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DRIVING EV TRANSFORMATION

WHITEHORSE CITY COUNCIL

Zero Emission Fleet Business Case

Whitehorse City Council, December 2025

Version	Date	Author	Reviewer	Comments
V1	13.11.2025	Alex Hagan	Edwin Higginson	
V2	17.12.2025	Alex Hagan	Edwin Higginson	Updated following v3.1 feedback from WCC
V3	23.12.2025	Alex Hagan	Edwin Higginson	Updated following final feedback from WCC
V4	27.01.2026	Alex Hagan	Edwin Higginson	Updated to reflect changes to emissions pie chart and chart titles

1 Executive Summary

Whitehorse City Council is pursuing a transition to a Zero Emission Fleet in support of its Climate Response Strategy 2023–2030 and Climate Response Plan 2023–2026. With buildings and streetlighting already powered by 100% renewable electricity, the vehicle fleet is now a primary source of remaining corporate emissions. This business case provides a practical, data-backed roadmap to eliminate fleet emissions while maintaining service delivery and financial responsibility.

Purpose and Scope

- Transition Council's entire vehicle fleet to low- and zero-emission vehicles over time.
- Support Council's **strategic target to aspire for net zero corporate emissions.**
- Include passenger cars, light commercials, medium/heavy-duty vehicles, and off-road plant.
- Analyse fleet composition, utilisation, fuel use, and whole-of-life costs.
- Assess site electrical capacity, charging infrastructure needs, and employees' readiness.

Key Findings

- **Fleet emissions total 1,200 tonnes CO_2 annually**, mostly from Trucks and Utilities.
- **Passenger cars, SUVs, and small vans are "EV-ready"** today with available models and lower running costs.
- **Heavy and specialised vehicles will transition later** as EV models become commercially viable between 2026–2030.
- Whole-of-life cost modelling shows **EVs reduce fleet operating costs by 24%**, delivering **$4.28 million in savings** over 10 years.
- **Vehicle purchase costs are $5.6 million higher** under the transition scenario, primarily due to current EV premiums for trucks and utilities.
- **Net increase in total fleet costs over 10 years is approximately $3.49 million**, or $349,000 per year.
- **Residual value risk is manageable**: resale values for EVs are improving and should be monitored; conservative assumptions have been used in the modelling.

Emissions Reduction Potential

The Zero Emission Fleet pathway delivers substantial and sustained emissions reductions in line with Council's climate ambitions.

- Based on 2024-25 emissions data Council's current fleet emits an estimated **1,200 tonnes of CO_2 annually**.
- Under the transition scenario, emissions begin declining initially from 2026 as light and medium EVs replace high-usage diesel vehicles.
- By **2034–35**, **tailpipe emissions could be reduced to near zero**, with the full fleet transitioned to zero-emission technology.
- Compared to the business-as-usual (BAU) scenario, the transition pathway avoids more than **10,000 tonnes of cumulative CO_2 emissions** over the next decade.
- This makes the fleet transition one of the most impactful decarbonisation initiatives available to Council.

A visual projection of this reduction is shown in Figure 1.

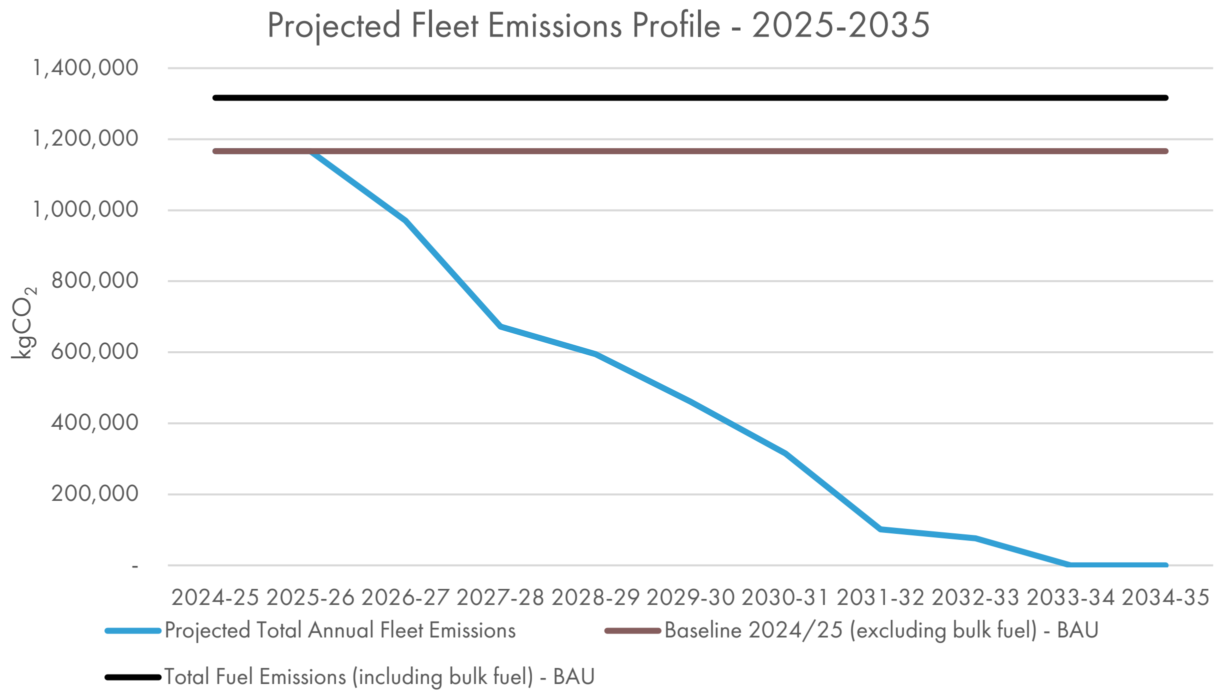

Figure 1 Council's projected fleet emissions profile 2025-2035

Fleet Transition Costs

The business case compares a BAU internal combustion fleet scenario with a planned transition to a zero-emission fleet over 10 years. While capital costs are higher under the transition scenario, lower fuel and maintenance costs result in significant long-term operational savings.

Summary of 10-Year Cost Comparison:

Table 1 Summary 10-year cost comparison

	BAU	Fleet Transition	Delta
Vehicle CAPEX	$14,412,000	$20,019,530	+$5,607,530
Vehicle OPEX	$18,168,056	$13,890,468	-$4,277,588
Charging Infrastructure CAPEX	NA	$1,454,900	+$1,454,900
Charging Infrastructure OPEX	NA	$545,500	+$545,500
Home Charging (50% Base Case)	NA	$160,875	+$160,875
Total	**$32,580,056**	**$36,071,273**	**+$3,491,217**

Key insights:

- The Zero Emission Fleet scenario results in a **net additional cost of $3.49 million** over 10 years.
- Operating cost savings (**$4.28 million**) partially offset the capital premium.
- Charging infrastructure and home-charging support add roughly **$2.16 million** across capital and operating costs.

- Residual values for EVs are expected to improve as the second-hand market matures; Council is advised to regularly review asset depreciation assumptions.

These costs represent a conservative planning baseline. Actual costs could be lower depending on grant availability, continued EV price declines and efficient deployment of charging infrastructure.

Short-Term Priorities (2025–2027)

- Replace passenger vehicles due for renewal with electric models.
- Install depot-based chargers.
- **Conduct operational trials** of:
    - **Prime movers**
    - **Light-duty rigid trucks**
    - **Medium- and heavy-duty rigids**
    - **Zero-emission off-road plant (e.g. ride-on mowers)**
- **Trial home charging** with a select group of engaged employees to assess installation processes, usage tracking, reimbursement approaches and user experience.
- Adopt an **EV-first fleet procurement policy**, with clear exemption criteria.
- Update Asset Management and Procurement policies to reflect zero-emission transition goals.
- Deliver employees training on EV operation, charging, and safety.

Medium-Term Priorities (2027–2030)

- Replace Utilities, vans, and medium-duty trucks as suitable EVs become available.
- Expand charging infrastructure at depots and administrative sites.
- Pursue co-funding opportunities (e.g. ARENA, state programs) for vehicles and infrastructure.
- Integrate depot solar PV and explore battery storage or vehicle-to-grid capabilities.
- Monitor EV market trends, cost forecasts, and performance data to refine planning.
- Review and plan changes to workshop facilities for servicing and maintenance. Train employees and ensure relevant mechanical and electrical skills to maintain fleet.

Long-Term Priorities (2030–2035)

- Complete fleet conversion and decommission remaining internal combustion vehicles.
- Continue to maintain charging equipment and prepare to replace charger as needed from year 10 of operation.
- Institutionalise new fleet practices into standard policies and asset management.
- Conduct a post-implementation review to assess emissions reductions, financial performance, and lessons learned.

Policy and Governance Recommendations

- Revise and embed zero-emission fleet commitments into Council's:
    - **Fleet Policy**
    - **Fleet Asset Management Plan**
    - **Procurement Policy**
    - **Asset Management Strategy**
- Incorporate environmental and lifecycle cost criteria into all fleet-related purchasing decisions.
- Establish reporting metrics and employee's accountability for transition progress.

2 Glossary and Abbreviations

The following glossary defines key terms and acronyms used throughout this report. It is intended to assist readers in interpreting technical, policy and financial terminology related to fleet management, electric-vehicle technology and infrastructure planning

Term / Acronym	Description
AC (Alternating Current)	The standard form of electricity supplied by the grid and used by most electric vehicle (EV) chargers for slower charging applications (typically 7–22 kW).
ARENA (Australian Renewable Energy Agency)	Federal agency that funds and supports innovation and commercialisation of clean energy technologies, including zero-emission transport projects.
ATO (Australian Taxation Office)	Federal authority responsible for administering the Fringe Benefits Tax (FBT) framework relevant to fleet vehicles.
BAU (Business as Usual)	Councils current fleet operations and costs.
Battery State of Health (SoH)	A measure (expressed as a percentage) of an EV battery's remaining energy capacity compared with its original condition. Used to assess residual value at disposal.
BEV (Battery Electric Vehicle)	A vehicle powered solely by an onboard battery that is recharged from an external electricity source. Produces zero tailpipe emissions.
B-cycle	Australia's national Battery Stewardship Scheme, focused on collection and recycling of batteries. Future phases are expected to include EV batteries.
CEFC (Clean Energy Finance Corporation)	Federal government-owned green bank providing concessional loans and co-investment for clean technology, including fleet electrification.
CCS2 (Combined Charging System Type 2)	The standard DC fast-charging connector type for EVs in Australia. Compatible with Type 2 AC charging ports.
DC (Direct Current)	Electricity used for fast-charging applications (typically 25–350 kW). DC chargers bypass the vehicle's onboard converter for faster charging rates.
DEECA (Department of Energy, Environment and Climate Action)	Victorian Government department responsible for administering the state's zero-emission vehicle and energy efficiency programs.
EV (Electric Vehicle)	A general term covering all vehicles powered in part or whole by electricity, including BEVs, PHEVs and FCEVs.
EV Ready	Per Australian EVS fleet electrification readiness index
FBT (Fringe Benefits Tax)	A tax payable by employers on non-cash benefits (such as private use of vehicles) provided to employees. EVs under the LCT threshold are exempt from FBT since July 2022.
FCEV (Fuel Cell Electric Vehicle)	A vehicle powered by a hydrogen fuel cell that generates electricity to drive the motor. Produces only water vapour as exhaust.
GVM (Gross Vehicle Mass)	Gross Vehicle Mass is the maximum total weight of a vehicle as specified by the manufacturer, including the vehicle itself, all occupants, payload, accessories, fluids and any fitted equipment.
Hybrid Vehicle	A hybrid vehicle uses both an internal combustion engine and an electric motor to propel the vehicle, it still relies on an internal combustion engine as its primary drivetrain.
ICE (Internal Combustion Engine)	A conventional petrol or diesel engine used in most existing fleet vehicles.

IPWEA (Institute of Public Works Engineering Australasia)	Professional association providing asset management and fleet-management guidance for local governments.
kW (Kilowatt)	Unit of power. Used to describe charging rate or engine/motor output.
kWh (Kilowatt-hour)	Unit of energy. Used to describe battery capacity and energy consumption.
LCT (Luxury Car Tax)	Federal tax applied to vehicles above a threshold value ($89 332 for fuel-efficient vehicles in 2024–25). EVs below this threshold qualify for FBT exemption.
NGA (National Greenhouse Accounting)	Australian Government framework and set of emissions factors used to calculate greenhouse gas emissions in a consistent and standardised manner across sectors. The NGA factors convert activity data (such as fuel use or electricity consumption) into carbon dioxide equivalent (CO_2-e) emissions for reporting and accounting purposes.
O&M (Operations and Maintenance)	The ongoing running and servicing costs associated with fleet or infrastructure assets.
OEM (Original Equipment Manufacturer)	The vehicle manufacturer or brand. Increasingly responsible for lifecycle management and end-of-life battery stewardship.
Payload	Refers to the maximum allowable weight that a vehicle can legally carry, excluding the vehicle's own weight. This includes tools, equipment, materials, cargo, fitted accessories, and occupants, and must remain within the vehicle's gross vehicle mass (GVM) limits.
PHEV (Plug-in Hybrid Electric Vehicle)	Vehicle combining an internal combustion engine with a rechargeable battery capable of limited electric-only operation.
SoC (State of Charge)	The current percentage of an EV battery's available energy relative to full capacity.
TCO (Total Cost of Ownership)	The full lifecycle cost of a vehicle, including purchase price, fuel or energy, maintenance, insurance and resale value.
Type 2 (Mennekes)	The Australian standard connector type for AC charging of electric vehicles.
VEEC (Victorian Energy Efficiency Certificate)	Tradeable certificate under the Victorian Energy Upgrades (VEU) program representing one tonne of CO_2-equivalent abatement.
VEU (Victorian Energy Upgrades Program)	Victorian Government program providing financial incentives for approved energy-efficiency activities, potentially including EV infrastructure.
ZEV (Zero Emission Vehicle)	Vehicle that produces no tailpipe emissions, including battery-electric and hydrogen fuel-cell vehicles.

3 Project Background

3.1 Council's Emissions Reduction Goals

Council has already achieved a major milestone in its climate journey through the procurement of 100% renewable electricity under the Victorian Energy Collaboration (VECO). This achievement, embedded within the Climate Response Plan 2023–2026, has dramatically reduced the organisation's emissions from electricity use across buildings and streetlighting.

As a result, the emissions profile of Council's operations has shifted significantly, with fleet fuel use now representing one third of corporate emissions. The transition away from fossil fuel–based transport is therefore central to achieving Council's aspiration to reach net-zero corporate emissions.

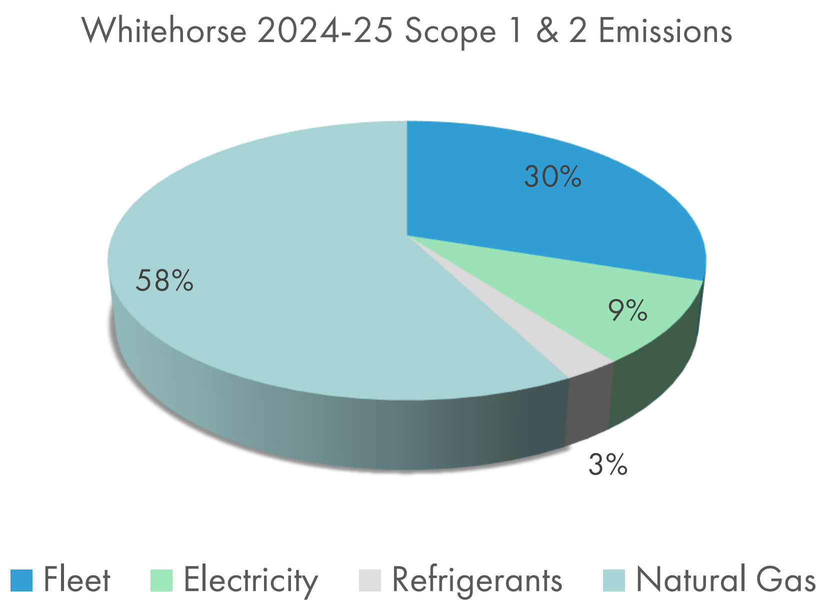

Figure 2 Whitehorse Current Scope 1 and 2 Emissions 2024-25

While contributors such as natural gas and refrigerants remain relatively stable, diesel and petrol usage across the Council's fleet and plant now account for a disproportionate share of residual emissions. These are concentrated in operational vehicles and machinery where market-ready low or zero emission alternatives are emerging.

The challenge ahead is to decarbonise these fleet operations while maintaining service delivery across diverse functions such as parks, civil works, waste, and community services. This will require:

- Phased vehicle replacement guided by lifecycle analysis and operational readiness.
- Investment in depot charging infrastructure and site electrical upgrades.
- Behavioural and operational changes to support employee's adoption and efficient fleet utilisation, ensuring required skills and experience for mechanics servicing and maintaining the fleet and
- Evaluation of interim fuels such as biofuels or renewable diesel where electrification is not yet feasible.

This next phase of the transition will be more complex than the switch to renewable electricity. However, it represents an opportunity for Council to demonstrate practical climate leadership by tackling one of its most significant remaining emissions sources through evidence-based, technically robust and financially sustainable solutions.

3.2 Emissions Factors

Emissions factors utilised in this report are as follows:

- **Electricity**: Assumed 0 kg CO_2 per kWh due to the presence of a 100% renewable electricity contract
- **Diesel:** 2.7 kg CO_2 per litre
- **Petrol:** 2.3 kg CO_2 per litre

3.3 Assumptions, Caveats and Limitations

The recommendations in this transition strategy and business case are informed by current market intelligence, vehicle data provided by Council, and best-practice whole-of-life cost (WOLC) modelling. Several assumptions and caveats underpin the fleet transition analysis and should be acknowledged when implementing or updating the plan.

- **Vehicle Representation:** Where specific electric vehicle (EV) models are referenced, they are indicative examples only. Council must undertake its own procurement and value-for-money assessment to confirm suitability, performance, and supplier reliability.
- **Pricing Basis:** Vehicle prices are based on manufacturers' recommended retail price (RRP) and exclude fleet discounts, optional accessories, or specialised bodywork. For utilities and trucks, cab-chassis pricing is assumed.
- **Utilisation Data:** Fleet utilisation (annual kilometres or operating hours) has been derived from the most recent data available from Council systems and fuel-card records. Data anomalies or missing records have been addressed using reasoned assumptions where necessary.
- **Replacement Schedules:** Existing replacement schedules have been maintained, meaning no vehicles are retired early. Adjustments have only been suggested where operational or economic justification exists.
- **Infrastructure and Site Conditions:** All charging infrastructure layouts, costs and power supply assessments are desktop-based and assume standard installation conditions. No intrusive investigation, design, or surveying of underground or latent site conditions has been undertaken.
- **Electrical Capacity:** Site electrical capacity assessments rely on the latest information provided by Council and indicative switchboard ratings. Final outcomes will depend on detailed design, DNSP (Distribution Network Service Provider) approvals, and available network capacity at the time of installation.
- **Civil and Structural Works:** Pricing assumes minimal civil, trenching, or resurfacing requirements. Costs could vary if underground services, contaminated soil, or structural constraints are identified during detailed design.
- **Energy Pricing and Tariffs:** Electricity prices are assumed to align with current VECO renewable energy contracts and may vary with future tariff or market changes.
- **Technology and Market Evolution:** The EV market and charging technologies are evolving rapidly. Vehicle availability, pricing, and performance specifications may change during the implementation period.

This transition strategy and business case should be regarded as a dynamic framework. All assumptions should be reviewed annually, with adjustments made to reflect updated fleet data, technology developments, energy pricing, funding programs, and Council's operational requirements.

4 Methodology

4.1 Desktop Review

The project began with a structured desktop review of all available fleet, energy and operational data provided by Council. This included:

- Fuel card data and fleet registers
- Maintenance cost records
- Existing EV charging infrastructure information

The data was analysed to establish baseline fuel use, lifecycle cost and emissions profiles for passenger, commercial and plant assets. The review also aligned findings with Council's **Climate Response Plan**, **Fleet Policy** and **Asset Management Plan** to ensure consistency with corporate objectives.

Australian EVS undertook supplementary research to benchmark technology and market readiness for electric and alternative-fuel vehicles relevant to Council's fleet. This included up-to-date OEM offerings, infrastructure standards and government incentive programs.

As part of this process, Australian EVS engaged directly with leading vehicle manufacturers and importers to validate the availability and suitability of vehicles for Council's operations. Discussions focused on:

- Electric light-commercial vehicles
- Medium and heavy rigid truck platforms
- Specialised plant such as loaders and mowers

These OEM consultations confirmed delivery timelines, indicative pricing and performance specifications, ensuring transition recommendations reflected practical, commercially available technology.

In parallel, Australian EVS examined Melbourne's EV market, recognising it as one of Australia's most advanced regions for fleet electrification. The review assessed:

- Local dealership and supplier availability
- Charging network coverage and service capability
- Victorian energy tariffs, grid capacity and planning regulations relevant to charger installation

This ensured that all recommendations were grounded in the local economic, regulatory and infrastructure context.

4.2 Workshop and Site Visits

Following the initial data review, Australian EVS facilitated a project workshop with key stakeholders—including Fleet, Sustainability, and Finance representatives—to confirm project objectives, data assumptions, and operational priorities. This engagement also identified any change-management or behavioural considerations for fleet users.

Two site visits were undertaken to the Civic Centre and Operations Centre, and a further review was conducted of the Recycling and Waste Centre, to assess site readiness for vehicle and charging infrastructure transition. These visits captured on-site electrical conditions, vehicle parking and duty allocation, and operational constraints. Outcomes from the workshops and site visits informed the feasibility analysis, risk assessment, and infrastructure concept design for each site.

4.3 Excel Tool Development

A custom Excel-based Fleet Transition and Whole-of-Life Cost tool was developed and pre-populated with Whitehorse's fleet inventory. The tool enabled Council to model replacement timing, cost-benefit scenarios, and emissions outcomes under different transition pathways. Core functions included comparative costing of ICE and EV options, Whole of Life Cost calculations, emissions tracking and the ability to adjust for energy and vehicle price variations. The tool was designed for ongoing internal use by Council employees, supported by instructions embedded in the calculator and built-in flexibility for future data updates.

4.4 Whole of Life Costs

Australian EVS has developed a comprehensive Whole of Life Costs (WOLC) calculator to assist in understanding the impact of EV transition on the costs associated with operating a fleet. As we know EVs may be more expensive to purchase but factors such as reduced operating costs and reduced maintenance can bring EVs close to or exceed parity with ICE alternatives.

The example calculation below shows how WOLC is calculated and depending upon the specific Council's data and use case, the WOLC position can vary significantly. This outlines why it is important to fully understand your fleet's operational requirements before deciding.

There are multiple variables to the calculator including purchase price, kilometres travelled, residual value, energy efficiency and energy cost to name a few. For the example below you can see that the overall WOLC position for vans. In this example the electric van which currently costs $55,000 needs to reach $48,601 when travelling 10,000km per annum to hit parity. However, should the vehicles utilisation hit 18,000 km per annum then all other inputs being equal the vehicle is already at parity. This calculator allows Council to directly compare like-for-like assets and is included in the Excel Based Tool.

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	Existing	Low/ZEV Replacement	
Vehicle Comparison	Peugeot Partner	Peugeot E-Partner	
	ICE (Petrol)	EV	
			
Purchase Price	$ 44,000	$ 55,000	$ 11,000
Residual Value (%)	20%	16%	
Life of Asset	6	6	
Fuel Efficiency (L/100km or kWh/100km)	7.5	19.0	
Fuel Burn Rate (L/h or kWh/h)	0.0	0.0	
Driving Cost ($/100km)	$ 13.50	$ 3.91	-$ 9.59
Fixed Costs			
Opportunity Cost	$ -	$ -	$ -
Insurance	$ 880	$ 1,100	$ 220
Registration	$ 350	$ 350	$ -
Charging Infrastructure Cost	$ -	$ -	$ -
Garaging Cost	$ -	$ -	$ -
Administration Overhead	$ -	$ -	$ -
Total Fixed Costs	$ 1,230	$ 1,450	$ 220
Variable Costs			
Annual Kilometres/Hours	10,000	10,000	$ -
Annual Depreciation	$ 5,867	$ 7,700	$ 1,833
Fuel Cost	$ 1,350	$ 391	-$ 959
Tyres	$ 400	$ 400	$ -
Maintenance	$ 380	$ 240	-$ 140
RV Risk Allowance	$ -	$ -	$ -
Cost of Carbon	$ 59	$ -	-$ 59
Total Variable Costs	$ 8,055	$ 8,731	$ 676
Total Annual WOLC	$ 9,285	$ 10,181	$ 896
Annual CO2 Emissions (kg)	1,725	-	- 1725 kg
Low/ZEV Purchase Price Required for Parity		**$ 48,601**	**12%**

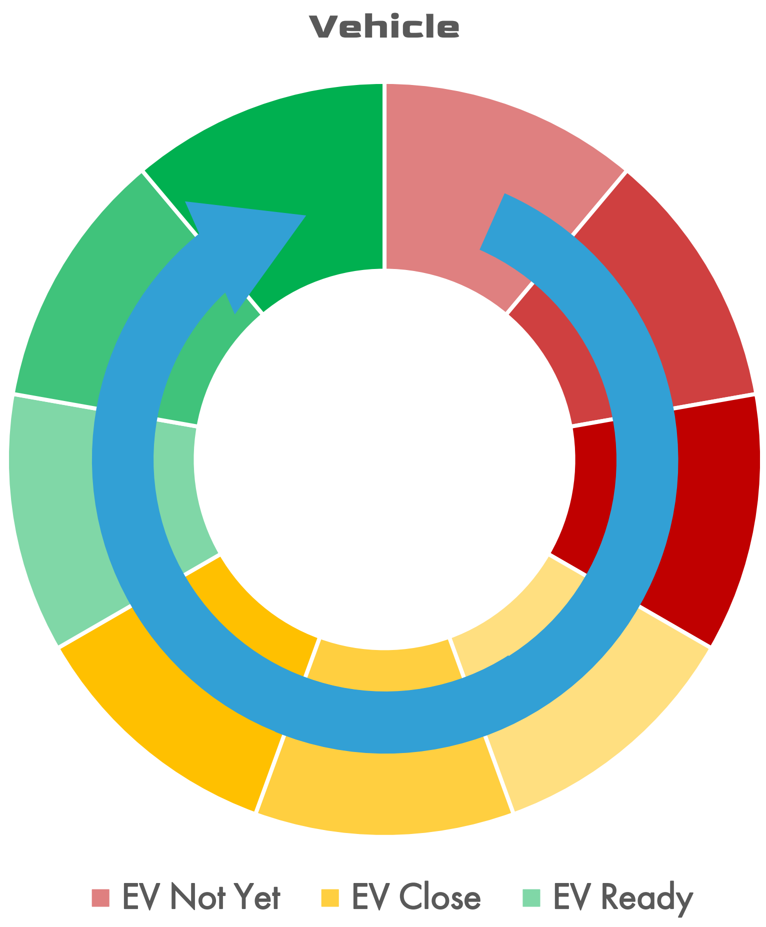
Figure 3 Example WOLC Calculator Output

4.5 Australian EVS Fleet Electrification Readiness Index

Australian EVS have developed a fleet electrification readiness index which acts as a quick guide to whether a particular vehicle or group of vehicles are ready for transition to EV within the context of your fleet operations.

The index score provided utilises fuel card data and Whole of Life Costs analysis to determine whether a vehicle is suitable to electrify.

EV Ready	Vehicles are available to purchase now Vehicles are suitable for the customers' duty cycle Vehicles are cost competitive on WOLC basis
EV Close	Vehicles are expected to be available within 12 months Vehicles are not yet suitable for the customers' duty cycle Vehicles are close to cost competitive on WOLC basis
EV Not Yet	Vehicles are currently not available nor expected in the next 12 months Vehicles are not suitable for the customers' duty cycle without modification Vehicles are not competitive on WOLC



5 Market Analysis

5.1 Overview of Market Direction

Australia's transport sector is undergoing a rapid shift towards zero emissions underpinned by falling technology costs, regulatory reform and private-sector investment. Electric vehicles now represent 12.1% per cent of national new-car sales in the first half of 2025 (Electric Vehicle Council, State of EVs Report 2025). Almost every major OEM offers battery-electric or hybrid models across passenger, SUV and light-commercial segments.

For councils, fleet transition represents the most controllable and visible pathway to decarbonisation. Council's timing aligns with the market inflection point where light-vehicle technologies are commercially proven, while medium- and heavy-vehicle options are entering early commercialisation. The wider Melbourne market has matured to a point where vehicle supply, charging infrastructure and after-sales support are locally available, substantially reducing transition risk.

Going forward the following National, State and Local Government data shows the direction of travel:

- **National** forecasts (CSIRO GenCost 2024, AEMO Integrated System Plan 2024, and the Electric Vehicle Council State of EVs Report 2025) project that electric vehicles will comprise more than 50 % of new light-vehicle sales nationally by 2030, aligning with Council's planning horizon.
- **Victoria**n adoption continues to perform strongly, with EVs representing 12.9 % of all new-vehicle sales in the first half of 2025, compared with a national average of 12.2 %. This reflects a 40 % year-on-year increase and places Victoria among the leading jurisdictions behind only the ACT (26.3 %) and Western Australia (12.3 %).
- **Council** fleets across Victoria are steadily incorporating battery-electric vehicles. While comparable national fleet data is limited, recent surveys indicate that 91% of Victorian councils operate at least one BEV.

The market is now mature enough for Council to begin transitioning light vehicles with confidence. Local availability of vehicles and charging infrastructure reduces delivery risk and allows staged implementation in line with replacement cycles.

5.2 Policy and Legislative Drivers

Council's Zero Emission Fleet Business Case is supported by a strong policy environment at all levels of government:

- **Federal:** The National Electric Vehicle Strategy (2023) establishes mandatory CO_2 emission standards and supports fleet transition through ARENA's Driving the Nation Fund.
- **Victorian:** The Zero Emission Vehicle Roadmap targets 50 per cent of new light-vehicle sales to be zero-emission by 2030 and promotes local-government leadership.
- **Local:** Council's own Climate Response Plan 2023–2026 and Climate Response Strategy 2023–2030 has an ambition to reach net-zero corporate emissions. Fleet fuel use remains one of Council's largest direct (Scope 1) emission sources.

- **Procurement alignment:** Participation in the Victorian Energy Collaboration (VECO) ensures Council's electricity supply is 100% renewable, allowing vehicle electrification to deliver genuine emissions elimination rather than displacement.

Existing policy commitments at all levels of government support fleet electrification and provide a clear investment signal. Council can align its program with these frameworks to access funding and demonstrate leadership in municipal emissions reduction.

