Local Authorities. We used our EV:Ready tool to forecast future EV uptake across the county under a number of scenarios and identified locations of maximum demand for chargers (which covered on and off-street parking locations). Employing stakeholder engagement and energy analysis, we identified locations for likely private sector investment in charging points and completed a gap analysis to identify priority locations for public investment. Our subsequent advice on actions were categorised according to the Council's level of control (i.e. to lead, enable, explore or encourage) and included initiatives such as updates to parking standards and collaborative working with other government agencies.

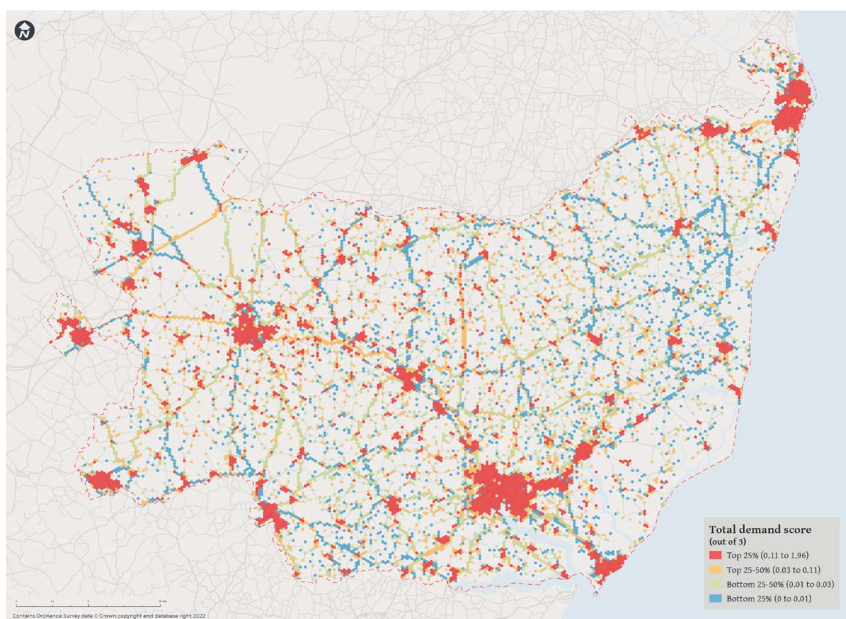


Figure 2 Forecast EV Charging Demand

LOW CARBON FLEET SCENARIO ANALYSIS – GREEN FLEET IQ

Fleet owners can apply WSP’s Green Fleet IQ scenario planning tool, to compare different alternative fleet scenarios, and understand the feasibility of different low carbon technology adoptions from a triple bottom line approach. Green Fleet IQ is used to develop Fleet Strategies and understand the associated capital and operating costs, taking a holistic approach with fleet and infrastructure, including the following aspects:



The Green Fleet IQ tool enables comparison of scenarios in terms of net present value (NPV) as well as annual capital and operating costs over the forecast period of the Fleet Strategy. It can also assist in identifying any constraints in terms of achieving the City’s GHG reduction targets. The tool enables comparison of investment cost against the magnitude of GHG reduction, to facilitate a cost-benefit comparison of alternative fuel technologies.

Our related Total Cost of Ownership tool for EVs analyses the total cost of owning the existing fleet (e.g. diesel, gas and hybrid) against equivalent EVs. The result is an Equivalent Annual Cost (EAC) that’s comparable across the various propulsion types at one or several agreed lifecycles for each type (e.g. 18 years for diesel versus 13 years for zero emission bus). The

complete model will include costs associated with all asset life stages in: procurement, operations and maintenance, overhaul/rehabilitation, and disposal.

We have applied Green Fleet IQ and the TCO tool with the City of Barrie in Canada, who wanted to understand the potential of alternative fuel technologies to meet their fleet operational needs while reducing its GHG emissions and air contaminants. We completed an alternative fuel study that investigated the feasibility of deploying a mixed fleet of alternative vehicles as well as subsequent infrastructure and roadmap requirements to transition the fleet. A phased implementation strategy was developed for the fleet replacement, with details on the costings, a timeline for when upgrades would be needed, as well as identifying training needs and key stakeholders.

ELECTRIC VEHICLE SELECTION TOOL AND DATABASE

WSP has established a number of databases globally detailing available EV models across various vehicle types in different locations, and has developed a EV Selection tool which has been applied to support a Fortune 100 listed company in the transition of its global fleet. The highly visual and interactive database allows for filtering of models by key data categories and selection criteria to allow for a deep dive into vehicles and OEMs. It allows clients to find suitable vehicles that match their unique needs while putting forward other vehicles for consideration, which helps ensure procurement and replacement decisions are informed by market insights, vehicle performance metrics, and cost comparisons.