5.3 Technology Readiness and Comparative Performance

The Australian vehicle market has entered a new phase of maturity for zero-emission technologies, with battery-electric options now proven and commercially viable. In contrast, hydrogen and biofuels remain limited to specialised or trial-stage applications. The following table outlines each drivetrain type, illustrating typical costs, emissions, and operational considerations for Council-scale fleets.

5.3.1 Comparative Overview of Low- and Zero-Emission Technologies (2025)

The below table summarises a more detailed review of each technology found in Appendix 1 and shows the relative energy efficiency, fuel cost and emissions intensity for each drivetrain type relevant to Council-scale fleet operations.

Table 2 - Comparative Overview of Low and Zero Emissions Technologies

Technology	Maturity (2025)	Indicative Energy/Fuel Cost ($/km)	GHG Emissions (kg CO_2/km)	Infrastructure Needs	Key Advantages	Key Limitations and Risks
Legacy Diesel (Baseline)	Mature	$0.18 – $0.25 / km	0.25 – 0.30	Existing fuel network	Established tech; high range	High emissions; volatile fuel price; maintenance-intensive
Battery Electric (BEV)	Commercially maturing	$0.04 – $0.06 / km (renewable supply)	0.00 – 0.05	AC/DC charging	Lowest running cost; zero tailpipe emissions	Higher Capital cost and range limits for some duties
Plug-in Hybrid (PHEV)	Mature	$0.10 – $0.15 / km	0.09 – 0.12	AC/DC charging	Fuel backup; familiar operation	Can be more expensive than ICE if not regularly plugged in or used in EV mode; higher servicing complexity
Hybrid (HEV)	Mature	$0.13 – $0.18 / km	0.13 – 0.16	None	Improved fuel efficiency vs ICE	Still 100% fossil-fuel dependent
Hydrogen FCEV	Emerging / pre-commercial	$0.70 – $0.90 / km (@ $10–$13 / kg H_2)	0.00 – 0.10 (renewable H_2)	Dedicated refuelling (c.$2–3 m / station)	Fast refuel; high range	High fuel cost; poor energy efficiency; immature supply chain

Bio-Diesel (B20–B100)	Mature but limited supply)	$0.22 – $0.30 / km	0.05 – 0.15 (feedstock dependent)	Existing diesel infrastructure	Drop-in fuel; low disruption	Dependant on feedstock availability; variable carbon intensity

Battery-electric vehicles (BEVs) have emerged as the clear focus for Council fleet transition, with total cost of ownership now reaching parity with diesel for many light and medium-duty applications — and expected to outperform legacy drivetrains as battery prices continue to fall. In contrast, hydrogen and biofuel pathways remain commercially immature, cost-intensive, and unlikely to achieve whole-of-life cost advantages over diesel. For Council, this places electric vehicles as the most practical, lowest-risk and highest-impact pathway to decarbonising fleet operations.

5.3.2 Technology Outlook and Relative Cost Trajectories

Battery-electric technology continues to benefit from global scale, falling battery prices and maturing supply chains. Lithium-ion cell costs have fallen by over 80% since 2015 and are forecast to reach around USD 80/kWh by 2030. These reductions flow directly into lower vehicle purchase prices and shorter payback periods, while operational savings on fuel and maintenance deliver consistent whole-of-life cost advantages.

In contrast, hydrogen fuel-cell vehicles face structural cost and efficiency barriers that make them unlikely to achieve diesel parity for Council fleet applications:

- **Energy efficiency:** Producing, compressing and transporting hydrogen consumes 2.5–3 times more electricity than directly charging a battery-electric equivalent.
- **Fuel cost:** Even under optimistic scenarios, renewable hydrogen is projected at AUD $8–10 per kg by 2035 still equating to $0.70–0.90 per km for a heavy truck, roughly double current diesel levels.
- **Infrastructure intensity:** Hydrogen refuelling depots require multimillion-dollar investment, complex safety systems and very high utilisation to approach economic viability.
- **Supply-chain maturity:** Australia's hydrogen refuelling network remains at demonstration stage with only one operational heavy-vehicle hydrogen refuelling station in Victoria.
- **OEM direction:** Major manufacturers such as Volvo, Scania and Daimler have reprioritised battery-electric platforms for medium and heavy vehicles, citing cost and simplicity advantages. As a small market, Australia will be a market follower rather than a market shaper, with domestic adoption timelines largely determined by global production priorities and right-hand-drive availability.

Hydrogen therefore remains a specialised long-range option for remote or continuous-haul operations rather than a mainstream Council fleet solution. BEV platforms, by comparison, continue to achieve learning-rate cost reductions of 5–8% per year, widening the economic gap. Within Council's 10-year planning horizon, BEV technology will deliver whole-of-life cost parity or better across all light and medium fleet classes, and approach parity for selected heavy-rigid use cases within 1-3 years.

Biofuels and synthetic diesel alternatives such as biodiesel hydrotreated vegetable oil (HVO) and synthetic diesel offer limited interim decarbonisation potential but face similar long-term constraints. While these fuels can reduce lifecycle CO_2 emissions by 40–80% compared with fossil diesel and require no major engine modification, they remain supply-constrained and relatively expensive (typically $0.20–$0.40 /L above standard diesel). Feedstock competition with aviation and heavy-industry demand limits scalability, and synthetic diesel production carries a large energy penalty due to conversion inefficiencies. For Council these fuels may provide a short-term transitional pathway for legacy plant where electrification is not yet practical, but they are unlikely to represent a cost-competitive or net-zero solution beyond this.

Battery-electric vehicles now deliver proven cost and emissions benefits for light-duty applications, while heavy-vehicle options are approaching commercial viability. Council can prioritise battery-electric adoption while monitoring hydrogen and biofuel developments for niche use cases.

5.4 Residual Values

The used EV market in Australia is now entering a period of stabilisation following several years of rapid price fluctuation driven by technology cost reductions and changing policy incentives. Early concerns around battery degradation and resale uncertainty have eased as performance data becomes available from the first generation of fleet vehicles reaching five years of age.

Battery testing and certification are emerging as key enablers of resale confidence. Tools such as independent battery health reports (showing independently analysed state-of-health percentages) are becoming standard in remarketing platforms. This transparency allows buyers to compare used EVs with confidence, underpinning stronger residual values relative to the early market.

While published residual-value forecasts for new EVs still appear low compared with diesel equivalents, typically 35–45% after five years, these figures are heavily influenced by the decline in new-vehicle prices rather than excessive depreciation. As battery and manufacturing costs have fallen sharply, new EVs entering the market are significantly cheaper than their predecessors, which mathematically lowers resale percentages even when used vehicle prices remain stable in absolute terms.

Recent resale data for 3–5-year-old BEVs such as the Hyundai Ioniq, Nissan Leaf, and Tesla Model 3 shows values holding in line with equivalent ICE models. Fleet sales now report growing demand for used EVs from private buyers and small businesses seeking affordable zero-emission options with for example over 60% of used EVs sold through the Pickles auction house being bought by private buyers.

Overall, the market is moving towards residual-value normalisation: as model choice widens, battery-testing standards mature and used-EV demand rises, resale risk for fleet operators will continue to diminish. Within the Council context, residual assumptions can therefore be treated as converging with those of comparable internal-combustion vehicles over the next procurement cycle.

Residual value risk can also be mitigated operationally. Extending the useful life of EV assets beyond their traditional replacement window - supported by battery health testing and condition-based maintenance - can improve overall value retention. Electric drivetrains experience far less mechanical wear, meaning that extending replacement intervals by one or two years has minimal impact on reliability or user satisfaction. Council can also explore secondary applications for retired EVs within less demanding duties (e.g. pool cars, parking enforcement or community programs) to maximise asset utilisation before resale.

Residual risk is easing as battery health testing and market data mature, so Council should require a battery state-of-health report at disposal to support resale value. Falling new-EV prices can depress residual values, so mitigate by extending service life where condition allows and budgeting conservatively for resale.

5.5 Vehicle Availability – Local Dealership and Fleet-Vehicle Examples

The availability of vehicles and supporting service networks is essential for a feasible transition. Melbourne now provides an established supply base across light, commercial and heavy-duty segments.

5.5.1 Light-vehicle examples

- Kia, Hyundai, BYD, MG and Tesla all operate dealerships within 10 km of Council's sites.
- These OEMs have models which match Council's passenger and commuter fleet requirements in range, payload and WOLC performance.
- Many other vehicle dealerships offering new and legacy OEM electric vehicles are also located within close proximity of Whitehorse.

5.5.2 Commercial and heavy-vehicle examples

- Foton Motor Australia markets the T5, Aumark and Auman EV trucks with service centres in Dandenong and Altona North.
- Daimler who has the Fuso eCanter range are in Port Melbourne and Dandenong.
- LDV whose eDeliver 7 and 9 electric vans and light trucks offer viable electric solutions from their dealership in Nunawading.
- Mercedes Benz who offers the eVito and eSprinter vans are in Ringwood.
- Peugeot who offers the E-Partner and E-Expert vans are in Balwyn.
- Renault who offers the Kangoo e-tech electric vans are in Croydon.
- Iveco who offers the eDaily in van or cab chassis are in Dandenong
- Farizon (Geely Commercial Vehicles) launched in 2025 via Jameel Motors Australia, introducing the Farizon SV electric van and H9E light truck; their Melbourne dealership is in Ringwood.
- CMV Group (Volvo, Mack, UD Trucks) has appointed a dedicated Market Development Manager for Emerging Technologies and Alternative Fuels, based in Melbourne, enhancing local technical capacity.

5.5.3 Infrastructure and demonstration activity

- Linfox Heavy Truck Electrification Project: 26 battery-electric prime movers and 25 chargers in Laverton North.
- Mondo Power Truck Charging Hub, Laverton North: 14 dual-plug 350 kW bays funded by ARENA – Australia's first shared truck-charging site.
- Toll Group, Laverton North: trialling electric heavy rigids in the same precinct, creating a regional ecosystem for zero-emission freight.
- Public EV Charging Networks: expanding with around 40 EV charging locations within 10km of Whitehorse

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Local dealer networks and service partners in Melbourne can now supply and maintain a wide range of EV models suited to Council operations. This local capacity minimises supply-chain risk and supports timely replacement planning.

5.6 Battery Longevity and Recycling

Modern electric vehicle batteries are designed for the full operating life of the vehicle and are not expected to require replacement within the normal Council ownership cycle. Improvements in battery chemistry, thermal management and software control have extended expected lifespans well beyond ten years, with most OEMs now offering eight-year or160,000 km warranties as standard on light vehicles and in fact CATL the worlds largest battery supplier now offers 1 million kilometre, 15-year warranties on their batteries in heavy vehicles such as buses and prime movers.

Real-world data from fleet applications in Europe and North America show capacity losses typically below 15% after eight years of service, meaning batteries retain sufficient range for secondary use in the vehicle market. As technology continues to improve this will only increase as this figure is based upon 8-year-old battery technology.

National product stewardship frameworks for end-of-life batteries are also maturing. The Battery Stewardship Scheme (administered by B-cycle) already provides collection and recycling pathways for smaller batteries, and expansion to EV battery modules is anticipated within the next few years. Several manufacturers now operate their own battery take-back or lifetime stewardship programs, reflecting European circular-economy models where OEMs retain ownership of critical materials.

For Council, the practical implication is that battery replacement during vehicle life is highly unlikely and end-of-life management will increasingly occur through OEM or accredited-recycler channels rather than local intervention. Council should continue to monitor the development of Australian battery stewardship legislation and ensure that future fleet procurement specifications include OEM battery take-back or certified recycling obligations. Council currently does not track or manage the subsequent use or disposal of internal-combustion vehicles once sold into the secondary market, so incorporating battery stewardship requirements would represent a change in policy and an extension of Council's lifecycle responsibility.

Battery packs are now expected to last the full vehicle life, reducing long-term risk for Council. Future procurement should specify OEM take-back or certified recycling programs so that end-of-life batteries are managed through accredited stewardship schemes rather than Council operations. Council currently does not track or manage the subsequent use or disposal of ICE vehicles once sold into the secondary market, so adopting battery stewardship measures would represent a shift toward greater lifecycle accountability.

5.7 EV Charging Standards and Market Trends

The charging infrastructure market has matured rapidly, with a wide range of proven suppliers now active in Australia. Depot, home and public charging solutions are widely available from local vendors such as JET Charge, EVSE Australia and Origin Energy, who provide integrated design, hardware and energy management services.

- **Connector standards:** All new electric vehicles sold in Australia now use either **Type 2 (AC only)** or **CCS2 (combined AC/DC)** connectors. These should be adopted as the standard specification across Council's fleet and charging infrastructure to ensure cross-compatibility.
- **Charger types:**
    - *AC chargers (7–22 kW)* suit passenger and light-commercial vehicles parked overnight.

  - *DC chargers (30–350 kW)* provide rapid charging for high-utilisation or heavy-duty vehicles.
- **Smart charging and load management:** Modern chargers integrate with energy management systems and can coordinate charging schedules to avoid peak demand and support renewable integration.
- **Home and depot charging:** The growing use of take-home vehicles makes home charging solutions increasingly relevant, with service providers offering hardware, installation and energy-tracking as managed packages.

Standardising on Type 2 and CCS2 connectors will futureproof the fleet and enable shared use of chargers across departments and vehicle types. Older style connectors should be avoided, however, this will not be an issue for new vehicle purchases.

5.8 Workforce Transition and Training

The transition to a zero-emission fleet will require a gradual shift in workforce capability, focusing on safe operation, maintenance and planning of new vehicle technologies and supporting infrastructure. While the scale of change is manageable, targeted training and policy alignment will be essential to ensure employees are confident and equipped to work safely around high-voltage systems.

5.8.1 Current workforce profile

Council's fleet operations and maintenance activities are currently supported by qualified mechanical and operational employees. Most of the existing skill base is centred on internal combustion engine maintenance, hydraulic systems and general mechanical servicing. These capabilities will remain relevant for a large portion of the fleet over the next decade, with transition occurring progressively as new vehicle technologies are introduced.

5.8.2 Training and qualification pathways

Accredited training in electric vehicle safety and maintenance is now widely available through TAFE and registered training organisations, including Box Hill Institute and Kangan Institute. Relevant qualifications include:

- *AUR40620 Certificate IV in Automotive Electrical Technology (Electric Vehicle Safety)*
- *AURSS00064 Electric Vehicle Service and Repair Skill Set*

These short courses and skill set focus on high-voltage safety, component isolation and fault diagnosis. They can be delivered flexibly to existing employees to build in-house capability without significant disruption.

5.8.3 Operational readiness and safety

Council's existing Work Health and Safety systems will need to incorporate updated procedures for high-voltage vehicle inspection, first response and workshop isolation protocols. Employees responsible for vehicle cleaning, towing or storage will also require basic awareness training. This ensures safe handling of EVs in depot and field environments and compliance with industry standards such as AS 5732:2022 (Electric Vehicle Operations and Maintenance).

5.8.4 Change management and cultural readiness

As the fleet transitions, a structured change management plan should accompany technology deployment. Early engagement, driver familiarisation sessions and hands-on training reduce resistance to change and build operational confidence. A phased introduction of electric or hybrid vehicles into high-visibility areas (such as pool or community vehicles) can support early employees learning and normalise new technology across departments.

5.8.5 Longer-term workforce evolution

Over time, fewer mechanical service hours will be required as scheduled maintenance demands decrease. This provides an opportunity to redeploy resources towards diagnostics, electrical systems and energy management functions. Council may also consider partnerships with local training providers to host apprenticeships or pilot programs that develop future workforce capability in sustainable transport and energy systems.

Targeted training in EV safety, maintenance and charging will build confidence and ensure compliance. Partnering with local providers like Box Hill Institute will support cost-effective upskilling as the fleet evolves.

5.9 Funding the Transition

The transition to zero emission vehicles (ZEVs) is supported by a mix of Federal and State programs that reduce capital costs and strengthen the financial case for fleet conversion. Whilst Victoria does not have its own specific EV or EV charging infrastructure grant like NSW, Council should continue to monitor for new schemes and advocate for funding to be allocated to fleet transition, especially beyond passenger vehicles.

5.9.1 External Funding and Finance

- **Australian Renewable Energy Agency (ARENA):** The Driving the Nation Fund supports fleet decarbonisation, charging infrastructure and heavy vehicle trials through competitive co-funding.
- **Clean Energy Finance Corporation (CEFC):** Provides concessional finance and tailored products for fleet and depot electrification projects.
- **Victorian Energy Efficiency Certificates (VEECs):** While VEECs under the Victorian Energy Upgrades (VEU) program are not currently available for the replacement of internal combustion vehicles with battery electric vehicles, the program is evolving to recognise transport-related decarbonisation. In the interim, Council may consider opportunities for VEEC generation linked to supporting infrastructure such as smart charging, energy management controls or on-site renewable generation that deliver measurable energy efficiency outcomes. Each VEEC represents one tonne of verified CO_2 abatement, currently valued at around $80–$90 per tonne.

5.9.2 Fringe Benefits Tax (FBT) implications

- From 1 July 2022, eligible battery electric and hydrogen fuel cell vehicles are exempt from FBT under Federal legislation.
- Vehicles previously subject to FBT can now be operated without additional tax liability, reducing total cost of ownership for commuter and entitlement vehicles.

Council can reduce upfront costs through programs such as ARENA and CEFC. Monitoring VEEC and new Federal or State based scheme developments will position Council to capture future value from incentives and subsidies.

6 Current Fleet Assessment and Policy Review

This section of the report presents a Fleet Transition Strategy for Council, providing a coordinated and actionable roadmap to decarbonise fleet operations and enable supporting infrastructure.

The Fleet Transition Strategy outlines a phased approach to transitioning the Council's fleet to low- and zero-emission vehicles. It leverages detailed analysis of fleet composition, operational usage, and market availability across vehicle classes, supported by real-world performance and cost benchmarks. Prioritised transition pathways are aligned to Council's existing vehicle replacement cycles and operational requirements.

This plan provides Council with a robust framework to guide investment, funding applications, procurement and operational change—ensuring the fleet transition is both environmentally effective and operationally feasible.

6.1 Fleet Assessment

6.1.1 Fleet Composition

The Council fleet is typical for a Council of this size. Overall, there are 207 assets under consideration for this review.

The graph below shows the distribution of the fleet by type, each of these fleet assets will be considered as part of this fleet and depot transition strategy.

For this assessment vehicle categories have been further developed to allow comparison between ICE and low and zero emission vehicle alternatives, for example the current vehicle type TRUCK >4.5T has been split into four sub-types; Prime Mover, Light Rigid, Medium Rigid and Heavy Rigid.

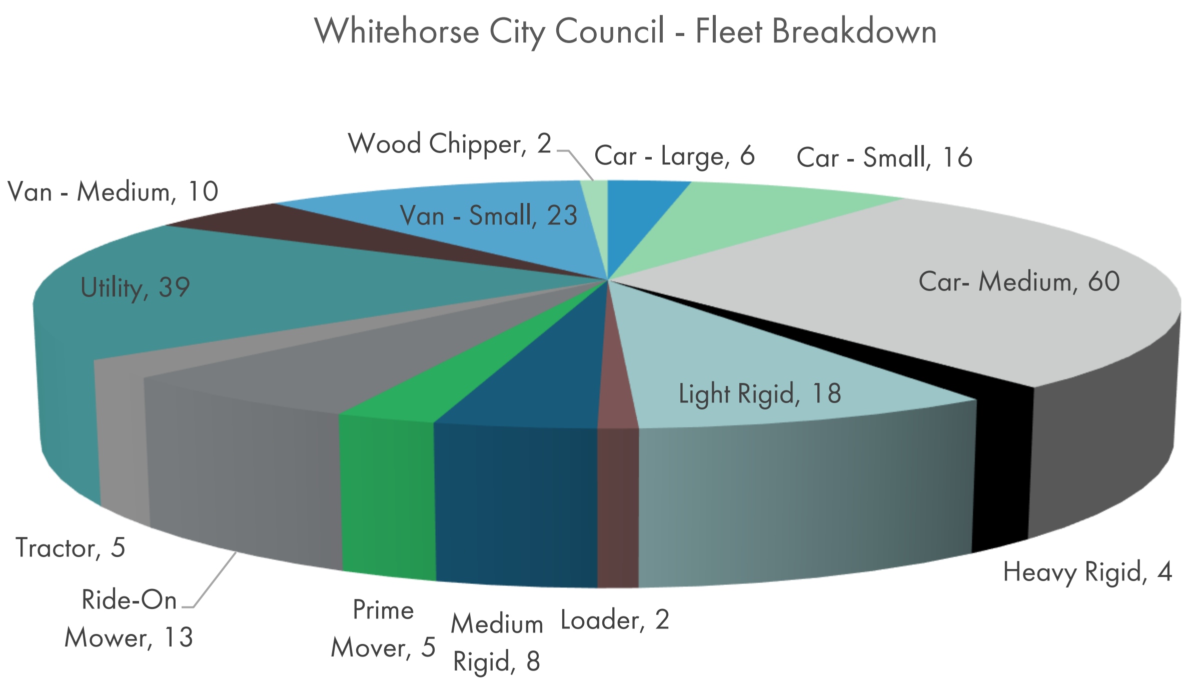


Figure 4 Council Current Fleet Breakdown by Type and Quantity

Overall, the Council fleet is currently heavily weighted towards passenger vehicles with 82 (39%) of the fleet being passenger vehicles. The rest of fleet makeup is very typical of Council operations with various classes and uses of Trucks, Ride-On Mowers, Utilities and Vans. One slightly unusual aspect of the Council fleet is the prevalence of five Prime Movers which is not typical of Council fleets and presents a unique case for transition of zero emissions alternatives.

It should be noted that Council is currently undergoing a transition of Passenger Vehicles to Commercial Vehicles, with 18 Utilities and 17 Vans currently on order in 2025/26 and due to replace Cars. This marks a significant shift in the fleet makeup and has been considered in the transition. It should be noted that this change also impacts the fleet emission profile and pace of the transition as discussed later.

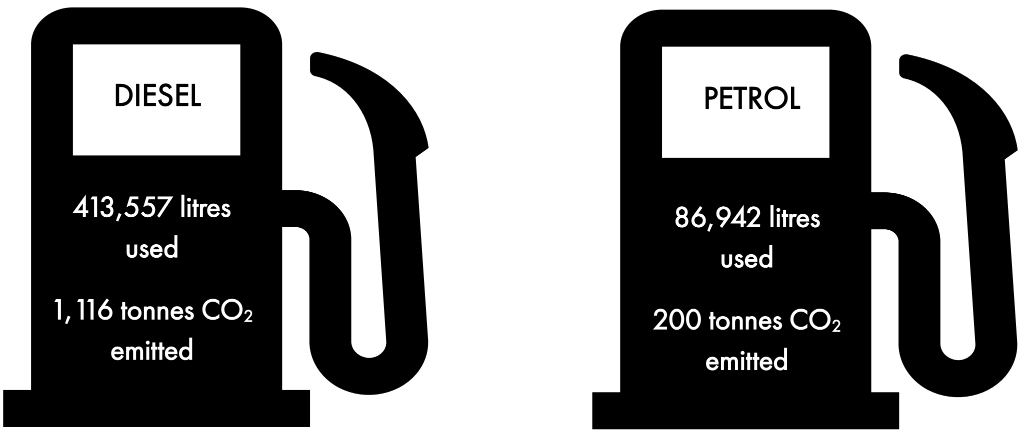
6.2 Baseline Fuel Usage and Emissions

6.2.1 Fuel Usage

Fuel data has been analysed over a 12-month period from July 2024 to June 2025. This provides a significant amount of information and insight into the drivers of fuel consumption and emissions within the fleet.

Across this 12-month period Council's fleet had the following impact:

- 413,557 litres of diesel and 86,942 litres petrol used with an 83% diesel to 17% petrol split
- Over $900,000 spent on fuel
- 1,316 tonnes of CO_2 emissions were released



The annual fuel usage by asset type is shown below and outlines where fuel is used across vehicle types. The main callouts are as follows:

- The five Prime Movers in the fleet are responsible for 36% of the fuel usage and emissions. They have a significantly outsized impact of the fleet's emissions profile compared to other assets.
- The second highest fuel usage and emissions is attributable to Utilities. This is only set to increase given that 18 passenger vehicles are due to be replaced with Utilities.
- Trucks including Light, Medium and Heavy rigid collectively contribute almost 20% of the fleet's fuel use and emissions.

- Fuel used by the heavy machinery including loaders is included in bulk fuel.

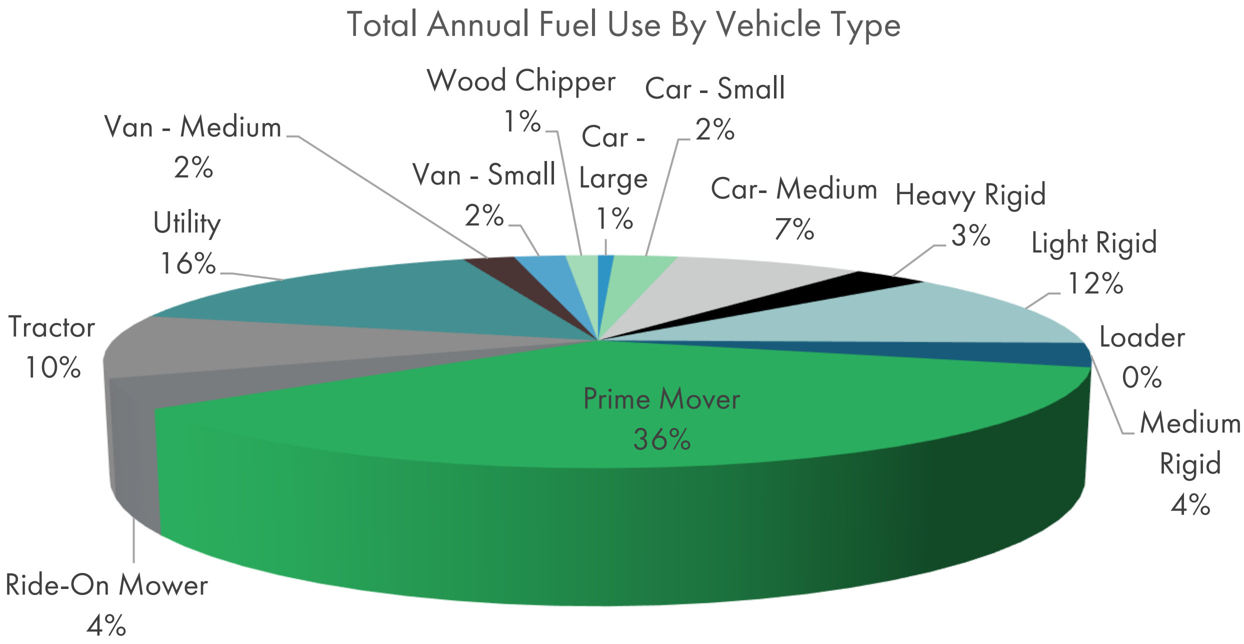


Figure 5 Council Total Annual Fuel Usage Breakdown 2024/25

6.2.2 Fleet Utilisation

Analysing the fuel card data shows that the kilometres travelled by the main vehicle categories are relatively low, this is typical of Council fleet's where vehicles tend to stay within the Whitehorse municipality.

In the case where fleet asset utilisation is measured by hours the average annual utilisation hours have been used to form the basis of WOLC and emissions calculations.

Fleet Category	Utilisation by Annual Kilometres	Utilisation by Annual Hours
Car - Large	15,813	
Car - Small	12,115	
Car- Medium	15,712	
Heavy Rigid	8,091	
Light Rigid	10,424	
Loader		810
Medium Rigid	7,675	
Prime Mover	47,120	
Ride-On Mower		301
Tractor		988
Utility	12,243	
Van - Medium	10,748	
Van - Small	6,860	
Wood Chipper		483

6.3 Fleet Optimisation and Non-Procurement Measures

While the largest emissions reductions will ultimately result from vehicle replacement, Council can achieve immediate improvements through fleet optimisation and non-procurement measures. These actions focus on how vehicles are allocated, utilised, and driven—delivering environmental and financial benefits before new capital investment is required.

6.3.1 Data Limitations and Practical Considerations

Council's fleet data is primarily derived from fuel-card records, which provide useful cost and fuel-type information but limited insight into utilisation, idle time, or operational duty cycles. As such, odometer or kilometre data alone should not be relied upon as a measure of asset productivity. For example, a truck that departs the depot in the morning, remains on site all day, and returns in the afternoon may record fewer than 5 km per day but still be fully utilised. Conversely, if that same truck regularly travels short distances with minimal payload, tasks that could be undertaken by a ute or light van it may be oversized for purpose and represent an opportunity for rationalisation.

It is recommended that Council undertake GPS or telematics trials, supported by driver and supervisor surveys, to build a more accurate picture of daily operations and identify where assets are under- or over-utilised.

6.3.2 Fleet Rationalisation and Right-Sizing

A detailed utilisation review can reveal opportunities to consolidate vehicles, share low-use assets between business units, or align vehicle size with actual operational requirements. Rationalisation can reduce the overall fleet size, improve asset productivity and defer replacement expenditure—delivering measurable cost and emissions savings without impacting service delivery.

It is recommended that Council should prioritise right-sizing during each replacement cycle, ensuring that vehicles match operational need and that surplus assets are retired or redeployed where feasible

6.3.3 Vehicle Substitution and Reallocation Initiatives

Targeted vehicle substitution can quickly improve efficiency and emissions outcomes:

- **Truck → Ute:** Assign lighter-duty or short-distance work to utilities, improving fuel efficiency and manoeuvrability.
- **Ute → Passenger Vehicle**: Replace utilities used primarily for commuting, site visits or inspections with small passenger BEVs.
- **Truck → Van:** In parks or facilities maintenance where payloads are light, enclosed panel vans can reduce fuel use and provide safer load storage.
- **Cross-Site Reallocation:** Rotate low-use or surplus vehicles between depots to balance utilisation and reduce duplication. For example, if a van located at the Civic Centre is found to be underutilised, swapping this with a heavily utilised van from the Operations Centre can improve utilisation.

It is recommended that Council should review vehicle substitution annually to ensure the fleet mix remains optimised for operational demand.

6.3.4 Driver Efficiency and Behavioural Measures

Driver behaviour can influence fuel consumption by up to 20%. Implementing eco-driving training and providing periodic feedback through fuel-card or telematics reporting can deliver immediate results. Key practices include smoother acceleration and braking, maintaining correct tyre pressures, reducing idling and planning efficient routes. These measures promote responsible vehicle use and reinforce Council's sustainability culture.

It is recommended that Council integrate driver-efficiency training into induction and refresher programs, supported by ongoing feedback from fuel data to reinforce positive habits.

6.3.5 Fuel Quality and E10 Considerations

For the remaining petrol fleet, Council could introduce an "E10-first" fuel policy for all manufacturer-approved vehicles. E10 (10 % ethanol blend) typically provides a 2–5 % lifecycle greenhouse benefit relative to standard unleaded petrol due to its renewable content.

Although Council's fuel-card data distinguishes between 91, 95, 98 RON and E10 purchases, these variations do not currently appear in emissions calculations. This is likely intentional, as most councils follow the NGA methodology, which applies standard "petrol" and "diesel" emission factors for consistency and comparability. The CO_2 variance between petrol grades or E10 blends (typically within 2–3 %) is generally considered immaterial.

It is recommended that Council adopt an E10-first policy for compatible vehicles, verify manufacturer guidance, and ensure reporting alignment with existing national greenhouse accounting methodologies while communicating the renewable-fuel benefit internally.

6.3.6 Private-Use Vehicles and Emissions Boundary Considerations

A proportion of Council's reported fleet emissions is attributable to private use of Council vehicles provided under FBT arrangements rather than to operational activity. Several vehicles are garaged at home and used for mixed business and personal travel.

From an emissions-accounting perspective

- **Operational vs Private Travel:** Fuel consumed for personal use contributes to Council's reported Scope 1 emissions but is not directly related to service delivery.
- **Boundary Definition:** Differentiating between operational and private-use emissions provides a clearer picture of organisational control and operational efficiency.

While not yet standard practice, some organisations have begun estimating or internally segmenting emissions from private use.

It is recommended that Council uses available data or new data to estimates the proportion of private-use emissions and distinguish these in internal reporting. This will enhance transparency and more accurately represent operational emissions performance.

6.4 Review of Council Fleet Policy

Whitehorse City Council's Fleet Policy (October 2024) and Fleet Procedure (October 2024) establish a clear framework for the allocation and use of vehicles across four categories: Private Use, Restricted Private Use, Commuter Use and Pool Vehicles.

These policies govern eligibility, employee contributions, fuel-card use, FBT treatment and garaging requirements. The following review summarises key provisions and highlights implications for Council's transition planning.

6.4.1 Summary of Current Policy

Category	Private Use Entitlement	Garaging	FBT / Contribution Treatment	Notes
Private Use	Full private use (including weekends and leave)	Home-garaged	Employee contribution for FBT and portion of operational costs.	Provided to senior employees (CEO, Directors, Mayor)
Restricted Private Use	Private use permitted within Victoria	Home-garaged; pool car use during work hours	Employee contribution for FBT and portion of operational costs.	Applies mainly to Managers and Coordinators
Commuter Use	Limited to home-to-work	May be parked at home overnight	Generally, exempt from FBT (operational use)	Operational need determines eligibility
Pool Vehicle	Business use only	Must remain on site	No FBT	Accessed via booking system for general work travel

This structure ensures that private-use benefits are cost-neutral to Council and that operational vehicles remain compliant with FBT rules.

6.4.2 FBT and Employee Contributions

Council, as the employer, is legally responsible for FBT on any private-use vehicles. To offset this, employees make after-tax contributions equal to the taxable value of the benefit, reducing the taxable value to zero and eliminating Council's FBT liability.

This approach is consistent with widespread Victorian local-government practice. Current examples from Bendigo, Merri-bek, West Wimmera and Yarriambiack councils all specify employee contributions for private-use vehicles.

This evidence indicates that employee contributions remain standard practice across the sector to ensure equity and cost recovery.

6.4.3 FBT Exemption for Zero-Emission Vehicles

Since 1 July 2022, eligible zero and low-emission vehicles (battery electric and hydrogen fuel-cell vehicles under the Luxury Car Tax threshold) have been exempt from FBT. Given Council's current Fleet Policy and Procedure (2024), where 100% of the FBT is payable by the employee, there is opportunity for both financial avoidance and emission reductions if qualifying EVs are made available on the vehicle selection list.

7 Fleet Transition Plan

This section of the report presents a Fleet Transition Plan for Council, providing a coordinated and actionable roadmap to decarbonise fleet operations and enable supporting infrastructure.

The Fleet Transition Plan outlines a phased approach to transitioning the Council's fleet to low- and zero-emission vehicles. It leverages detailed analysis of fleet composition, operational usage, and market availability across vehicle classes, supported by real-world performance and cost benchmarks. Prioritised transition pathways are aligned to Council's existing vehicle replacement cycles and operational requirements.

This plan provides Council with a robust framework to guide investment, funding applications, procurement and operational change—ensuring the fleet transition is both environmentally effective and operationally feasible.

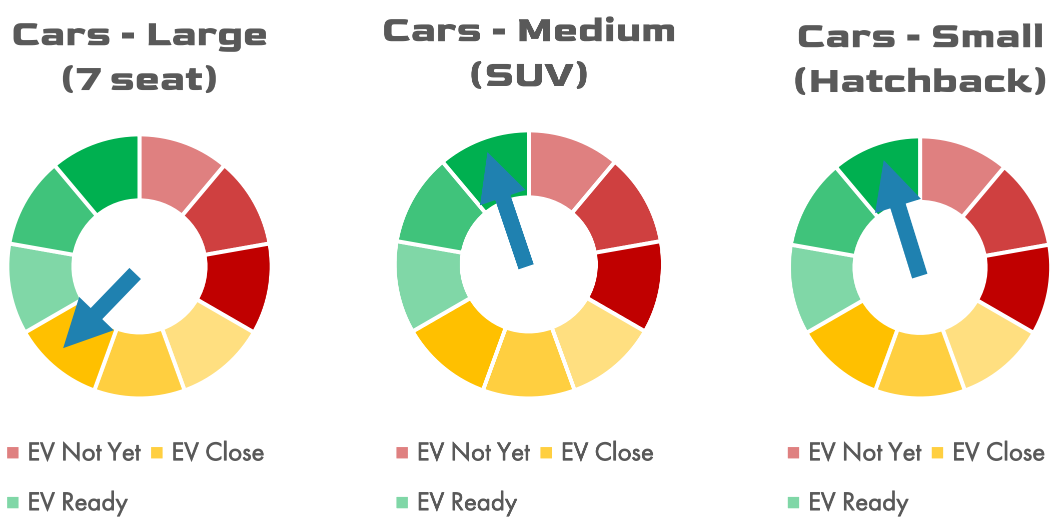
7.1 Cars

7.1.1 Low and Zero Emission Readiness

Cars are the lowest hanging fruit for Council to transition to EV. There are well over 140 available models in Australia which are suitable for Council operations, all vehicles currently on the market in Australian have north of 300km of range meaning suitability Council operations as well and everyday use in the case of private vehicles is very high.

Overall, Cars are EV ready and should be transitioned to EVs as per their replacement cycle. There are a couple of challenges in this space related to residual value projections as discussed earlier in this report. Mitigation to this can be achieved by keeping vehicles for longer, this appears to already be the case at Council with the existing EVs in the fleet already being kept for 6 years rather than 3.

Large Cars as a direct replacement for 7 Seat Kia Sorento's present a minor challenge with currently available EV equivalents being significantly more expensive than their ICE alternatives, it is anticipated that more 7 seat EV models becoming available in Australian in the next 6-12 months. Council should consider if 7 Seat SUVs are necessary and consider whether Medium SUVs are suitable alternatives.



7.1.2 Whole Of Life Costs

For each asset class, a WOLC calculation has been completed, where the results are summarised in this Business Case. The example below for Large Cars shows that the EV equivalent would need to fall to around $65,000 to reach cost parity with the ICE equivalent.

	Existing		Low/ZEV Replacement		
Vehicle Comparison	Kia Sorento ICE (Diesel)		Kia EV9 Air EV		
					
Purchase Price	$	48,500	$	95,000	$ 46,500
Residual Value (%)		66%		40%	
Life of Asset		3		6	
Fuel Efficiency (L/100km or kWh/100km)		8.5		19.0	
Fuel Burn Rate (L/h or kWh/h)		0.0		0.0	
Driving Cost ($/100km)	$	15.56	$	3.80	-$ 11.76
Fixed Costs					
Insurance	$	970	$	1,900	$ 930
Registration	$	350	$	350	$ -
Total Fixed Costs	$	1,320	$	2,650	$ 1,330
Variable Costs					
Annual Kilometres/Hours		16,340		16,340	$ -
Annual Depreciation	$	5,497	$	9,500	$ 4,003
Fuel Cost	$	2,542	$	621	-$ 1,921
Tyres	$	500	$	500	$ -
Maintenance	$	600	$	240	-$ 360
Cost of Carbon	$	128	$	-	-$ 128
Total Variable Costs	$	9,266	$	10,861	$ 1,595
Total Annual WOLC	$	10,586	$	13,511	$ 2,925
Annual CO2 Emissions (kg)		3,750		-	- 3750 kg
Low/ZEV Purchase Price Required for Parity			$	65,749	31%

Figure 6 WOLC Output - Large Cars

	Existing		Low/ZEV Replacement		
Vehicle Comparison	Toyota RAV4 GX Hybrid ICE (Petrol)		Geely EX5 EV		
					
Purchase Price	$	39,000	$	40,990	$ 1,990
Residual Value (%)		66%		40%	
Life of Asset		3		6	
Fuel Efficiency (L/100km or kWh/100km)		6.0		17.0	
Fuel Burn Rate (L/h or kWh/h)		0.0		0.0	
Driving Cost ($/100km)	$	10.80	$	3.40	-$ 7.40
Fixed Costs					
Insurance	$	780	$	820	$ 40
Registration	$	350	$	350	$ -
Total Fixed Costs	$	1,130	$	1,170	$ 40
Variable Costs					
Annual Kilometres/Hours		16,217		16,217	$ -
Annual Depreciation	$	4,420	$	4,099	-$ 321
Fuel Cost	$	1,751	$	551	-$ 1,200
Tyres	$	500	$	500	$ -
Maintenance	$	472	$	250	-$ 222
Cost of Carbon	$	76	$	-	-$ 76
Total Variable Costs	$	7,220	$	5,400	-$ 1,819
Total Annual WOLC	$	8,350	$	6,570	-$ 1,779
Annual CO2 Emissions (kg)		2,238		-	- 2238 kg
Low/ZEV Purchase Price Required for Parity			N/A		-

Figure 7 WOLC Output - Medium Cars

Australian EVS
DRIVING EV TRANSFORMATION

Australian EVS	Existing	Low/ZEV Replacement	
Vehicle Comparison	Toyota Corolla Ascent Sport ICE (Petrol)	BYD Atto 3 Essential EV	
			
Purchase Price	$ 31,000	$ 39,990	$ 8,990
Residual Value (%)	66%	40%	
Life of Asset	3	6	
Fuel Efficiency (L/100km or kWh/100km)	6.0	14.0	
Fuel Burn Rate (L/h or kWh/h)	0.0	0.0	
Driving Cost ($/100km)	$ 10.80	$ 2.80	-$ 8.00
Fixed Costs			
Insurance	$ 620	$ 800	$ 180
Registration	$ 350	$ 350	$ -
Total Fixed Costs	$ 970	$ 1,550	$ 580
Variable Costs			
Annual Kilometres/Hours	12,205	12,205	$ -
Annual Depreciation	$ 3,513	$ 3,999	$ 486
Fuel Cost	$ 1,318	$ 342	-$ 976
Tyres	$ 400	$ 400	$ -
Maintenance	$ 431	$ 276	-$ 155
Cost of Carbon	$ 57	$ -	-$ 57
Total Variable Costs	$ 5,720	$ 5,017	-$ 703
Total Annual WOLC	$ 6,690	$ 6,567	-$ 123
Annual CO2 Emissions (kg)	1,684	-	- 1684 kg
Low/ZEV Purchase Price Required for Parity	N/A	-	

Figure 8 WOLC Output - Small Cars

7.1.3 Fleet Transition

Within the fleet transition for Cars the 35 vehicles which are currently being replaced by commercial vehicles have been excluded bringing down the share of fleet from 82 to 47. As there are already 4 EVs in the fleet this means that 43 ICE vehicles are due to be transitioned starting in 2026-27 and completed by the end of 2027-28.

Vehicles which are due for replacement in 2025-26 beyond those transitioning to Commercial have been delayed following discussion with Council to 2026-27 due to budgeting already being locked in for the current FY. This is across all fleet assets where a judgement call has been made to begin the fleet transition from 2026-27 financial year.

	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	2030-2031	2031-2032	2032-2033	2033-2034	2034-2035
# New Low and Zero Emission	0	8	35	0	0	0	0	0	0	0
Cumulative Low and Zero	4*	12	47	47	47	47	47	47	47	47
ICE Vehicles	43	35	0	0	0	0	0	0	0	0

*Existing

7.1.4 Emissions Reduction

By transitioning the Car fleet to EV, emissions from Cars can be eliminated by the end of the 2026-27 financial year.

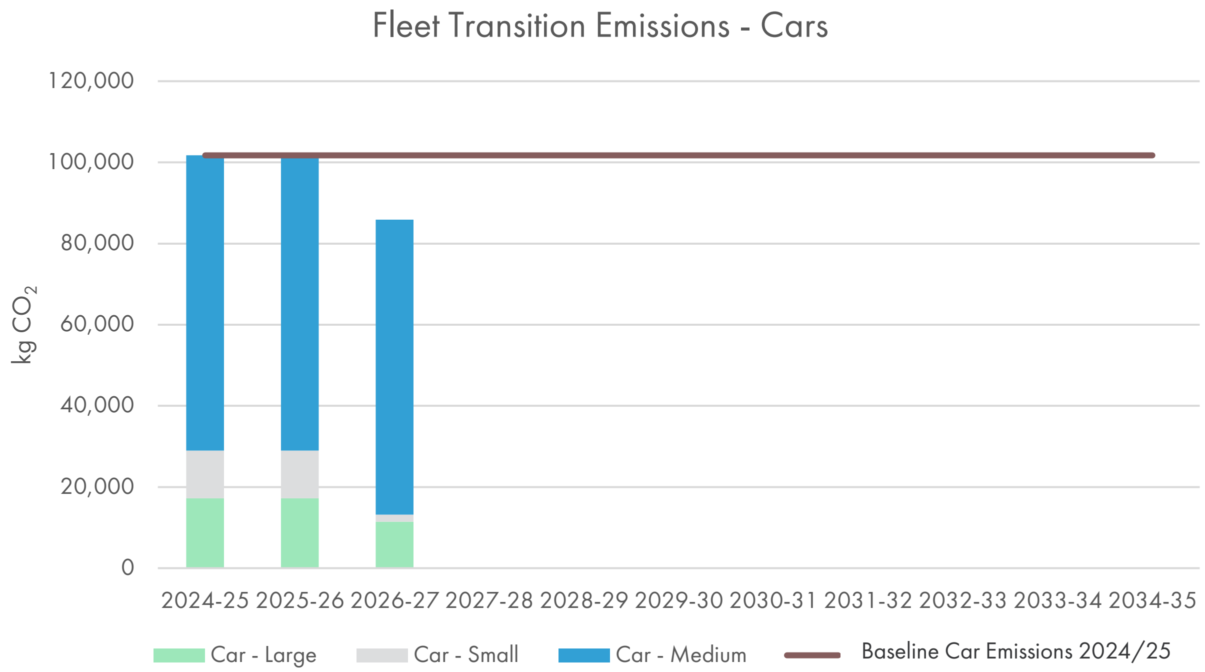


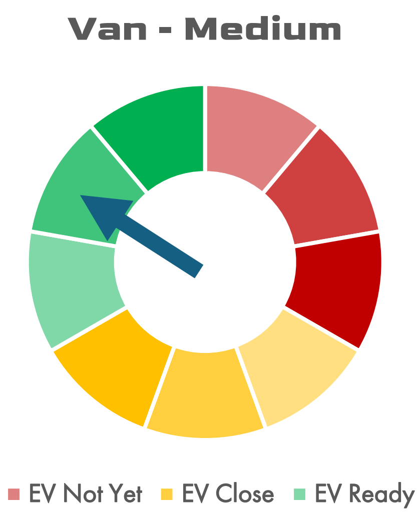
Figure 9 Fleet Transition Emissions - Cars

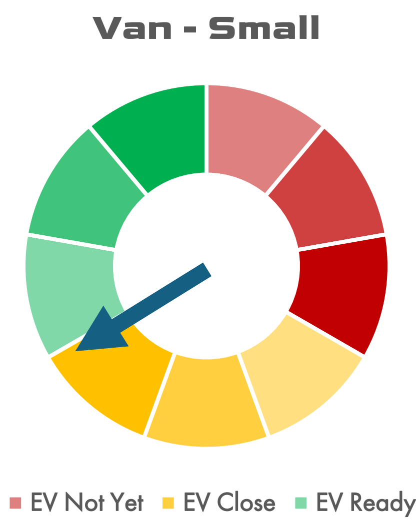
7.2 Vans

7.2.1 Low and Zero Emission Readiness

Vans offer some the best opportunities within the Council fleet. There are multiple suitable vehicles on the market currently with several further vehicle additions due in the Australian market in the coming months. For this assessment Vans have been split into Medium and Small categories to reflect the significant difference between an equivalent to a Ford Transit and a Peugeot Partner sized vehicle.

Overall, this category is expected to increase in size as passenger vehicles are transitioned to commercial vehicles, with an additional 17 vans added. However, because these 17 vans are being introduced this year, their replacement is not scheduled until 2031 under the current 6-year asset life. They will therefore be replaced prior to the end of their 6-year asset life, when there is a favourable cost comparison.





7.2.2 Whole Of Life Costs

Keeping the same 6-year asset replacement schedule Medium Vans are already at parity with their ICE equivalents. For Small Vans a small premium is currently shown with a price reduction of 10% required to meet WOLC parity. However, this could quite easily be bridged by either leveraging fleet discounts or by increasing the asset life to 7 or 8 years which is perfectly feasible.

		Existing		Low/ZEV Replacement		
Vehicle Comparison		Ford Transit Custom ICE (Diesel)		LDV eDeliver 7 EV		

Purchase Price	$	52,000	$	59,990	$	7,990
Residual Value (%)		20%		16%		
Life of Asset		6		6		
Fuel Efficiency (L/100km or kWh/100km)		11.7		18.0		
Fuel Burn Rate (L/h or kWh/h)		0.0		0.0		
Driving Cost ($/100km)	$	21.41	$	3.60	-$	17.81
Fixed Costs						
Insurance	$	1,040	$	1,200	$	160
Registration	$	430	$	430	$	-
Total Fixed Costs	$	1,470	$	1,630	$	160
Variable Costs						
Annual Kilometres/Hours		10,996		10,996	$	-
Annual Depreciation	$	6,933	$	8,399	$	1,465
Fuel Cost	$	2,354	$	396	-$	1,958
Tyres	$	500	$	500	$	-
Maintenance	$	560	$	240	-$	320
Cost of Carbon	$	118	$	-	-$	118
Total Variable Costs	$	10,466	$	9,534	-$	931
Total Annual WOLC	$	11,936	$	11,164	-$	772
Annual CO2 Emissions (kg)		3,474		-		- 3474 kg
Low/ZEV Purchase Price Required for Parity				N/A		-

Figure 10 WOLC Output - Medium Van

7.2.1 Fleet Transition

Due to the addition of 17 vans this year, coupled with recent purchases there is a significant spike in replacements scheduled for the 2031-32 FY. Council will likely need to consider whether to delay or bring forward the replacement of these vehicles to spread out their capital commitments and reduce emissions sooner.

The size of the Van fleet will increase from 33 to 50 vehicles reflecting a change from the current fleet breakdown.

	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	2030-2031	2031-2032	2032-2033	2033-2034	2034-2035	2035-2036
# New Low and Zero Emission	0	7	2	2	1	0	38	0	0	0	0
Cumulative Low and Zero	0	7	9	11	12	12	50	50	50	50	0
ICE Vehicles	50	43	41	39	38	38	0	0	0	0	0

7.2.2 Emissions Reduction

Due to the addition of 17 vans this year, baseline emissions are projected to rise above the 2024–25 level. As these new vehicles have a six year replacement cycle, no significant reduction in van-related emissions is expected until 2031–32, when 38 vans are scheduled for replacement within a single financial year.

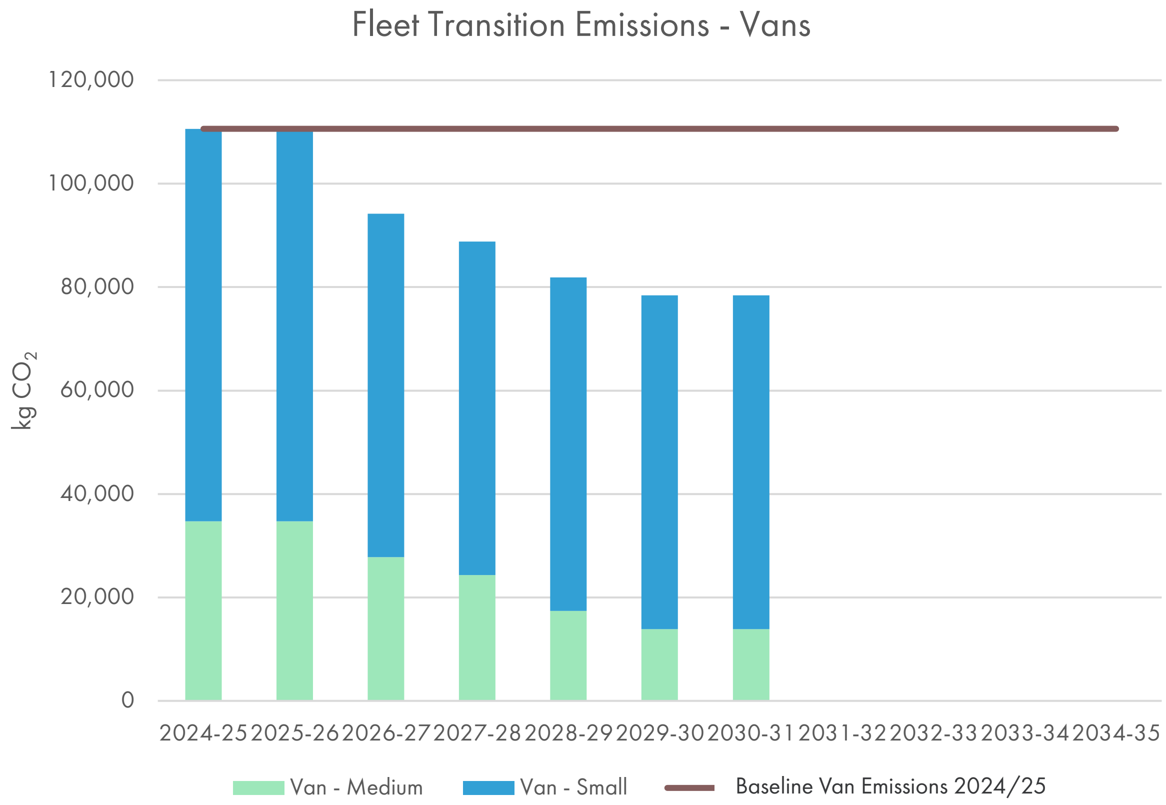


Figure 11 Fleet Transition Emissions - Vans

7.3 Trucks

7.3.1 Low and Zero Emission Readiness

There are four classes of truck in the Council Fleet with Prime movers, Heavy, Medium and Light Rigid Trucks.

7.3.1.1 Prime Mover

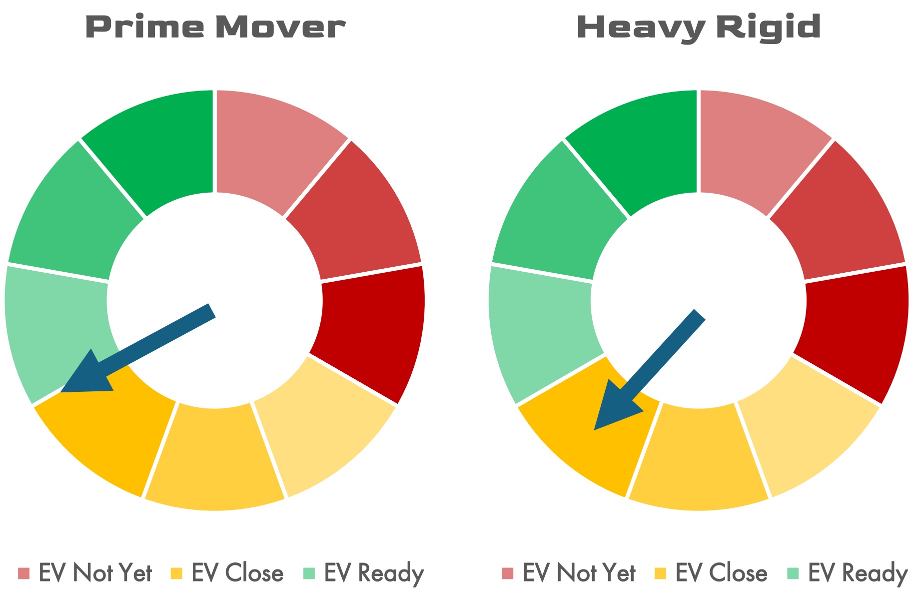
The five Prime Movers in the fleet are based at the Recycling and Waste Centre and are utilised to transport waste to one of two landfills in Melbourne with walking floor trailers. These vehicles complete 2-3 rounds trips of 66km each way per day and consume a significant amount of fuel. The fuel data shows that these vehicles use on average 52 litres of diesel per 100km. This reflects the nature of the duty cycle with significant portion of this driving being in slow moving stop-start traffic.

Electrification of these assets is feasible now from a technical and commercial perspective, the daily range requirement of circa 400km is well within the capability of electric Prime Movers, especially when considering that 50% of the daily use will be unladen following the drop off at the tip. Discussions have been held with Volvo Australia, and a trial unit could be made available to allow Council to determine its operational suitability before committing to purchasing in the next round of replacements. Given there are five Prime Movers with typically a maximum of 4 utilised concurrently, Council has a significant amount of redundancy which would allow for a fairly low risk transition of two units over the coming years whilst maintaining diesel as a backup.

Volvo has no concerns about the duty cycle, and particularly the use of these vehicles in an offroad setting, there are no practical reasons an EV Prime Mover cannot be utilised within this environment. Volvo confirm that their existing maintenance program can be extended to their EV prime movers.

7.3.1.2 Heavy Rigid

There are only four Heavy Rigid vehicles in the Council fleet, these have quite varied use cases and therefore body types. Overall, these vehicles are well suited to electrification as range is not a significant consideration given their low annual utilisation of less than 10,000 kilometres (on average 42km per day). Despite the relatively low kilometres travelled making fuel savings harder to achieve, the eight-year asset life of these vehicles allows those savings to accumulate over time, making WOLC parity achievable.



7.3.1.3 Medium Rigid and Light Rigid

Medium Rigid (8t – 12t) and Light Rigid (up to 8t) trucks form the backbone of Council's truck fleet. In reality 7.5t, 8.5t and 8.7t trucks are virtually identical with OEMs generally offering the same truck in several different GVM options.

If there is no operational requirement to keep vehicles under 8t GVM (MR licensing perhaps being a driver) then the same zero emission truck options could be utilised across those categories.

In the Medium Rigid category there are a further three trucks with 10-11 tonne GVM. Currently this is quite a niche application and therefore low and zero emissions alternatives for these vehicles are not available unless the Heavy Rigid truck is Gross Vehicle Mass (GVM) reduced to fit into this category.

For example, both Volvo and Foton have 16-18t electric trucks but currently no options around the 11t mark. It is expected that more vehicles will become available but given the small market share of 11t GVM trucks this may be a few years away.

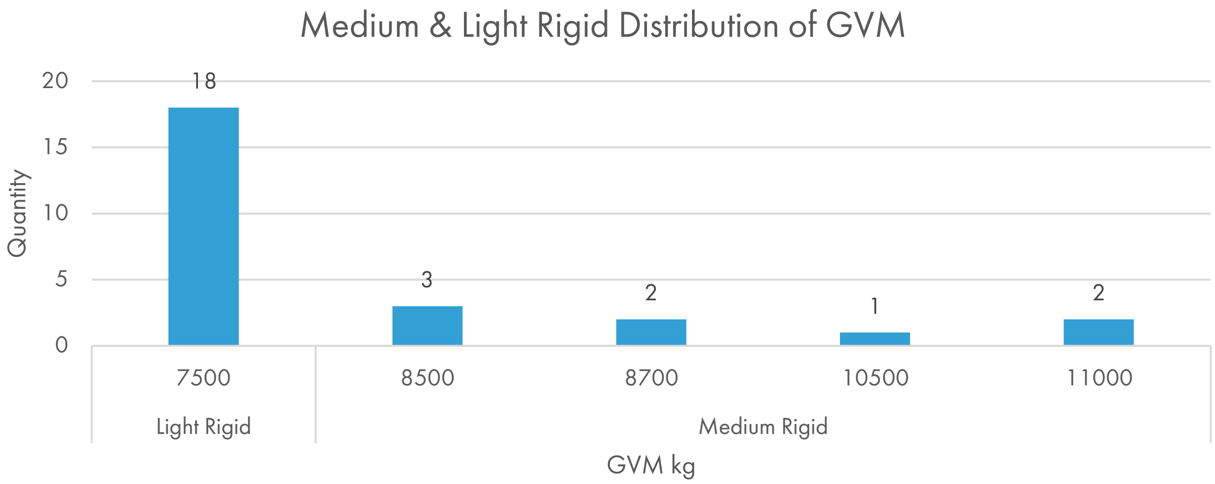
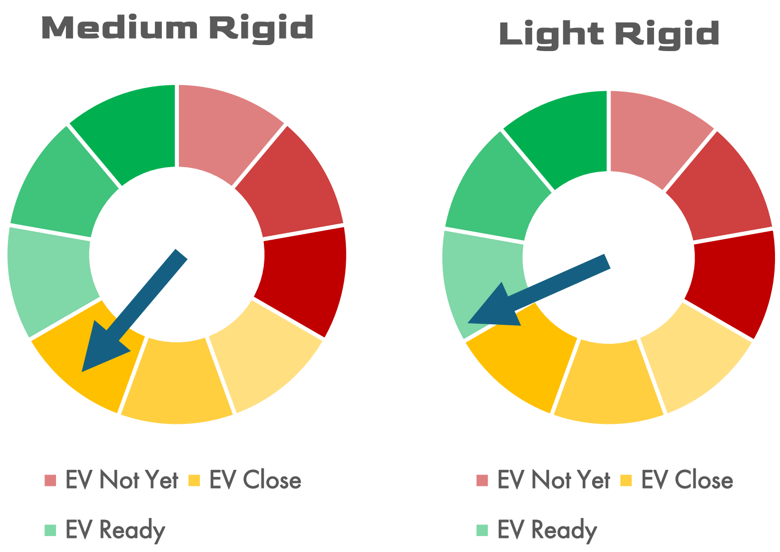


Figure 12 Distribution of GVM of Light and Medium trucks



7.3.2 Whole Of Life Costs

Prime Movers offer the ability to significantly reduce emissions at WOLC parity compared to their ICE equivalents. Even with a significantly higher CAPEX the fuel and maintenance savings offset this over the vehicle's six-year asset life. With parity achievable without increasing the asset life Prime movers offer a significant opportunity to reduce emissions without impacting the Council's overall budget.