1. Chose 1 or multiple

Fleet, Vehicle Types

- Facilities
- Security Fleet

2. Narrow down (Pick 1 Vehicle)

Vehicle Types, Make ...

- Other
- Pickup Truck
 - Canoo, Pickup Truck
 - Chevrolet, Silverad...
 - Ford, F-150 Lightni...
 - Ford, F-150 Lightni...
 - Lordstown, Endura...
 - Rivian, EDV 500
 - Rivian, EDV 700
 - Rivian, EDV 900
 - Rivian, R1T Explore
 - Tesla, Cybertruck
 - Volvo, VNR Electric
 - Workhorse, C1000
- Sedan
- SUV
- Van-Cargo
 - Arrival, Van L3H3 (...)
 - Arrival, Van L3H3 (...)
 - Arrival, Van L3H3 (...)
 - Arrival, Van L3H3 (...)


Ford
Make

F-150 Lightning Pro
Model

2022
Year

230
Est Range

40.0K
MSRP



Other Information

Availability	2022
Battery Size (kWh)	110
Charging Standard	TBD
Compatibility with Exist. ChargePo...	Y
Efficiency (kWh/mile)	0.4783
EPA Efficiency (MPGe)	TBD
Est. Charge Time 60 kW	2.037
Est. Charge Time 7.5 kW	16.9753
Fast Charge Capable	N
Made from Scratch	Y
Widely Available Maintenance	TBD
Years of EV Experience	0.4

Client Requirements

Criteria	Fleet		Facilities		Security Fleet	
	Client Needs	Actuals	Flag	Client Needs	Actuals	Flag
AWD or Chains	AWD	AWD	Pass	AWD	AWD	Pass
Backup Cameras	Preferred	Y	Pass	Preferred	Y	Pass
Bench Seat	N	TBD		N	TBD	
HVAC	Y	Y	Pass	Y	Y	Pass
Lift Gate	N	TBD		N	TBD	
Luxury Vehicle	N	N	Pass	N	N	Pass
Upfit Availability	N	Y	Pass	Y	Y	Pass

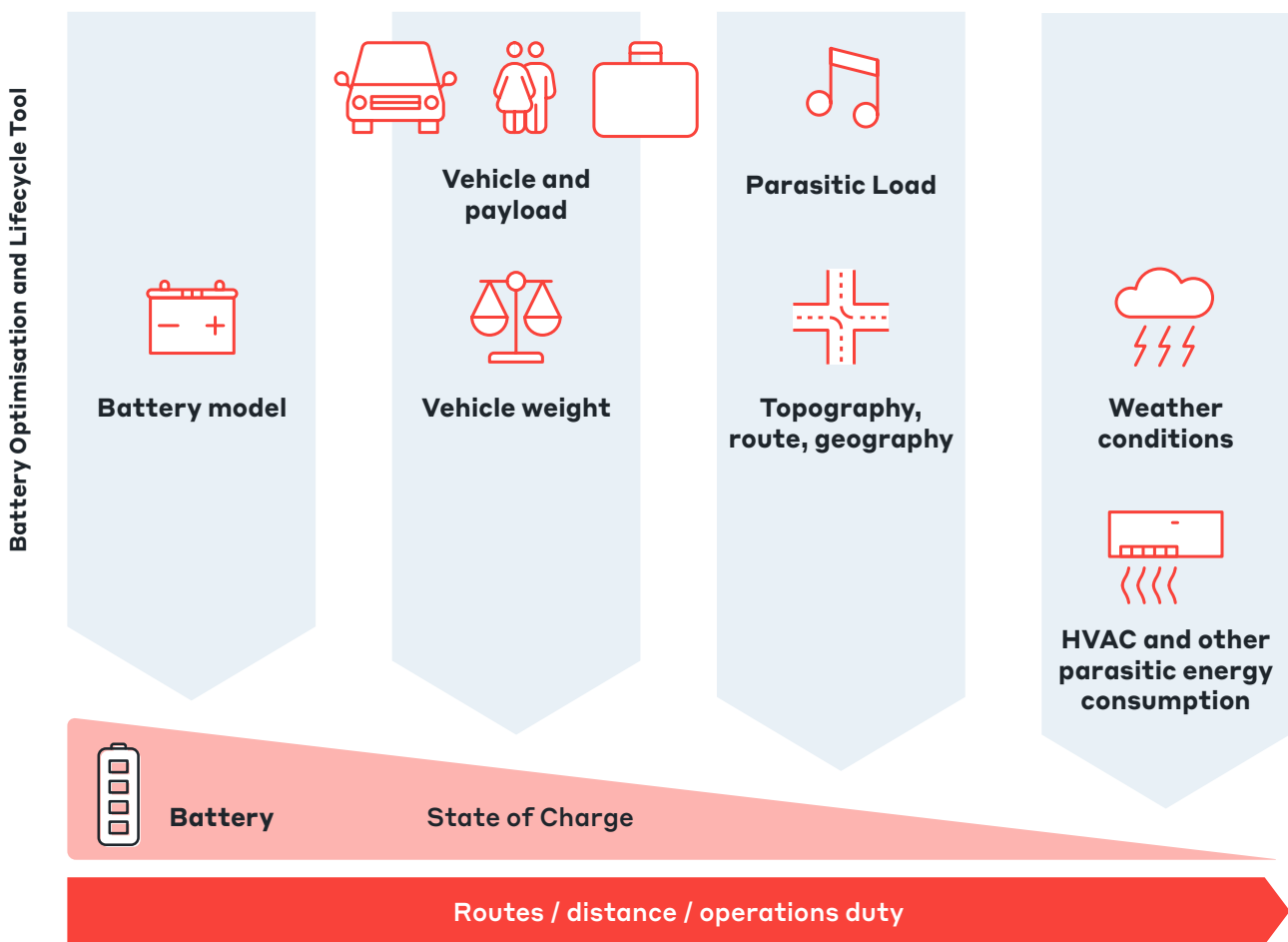
Criteria	Fleet		Facilities		Security Fleet	
	Client Needs	Actuals	Flag	Client Needs	Actuals	Flag
Est. Max Range	100.0	230.0	Pass	149.0	230.0	Pass
Front head room	41.0	40.8	Fail	41.0	40.8	Fail
Front leg room	43.1	43.9	Pass	43.1	43.9	Pass
Front shoulder room	55.9	66.7	Pass	55.9	66.7	Pass
PAX Cap	2.0	5.0	Pass	2.0	5.0	Pass
Payload Cap	3000.0	2000.0	Fail	3000.0	2000.0	Fail
Rear head room	0.0	40.4				
Rear leg room	0.0	43.6				
Rear shoulder room	0.0	66.0				
Tow Cap	10000.0	10000.0	Pass	10000.0	10000.0	Pass