Australian EVS	Existing	Low/ZEV Replacement	
Vehicle Comparison	**Volvo FMX**	**Volvo FMX Electric**	
	ICE (Diesel)	**EV**	
			
Purchase Price	$ 420,000	$ 675,000	$ 255,000
Residual Value (%)	20%	16%	
Life of Asset	6	6	
Fuel Efficiency (L/100km or kWh/100km)	52.0	120.0	
Fuel Burn Rate (L/h or kWh/h)	0.0	0.0	
Driving Cost ($/100km)	$ 95.16	$ 24.00	-$ 71.16
Fixed Costs			
Insurance	$ 8,400	$ 13,500	$ 5,100
Registration	$ 900	$ 900	$ -
Total Fixed Costs	$ 9,300	$ 14,400	$ 5,100
Variable Costs			
Annual Kilometres/Hours	47,000	47,000	$ -
Annual Depreciation	$ 56,000	$ 94,500	$ 38,500
Fuel Cost	$ 44,725	$ 11,280	-$ 33,445
Tyres	$ 4,500	$ 5,625	$ 1,125
Maintenance	$ 21,000	$ 12,600	-$ 8,400
Cost of Carbon	$ 2,244	$ -	-$ 2,244
Total Variable Costs	$ 128,469	$ 124,005	-$ 4,464
Total Annual WOLC	$ 137,769	$ 138,405	$ 636
Annual CO2 Emissions (kg)	65,988	-	- 65988 kg
Low/ZEV Purchase Price Required for Parity		$ 670,456	1%

Figure 13 WOLC comparison - Prime Movers

Heavy Rigid trucks are also able to achieve parity with ICE whilst maintain the same 8-year asset life.

Australian EVS	Existing	Low/ZEV Replacement	
Vehicle Comparison	**Isuzu FVR 165-300**	**Foton eAuman D**	
	ICE (Diesel)	**EV**	
			
Purchase Price	$ 198,000	$ 240,000	$ 42,000
Residual Value (%)	20%	16%	
Life of Asset	8	8	
Fuel Efficiency (L/100km or kWh/100km)	45.3	75.0	
Fuel Burn Rate (L/h or kWh/h)	0.0	0.0	
Driving Cost ($/100km)	$ 82.90	$ 15.00	-$ 67.90
Fixed Costs			
Insurance	$ 3,960	$ 4,800	$ 840
Registration	$ 900	$ 900	$ -
Total Fixed Costs	$ 4,860	$ 5,700	$ 840
Variable Costs			
Annual Kilometres/Hours	8,116	8,116	$ -
Annual Depreciation	$ 19,800	$ 25,200	$ 5,400
Fuel Cost	$ 6,728	$ 1,217	-$ 5,511
Tyres	$ 1,500	$ 1,500	$ -
Maintenance	$ 1,862	$ 1,100	-$ 762
Cost of Carbon	$ 338	$ -	-$ 338
Total Variable Costs	$ 30,228	$ 29,017	-$ 1,210
Total Annual WOLC	$ 35,088	$ 34,717	-$ 370
Annual CO2 Emissions (kg)	9,927	-	- 9927 kg
Low/ZEV Purchase Price Required for Parity		N/A	-

Figure 14 WOLC comparison - Heavy Rigid

Light Rigid and Medium Rigid trucks (7.5-8.7t) are currently harder to achieve WOLC parity, Prices would need to reduce by circa 16% to achieve parity, Council may be able to bridge 7-10% of this gap through their purchasing power. Should these vehicles be utilised more than average, then parity can be achieved more easily. The average kilometres travelled per year for this asset type is quite low but at the top end some assets travel close to 20,000km per year which would make them better than parity with ICE equivalents.

	Existing	Low/ZEV Replacement	
Vehicle Comparison	Isuzu NPR 75-190 ICE (Diesel)	Foton eAumark S EV	
			
Purchase Price	$ 88,000	$ 136,000	$ 48,000
Residual Value (%)	20%	16%	
Life of Asset	8	8	
Fuel Efficiency (L/100km or kWh/100km)	22.0	48.0	
Fuel Burn Rate (L/h or kWh/h)	0.0	0.0	
Driving Cost ($/100km)	$ 40.26	$ 9.60	-$ 30.66
Fixed Costs			
Insurance	$ 1,760	$ 2,720	$ 960
Registration	$ 900	$ 900	$ -
Total Fixed Costs	$ 2,660	$ 3,620	$ 960
Variable Costs			
Annual Kilometres/Hours	10,480	10,480	$ -
Annual Depreciation	$ 8,800	$ 14,280	$ 5,480
Fuel Cost	$ 4,219	$ 1,006	-$ 3,213
Tyres	$ 1,200	$ 1,200	$ -
Maintenance	$ 1,800	$ 1,080	-$ 720
Cost of Carbon	$ 212	$ -	-$ 212
Total Variable Costs	$ 16,231	$ 17,566	$ 1,335
Total Annual WOLC	$ 18,891	$ 21,186	$ 2,295
Annual CO2 Emissions (kg)	6,225	-	- 6225 kg
Low/ZEV Purchase Price Required for Parity		$ 114,141	16%

Figure 15 WOLC comparison - Light and Medium Rigid

7.3.3 Fleet Transition

Like other asset types, the fleet transition for trucks at the earliest is 2026-27 based on the current replacement schedule. Dependent on future capital budget, needs analysis and market availability, as well as the planning and delivery of charging infrastructure, the fleet transition can be adapted.

	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	2030-2031	2031-2032	2032-2033	2033-2034	2034-2035
# New Low and Zero Emission	0	7	6	5	3	5	4	2	3	0
Cumulative Low and Zero	0	7	13	18	21	26	30	32	35	35
ICE Vehicles	35	28	22	17	14	9	5	3	0	0

7.3.4 Emissions Reduction

Emissions from Trucks show a steady decline across the period, given the long asset life, ICE vehicles remain in the fleet until 2032-33 unless retired early.

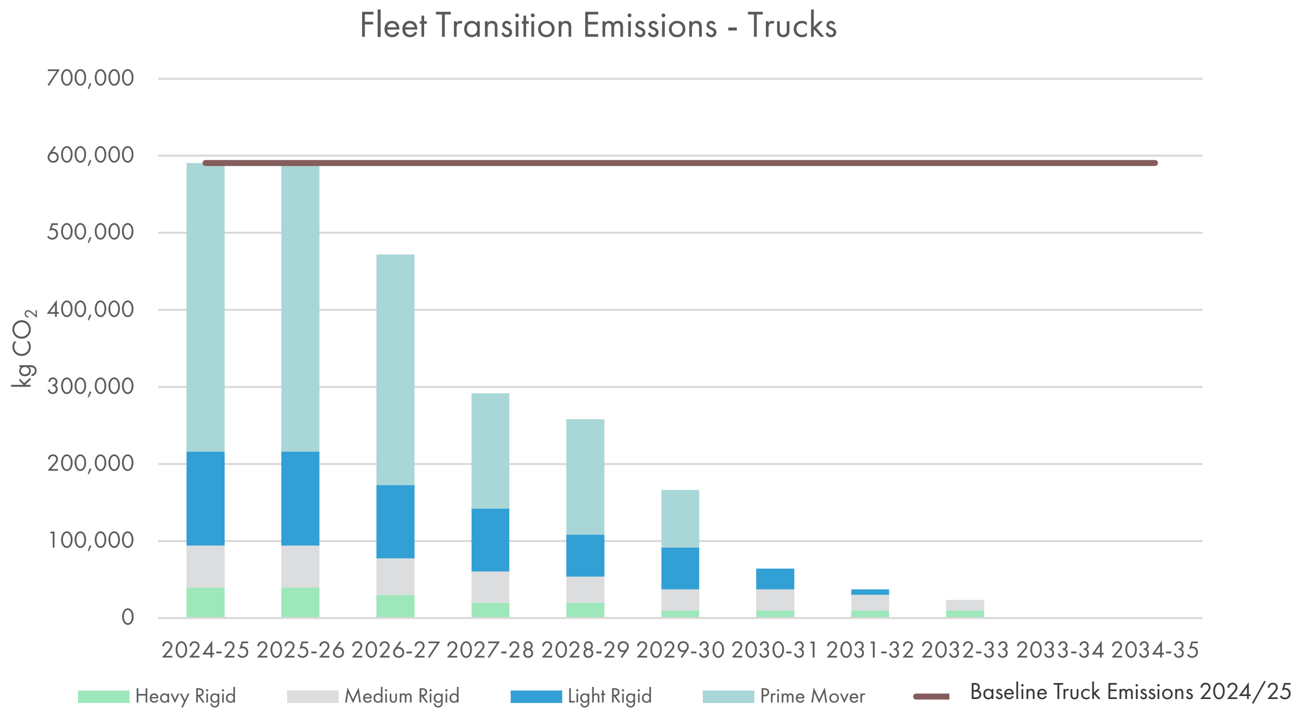


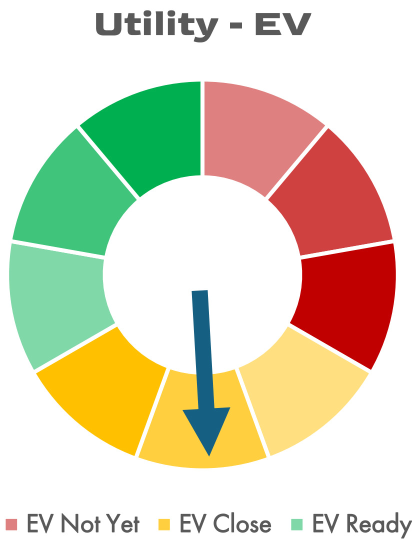
Figure 16 Fleet Transition Emissions - Trucks

7.4 Utility

7.4.1 Low and Zero Emission Readiness

Utility vehicles are a large portion of the Council fleet with 39 vehicles, due to the transition from passenger to commercial vehicles this will only increase with an additional 18 assets being added this year. Currently there are no viable Plug-in hybrid or EV alternatives which have a cab chassis option. Even though vehicles are currently available which would reduce emissions, specifically Plug in Hybrids such as the Ford Ranger PHEV and BYD Shark 6 – none of these vehicles are currently available in a cab chassis option. Whilst some aftermarket solutions are available to allow a custom tray to be fitted these are not supported by the OEM, specifically Ford has stated that aftermarket trays as required by Council are not compatible with their warranty. Discussions are ongoing with BYD, and it is anticipated that a cab chassis version will be available in the Australian market within 12 months. However, PHEVs require significant operational controls to be put in place to ensure that they are correctly used. In EV only mode they reduce emissions but in Hybrid mode or when the battery is depleted, they are often worse than ICE for emissions.

Once available in a suitable cab chassis specification Utility vehicles have the potential to be electrified given that they travel relatively low annual kilometres. Vehicles on the horizon include a fully electric Isuzu D-Max which is currently available in the UK right-hand drive market. Council should monitor this fleet category as electrification of these assets will be relatively straightforward once suitable vehicles are available in Australia.



7.4.2 Whole Of Life Costs

The WOLC calculation for PHEV Utility vehicles are highly predicted on controls being in place to ensure that these vehicles are charged every night (research by GEOTAB found that 30% of PHEVs in fleets have not been plugged in for more than 3 months) and are driven in EV mode which will allow 80k-100km of emissions free driving per day. Without these controls in place the cost and emissions benefits will not be achieved.

Overall, once available a PHEV BYD shark in cab chassis configuration would provide WOLC parity now and a full EV would require a purchase price of around $62,000 to achieve parity. BYD, KIA, GWM and Isuzu are expected to release full EV Utilities in the Australian market within 12-18 months. Pricing is currently unknown, but it is hoped that a sub-$70,000 model will be available.

		Existing		Low/ZEV Replacement		
Vehicle Comparison		Isuzu D-Max 4x2 ICE (Diesel)		BYD Shark 6 (EV Mode) EV		
Purchase Price	$	45,000	$	57,500	$	12,500
Residual Value (%)		20%		16%		
Life of Asset		8		8		
Fuel Efficiency (L/100km or kWh/100km)		12.0		19.0		
Fuel Burn Rate (L/h or kWh/h)		0.0		0.0		
Driving Cost ($/100km)	$	21.96	$	3.80	-$	18.16
Fixed Costs						
Insurance	$	900	$	1,150	$	250
Registration	$	430	$	350	-$	80
Total Fixed Costs	$	1,330	$	1,500	$	170
Variable Costs						
Annual Kilometres/Hours		12,385		12,385	$	-
Annual Depreciation	$	4,500	$	6,038	$	1,538
Fuel Cost	$	2,720	$	471	-$	2,249
Tyres	$	500	$	500	$	-
Maintenance	$	469	$	405	-$	64
Cost of Carbon	$	136	$	-	-$	136
Total Variable Costs	$	8,325	$	7,413	-$	912
Total Annual WOLC	$	9,655	$	8,913	-$	742
Annual CO2 Emissions (kg)		4,013		-		- 4013 kg
Low/ZEV Purchase Price Required for Parity		N/A		-		

Figure 17 WOLC comparison - PHEV Utility

A speculative price of $75,000 has been included for the upcoming Isuzu D-Max EV and the modelling shows that a parity price of circa $62,000 will be required based on the current asset life and average utilisation rate. Like trucks, there are Utility assets which travel upwards of 15,000km per year which would improve the WOLC position.

	Existing		Low/ZEV Replacement		
Vehicle Comparison	Isuzu D-Max 4x2		Isuzu D-Max EV		
	ICE (Diesel)		EV		
					
Purchase Price	$	45,000	$	75,000	$ 30,000
Residual Value (%)		20%		16%	
Life of Asset		8		8	
Fuel Efficiency (L/100km or kWh/100km)		12.0		19.0	
Fuel Burn Rate (L/h or kWh/h)		0.0		0.0	
Driving Cost ($/100km)	$	21.96	$	3.80	-$ 18.16
Fixed Costs					
Insurance	$	900	$	1,500	$ 600
Registration	$	430	$	430	$ -
Total Fixed Costs	$	1,330	$	1,930	$ 600
Variable Costs					
Annual Kilometres/Hours		12,385		12,385	$ -
Annual Depreciation	$	4,500	$	7,875	$ 3,375
Fuel Cost	$	2,720	$	471	-$ 2,249
Tyres	$	500	$	500	$ -
Maintenance	$	469	$	250	-$ 219
Cost of Carbon	$	136	$	-	-$ 136
Total Variable Costs	$	8,325	$	9,096	$ 770
Total Annual WOLC	$	9,655	$	11,026	$ 1,370
Annual CO2 Emissions (kg)		4,013		-	- 4013 kg
Low/ZEV Purchase Price Required for Parity			$	61,948	17%

Figure 18 WOLC comparison - EV Utility

7.4.3 Fleet Transition

As with Vans, the transition from Passenger Vehicles to Commercial Vehicles influences fleet composition and the pace of transition. With Utilities having an asset life of eight years, the 18 vehicles added this year are expected to remain in the fleet until 2032–33, affecting the timing and trajectory of emission reductions in this category.

	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	2030-2031	2031-2032	2032-2033	2033-2034	2034-2035
# New Low and Zero Emission	0	6	5	2	0	6	34	4	0	0
Cumulative Low and Zero	0	6	11	13	13	19	35	39	57	57
ICE Vehicles	57	51	46	44	44	38	22	18	0	0

7.4.4 Emissions Reduction

With the number of Utility vehicles increasing from 39 to 57 in 2025-26 the emissions from these assets will increase beyond the 2024-25 baseline.

Emissions from this category do not reduce to zero until 2033-34 due to the 8-year asset life of the assets added this year. Early retirement of these assets would be required to reduce emissions sooner.

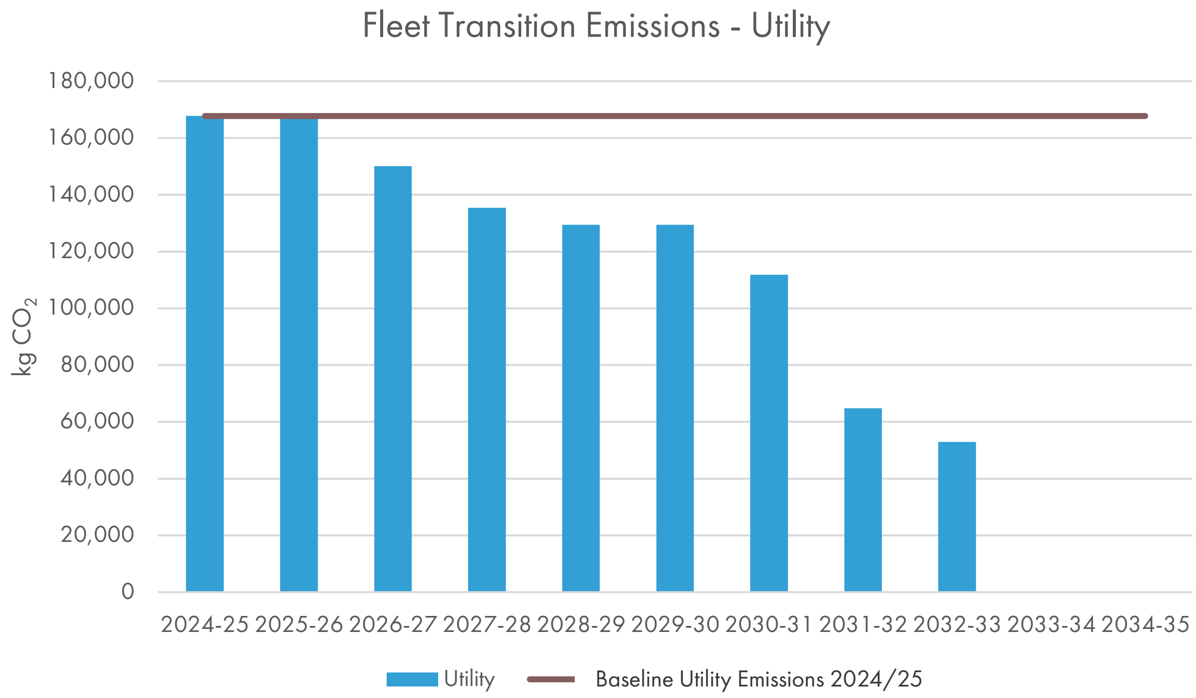


Figure 19 Fleet Transition Emissions - Utility

7.5 Ride On Mowers

7.5.1 Low and Zero Emission Readiness

Within this fleet category there are viable zero emissions alternatives to Ride-On Mowers. They offer many advantages compared to their ICE counterparts, namely a reduction in vibration and noise which is beneficial to both operators and the wider community.

Council will need to evaluate their performance and suitability for their operations via trials, particularly regarding charging requirements and whether these models are able to complete a full day on a single charge or whether solutions need to be sought to allow charging on the go.

However, given the relatively low utilisation of less than 1 hour per day it is expected that electric models can comfortably meet this requirement as most electric alternatives have a stated performance of more than 6 hours of typical operation.

The low utilisation does mean that fuel and maintenance savings are more limited than in a typical commercial operation and an increase in asset life or utilisation will be required to hit parity. Council will need to ensure assets are fit-for-purpose prior to embarking on a replacement program.

7.5.2 Whole Of Life Costs

Keeping asset life at 4 years would require an 11% discount on price to be achieved by Council to reach WOLC parity.

Australian EVS	Existing	Low/ZEV Replacement	
Vehicle Comparison	John Deere Terrain Cut 72	Ecoteq EcoMow R74	
	ICE (Diesel)	EV	
			
Purchase Price	$ 64,000	$ 89,000	$ 25,000
Residual Value (%)	12%	10%	
Life of Asset	4	4	
Fuel Efficiency (L/100km or kWh/100km)	0.0	0.0	
Fuel Burn Rate (L/h or kWh/h)	7.0	5.0	
Driving Cost ($/100km)	$ -	$ -	$ -
Fixed Costs			
Insurance	$ 1,280	$ 1,780	$ 500
Registration	$ 49	$ 49	$ -
Total Fixed Costs	$ 1,329	$ 1,829	$ 500
Variable Costs			
Annual Kilometres/Hours	300	300	$ -
Annual Depreciation	$ 14,080	$ 20,114	$ 6,034
Fuel Cost	$ 3,843	$ 300	-$ 3,543
Tyres	$ -	$ -	$ -
Maintenance	$ 1,715	$ 1,029	-$ 686
Cost of Carbon	$ 4	$ -	-$ 4
Total Variable Costs	$ 19,642	$ 21,443	$ 1,801
Total Annual WOLC	$ 20,971	$ 23,272	$ 2,301
Annual CO2 Emissions (kg)	116	-	- 116 kg
Low/ZEV Purchase Price Required for Parity		**$ 78,818**	**11%**

Figure 20 WOLC comparison - Ride-on lawnmowers 4 years asset life

Increasing the asset life to 6 years can provide an annual WOLC saving of $4,400, this should be feasible given the significantly reduced maintenance and moving parts coupled with relatively low average utilisation of these assets.

Australian EVS	Existing	Low/ZEV Replacement	
Vehicle Comparison	John Deere Terrain Cut 72 ICE (Diesel)	Ecoteq EcoMow R74 EV	
			
Purchase Price	$ 64,000	$ 89,000	$ 25,000
Residual Value (%)	12%	10%	
Life of Asset	4	6	
Fuel Efficiency (L/100km or kWh/100km)	0.0	0.0	
Fuel Burn Rate (L/h or kWh/h)	7.0	5.0	
Driving Cost ($/100km)	$ -	$ -	$ -
Fixed Costs			
Insurance	$ 1,280	$ 1,780	$ 500
Registration	$ 49	$ 49	$ -
Total Fixed Costs	$ 1,329	$ 1,829	$ 500
Variable Costs			
Annual Kilometres/Hours	300	300	$ -
Annual Depreciation	$ 14,080	$ 13,409	-$ 671
Fuel Cost	$ 3,843	$ 300	-$ 3,543
Tyres	$ -	$ -	$ -
Maintenance	$ 1,715	$ 1,029	-$ 686
Cost of Carbon	$ 4	$ -	-$ 4
Total Variable Costs	$ 19,642	$ 14,738	-$ 4,904
Total Annual WOLC	$ 20,971	$ 16,567	-$ 4,404
Annual CO2 Emissions (kg)	116	-	- 116 kg
Low/ZEV Purchase Price Required for Parity	N/A	-	

Figure 21 WOLC comparison - Ride-On Lawnmowers 6 years asset life

7.5.3 Fleet Transition

Replacement due in 2025-26 have been deferred to 2026-27 to allow time for trials and capital to be allocated. Refer to Charging Infrastructure Design for charging infrastructure requirements related to this transition.

Ride-On Mowers with high utilisation offer significant emissions reduction potential so ensuring that new electric assets are utilised at higher rates than average can significantly drive down emissions, fuel and maintenance costs.

	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	2030-2031	2031-2032	2032-2033	2033-2034	2034-2035
# New Low and Zero Emission	0	7	3	3	0	0	0	0	0	0
Cumulative Low and Zero	0	7	10	13	13	13	13	13	13	13
ICE Vehicles	13	6	3	0	0	0	0	0	0	0

7.5.4 Emissions Reduction

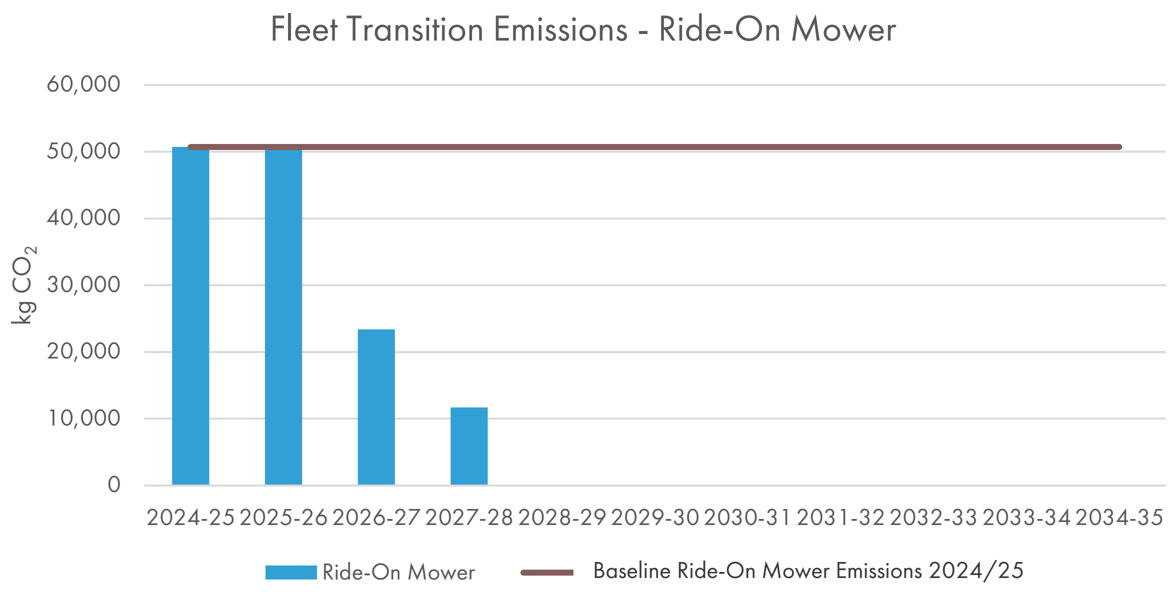


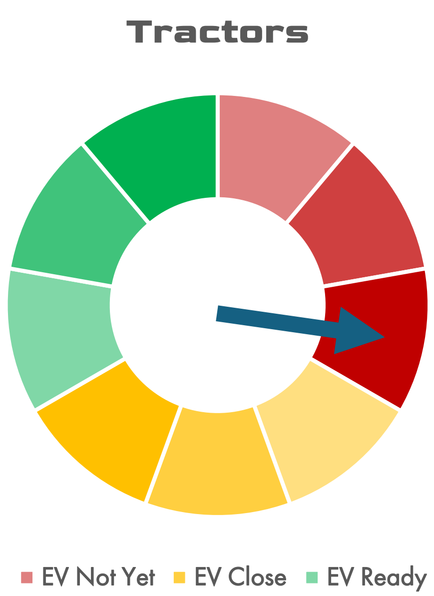
Figure 22 Fleet Transition Emissions - Ride-On Mowers

7.6 Tractor

7.6.1 Low and Zero Emission Readiness

Tractors make up a small portion of the Council fleet with only 5 units. Whilst specific low-and zero-emissions alternatives are not yet available in the Australian market, it is still possible to estimate the price point at which these assets are likely to reach parity with its ICE equivalents.

Council operations are a good solution for the use of EV tractors given their relatively low utilisation, however, Tractors being an agricultural product which is traditionally heavily utilised are being developed more slowly even though they could probably do the job required by a Council now with relatively small batteries. As their target market is the agricultural sector there is still some way to go before viable alternatives are available.



7.6.2 Whole Of Life Costs

A hypothetical WOLC calculation shows that at current utilisation rates and asset life, an EV alternative would need to be available at circa $275,000 compared to the current price of an ICE tractor at circa $200,000. Based on this analysis, introduction of EV tractors into the fleet is achievable given no tractors are due for replacement until 2028-29 there is time for the market to mature.

Australian EVS	Existing	Low/ZEV Replacement	
Vehicle Comparison	John Deere 6110R ICE (Diesel)	Future EV Tractor EV	
			
Purchase Price	$ 195,000	$ 300,000	$ 105,000
Residual Value (%)	12%	10%	
Life of Asset	8	8	
Fuel Efficiency (L/100km or kWh/100km)	0.0	0.0	
Fuel Burn Rate (L/h or kWh/h)	7.0	10.0	
Driving Cost ($/100km)	$ -	$ -	$ -
Fixed Costs			
Insurance	$ 3,900	$ 6,000	$ 2,100
Registration	$ 49	$ 49	$ -
Total Fixed Costs	$ 3,949	$ 6,049	$ 2,100
Variable Costs			
Annual Kilometres/Hours	994	994	$ -
Annual Depreciation	$ 21,450	$ 33,900	$ 12,450
Fuel Cost	$ 12,733	$ 1,988	-$ 10,745
Tyres	$ 1,000	$ 1,000	$ -
Maintenance	$ 2,000	$ 1,200	-$ 800
Cost of Carbon	$ 13	$ -	-$ 13
Total Variable Costs	$ 37,196	$ 38,088	$ 892
Total Annual WOLC	$ 41,145	$ 44,137	$ 2,992
Annual CO2 Emissions (kg)	383	-	- 383 kg
Low/ZEV Purchase Price Required for Parity		**$ 273,524**	**9%**

Figure 23 WOLC comparison - Tractor

7.6.3 Fleet Transition

As no vehicles are due for replacement until 2028-29 these assets will be transitioned as a slower pace and not fully transitioned until 2031-32.

The emissions reduction shown overleaf is similarly impacted with the long asset life of 8 years being emissions reductions don't begin to occur until 2028.

	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	2030-2031	2031-2032	2032-2033	2033-2034	2034-2035
# New Low and Zero Emission	0	0	0	1	2	1	1	0	0	0
Cumulative Low and Zero	0	0	0	1	3	4	5	5	5	5
ICE Vehicles	5	5	5	4	2	1	0	0	0	0

7.6.4 Emissions Reduction

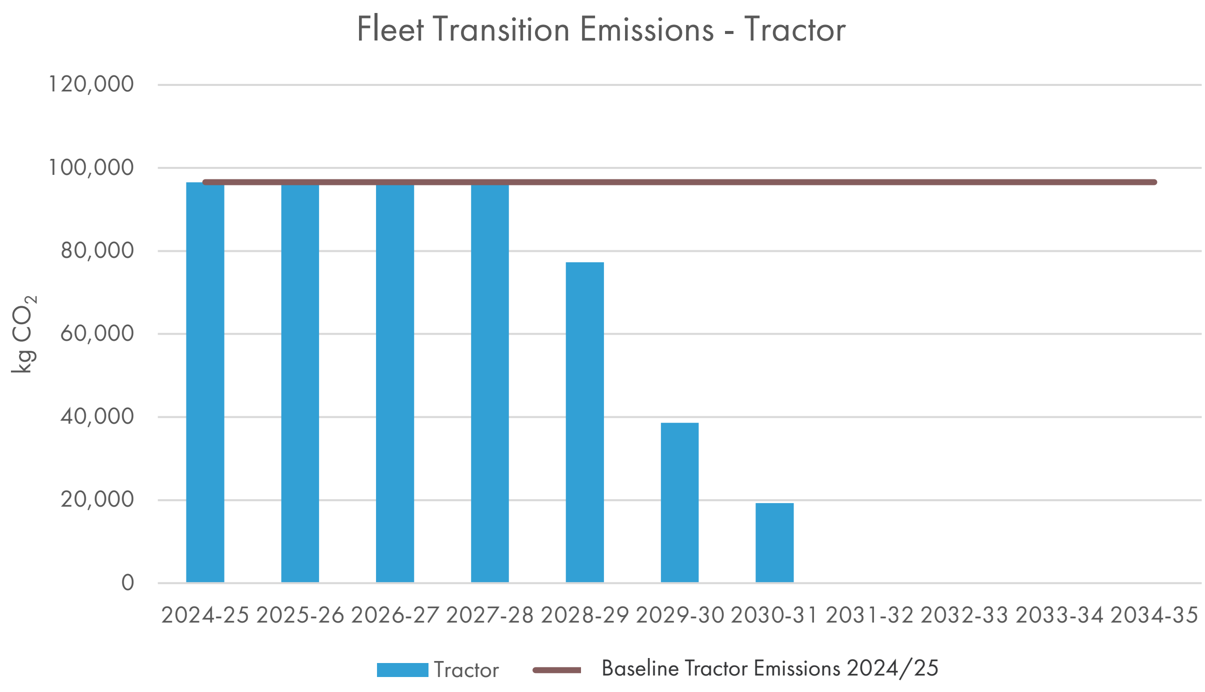


Figure 24 Fleet Transition Emissions - Tractor

7.7 Heavy Plant, Loaders and Other Assets

The transition to low- and zero-emission technologies for non-road mobile machinery—such as backhoes, rollers, excavators, wheel loaders, and All Terrain Vehicles presents a unique set of challenges for Council. While electric alternatives for many of these assets are emerging internationally and starting to appear in the Australian market, accurate decision-making is currently hindered by a lack of granular operational data.

These vehicle types often operate under highly variable duty cycles, with significant differences in runtime, idle time and load conditions depending on the task, terrain, and operator. In many cases, these assets are not fitted with telematics or fuel tracking systems, which are essential to calculate actual fuel usage, energy consumption, and operational efficiency.

Without accurate runtime and fuel usage data, it becomes extremely difficult to conduct reliable WOLC analysis. Key inputs such as annual utilisation (hours), fuel consumption per hour, maintenance intervals, and repair costs must be estimated using assumptions or industry averages—leading to a high degree of uncertainty.

For example, the economic feasibility of replacing a diesel-powered excavator with an electric equivalent depends heavily on the runtime per day, fuel usage per hour, and the cost differential between electricity and diesel. In the absence of reliable data, Council may over- or underestimate the potential savings, making the business case for electrification less robust.

Furthermore, unlike on-road vehicles where emissions and efficiency metrics are standardised, plant and equipment lack consistent regulatory reporting requirements. This exacerbates the data gap and limits Council's ability to benchmark equipment or track improvements over time.

To address this, it is recommended that Council:

- Implement telematics or fuel tracking on high-use equipment to monitor operating hours, idle time, and fuel burn.
- Standardise usage reporting to collect consistent data on equipment utilisation and maintenance.
- Conduct pilot trials with electric or hybrid equipment where data can be closely monitored and compared against baseline diesel performance.

Until this data is available, any WOLC comparison between diesel and electric earthmoving equipment should be treated as indicative rather than definitive. Nonetheless, as equipment data collection improves and the electric plant market matures, these segments represent significant opportunities for long-term decarbonisation and cost savings.

7.8 Fleet Carbon Emissions Reduction

A core objective of Council's Fleet Transition Plan is to significantly reduce operational GHG emissions associated with the fleet. This section shows a detailed emissions analysis based on current fleet composition and the forecasted impact of phased electrification from FY2025–26 through FY2034–35.

The analysis integrates insights from three key perspectives: annual emissions reduction, fleet category contributions, and emissions trends over time.

7.8.1 Overall Emissions Trend

The line chart titled "Total Fleet Emissions by Year" demonstrates a clear downward trend in Council's fleet emissions over the transition period. From a baseline of approximately 1.2 million kg CO_2 in 2024–25, total emissions are projected to decline, reaching zero by 2033–34. However, it should be noted that the emissions are projected to increase for 2025-26 compared to the baseline due to the Passenger to Commercial transition.

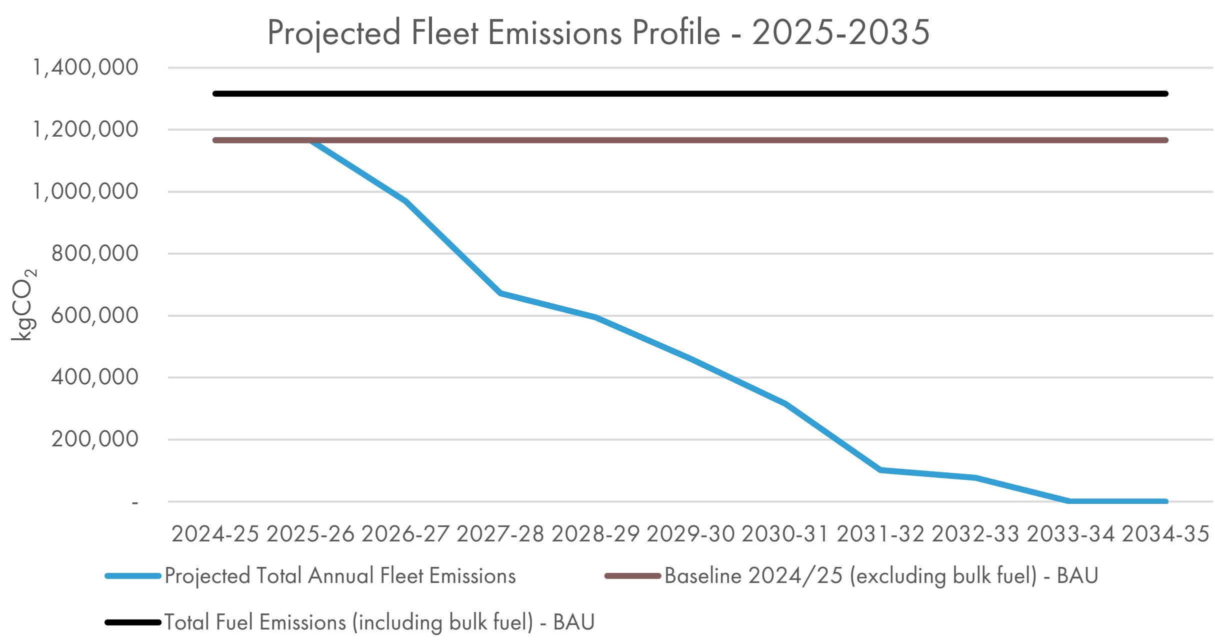


Figure 25 Projected Fleet Emissions Profile 2025-2035

Key observations:

- Council's Net Zero ambition can be achieved by 2033 based on the current fleet replacement schedule outlined in this plan.

- The most substantial reduction occurs between 2027–28 and 2030–31, coinciding with the proposed replacement of high-emitting vehicle categories.
- A plateauing effect beyond 2031 indicates that remaining emissions are increasingly concentrated in hard-to-electrify or niche fleet segments.
- Vehicles with significantly long asset lives continue to contribute to emissions unless retired early.
- Actual emissions will likely increase from the baseline in the short term due to the replacement of Passenger Vehicles with Vans and Utilitys.

An important consideration within the emissions profile is the difference between the Fleet Emissions and the Total Fuel Emissions of around 150 tonnes of CO_2. This encompasses emissions not currently linked to a specific vehicle or asset and includes:

- Small plant and equipment such as chainsaws, whipper snippers, blowers, pressure sprayers etc.
- Heavy Plant not individually tracked through telematics or fuel management systems, or which are fuelled using the bulk fuel at the WRWC.

While individually small, these items collectively contribute 11% of Council's total fleet emissions reduction potential. Improvements in fuel data granularity, asset tagging and telemetry will support future efforts to better allocate and reduce emissions from these sources. Electrification of handheld and trailer-mounted equipment should be considered a low-barrier, high-impact opportunity in the early years of the transition.

7.8.2 Total Emissions Reduction Contribution by Fleet Category

An assessment of emissions reductions by fleet category provides critical insight into which vehicle classes offer the greatest decarbonisation opportunities. This analysis draws from both year-on-year reductions and the cumulative share of emissions abatement across the full transition period.

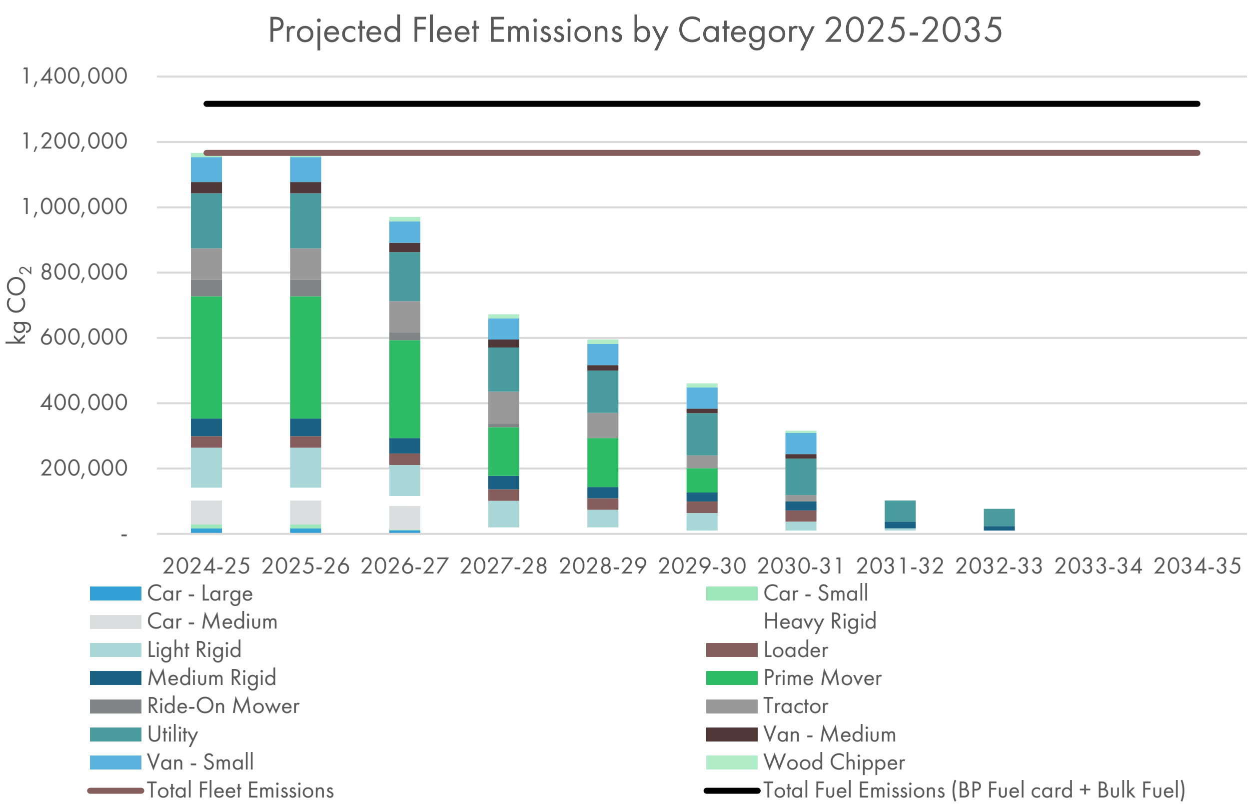


Figure 26 Projected fleet emissions by category 2025-2035

The results clearly demonstrate that a small number of high-emitting asset groups are responsible for a significant portion of Council's projected fleet emissions and therefore present the highest priority for transition. By prioritising the transition of Prime Movers, Council can reduce almost one third of their fleet emissions.

7.9 Overall Fleet Transition to Low and Zero Emission

The table below shows the transition of fleet assets to EV over the period 2025-2035.

	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
Car - Large	0	2	4	0	0	0	0	0	0	0
Car - Small	0	6	1	0	0	0	0	0	0	0
Car-Medium	0	0	30	0	0	0	0	0	0	0
Heavy Rigid	0	1	1	0	1	0	0	0	1	0
Light Rigid	0	4	2	4	0	4	3	1	0	0
Loader	0	0	0	0	0	0	2	0	0	0
Medium Rigid	0	1	1	1	1	0	1	1	2	0
Prime Mover	0	1	2	0	1	1	0	0	0	0
Ride-On Mower	0	7	3	3	0	0	0	0	0	0
Tractor	0	0	0	1	2	1	1	0	0	0
Utility	0	6	5	2	0	6	16	4	18	0
Van - Medium	0	2	1	2	1	0	4	0	0	0
Van - Small	0	5	1	0	0	0	34	0	0	0
Wood Chipper	0	0	0	0	0	1	1	0	0	0
Annual Total	**0**	**35**	**51**	**13**	**6**	**13**	**62**	**6**	**21**	**0**

The fleet transition trajectory is highly theoretical, with some assumptions on vehicle availability and cost being made. A good example is in the transition of Utility to EV. The 6 assets due for replacement in 2026-27 are predicated on an EV or PHEV cab chassis alternative being available in the Australian market by then.

The transition of vehicles has been discussed in collaboration with key Council stakeholders and reflects a realistic but ambitious transition profile with planned requirement to ensure 35 assets can be transitioned in 2026-27.

The graph below represents the overall transition of ICE to low and zero emission vehicles over the course of the 10-year period assessed.

The tipping point at which low and zero emission vehicles surpass ICE vehicles as a % of the fleet is projected to be achieved in 2029-30 with the fleet transition trajectory continuing up until the last residual ICE vehicles are removed from the fleet in 2033-34.

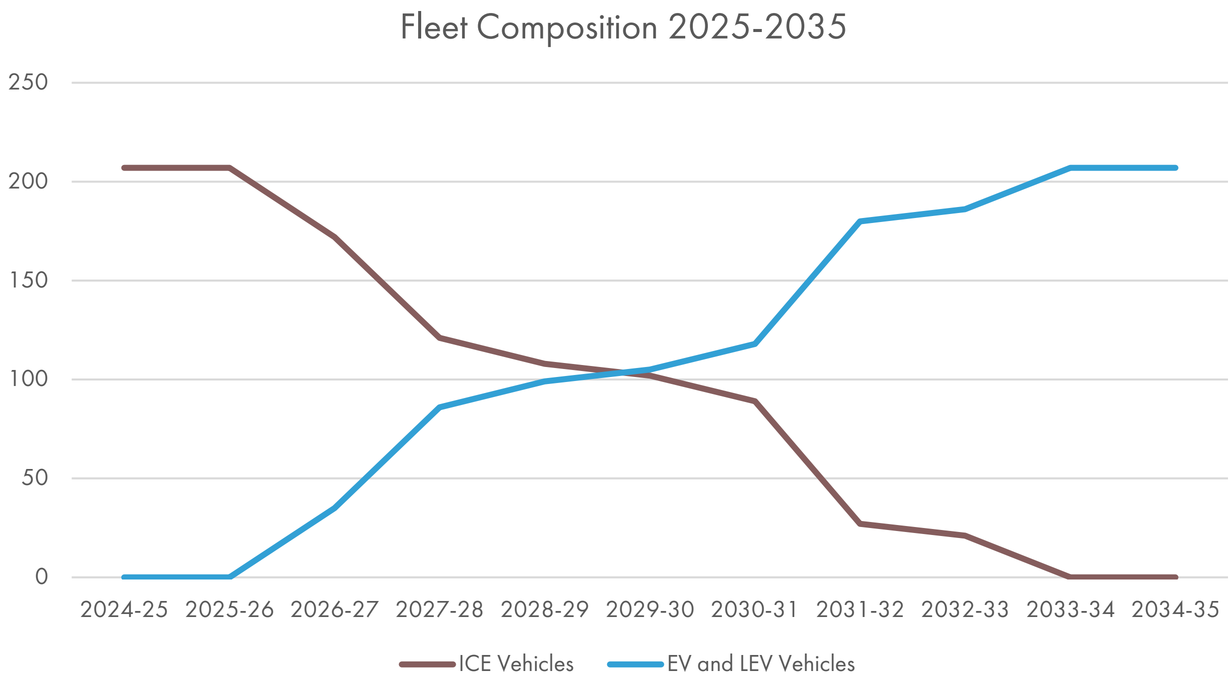


Figure 27 Fleet composition 2025-2035

Overall, the transition of Council's fleet to low and zero emission vehicles is achievable when considering natural replacement of fleet assets per their current replacement schedule.

However, if Council decides to reach Net Zero sooner, some assets will need to be retired earlier to meet the more ambitious emission reduction target.

8 Charging Infrastructure Transition Plan

As Council undertakes the transition to a low- and zero-emissions fleet, a fit-for-purpose charging infrastructure plan is critical to ensuring operational continuity, cost efficiency and long-term scalability. The Charging Infrastructure Transition Plan provides a detailed roadmap for upgrading Council depots to support the charging needs of a mixed fleet comprising internal combustion engine (ICE) and battery electric vehicles (BEVs).

This section translates the Fleet Transition Plan into practical depot infrastructure requirements. It assesses the physical and electrical readiness of Council's depot facilities and proposes tailored solutions for each location, considering fleet usage profiles, vehicle dwell times and grid constraints

Drawing on site-specific inspections, stakeholder consultation, and detailed load analysis, this plan identifies the optimal mix of charger types, layout configurations, and energy management systems. It also explores opportunities for renewable energy integration, load control technologies, and smart charging systems to minimise cost and reduce grid dependency.

By aligning depot upgrades with the Fleet Transition Plan, this ensures Council can deliver a reliable and cost-effective electrification program that maintains service delivery standards and supports Council's broader sustainability goals.

There are three main sites under consideration for electrification:

- Operations Centre
- Civic Centre
- Recycling and Waste Centre

This is also considered alongside home and public charging to form an integrated EV charging strategy.

8.1 Current Depot Facilities

There are three main Council sites which house collectively 105 vehicles being the Depot, Civic and the Recycling and Waste Centre. There are additionally four satellite sites with small vehicle numbers and an additional 99 vehicles which are taken home by employees.

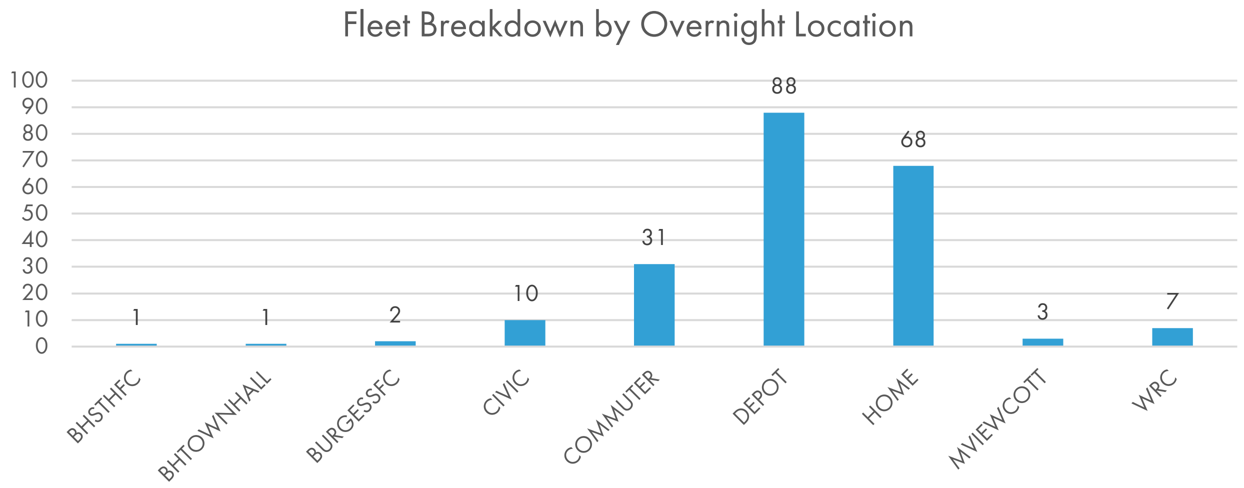


Figure 28 Fleet Breakdown by Overnight Location

8.1.1 Operations Centre

The depot has two main areas for parking, the blue area which is primarily used for passenger vehicles and employees parking. The green area predominately reserved for truck, van, utility and other commercial vehicle parking.

Overall, this is a well-designed and spacious depot with lots of parking spaces backing onto a wall or fence, which is advantageous from a charging infrastructure design and build perspective, because it reduces the need to trench into the middle of the yard, reducing complexity, cost and disruption during build.

The breakdown of vehicle types which are located at this depot is shown below, as is typical for Council depots most vehicles are Trucks and Utilities with 68 of the 88 vehicles falling into these two categories.

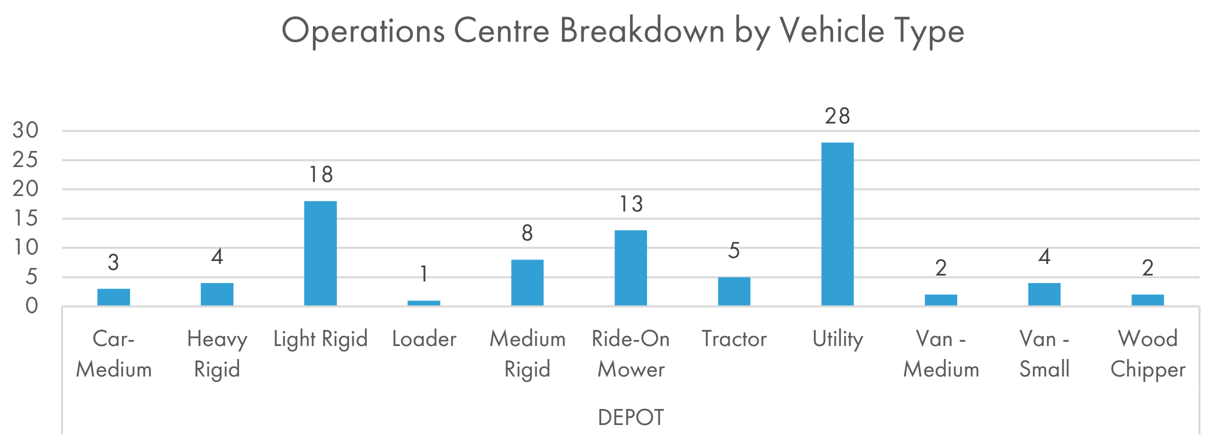


Figure 29 Operations Centre Fleet Breakdown by Vehicle Type

8.1.2 Civic Centre

The Civic Centre has two main parking areas, but one is predominately used for the public. The blue area shown below represents the main area of parking for Council owned vehicles.

There is ample opportunity at this site for the installation of additional EV charging infrastructure for cars, utilitys and vans.

The breakdown of vehicle types shows that there are currently only 10 vehicles that are located at the Civic Centre overnight.

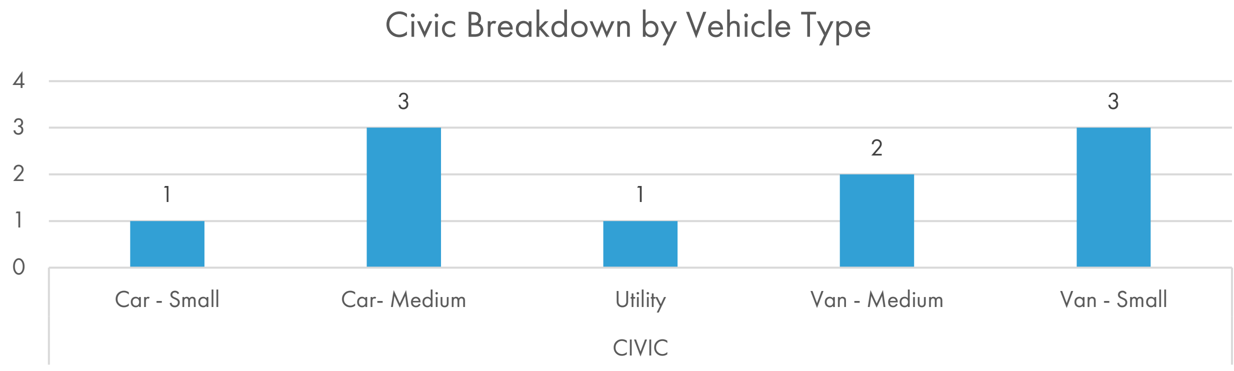


Figure 30 Civic Centre Fleet Breakdown by Vehicle Type

8.1.3 Recycling and Waste Centre

There are five Prime Movers that operate from the Recycling and Waste Centre. Additional Minor Plant is also located here which encompasses a further two track loaders which are not included on the main fleet list but are listed as Minor Plant.

Overall, the WRWC presents a minor opportunity with only nine vehicles, however, as previously discussed the Prime Movers represent a significant opportunity to reduce emissions and fuel use from these assets which represent a significant portion of the overall Council fleet emissions.

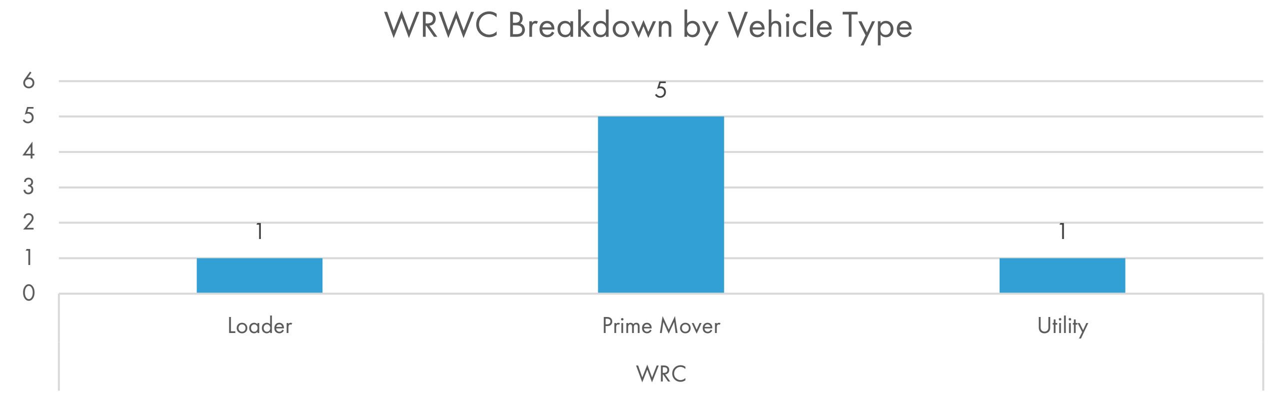


Figure 31 WRWC Fleet Breakdown by Vehicle Type

8.2 Current Electricity Usage and Infrastructure

A critical enabler of the fleet electrification program is the capacity, condition, and configuration of the existing electrical infrastructure across Council's operational sites. Initial assessments indicate that current electrical systems were not originally designed to accommodate the additional demand associated with widespread electrification of fleet vehicles—particularly those requiring overnight charging or high-powered DC fast charging.

Across the key sites, the available electrical capacity and level of load control vary significantly. In most cases, existing infrastructure is limited by both connection size and the absence of modern energy management systems, constraining the ability to support many EV chargers within current supply limits. Preliminary analysis suggests that, in their present configuration, the sites would be unable to accommodate full fleet electrification without triggering grid-capacity constraints or requiring operational trade-offs such as staggered or partial charging.

Future readiness will depend on a combination of infrastructure upgrades, connection augmentation, and implementation of smart load management, ensuring that charging demand is integrated efficiently with existing building and operational loads.

8.2.1 Operations Centre

The Operations Centre operates from a three-phase 400 V low-voltage connection, supplying workshops, offices, and fleet parking areas. Based on 12-month billing and 30-minute interval data, annual consumption is approximately 312 MWh, with an average daily load of around 850 kWh.

The maximum half-hour demand recorded was 166 kW, corresponding to an apparent power of approximately 216 kVA (power factor 0.95) and an estimated load current of c. 312 A three-phase. Allowing a 25 % engineering margin for operational diversity suggests a likely grid connection limit of about 200 kW (250–315 A), typical for a site of this scale.

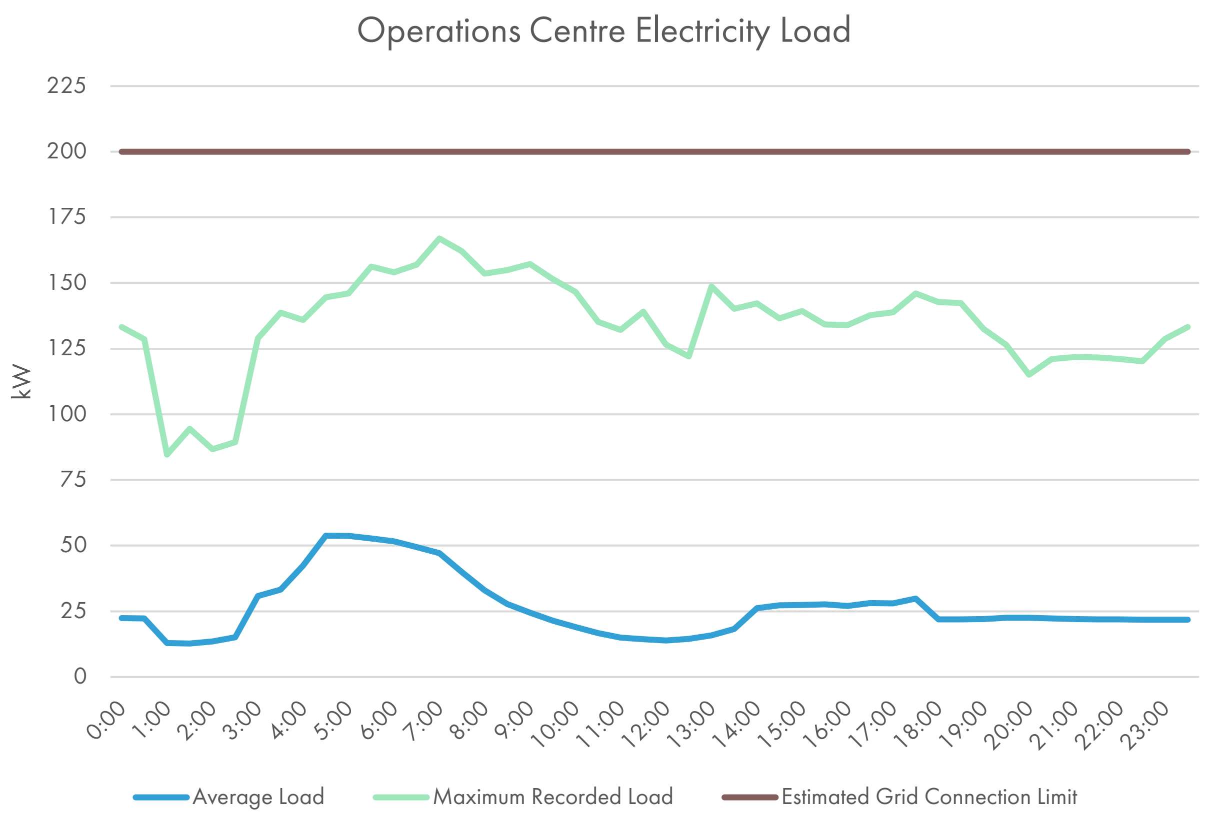


Figure 32 Operations centre electricity load profile

Load-profile analysis shows high daytime utilisation and substantial overnight headroom. Average daytime demand ranges between 50–80 kW, peaking at 165 kW during summer operations, while overnight consumption drops to 20–30 kW once workshop activity ceases.