BATTERY OPTIMISATION AND LIFECYCLE TOOL (BOLT) FOR SCHEDULED FLEETS

WSP developed BOLT to simulate heavy-duty Battery Electric Bus (BEB) and other scheduled fleet operation and help government agencies and operators quickly and easily identify the best routes for electrification, as well as energy consumption at depots.

BOLT takes in local analyses of numerous electrification scenarios, considering all the critical factors needed to simulate BEB or battery electric vehicles fleet vehicle range, to determine energy consumption, and evaluate performance and lifecycle operating cost. This allows simulation of a fleet owner’s entire network to create a system network Electrifiable Index that identifies the routes that can be electrified; potential routes for near-term conversion; and a recommended path to guide a long-term transition to a zero-emission fleet.

The tool can be tailored to analyse various scheduled battery electric fleet operations to support the transition to electric vehicles.



WSP IN ACTION

ZERO EMISSION BUS TECHNICAL ADVISORY, TRANSITION PLANNING AND DEPOT DESIGN – TRANSPORT FOR NEW SOUTH WALES

SYDNEY, AUSTRALIA

Transport for NSW is transitioning the existing NSW bus fleet to a zero-emissions fleet to support NSW Government’s goal of reaching net-zero by 2050. The transition requires the replacement of over 8,000 buses, and upgrades to over 600 depots to include zero emission bus supporting infrastructure.

WSP was engaged to provide technical advice on the technology selection of TfNSW’s zero-emissions bus fleet. We investigated a range of potential technologies including battery-electric and hydrogen fuel cell solutions and assessed their relevance through a multi criteria analysis (MCA). We then applied the preferred zero emission technology to existing bus operations to understand the implications on infrastructure and operations.

Our findings informed the technology implementation plan and transition strategy, where we determined the readiness of bus contract regions for the transition roadmap and a range of technical considerations, implications, and opportunities.

WSP was then engaged to help TfNSW define the appropriate technical and performance requirements for key components within the ZEB system: buses, charging equipment, depots, and software. We co-developed the requirements framework and developed a Fire Life Safety (FLS) strategy based on research and international case studies.

As TfNSW progresses with the transition to a zero-emission fleet, critical paths on the ZEB program will include retrofits to depots and upgrades to power infrastructure. WSP is currently developing concept designs for five existing depots, using a multi-disciplinary team. The designs aim to provide a suitable layout for charging a maximum number of buses on site while accommodating electrical infrastructure and equipment.