Under static charging assumptions, this equates to approximately 60–80 kW of spare capacity that can safely be allocated to EV charging without exceeding the 200-kW grid limit.

However, with dynamic load control, chargers can automatically modulate to use the instantaneous headroom, enabling up to 150–170 kW of charging during off-peak hours when site demand is minimal.

Key Observations

- The Depot's existing supply (estimated at 200 kW / 315 A three-phase) is sufficient for early-stage electrification of light and medium vehicles.
- Overnight load control enables significantly greater utilisation of existing capacity than a static charging approach.
- Electrical augmentation (e.g. upgraded sub-mains, load-management systems, or solar-battery integration) will be required before full electrification.
- The age and configuration of the main switchboard may limit circuit expansion and will likely require expansion regardless of EV rollout.

8.2.2 Civic Centre

The Civic Centre and Library operate from a three-phase 400 V low-voltage supply serving administrative offices, public areas, and community spaces. The connection supports significant HVAC, lighting, and ICT loads during business hours, with minimal activity overnight.

Based on 12 months of 15-minute interval data, the site recorded a maximum half-hour demand of approximately 386 kW and an average daytime demand of 130 kW. Overnight demand typically falls to 40–60 kW, reflecting the building's base load. Assuming a typical power factor of 0.95, this equates to an apparent power of approximately 406 kVA. Allowing a 25 % engineering margin suggests a likely grid connection capacity of c.400 kW.

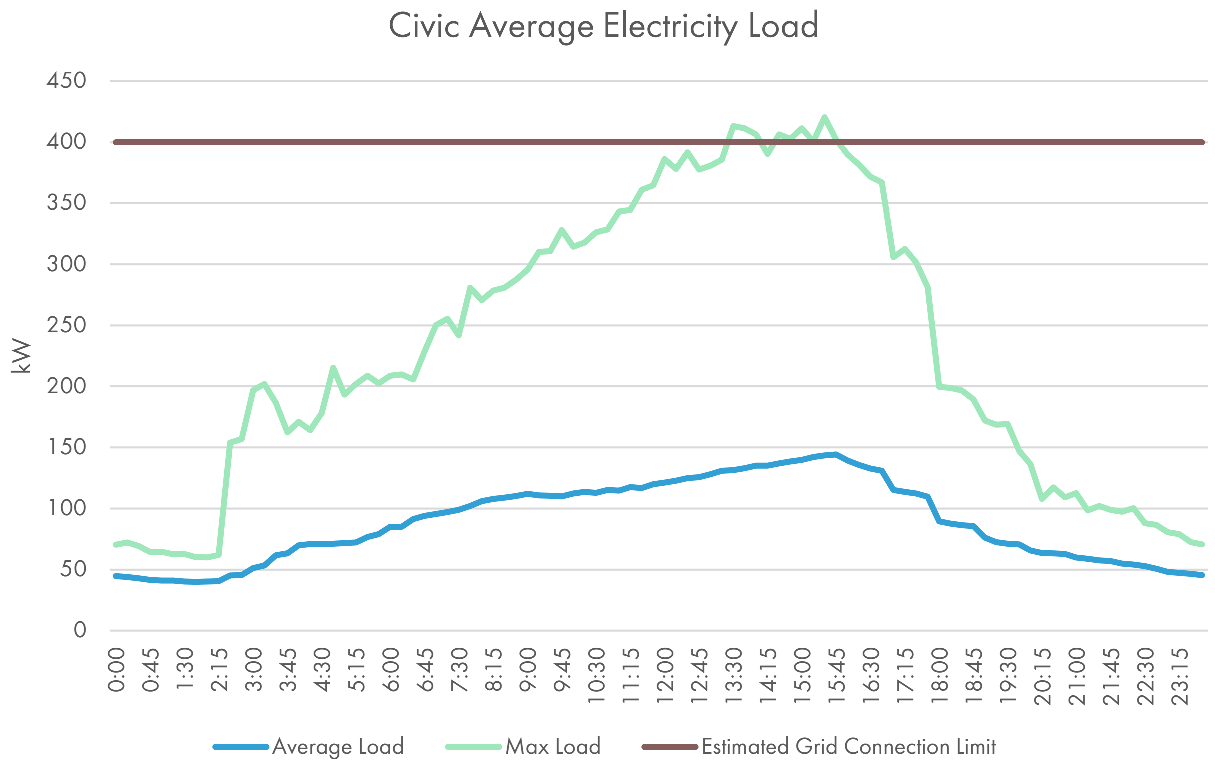


Figure 33 Civic centre electricity load profile

The Civic Centre load profile shows high daytime utilisation between 8 am and 3 pm, peaking around 380–410 kW, followed by a steady decline after business hours to below 200 kW by 6 pm and approximately 50 kW overnight.

Under static charging assumptions, this supports around 80–100 kW of continuous EV-charging capacity within the existing connection.

With dynamic load management, chargers can modulate in real time to utilise the instantaneous, enabling up to 280–320 kW of charging capacity overnight when building demand is lowest.

Key Observations

- The Civic Centre's existing supply (c. 400 kW / 600 A three-phase) is adequate electrification of a small administrative or passenger-vehicle fleet.
- Overnight and weekend headroom provides sufficient capacity for EV charging without any grid upgrade.
- High daytime utilisation may limit charging opportunities during business hours; any daytime fast-charging would require dynamic load control or supply augmentation.

- The existing main switchboard and distribution system are nearing practical capacity for new circuits and may require dedicated EV sub-boards for future expansion.

8.3 Charging Requirements

To determine the charging load requirements an assessment of each vehicle type and it's expected daily charging requirement have been made. This informs the peak power requirement at each site.

Fleet Category	Battery Size kWh	Assumed Battery Usage	Required kWh	Dwell Time hours	Charging Load kW including losses
Car - Large	70	60%	42	12	3.9
Car - Small	50	60%	30	12	2.8
Car-Medium	60	60%	36	12	3.3
Heavy Rigid	280	30%	84	12	7.7
Light Rigid	100	60%	60	12	5.5
Loader	100	30%	30	12	2.8
Medium Rigid	120	60%	72	12	6.6
Prime Mover	540	50%	270	10	29.7
Ride-On Mower	50	90%	45	12	4.1
Tractor	100	50%	50	12	4.6
Utility	70	60%	42	12	3.9
Van - Medium	70	60%	42	12	3.9
Van - Small	50	60%	30	12	2.8
Wood Chipper	100	50%	50	12	4.6

8.3.1 Operations Centre

There are 88 vehicles at the Operations Centre site., by applying the fleet transition schedule to the number of vehicles located at the site the following rollout of EV assets is determined.

DEPOT	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	2030-2031	2031-2032	2032-2033	2033-2034	2034-2035
Car-Medium	0	2	3	3	3	3	3	3	3	3
Heavy Rigid	0	1	2	2	3	3	3	3	4	4
Light Rigid	0	4	6	10	10	14	17	18	18	18
Loader	0	0	0	0	0	0	1	1	1	1
Medium Rigid	0	1	2	3	4	4	5	6	8	8
Ride-On Mower	0	7	10	13	13	13	13	13	13	13

Tractor	0	0	0	1	3	4	5	5	5	5
Utility	0	6	11	13	13	19	28	28	28	28
Van - Medium	0	2	2	2	2	2	2	2	2	2
Van - Small	0	4	4	4	4	4	4	4	4	4
Wood Chipper	0	0	0	0	0	1	2	2	2	2

Applying the vehicle rollout to the estimated charging loads by vehicle type allows us to estimate the amount of power required by year of the transition and is shown below.

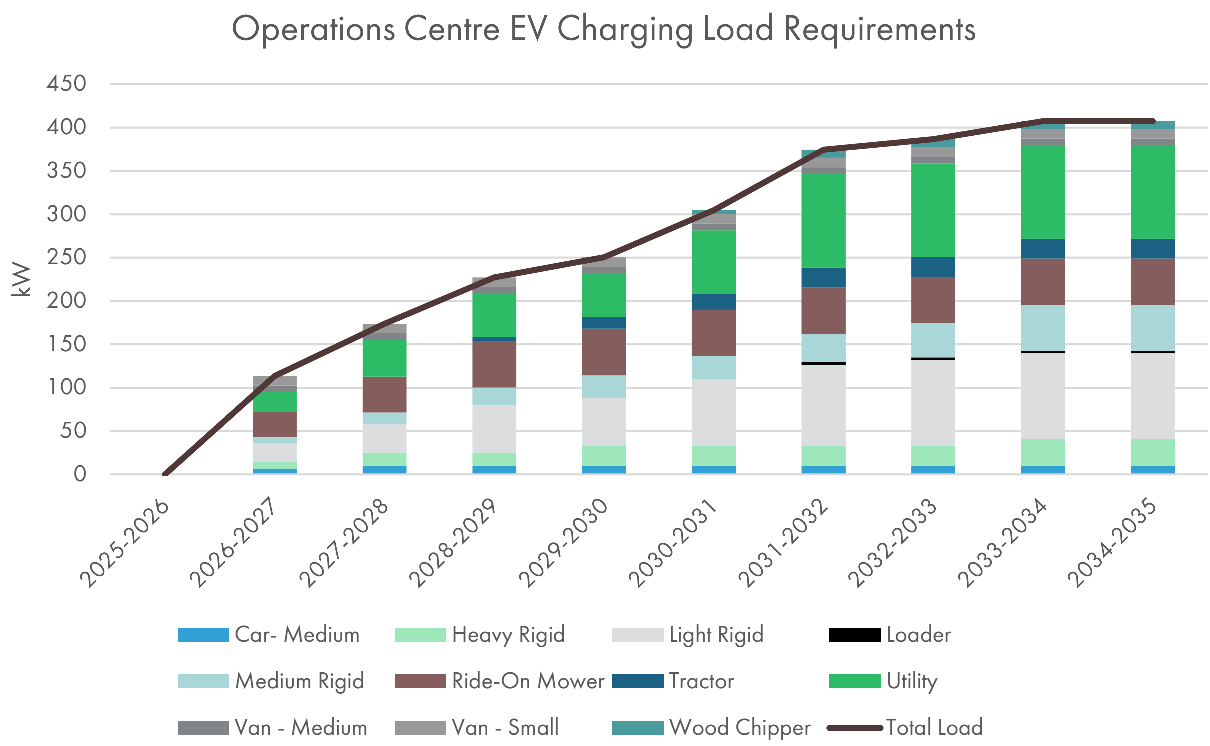


Figure 34 Operations centre EV charging load requirements

The 88 electrified assets at the Operations Centre require a total charging load of 407 kW. Based on the current vehicle rollout the electrification of fleet assets at this site gradually ramps up over time with electrification complete by 2033-34.

The load assumptions are based on a 12-hour vehicle dwell period, with vehicles charging concurrently under load control. Further reductions in peak demand may be achievable through additional staggering of charging windows.

As an example, some vehicles may be able to be charged in a 12-hour window from 3pm – 3am whilst other vehicles are charged in a 12-hour window from 9pm – 9am. In this situation only 6 hours of the charging would occur concurrently meaning there is further opportunity to optimise the charging schedule. As such the above loads represent a worse case planning assumption with all vehicles charged in the same 12-hour window.

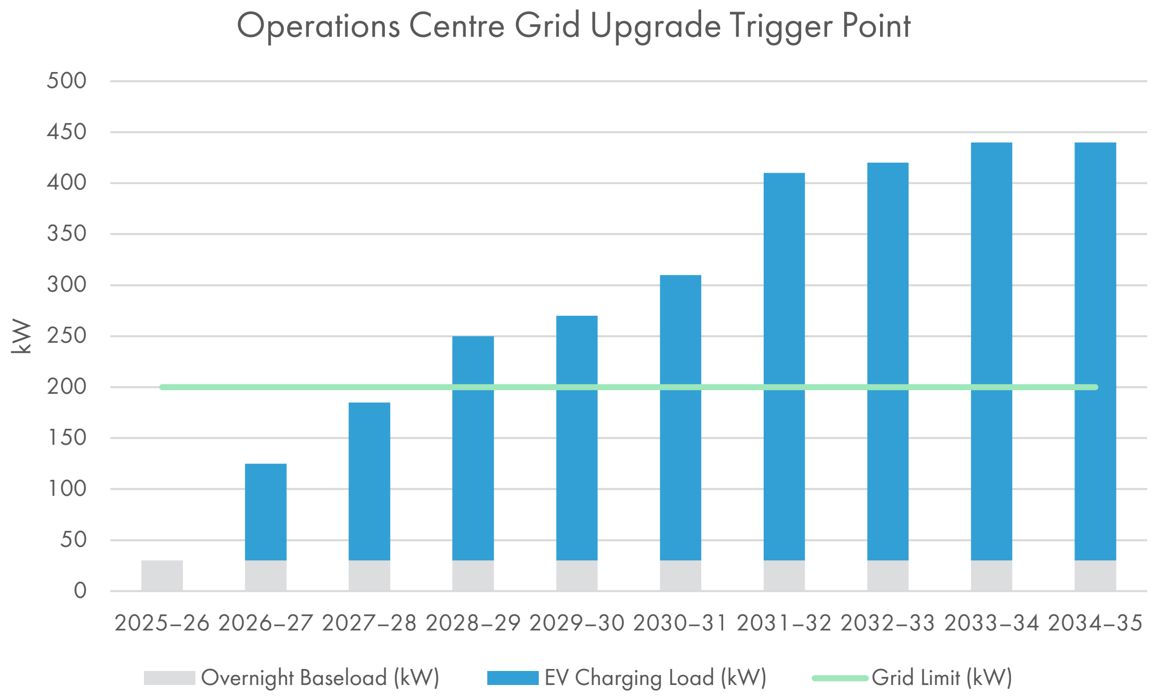


Figure 35 Operations centre grid upgrade trigger point

On a static-headroom basis (200 kW connection less c.30 kW overnight baseload = 170 kW available for EVs), the Operations Centre first exceeds capacity in 2028–2029, confirming the need to plan a grid augmentation by that year.

8.3.2 Civic Centre

There are 10 overnight vehicles at the Civic Centre site, by applying the fleet transition schedule to the number of vehicles located at the site, the following rollout of EV assets is determined.

CIVIC	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	2030-2031	2031-2032	2032-2033	2033-2034	2034-2035
Car - Small	0	1	1	1	1	1	1	1	1	1
Car-Medium	0	0	3	3	3	3	3	3	3	3
Utility	0	0	0	0	0	0	1	1	1	1
Van - Medium	0	0	1	2	2	2	2	2	2	2
Van - Small	0	1	2	2	2	2	3	3	3	3

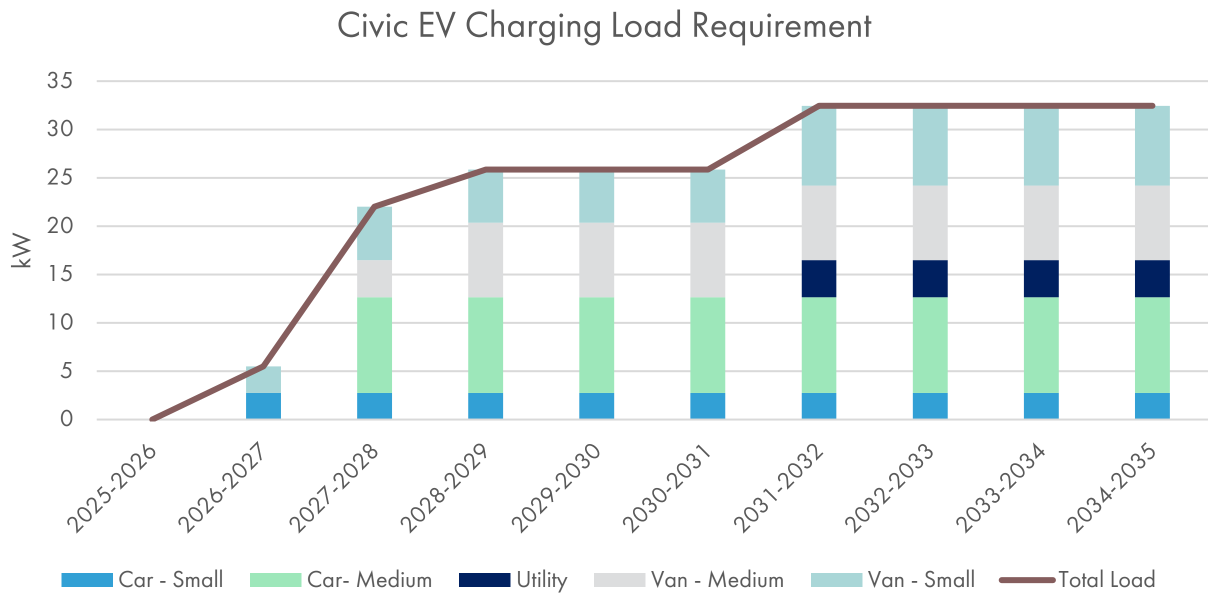


Figure 36 Civic centre EV charging load requirement

The Civic Centre's existing electrical supply, rated at approximately 400 kW (600 A, three-phase), provides substantial capacity to support fleet electrification. With only ten light-duty vehicles anticipated to charge at the site, the expected EV charging demand will account for less than one-third of the available overnight headroom. As such, no grid or switchboard augmentation is expected to be required, if charging is scheduled outside of peak operational hours. A small cluster of 7–22 kW AC chargers can be readily accommodated within the existing electrical system, using current distribution boards and cable runs, subject to confirmation of spare breaker capacity and appropriate cabling routes.

8.3.3 Recycling and Waste Centre

The seven vehicles at the WRWC provide the following rollout schedule.

WRWC	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	2030-2031	2031-2032	2032-2033	2033-2034	2034-2035
Loader	0	0	0	0	0	0	1	1	1	1
Prime Mover	0	1	3	3	4	5	5	5	5	5
Utility	0	0	0	0	0	0	1	1	1	1

When applied to the estimated EV charging loads an overnight peak power requirement of 155kW is required which is predominately used for charging of the Prime Movers. It should be noted that:

- The load required assume all 5 Prime Movers are electrified and represent a worst-case scenario when all 5 vehicles are utilised in that day. On most days only two Prime Movers are used but grid planning and infrastructure needs to consider how to plan for full utilisation of the fleet assets.
- Additional vehicle charging from future electrification of track loaders has not been considered, however, as per the above point, there will be plenty of grid headroom given all five Prime Movers are rarely if ever utilised simultaneously on a given day.

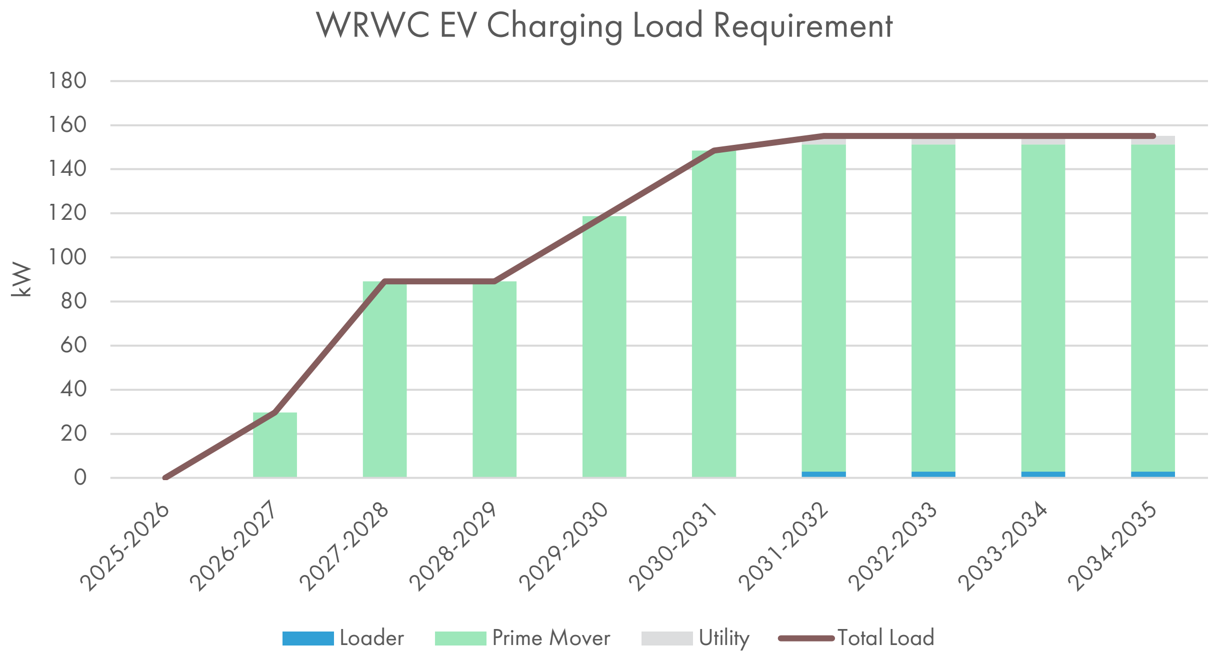


Figure 37 WRWC EV charging load requirement

8.4 Charging Infrastructure Design

Council has already taken proactive steps toward fleet electrification, with charging infrastructure currently installed at two key operational sites the Operations Centre and the Civic Centre. These existing assets provide a valuable foundation for scaling up as the fleet transitions to zero-emission vehicles.

The proposed charging solutions outlined in this report present an indicative layout and cost estimate for the total charging infrastructure required to support Council's electrified fleet. These concept designs consider a range of charger types, power ratings, and future scalability options to align with projected fleet growth and operational needs.

It is important to note that site-specific factors will influence final design and cost outcomes. Elements such as trenching and conduit runs, the presence of underground services or contaminated soil, and the capacity of existing switchboards will all affect installation feasibility and cost. The most significant variable, however, is likely to be the cost and feasibility of upgrading the incoming electrical supply. This will involve engagement with the Distribution Network Service Provider (DNSP) United Energy to assess whether network augmentation is required to support increased site demand.

Existing charging assets include:

- 4 x 7 kW Bosch PowerMax chargers located at both the Operations Centre and Civic Centre
- 3 x 22kW Schneider Electric EV charging stations supporting operational plant (Plant 275, Plant 115, and Plant 235) based at the Operations Centre

These installations provide immediate capability for light fleet and small plant charging, while also offering a platform for data collection and employees familiarisation with EV operations. Future infrastructure planning will build upon these foundations to ensure a coordinated, cost-effective, and scalable charging network across all Council sites.

8.4.1 Operations Centre

The charger sizing philosophy for the Operations Centre has been developed to align with fleet behaviour, vehicle capability, and available electrical capacity. The guiding principle is simple **chargers should be only as fast as necessary** to meet operational needs. Faster does not always mean better.

While 22 kW AC chargers provide higher nameplate output, they offer little practical advantage when vehicles are parked for extended periods. Even if a vehicle is technically capable of 22 kW AC charging, there is no operational benefit in fully charging it in three hours when it will remain parked for the next nine. Oversizing chargers in such cases only increases electrical demand, installation costs, and potential grid upgrade requirements without improving fleet readiness or utilisation.

A 7 kW AC charger delivers around 84 kWh over a 12-hour dwell period, sufficient to fully recharge the vast majority of Council's passenger and light commercial vehicles overnight. This ensures every vehicle returns to service each morning at full charge, without unnecessary energy infrastructure expense.

Typical vehicle AC charging limits include:

- *Peugeot e-Partner* – up to 7.4 kW AC
- *LDV eDeliver 9* – up to 11 kW AC
- *Fuso eCanter* – 11–22 kW AC depending on configuration

These examples highlight that while some vehicles can technically use 22 kW, most cannot — and more importantly, most do not need to.

Installing 22 kW chargers throughout the depot would quickly raise site peak load and likely trigger supply or transformer upgrades. The marginal charging time saved for a handful of vehicles would come at significant additional cost. The existing three 22 kW chargers already provide flexibility for medium-speed charging where it is genuinely required.

Recommended approach:

- Establish a 7 kW smart-AC charging network as the operational baseline.
  - Evenly distributed across supply phases.
  - Managed with load-balancing software to maintain power stability.
- Supplement with a limited number of higher-power chargers for exceptional circumstances, such as:
  - A vehicle returning from maintenance needing a quick turnaround.
  - A vehicle that missed its overnight charge.
- Include a dedicated drive-through fast-charge bay that can accommodate any vehicle type for rapid charging when required.

This approach ensures charger capacity matches real fleet requirements, supports overnight charging for all vehicles, and avoids unnecessary capital or electrical costs. It also provides scalable flexibility for future electrification as heavier or faster-charging vehicles are introduced.

8.4.1.1 Example EV Chargers

Most 7kW AC chargers can be either wall or pedestal mounted giving flexibility for the installation methodology.

Tethered	Untethered
	
• Cable is already attached to the charger. • Cable length is fixed at point of installation unless retrofitted to provide a longer/shorter cable. • Cables getting damaged is the number one cause of charger outages. If the cable is damaged it needs to be replaced by an electrical contractor. • Cable cannot easily be stolen although cable theft increasingly involves cable cutting.	• Cable is supplied separately; however, it can be left plugged in. • Allows multiple charging cable length options to suit the vehicle being charged i.e. placement of charging port can be factored in. • If a cable is damaged a new cable can be plugged in without requiring specialist contractor. • Cable can be stolen more easily – not recommended for public areas.

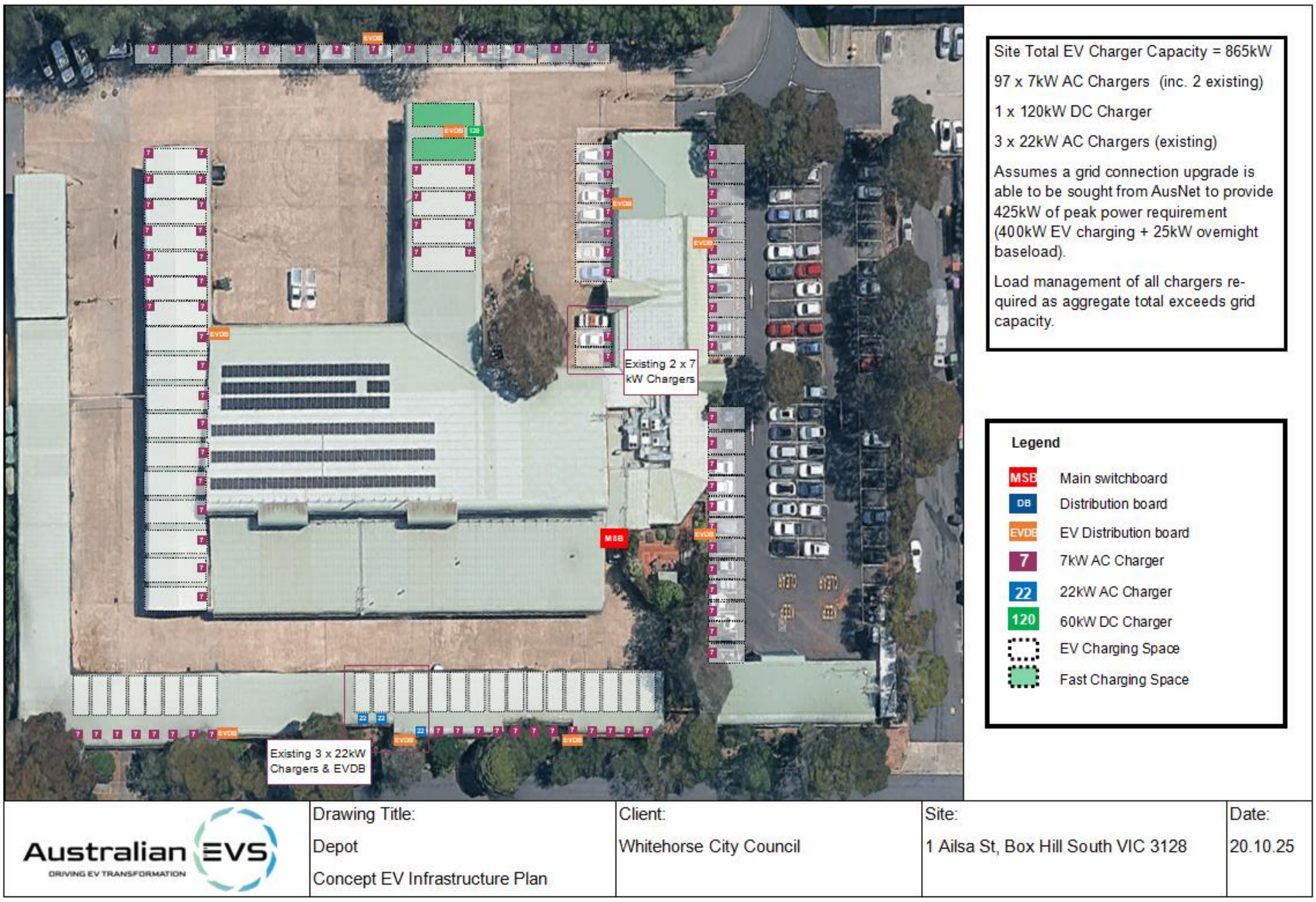
It is recommended that untethered EV charging solutions are installed, where the AC cable is not attached permanently to the charger and instead a charging cable is supplied separately.

When considering DC chargers, there are multiple solutions available. For providing a single DC charger at the Operations Centre a standard all-in one DC charging box, incorporating cable management should be chosen. Dual outlets are typical in this sort of charger and allow power to be split dynamically between the two outlets e.g. one vehicle plugged in can charge at up to 120kW or two vehicles at up to 60kW.

Example DC Charger – Ocular Atlas 120kW

8.4.1.2 Indicative Site Layout

The concept EV charging layout is shown below and in Appendix 2. The site is split into four areas for the purpose of assessment.



8.4.1.3 Area 1 Layout and Pricing

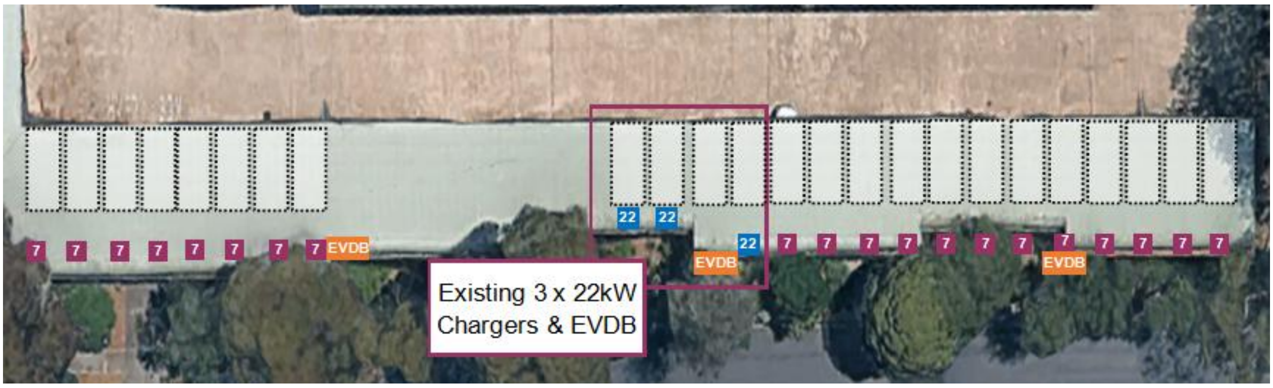
This area accommodates utilities, vans, and passenger vehicles, and will utilise 7 kW AC chargers suitable for both fleet and commuter use. A total of 30 new 7 kW chargers will be installed in this zone, supplementing the two existing 7 kW chargers already in place.

Of these, 23 chargers will be located within the employees carpark, enabling dual-purpose operation—either for overnight fleet charging or daytime use by commuter or personal vehicles. Two chargers have been allocated to the dedicated accessible parking bays, ensuring these remain compliant and available for employees or visitors with accessibility requirements.

All chargers in this area will be pedestal-mounted, providing a consistent installation style across the carpark. To ensure asset protection and compliance with Council standards, bollards will be installed at each charger location to mitigate the risk of vehicle impact. This layout maximises charger accessibility, maintains clear circulation space, and provides flexibility for both operational and employees use.

Charging Infrastructure	Pricing Estimate	
Chargers	$57,000	
Cable trays	$19,000	
Distribution boards	$45,000	
Sub-mains	$11,000	
Final circuits	$8,700	
Ethernet	$2,040	
New infrastructure cost	**$142,740**	
Site and upstream works	Lower estimate	Upper estimate
Trenching and backfill	$8,060	$24,180
Site electrical upgrades	$32,000	$75,000
Upstream upgrade cost	$15,000	$30,000
Site and upstream works costs	**$55,060**	**$129,180**
Total Area 1 Estimate	**$197,800**	**$271,920**

8.4.1.4 Area 2 Layout and Pricing



This area serves the City Works functions and currently includes three existing 22 kW AC chargers and an EV distribution board (EVDB). Additional chargers proposed for this area will be wall-mounted, taking advantage of the building structure and clear wall space to minimise civil works. The site layout allows for most cabling to be routed neatly via overhead cable trays, simplifying installation and reducing excavation requirements.

Given the proximity of the chargers to the main switchboard (MSB), existing underground conduits can likely be reused to provide the supply route between the MSB and this charging zone, avoiding the need for new trenching. This configuration offers a cost-effective and low-disruption installation pathway; while maintaining flexibility for future expansion should additional fleet vehicles require charging capacity in this section of the depot.

Charging Infrastructure	Pricing Estimate	
Chargers	$38,000	
Cable trays	$20,000	
Distribution boards	$30,000	
Sub-mains	$14,000	
Final circuits	$6,960	
Ethernet	$2,048	
New infrastructure cost	**$111,008**	
Site and upstream works	Lower estimate	Upper estimate
Trenching and backfill	$1,300	$3,900
Site electrical upgrades	$20,000	$50,000
Upstream upgrade cost	$25,000	$45,000
Site and upstream works costs	$46,300	$98,900
Total Area 2 Estimate	**$157,308**	**$209,908**

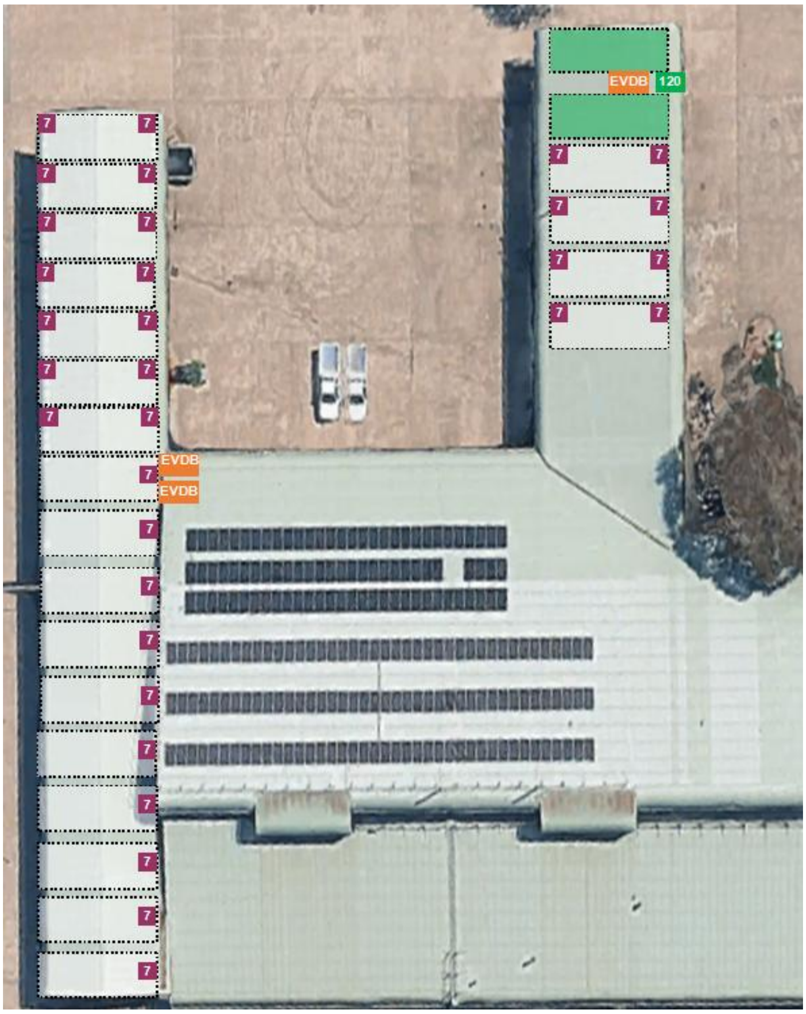
8.4.1.5 Area 3 Layout and Pricing

Area 3 serves as the primary charging zone for heavy fleet and operational plant, including rigid trucks, trailers, and small plant such as ride-on mowers and ground-maintenance equipment. This zone has been designed for flexibility, accommodating both vehicle and equipment charging through a mix of AC and DC infrastructure.

A dedicated drive-through fast-charging bay will be established in this area, equipped with a 120kW dual gun DC charger suitable for all fleet vehicle types. The drive-through configuration ensures large vehicles can enter and exit safely without the need for reversing or complex manoeuvres, supporting safe and efficient operations within the depot. This bay will also provide redundancy for other fleet assets requiring urgent turnaround or daytime top-up charging.

In addition to vehicle charging, the concept includes provision for charging small electric plant and ride-on equipment using dedicated outlets positioned within the same area. This enables smaller battery-electric equipment to be recharged efficiently from the same infrastructure, reducing the need for separate charging locations across the depot and simplifying maintenance and energy management. – see image below which shows a dual outlet 7kW charger being utilised to charge both the truck and the equipment, without the need to remove the equipment from the trailer. Either a dual outlet 2 x 7kW charger could be utilised or pending more detailed consideration of the layout two separate 7kW may be a solution which allows individual chargers to be installed directly onto the structural columns.

Operational safety is a key consideration for this configuration. When charging equipment is connected to a vehicle or parked adjacent to fleet assets, interlock systems or visual safety indicators must be employed to prevent accidental vehicle movement while charging cables are connected. Suitable controls may include plug-sensing interlocks, physical lockouts, or clear "charging in progress" signage and delineation. Defined operational procedures and employees training will be essential to ensure equipment charging is managed safely and consistently within the shared loading and vehicle movement areas.



This configuration delivers a multi-purpose, future-ready charging hub, providing high-power capability for trucks alongside flexible charging for smaller electric plant and equipment, while maintaining safety, operational efficiency, and scalability as Council's electric fleet expands.

Charging Infrastructure	Pricing Estimate	
Chargers	$116,600	
Cable trays	$36,000	
Distribution boards	$45,000	
Sub-mains	$28,300	
Final circuits	$10,800	
Ethernet	$3,584	
New infrastructure cost	**$240,284**	
Site and upstream works	Lower estimate	Upper estimate
Trenching and backfill	$0	$0
Site electrical upgrades	$32,000	$75,000
Upstream upgrade cost	$150,000	$200,000
Site and upstream works costs	**$182,000**	**$275,000**
Total Area 3 Estimate	**$422,284**	**$515,284**

8.4.1.6 Area 4 Layout and Pricing

This area comprises a linear parking zone along the northern boundary of the Operations Centre, primarily supporting light commercial and utility vehicles. This section will include 13 x 7 kW AC chargers, connected to a centrally located EV distribution board to minimise cable runs and balance electrical load across the installation.

All chargers in this area will be pedestal-mounted, positioned between bays to enable shared access for adjacent vehicles. The linear configuration allows for efficient installation and straightforward maintenance, with the cabling contained within a continuous surface-mounted conduit or cable tray system protected from vehicle movement.

This area is well suited for overnight fleet charging, with all vehicles returning to base for extended dwell periods. The use of 7 kW smart AC chargers provides sufficient capacity for full overnight replenishment while allowing future scalability through networked load management. Bollards and clear bay markings will be installed to protect the chargers and ensure compliance with operational safety standards.

It is unknown whether any existing conduits are available to allow access to power in this location, trenching across the yard may be required, subject to services scan.

Charging Infrastructure	Pricing Estimate	
Chargers	$24,700	
Cable trays	$17,200	
Distribution boards	$15,000	
Sub-mains	$9,600	
Final circuits	$3,900	
Ethernet	$1,288	
New infrastructure cost	**$71,688**	
Site and upstream works	Lower estimate	Upper estimate
Trenching and backfill	$1,300	$3,900
Site electrical upgrades	$5,000	$20,000
Upstream upgrade cost	$5,000	$15,000
Site and upstream works costs	**$11,300**	**$38,900**
Total Area 4 Estimate	**$82,988**	**$110,588**

8.4.1.7 Operations Centre Total Pricing Summary

The total cost to electrify the four charging areas at the Box Hill Operations Centre is estimated at $860,000–$1.11 million. This covers all new charging infrastructure, electrical and civil works, and a single consolidated allowance for potential upgrades to the site's main power supply.

Around $565,000 of the total relates to new infrastructure, including AC and DC chargers, cable trays, distribution boards, sub-mains, and communications cabling for networked load management.

The remaining $294,000–$542,000 covers electrical and site works to connect the chargers to existing supply points—such as trenching, new EV distribution boards, circuit protection, and minor switchboard modifications.

To avoid double-counting, electrical upgrades have been allocated according to the location of works across the site. Each area includes its local electrical and civil requirements, while a single upstream allowance of $195,000–$290,000 covers any depot-wide augmentation that may be required at the main supply point or through DNSP coordination.

This ensures shared infrastructure—such as the incoming feed, transformer and master switchboard—is only costed once. The final range provides a realistic, all-inclusive estimate for electrifying the Operations Centre. The lower value assumes adequate existing capacity, while the upper value allows for potential transformer or main-switchboard upgrades should the total EV load approach the site's supply limit.

Charging Infrastructure	Pricing Estimate	
Chargers	$236,300	
Cable trays	$92,200	
Distribution boards	$135,000	
Sub-mains	$62,900	
Final circuits	$30,360	
Ethernet	$8,960	
New infrastructure cost	**$565,720**	
Site and upstream works	Lower estimate	Upper estimate
Trenching and backfill	$10,660	$31,980
Site electrical upgrades	$89,000	$220,000
Upstream upgrade cost	$195,000	$290,000
Site and upstream works costs	**$294,660**	**$541,980**
Total Operations Centre Estimate	**$860,380**	**$1,107,700**

When planning the full electrification of the Operations Centre, it is important to consider which areas should be prioritised first and how existing operations can be adapted to avoid over-capitalisation in the early stages of transition.

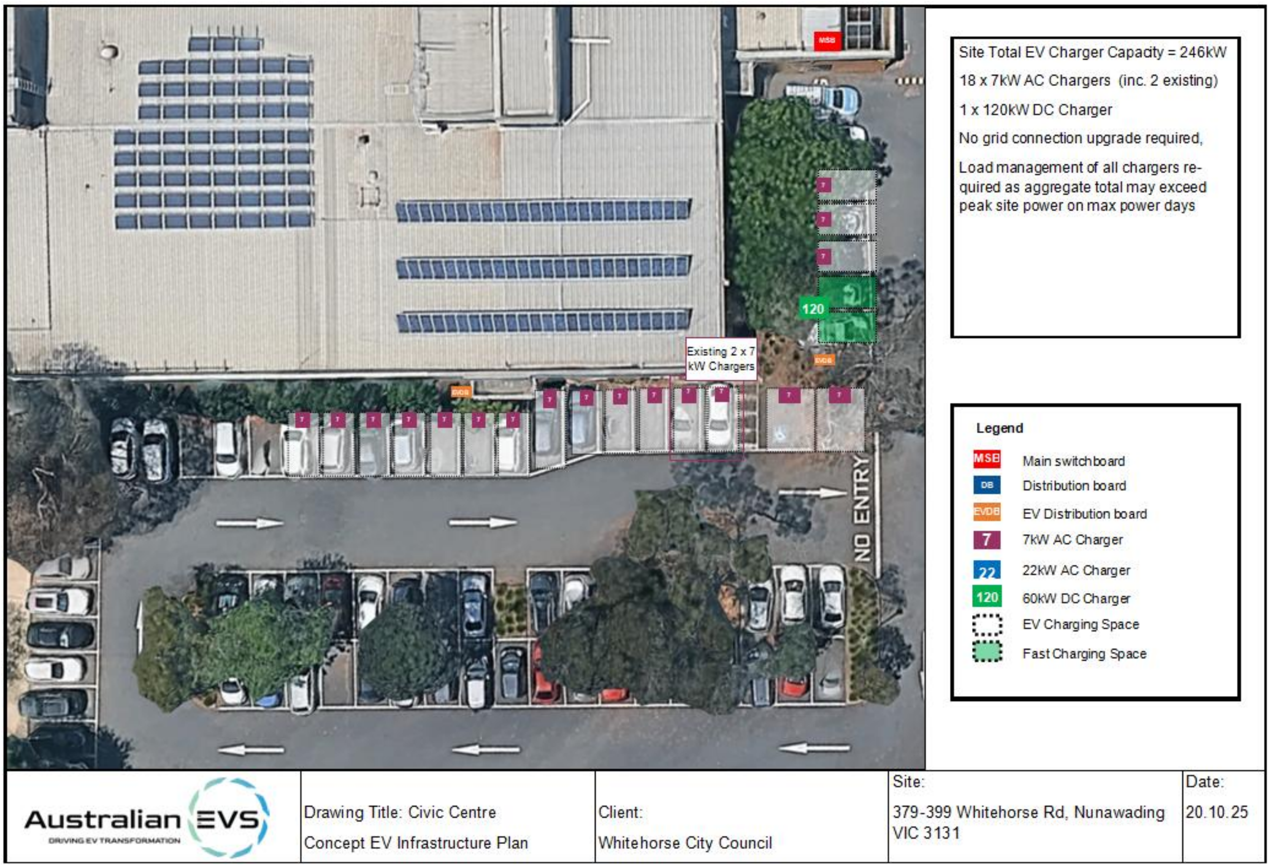
Area 1 represents a logical starting point for charger installation, given its accessibility and proximity to existing electrical infrastructure. Vehicles currently parked in other areas but scheduled for early electrification could be temporarily relocated to Area 1, enabling them to transition to electric operation without requiring immediate investment in multiple charging zones.

8.4.2 Civic Centre

The Civic Centre has a relatively small operational fleet presence, with ten Council vehicles parked on site overnight. The remainder of the car park is primarily used by employee's commuter and pool vehicles during the day. The site's design philosophy therefore focuses on providing sufficient overnight charging for the small number of operational vehicles while enabling convenient daytime use for employees and commuter vehicles, all within the limits of the existing electrical capacity.

A review of the main switchboard confirmed that adequate spare capacity exists to support new EV chargers without requiring upstream network augmentation. Two spare main switches, rated at 250 A and 160 A respectively, allow connection of a new dedicated EV distribution board. This approach enables new charging infrastructure to be integrated with the existing electrical system without major civil works or additional supply connections, which is beneficial given the constrained and continuously used nature of the site.

The proposed design (see Appendix 2 and below) includes a mix of 7 kW AC chargers and an optional single 120 kW DC fast charger. This provides a flexible balance between overnight fleet charging and daytime commuter use. Overnight charging will ensure the small number of Council vehicles are ready for service each morning, while the DC charger supports fast turnaround of pool vehicles or unexpected operational needs. The AC chargers will also be accessible for employee's commuter charging during the day, particularly for those without home charging options. Council may consider whether to provide charging as a workplace benefit or under a cost-recovery model.



All chargers will be managed under a dynamic load control system that distributes power automatically based on real-time demand. This ensures the total site load remains within available electrical capacity, avoids unnecessary infrastructure upgrades and prioritises overnight charging when the building load is lowest.

As vehicle electrification expands, further chargers can be added with minimal disruption. Spare capacity within the new EV distribution board and pre-planned conduit routes will allow for straightforward and cost-effective expansion should additional vehicles be based at the site, or if home charging is found to be unsuitable for a larger number of employees.

Given that the car park is open to pedestrians and the public, safety and asset protection are key design considerations. The use of untethered chargers is recommended to reduce the risk of cable theft and vandalism. Charger locations should maintain clear pedestrian sightlines and avoid obstructing walkways. Adequate lighting and CCTV coverage should be ensured across all charging bays to provide a safe environment for users and to deter theft or tampering.

Overall, the Civic Centre charging design is a modest, practical solution that meets current operational needs, allows for controlled employees access and provides a scalable foundation for future growth. It prioritises safety, functionality, and efficient use of existing infrastructure, delivering a low-cost, low impact charging solution suited to the site's limited overnight fleet activity and allowing commuter vehicles to charge during the day.

8.4.2.1 Civic Centre Pricing

The estimated cost to implement the proposed Civic Centre charging infrastructure ranges between $180,140 and $222,740. This range includes all new chargers, cabling, electrical integration, and minor civil works required to connect the equipment within the existing site supply.

Of the total, circa $138,000 relates to new charging hardware and associated installation, including AC and DC chargers, cable trays, distribution boards, sub-mains, and communications cabling.

The remaining $41,000 to $84,000 covers trenching, internal electrical works, and connection to the main switchboard through a new EV distribution board. No allowance has been made for upstream or DNSP augmentation, as the Civic Centre's electrical review confirmed that sufficient spare capacity exists within the main switchboard to support the proposed load.

All electrical integration works are therefore contained within the site boundary and can be delivered without changes to the external supply connection. This cost range reflects a low-impact, scalable implementation that makes effective use of the existing electrical infrastructure.

Charging Infrastructure	Pricing Estimate	
Chargers	$90,000	
Cable trays	$5,000	
Distribution boards	$30,000	
Sub-mains	$6,000	
Final circuits	$6,600	
Ethernet	$1,240	
New infrastructure cost	**$138,840**	
Site and upstream works	Lower estimate	Upper estimate
Trenching and backfill	$1,300	$3,900
Site electrical upgrades	$40,000	$80,000
Upstream upgrade cost	$0	$0
Site and upstream works costs	**$41,300**	**$83,900**
Total Civic Centre Estimate	**$180,140**	**$222,740**

8.4.3 Recycling and Waste Centre

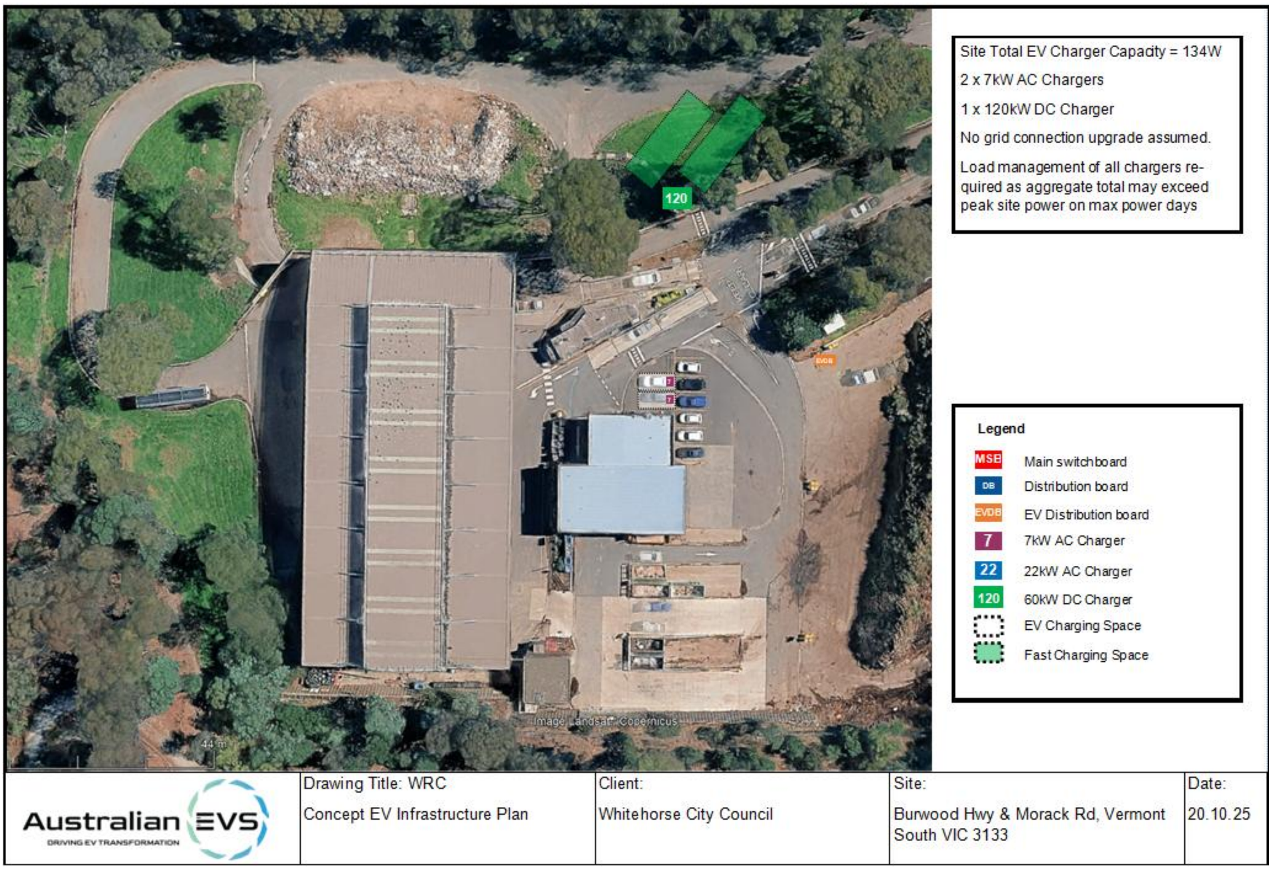
Whilst the Recycling and Waste Centre (WRWC) was not an initial focus of this report, its role as the base for some of Council's highest-emitting fleet assets warrants consideration of suitable charging solutions. The site houses several Prime Movers which represent a significant portion of Council's fleet emissions. Encouragingly, these vehicles are now close to being economically viable for electrification, with whole-of-life costs approaching parity with their diesel equivalents. As such, they are a key driver of any electrification strategy for this site.

In parallel, there is a growing opportunity to plan for future electrification of the site's mobile plant, including track loaders and other small construction or materials-handling equipment. Any charging design for this location should therefore consider the flexibility required to support both heavy vehicle and plant electrification over time.

Electric Prime Mover typically have between 500 and 600kWh of battery capacity with the Volvo FMX Electric having a 540kWh battery. This means that to charge a vehicle from 20-100% around 430 kWh of electricity needs to be added. Assuming a 10-hour dwell time necessitates around 50kW of power draw per vehicle.

It is recommended that initially the WRWC focusses on the installation of one DC fast charger with a dual gun capability of 120kW. This would be enough to fully electrify two electric prime movers. Two 7kW chargers could also be added to facilitate charging of the small number of small vehicles located at this site. As plant such as track loaders become more readily available further chargers can be added in strategic locations depending on the vehicle's location on the site.

The proposed 120kW DC charger has multiple potential locations, the location suggested with vehicles parked in a herringbone orientation would keep the vehicles off the road and allow two vehicles to charge concurrently.



Whilst the site was not assessed in detail from an electrical perspective, given the nature of the site it is expected that a single 120kW charger could be accommodated, especially considering the site overnight baseload is expected to be low. The proposed 7kW chargers would require very little infrastructure and it is assumed they could be accommodated on existing boards within the buildings.

Overall, the bulk of the cost are associated with the DC fast charger itself with no upstream works assumed.

Charging Infrastructure	Pricing Estimate	
Chargers	$58,800	
Cable trays	$1,000	
Distribution boards	$15,000	
Sub-mains	$2,500	
Final circuits	$3,000	
Ethernet	$360	
New infrastructure cost	**$80,660**	
Site and upstream works	Lower estimate	Upper estimate
Trenching and backfill	$2,600	$7,800
Site electrical upgrades	$5,000	$20,000
Upstream upgrade cost	$0	$0
Site and upstream works costs	**$7,600**	**$27,800**
Total WRWC Estimate	**$88,260**	**$108,460**

It should also be noted that Council may consider how to accommodate a trial vehicle and charge it overnight. Utilising a portable DC charger could provide a solution when connected to a 3-phase socket. These chargers offer fast charging in a portable configuration without the need for significant upgrades and can provide a bridge between trialling vehicles and full-time usage. The example shown below from Kempower provides 40kW of DC power when plugged into a 63amp socket and 20kW when plugged into a 32amp socket. It also offers the ability to charge two vehicles simultaneously at 20kW.

Portable chargers offer Council the ability to trial vehicles at different sites with minimal expenditure on fixed infrastructure. Once electrification is complete portable chargers can be utilised in workshop areas to provide charging for assets pre or post maintenance. The cost of these chargers is in the region of $20,000-$40,000 depending upon make and model.

8.5 Satellite Sites

There are a further four satellite sites which house limited numbers of vehicles. Council should consider installation of one or two 7kW AC chargers at each of these sites to provide charging for these assets once electrified. Installation of a single 7kW charger may cost between $2,000 and $4,000 installed and provide sufficient overnight charging capacity for vehicles located at these sites.

8.6 Home Charging Solutions

Council has 68 fleet vehicles garaged at employees' homes and 31 commuter vehicles generally returning home daily. A core principle for electrification is to charge vehicles where they already park overnight, to maximise convenience and utilise off-peak hours. Aligning with this principle ensures vehicles start each day with a full battery and minimises disruption to operations. Any charging strategy should prioritise enabling home charging for these take-home vehicles wherever feasible while providing alternatives for those without a practical home option.

Charging at the home base overnight is ideal for light-duty fleet EVs that have modest daily driving requirements. A standard 7 kW AC home charger can replenish c. 40 to 50 km of range per hour, easily covering typical daily use over a 12-hour overnight dwell time. This approach reduces reliance on daytime public or depot charging and spreads load to off-peak times with lower electricity rates. In short, charging where the vehicle sleeps are both operationally efficient and cost-effective.

However, not every employee's home can support a charger. The strategy must accommodate different housing scenarios, such as apartments or rentals and ensure those drivers can still reliably charge. Commuter fleet vehicles, even if usually home-garaged, should retain flexibility to use depot chargers or public infrastructure when needed. For instance, an employee in an apartment with no private parking may need to charge at a Council depot or fast charger periodically. The goal is to provide equitable charging solutions so all fleet EVs, regardless of home situation, have a consistent means to recharge overnight or during downtime.

8.6.1 Home Charging Solution Options for Fleet Vehicles

Several implementation models are available for equipping employee's homes with EV charging. Council can either invest capital upfront or leverage service-based offerings to deploy home chargers. The main options include:

Council-Funded Charger Installations: Council can directly fund the purchase and install of a home charging unit for each take-home vehicle. This typically costs c. $2,000 per charger installed. Council would own the hardware and cover installation via approved electricians. This up-front investment ensures drivers have reliable charging at home. It also allows Council to choose hardware and integrate these assets into its fleet systems. The downside is the capital expenditure and the administrative effort to manage installations across numerous private residences. Council-funded home chargers are a straightforward solution but must be weighed against the Fringe Benefits Tax implications of providing equipment at an employee's home.

Charging-as-a-Service Subscriptions: An increasingly popular approach is to partner with a specialist provider that offers home charging as a managed service. Companies like JET Charge and Origin Energy provide end-to-end charging-as-a-service (CaaS) solutions. Under this model, the provider supplies and installs the home charger with little or no upfront cost to Council, and in return Council pays a monthly service fee. The service typically includes the charger hardware, standard installation, maintenance, network connectivity and software for usage tracking. This shifts charging infrastructure from a capital project to an operational expense. It also simplifies logistics, as the provider handles coordination with electricians, customer support for the employee and even removal or transfer of the charger if the employee's member moves house or changes vehicles. The advantage of CaaS is reduced complexity for Council and assurance that chargers are maintained and data-enabled, though the long-term subscription costs need consideration.

Bundled Lease or Subscription Packages: Another option is to include home charging provision as part of the vehicle lease or fleet procurement package. Some fleet management organisations now offer bundled EV solutions where the home charger and its installation are rolled into the monthly lease or subscription fee. For example, AGL's EV subscription pilot provided an EV to the user along with at-home charging facilities installed, all for a fixed weekly payment. In a fleet context, Council could negotiate with its leasing provider to supply and install chargers for each leased EV, amortising the hardware cost over the lease term. This simplifies cost allocation. However, for taxation purposes the cost of a home charger cannot be simply hidden in a vehicle lease, the ATO requires that the charger's value be identified and treated separately for FBT. Bundled solutions can be used to reduce the immediate financial barrier for employees and ensure each EV comes with the necessary charging infrastructure. Council might also explore group procurement deals with vendors for volume discounts on home charger units if doing a bulk rollout.