ZERO EMISSION BUS STRATEGIC AND FINAL BUSINESS CASE – TRANSPORT FOR NEW SOUTH WALES

SYDNEY, AUSTRALIA

WSP supported Transport for New South Wales in the preparation and presentation of the Strategic Business Case for the full Zero Emission Bus transition, as well as the Final Business Case for the Tranche 1 of Greater Sydney buses. This work included both the financial and economic modelling and the business case submission writing. Our support of Transport for New South Wales has led to the public announcement of the Tranche 1 rollout which will see 200 electric buses on the roads by 2023, and conversion of all of Greater Sydney by 2035, supported by a series of retrofitted and greenfield electric bus depots. This project is an example of WSP’s ability to combine deep technical knowledge with our financial and economics expertise to deliver a game changing outcome for Australia.



ELECTRIC VEHICLE CHARGING INFRASTRUCTURE PRIORITIES AND NEEDS RESEARCH – DEPARTMENT OF CLIMATE CHANGE, ENERGY, THE ENVIRONMENT AND WATER

AUSTRALIA

WSP was engaged to review global literature and practices to understand electric vehicle charging infrastructure priorities and needs, in order to support the rapid uptake of EVs as they approach price parity with internal combustion engine (ICE) vehicles in Australia.

The study identified the features of a well-designed charging network from international experience and highlighted lessons and actions to be taken in the Australian context. It focused on three main features of a well-designed EV charging network: network coverage and supply, standards and interoperability and delivering a positive user experience. These are underpinned by elements including data and information, the need for multi-sector collaboration and grid capacity, stability and reliability. The report identified a series of next steps for governments, charging infrastructure providers, electricity grid operators and other key parties to consider when managing the increase in EV uptake on Australian roads and associated impacts on electricity grids. The work is being used to inform the development of a National Electric Vehicle Strategy to increase the affordability and up take of EVs in Australia.

LEPPINGTON AND EDMONDSON PARK SOUTH COMMUTER CAR PARKS – AW EDWARDS & TRANSPORT FOR NEW SOUTH WALES

SYDNEY, AUSTRALIA

WSP was engaged as the Sustainability Consultant for the two commuter car parks in the TfNSW Commuter Car Park Program, Leppington and Edmondson Park South. WSP has supported AW Edwards with the delivery of the IS sustainability rating including a whole of life greenhouse gas assessment demonstrating the car parks have been designed for carbon positive operation, exceeding the net zero objectives of the program. WSP also produced an EV charging feasibility study, solar PV feasibility study and whole of life cost study to inform options for solar PV, EV charging equipment, onsite battery storage and a smart energy management system. We have also undertaken similar work on other car parks (e.g. NorthWest Rail Link in Sydney).



NET ZERO HIGHWAYS – HIGHWAYS ENGLAND

nationalhighways.co.uk/netzerohighways

ENGLAND, UNITED KINGDOM

The WSP-led team developed UK’s National Highway Net Zero Plan which aims to build an ambitious and credible strategy for net zero highways across the UK by 2050. The plan involved developing a compelling strategic vision for net zero transport and set targets covering corporate emissions (net zero by 2030), construction and maintenance emissions (net zero by 2040), and road user emissions (net zero by 2050). A series of practical actions and delivery mechanisms were devised as part of the plan to deliver on the vision and targets. We are continuing to work with Highways England on the implementation of the plan.

GLOBAL EV FLEET CONVERSION – CONFIDENTIAL FORTUNE 100 CLIENT

GLOBAL

WSP is supporting a confidential Fortune 100 client with electrifying their global fleet of over 1,600 vehicles by 2030 in order to become carbon neutral by this date. WSP is their trusted advisor, working on over 20 sites across 6 different countries. We have assisted in feasibility studies, engineering and implementation for this project to ensure the correct vehicles are selected and the proper electrification infrastructure is in place to support fleet and employee charging of electric vehicles.

A wide range of vehicle types are included, including e-bikes, passenger cars, minibuses, full size coaches, cargo and delivery vans. We have collated information on all available vehicles in an interactive database, which has been used to analyse and select alternative vehicles to meet specific client requirements.



CONTACTS

For more information about how WSP can support you in the transition to zero emission vehicles, and any wider decarbonising transport activities, please get in touch.



ELEANOR SHORT

SENIOR PRINCIPAL –
TRANSPORT ADVISORY

TPT Planning & Mobility

Eleanor.Short@wsp.com



BEN JENSEN

PRINCIPAL

Infrastructure Investment Decisions

Ben.Jensen@wsp.com



BRIAN SMITH

TECHNICAL EXECUTIVE

TPT Planning & Mobility

Brian.Smith@wsp.com



IVAN PENA

DIRECTOR, BUILDING SERVICES

Property and Buildings

Ivan.Pena@wsp.com

WSP Australia Pty Ltd



Our Offices

(click for link)

About

WSP is one of the world's leading engineering professional services consulting firms, bringing together approximately 4,300 talented people across 14 offices in Australia. We are technical experts who design and provide strategic advice on sustainable solutions, and **future ready** engineering projects that will help societies grow for lifetimes to come.