8.6.2 Verifying Installation, Usage and Emissions for Home Charging

No matter which home charging solution is deployed, Council will need a robust method to verify that chargers are installed correctly and to monitor their usage for both cost reimbursement and environmental reporting. Accurate data on electricity consumed for fleet vehicles charging at home is crucial to reimburse employees fairly for their electricity costs and account for the energy and emissions in Council's reports.

Installation Verification: Council should ensure each home charger installation is performed by a licensed electrician and obtain a certificate of electrical compliance. This confirms safety standards and provides documentation for Council records. If Council funds the install, a formal process can require the employee's member to submit proof of installation completion. For charging-as-a-service or lease bundles, the provider typically handles installation and can furnish evidence to Council that the unit has been installed and commissioned. In all cases, having an asset register of home chargers linked to vehicle and employee is recommended.

Usage Tracking: The simplest way to capture home charging energy use is to deploy networked smart chargers. Most modern EV wall chargers can connect via Wi-Fi or 4G and record each charging session. By selecting smart chargers or requiring the service provider to supply them, Council can automatically collect usage data per vehicle. These systems enable Council to generate reports of kWh used by each vehicle at home, which can be cross-checked against vehicle odometer readings or telematics for reasonableness. If smart chargers are not available, alternatives include installing a separate electricity sub-meter on the charger circuit or using the vehicle's telematics. In a pinch, the ATO's simplified method can estimate home energy use based on kilometres driven at 4.2 cents per km, but direct measurement is preferable.

Electricity Source and Emissions Intensity: Since Council is committed to emissions reporting, it should also consider the source of electricity for home charging. Council facilities already purchase 100 percent renewable electricity under VECO, but employee's home electricity may be from the grid mix. Smart charging data can quantify kWh used, which can then be multiplied by an emissions factor to estimate Scope 2 emissions from home charging. Council could encourage or incentivise employees to switch to Greenpower or EV off-peak plans, but at minimum, having usage data allows applying the appropriate emissions factor. Verification of renewable energy could also be part of the program. Overall, by leveraging smart chargers and software, Council can ensure that every kWh of home charging is logged and accounted for in the fleet's energy and emissions ledgers.

8.6.3 Housing Scenarios and Charging Approaches

- **Detached Homes with Driveway:** Proceed with charger installation using Council-funded or subscription service models.
- **Rental Properties with Driveway:** Seek landlord approval. If granted, proceed with charger installation. If denied, offer depot or public charging alternatives.
- **Apartments or Homes with No Off-Street Parking:** Assume home charging is not feasible. Assign vehicle to depot charging infrastructure or provide access to public chargers.
- **Depot Charging for Commuter Vehicles**: Where home charging is impractical, ensure access to daytime depot charging or public networks. These options provide operational resilience and equitable access for all drivers.

Council should implement a decision-making flowchart which will streamline the approach to home charging. This systematic approach ensures each EV has an appropriate and practical charging solution aligned with operational needs and climate goals.

8.6.4 Fringe Benefits Tax (FBT) Implications

- **Electricity Reimbursement:** FBT exempt if Council reimburses the employee under the ATO's rate (currently 4.2c/km) or actual cost with proper documentation.
- **Charger Hardware:** Subject to FBT if the total value exceeds $300. This applies whether the charger is provided directly, through a lease or bundled service.

8.6.5 Conclusion

Combining tailored solutions for each housing type, monitoring energy use and emissions and managing FBT implications, Council can implement a flexible and equitable home charging strategy for all 99 take-home vehicles. This supports broader climate targets while maintaining operational effectiveness.

Importantly, by electrifying and supporting home charging for its commuter fleet, Council also demonstrates leadership beyond its organisational boundaries. While community-wide decarbonisation sits outside the direct scope of this fleet strategy, Council's actions can help inspire confidence in residents, businesses and other government agencies. Employees driving EVs home, charging visibly on residential streets or in driveways and discussing their experience can normalise the transition to electric mobility in the municipality. In doing so, Council not only cuts its own emissions but shows its community what is possible.

This is particularly relevant in the context of Whitehorse's Climate Response Strategy 2023–2030, which sets an aspirational target of net zero community emissions by 2040. With over 1.3 million tonnes of CO_2 emitted by the community and transport one of the key contributors, the electrification of the Council fleet provides a direct and visible example of climate action. Each take-home vehicle that charges cleanly at home strengthens the narrative that decarbonising transport is achievable today and it reinforces Council's commitment to lead by example.

9 Overall Cost of Fleet Transition

9.1 Vehicle Costs

The overall cost of the transition to low and zero emission vehicles shown below and is attributable to the difference between the BAU fleet CAPEX and OPEX compared to the fleet transition. The following need to be considered:

- Only the transition costs are counted, where a vehicle is swapped from ICE to EV the CAPEX associated is only counted once.
- The Vehicle CAPEX costs do not consider any cost down or inflationary assumptions, the price is static for both the BAU and fleet transition vehicles unless otherwise stated to aid in direct comparison.
- Vehicle CAPEX only includes the cost of a cab-chassis, there is no consideration in the CAPEX of the cost of specialised body work which varies considerably across vehicles.
- For OPEX the total per vehicle includes the fuel, maintenance, insurance, registration and tyre costs but excludes the annual depreciation

9.1.1 Vehicle CAPEX Costs

The below table shows the total per asset category cost of vehicle assets over the 10 year transition.

Fleet Category	No. of Vehicles	BAU CAPEX	Fleet Transition CAPEX
Car - Large	6	$ 291,000	$ 570,000
Car - Small	16	$ 217,000	$ 279,930
Car- Medium	60	$ 1,170,000	$ 1,229,700
Heavy Rigid	4	$ 792,000	$ 960,000
Light Rigid	18	$ 1,584,000	$ 2,448,000
Loader	2	$ 560,000	$ 560,000
Medium Rigid	8	$ 744,000	$ 1,088,000
Prime Mover	5	$ 2,100,000	$ 3,375,000
Ride-On Mower	13	$ 832,000	$ 1,157,000
Tractor	5	$ 975,000	$ 975,000
Utility	39	$ 2,565,000	$ 4,275,000
Van - Medium	10	$ 520,000	$ 599,900
Van - Small	23	$ 1,760,000	$ 2,200,000
Wood Chipper	2	$ 302,000	$ 302,000
Total	207	$14,412,000	$20,019,530
		Delta	+$5,607,530

Overall, the cost of vehicles is projected to be $5,607,530 more expensive under the fleet transition scenario. However, it should be noted that as EVs and ICE vehicle CAPEX pricing converges then this gap will decrease per the example below:

Fleet Type	BAU	Current EV Cost	WOLC Parity
Medium Rigid	$93,000	$136,000	$105,956

In the above example the current price used in the overall CAPEX is the current EV cost, whilst WOLC parity would be achieved at a CAPEX of $105,956. Should, as expected EV continue to decline in price, then the impact to the overall vehicle CAPEX budget will be less than the c.$5.6million figure presented. This therefore represents a starting point for budgeting and business case development.

9.1.2 Vehicle OPEX Costs

The 10-year OPEX costs are shown below and show that from a BAU OPEX cost of $1,651,641 per annum the OPEX cost fall progressively to $985,403 per annum which represents a 40% decrease in vehicle OPEX costs under a fleet transition scenario.

Over 10 years the cumulative savings in OPEX costs amounts to $4,080,280.

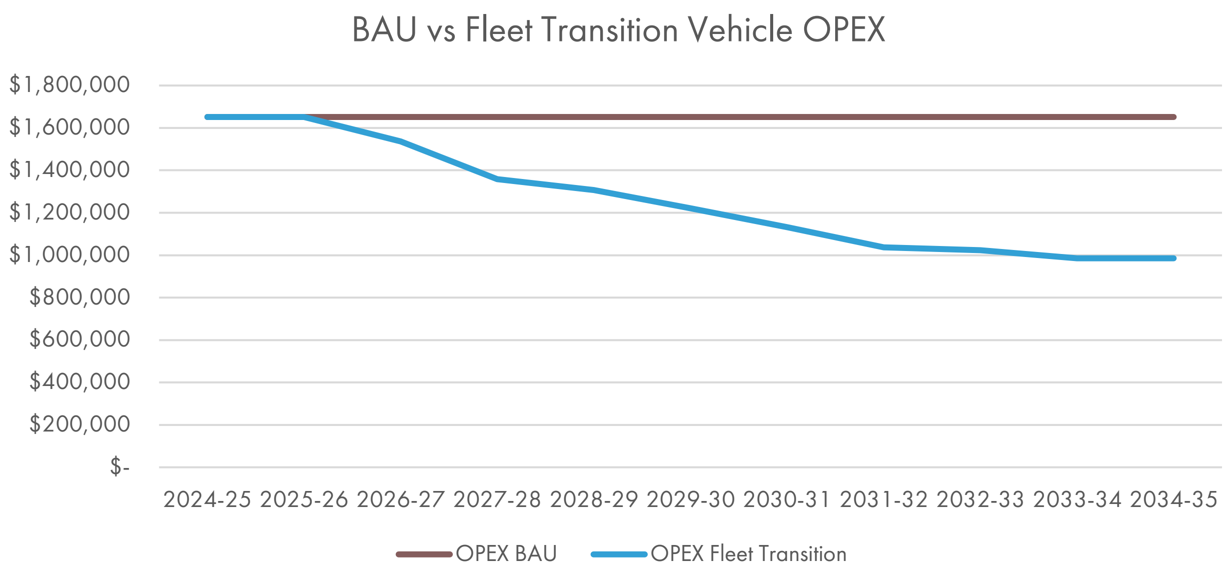


Figure 38 BAU vs fleet transition vehicle OPEX

9.1.3 Overall Vehicle Business Case

The overall position for Council is that the vehicle only CAPEX and OPEX represent a premium of $1,329,942 under the fleet transition scenario, over 10 years this represents an annual cost of $132,994 per annum.

	CAPEX	OPEX	Total
BAU	$14,412,000	$18,168,056	$32,580,056
Fleet Transition	$20,019,530	$13,890,468	$33,909,998
Total	+$5,607,530	-$4,277,588	+$1,329,942

9.2 Charging Infrastructure Costs

9.2.1 Depot Electrification Costs

The total electrification cost for the depot component of the charging infrastructure is shown below:

Site	Low Estimate	High Estimate
Total Operations Centre Estimate	$860,380	$1,107,700
Total Civic Centre Estimate	$180,140	$222,740
Total WRWC Estimate	$88,260	$108,460
Total Satellite Sites	$8,000	$16,000

Total	$1,136,780	$1,454,900

9.2.2 Timing of Site Expenditure for Electrification

The timing of depot electrification works is a critical factor in ensuring a smooth and coordinated fleet transition. Charging infrastructure must be planned and delivered ahead of vehicle arrivals to avoid operational disruption and to support immediate utilisation of electric assets once deployed.

For the Operations Centre, staged delivery of charging infrastructure should align with the vehicle replacement profile outlined in the Fleet Transition Plan. Priority areas should be identified based on early vehicle transitions and operational criticality, with detailed design, procurement, and installation commencing now to meet anticipated delivery timelines.

Early planning and procurement also mitigate risks related to long lead times for electrical components, DNSP approvals, and civil works. To avoid overcapitalising in any single area, Council should also consider temporary vehicle reallocations during the early transition years. This approach allows new electric vehicles to be housed or charged in existing or upgraded areas with available capacity, reducing the need for premature infrastructure investment in low-utilisation zones.

By sequencing upgrades in parallel with the fleet replacement schedule and applying temporary fleet movements where practical, Council can optimise capital deployment, minimise downtime, and ensure that depot charging capacity expands progressively in line with actual charging demand.

The suggested expenditure on charging infrastructure is shown below with expenditure on each area spread over two financial years where appropriate with the understanding that infrastructure expenditure will be staged as per progress. The high range estimate has been used.

Site	2025-26	2026-27	2027-28	2028-29
Operations Centre – Area 1		$135,960	$135,960	
Operations Centre – Area 2		$104,954	$104,954	
Operations Centre – Area 3			$257,642	$257,642
Operations Centre – Area 4			$55,294	$55,294
Civic Centre		$111,370	$111,370	
WRWC		$54,230	$54,230	
Satellite Sites			$8,000	$8,000
Total		**$406,514**	**$727,450**	**$320,936**

The work packages could be tendered as follows:

- Work Package 1: Operations Centre Area 1 and 2
- Work Package 2: Civic Centre and WRWC
- Work Package 3: Operations Centre Area 3 and 4
- Work Package 4: Satellite Sites

9.2.3 Charging Infrastructure OPEX

Operating expenditure (OPEX) associated with charging infrastructure is an important consideration for ongoing budgeting and lifecycle cost modelling. Although the capital cost of EV chargers and electrical upgrades represents the largest initial investment, annual operating costs ensure that the assets remain safe, functional, and compliant over their service life.

An annual allowance of $500 per charger has been adopted for this analysis. This figure is based on benchmark data from comparable council and commercial fleet installations across Australia and covers the following key cost components:

- **Routine inspection and testing** – annual electrical safety tests, RCD and insulation checks, firmware updates, and visual condition inspections.
- **Preventative maintenance** – cleaning of enclosures and connectors, tightening of terminals, replacement of worn cables or plugs, and verification of earthing and protection devices.
- **Corrective maintenance** – minor repairs arising from fault codes, vandalism, or physical damage.
- **Software and network fees** – basic networking or monitoring platform subscriptions (for systems using open-protocol or managed platforms).
- **Switchboard and distribution maintenance** – periodic inspection of dedicated EV distribution boards, circuit protection devices, and associated cabling.

At $500 per charger per year, this allowance equates to roughly 3-5% of the initial capital cost of the charging infrastructure, aligning with standard asset-management ratios for electrical infrastructure. This figure provides a conservative but realistic basis for lifecycle modelling while ensuring that routine maintenance and minor faults can be addressed without deferring expenditure or risking downtime.

Site	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	Etc.
Operations Centre – Area 1	$0	$16,000	$16,000	$16,000	$16,000	$16,000
Operations Centre – Area 2	$0	$11,500	$11,500	$11,500	$11,500	$11,500
Operations Centre – Area 3	$0	$0	$16,500	$16,500	$16,500	$16,500
Operations Centre – Area 4	$0	$0	$6,500	$6,500	$6,500	$6,500
Civic Centre	$0	$9,500	$9,500	$9,500	$9,500	$9,500
WRWC	$0	$1,500	$1,500	$1,500	$1,500	$1,500
Satellite Sites	$0	$0	$1,000	$2,000	$2,000	$2,000
Annual Total	$0	$38,500	$62,500	$63,500	$63,500	$63,500
Total Over 10 years	**$545,500**					

9.2.4 Home Charging Costs

To account for varying levels of home charging adoption across the 99 commuter and personal vehicle fleet, indicative cost scenarios have been modelled based on 25%, 50% and 75% of these vehicles charging at home. Using an indicative CAPEX figure of $2,000 per charger and $250 per charger per year OPEX, the following costs represent the additional expenditure attributable to fleet transition under each scenario, with 50% home charging adopted as the base case with 5 years chosen as an average time each vehicle is housed at home across the 10-year transition.

% Charged at Home	25%	50%	75%
CAPEX	$49,500	$99,000	$148,500
OPEX - 5 years	$30,938	$61,875	$92,813
Total	**$80,438**	**$160,875**	**$241,313**

9.3 Total Overall Cost of Fleet Transition

9.3.1 Total Cost of Fleet Transition

The estimated total of the Fleet Transition is projected at $36.07 million versus a BAU expenditure of $32.58 million.

This represents the total cost of the transition at $3.49 million above the BAU over the course of 10 years, annualised this amounts to an additional $350,000 per annum impact to the Council's budget.

	BAU	Fleet Transition	Delta
Vehicle CAPEX	$14,412,000	$20,019,530	+$5,607,530
Vehicle OPEX	$18,168,056	$13,890,468	-$4,277,588
Charging Infrastructure CAPEX (High Estimate)	NA	$1,454,900	+$1,454,900
Charging Infrastructure OPEX	NA	$545,500	+$545,500
Home Charging (50% Base case)	NA	$160,875	+$160,875
Total	**$32,580,056**	**$36,071,273**	**+$3,491,217**

Key Findings:

- Fleet transition requires an additional cost over the 10-year period, with an additional $3.49 million (around $350,000 per year) compared with the BAU.
- Vehicle operating cost savings of $4.28 million substantially offset the higher upfront capital required for EV procurement and charging infrastructure.
- Charging infrastructure capital and operating costs together account for around $2.0 million of the total delta, reflecting investment in long-term enabling assets that support the transition.
- The major cost driver is higher vehicle CAPEX, reflecting current EV purchase prices; however, this is progressively offset by lower fuel and maintenance costs over time.
- The charging infrastructure OPEX allowance ($545,500)—equivalent to roughly $500 per charger per year—ensures adequate provision for maintenance, software support, and electrical inspections to maintain system reliability.
- When lifecycle savings, emissions reductions, and operational resilience are considered, the incremental cost is modest and strategically justified given Council's long-term sustainability objectives.

9.3.2 Consideration of WOLC Parity and Purchase Price Parity

The total cost of transitioning Council's fleet to zero-emission vehicles depends not only on vehicle replacement volumes but also on the timing of procurement. The current modelling assumes static pricing for electric vehicles based on today's market rates. However, if Council were to align future replacements with the point at which electric models reach whole-of-life cost (WOLC) parity with internal-combustion equivalents, the overall cost of transition would materially decrease.

This approach recognises that technology costs, residual values, and operating efficiencies are improving rapidly across most fleet segments. Deferring certain purchases until parity is achieved allows Council to optimise financial outcomes while still maintaining a clear and achievable pathway to full fleet decarbonisation.

In the example below vehicles purchases occur at WOLC parity and show the overall cost of the transition reducing to $3,08 million or $300,000 per annum.

Total Cost of Fleet Transition at WOLC Parity

	BAU	Fleet Transition	Delta
Vehicle CAPEX (at WOLC Parity)	$14,412,000	$18,612,666	+$4,200,666
Vehicle OPEX	$18,168,056	$13,890,468	-$4,277,588
Charging Infrastructure CAPEX (High Estimate)	NA	$1,454,900	+$1,454,900
Charging Infrastructure OPEX	NA	$545,500	+$545,500
Home Charging (50% Base case)	NA	$160,875	+$160,875
Total	**$32,580,056**	**$34,664,409**	**+$2,084,353**

9.3.3 Conclusion

For financial planning, it is recommended that Council adopt the static pricing methodology as the basis for fleet transition budgeting. This approach provides a conservative estimate that effectively represents a base or worst-case position using today's vehicle and infrastructure pricing.

In practice, the total cost of transition is expected to decline over time as electric vehicle purchase prices continue to fall and whole-of-life cost parity becomes standard across most fleet categories. Ongoing reductions in battery and drivetrain costs, supported by 5–8% annual price reductions, will progressively narrow and eventually eliminate the upfront price premium for EVs.

As a result, while current modelling assumes static prices for prudence, the actual cost to Council is likely to trend downward. Over the life of the transition, the fleet's total cost of ownership is expected to move from near neutral against the BAU to potentially favourable, delivering both financial and emissions benefits without an additional burden on operational budgets.

The graph below shows how the vehicle purchase price impacts the total cost of the transition; should Council pursue the fleet transition a mix of vehicle purchase will be achieved with vehicles purchased early in the transition at closer to the Static pricing case and vehicles purchased towards the end of the transition at closer to purchase price parity.

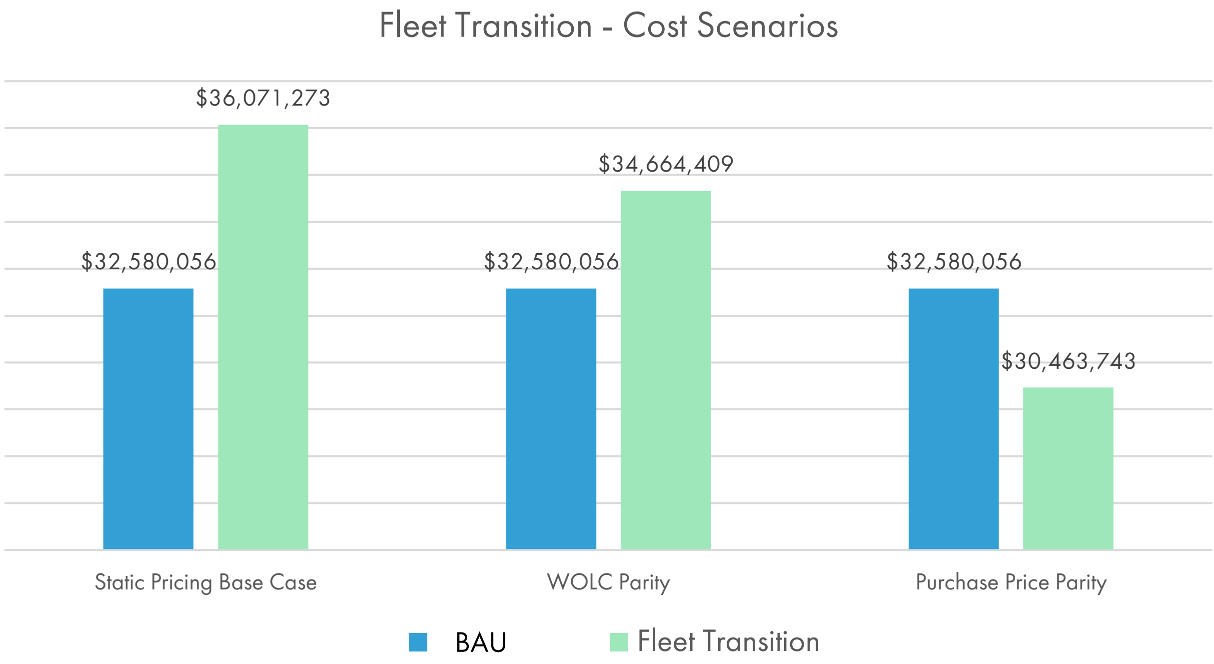


Figure 39 Fleet transition - cost scenarios

These assumptions should be revisited periodically as part of Council's ongoing fleet replacement planning process to ensure updated vehicle pricing, technology developments and infrastructure costs are accurately reflected in future budget forecasts.

Overall, as Council replaces ICE vehicles with EVs, the fleet is expected to become cheaper to purchase and maintain over time. Planning for this change, including investing in charging infrastructure, will help Council manage the transition as vehicle technology develops.

Waiting until EVs and ICE vehicles reach similar purchase costs would keep fleet costs lower than continuing with the current approach. However, delaying the transition until this point would not be consistent with Council's stated sustainability and leadership objectives. It would also reduce opportunities to lower emissions earlier and to gain operational experience with EVs before they become more widely used.

10 Fleet Transition Risk Mitigation

The transition to a low- and zero-emission fleet presents a range of risks across vehicle selection, infrastructure development, and day-to-day operations. This section outlines key risk categories and provides corresponding mitigation strategies to ensure that Council's fleet transition remains resilient, cost-effective and operationally sound.

10.1 Vehicle Selection and Technology Risks

Selecting appropriate vehicles is crucial to meeting operational needs without introducing new hazards. Key risks include choosing vehicles that are not fit-for-purpose, overestimating emerging technology reliability, or failing to secure employees buy-in.

Risks and Mitigation Strategies:

1. **Inappropriate vehicle selection** – risk of vehicles lacking required range, payload, or towing capacity.

   Mitigation: Apply strict fit-for-purpose specifications, pilot and trial vehicles in real operations, and exclude models that fail to meet thresholds.

2. **Overreliance on unproven EV models** – risk of supply chain disruption or unexpected failures.

   Mitigation: Phase in through pilot programs, diversify across OEMs and require robust warranty support.

3. **Unrealistic cost assumptions** – risk of expected EV cost reductions not occurring.

   Mitigation: Use Whole-of-Life Cost modelling and review annually before committing to procurement.

4. **Operator resistance** – risk of under-utilisation due to low acceptance.

   Mitigation: Run driver engagement programs, EV demonstration days and feedback loops during pilots.

5. **Software/IT reliability** – risk of downtime from EV or telematics software faults.

   Mitigation: Require vehicles with proven over-the-air update capability, maintain vendor support contracts and keep ICE or hybrid fallback options.

10.2 Depot Charging Infrastructure and Construction Risks

Upgrading depots for charging infrastructure involves construction activities and electrical work, which carry both project and safety risks.

Risks and Mitigation Strategies:

6. **Construction delays** – risk of late vehicle deployment.

   Mitigation: Stage the rollout, prioritise high-readiness depots and build in schedule buffers.

7. **Electrical capacity shortfalls** – risk of unexpected grid upgrades.

   Mitigation: Conduct early site load assessments, design smart charging with load management, and keep a 10–15% budget contingency.

8. **Unexpected civil works costs** – risk from trenching complexity or hidden utilities.

   Mitigation: Undertake potholing and site surveys before finalising scope, include contingency allowances.

9. **Electrical hazards during works** – risk of shock or arc flash.

   Mitigation: Lock-out/tag-out procedures, only licensed EV-trained electricians, and use of PPE such as insulated gloves and arc-rated clothing.

10. **Charger malfunction or fire** – risk of property damage and injury.

    Mitigation: Use certified EV chargers, install isolation switches and surge protection, provide fire extinguishers, and keep clearances around chargers.

11. **Extreme weather/environmental risks** – flooding, heat, or lightning damaging assets.

    Mitigation: Avoid flood-prone sites, install lightning protection, use weatherproof enclosures, and provide emergency backup charging plans.

10.3 Operational Risks

Operational risks occur in the day-to-day management of EVs and charging systems.

Risks and Mitigation Strategies:

12. **Vehicles not charged at shift end** – risk of unavailability the next day.

    Mitigation: Introduce safe operating procedures/checklists, signage reminders and smart charging software alerts.

13. **Grid outages disrupting charging** – risk of fleet downtime.

    Mitigation: Install depot backup systems, arrange access to public charging networks and stagger charging schedules.

14. **Inefficient scheduling** – risk of vehicles not available when needed.

    Mitigation: Use telematics and dwell time data to align charging windows and implement scheduling software.

15. **Operator unfamiliarity** – risk of misuse or range anxiety.

    Mitigation: Provide training for drivers and mechanics, create quick reference guides, and appoint "EV champions" to mentor.

16. **Organisational culture** – risk of inconsistent adoption.

    Mitigation: Apply structured change management, clear policies, leadership communication and reward successful adoption.

17. **IT/Cyber risks** – risk of charger or telematics failure from software bugs or breaches.

Mitigation: Choose secure platforms, keep firmware updated, implement firewalls and manual fallback charging protocols.

18. **Service Changes** – risk of expansion or contraction of Council services leading to infrastructure being no longer fit for purpose.

    Mitigation: Ensure there is headroom in the grid connection sizing to allow for future fleet expansion.

10.4 Work Health and Safety (WHS) and Environmental Risks

EVs introduce unique WHS hazards that must be managed carefully.

Risks and Mitigation Strategies:

19. **High-voltage systems** – risk of electric shock or arc flash during maintenance.

    Mitigation: Lock-out/tag-out procedures, qualified EV-trained mechanics, insulated tools and PPE, EV service disconnect use.

20. **Battery fire/thermal runaway** – risk of intense fire and toxic smoke.

    Mitigation: Prefer safer chemistries (e.g. LFP), isolate charging bays, provide fire detection/suppression and train employees in emergency response.

21. **Charging station electrical fire** – risk of fire or explosion.

    Mitigation: Certified equipment, regular inspections, emergency shut-offs, clear signage, fire extinguishers.

22. **Quiet operation and high torque** – risk of accidents with pedestrians or unintended acceleration.

    Mitigation: Ensure EVs have acoustic alerting systems, defensive driving training, signage at depots.

23. **Damaged batteries or electrolyte leaks** – risk to people and environment.

    Mitigation: Isolate damaged EVs outdoors, coordinate with licensed waste contractors, provide spill kits and PPE, follow environmental compliance for battery recycling.

11 Recommendations and Next Steps

The business case provides Council with a structured, evidence-based plan to transition its vehicle fleet to low- and zero-emission alternatives. The following recommendations outline immediate and longer-term actions across policy, procurement, infrastructure, and workforce readiness. These actions are designed to align with existing Council objectives and embed the transition within governance and operational processes.

11.1 Policy and Governance

- Adopt an EV-First Procurement Policy that prioritises zero-emission vehicles for all new fleet acquisitions, with defined exemption criteria.
- Update the Fleet Policy to embed zero-emission targets, whole-of-life cost considerations, and emissions reporting metrics.
- Amend Asset Management and Long-Term Financial Plans to include charging infrastructure, vehicle lifecycles, and anticipated savings.
- Integrate fleet transition milestones into corporate reporting and KPIs, ensuring progress is visible and accountable.

11.2 Vehicle Transition and Trials

- Replace all passenger vehicles due for renewal with electric models starting in FY2025–26.
- Initiate operational trials of:
  - Prime movers
  - Light, medium and heavy-duty rigid trucks
  - Medium and Small vans
  - Zero-emission off-road plant (e.g. ride-on mowers)
- Trial home charging with a select group of engaged employees to assess installation processes, usage tracking, reimbursement approaches and user experience. Use findings to shape the broader rollout strategy.
- Use trial data to inform purchasing decisions, evaluate performance in local operating conditions and build employees confidence and internal capability.
- Phase out ICE vehicles in line with asset replacement schedules, targeting full conversion by 2034–35 or earlier where feasible.

11.3 Charging Infrastructure Deployment

- Undertake a detailed feasibility study and pricing assessment as the first step. This should include:
  - Site-level electrical capacity reviews
  - Phased infrastructure rollout recommendations and cost estimates
  - Tender of work packages in line with deployment timetables
- Install depot-based chargers to support overnight charging for light vehicles, using load management to avoid major electrical upgrades where possible.
- Enable home charging for employees who garage fleet vehicles off-site (approx. 50% of the fleet), using a structured program with installation support, energy use tracking and reimbursement mechanisms.
- Develop a staged, scalable charging strategy aligned with vehicle replacement timing, depot energy planning and operational needs.

11.4 Financial Planning and Funding

- Incorporate capital and operational impacts into the 10-year financial plan, using the transition scenario as a baseline for budgeting.
- Pursue external funding opportunities (e.g. ARENA, Victorian Government grants) to offset vehicle and infrastructure costs and improve overall affordability.
- Reassess residual value assumptions and depreciation schedules annually to reflect evolving EV resale market trends and maximise asset value.

11.5 Workforce and Change Management

- Deliver training for operational employees on EV driving, charging and safety procedures as new vehicles are introduced.
- Upskill maintenance teams to handle electric drivetrains and high-voltage systems safely and effectively.
- Update WHS procedures to account for EV-specific risks, such as battery hazards, electrical safety and emergency response.
- Engage employees early through internal communication, pilot participation and feedback loops, building internal ownership and a culture of innovation.

11.6 Recommended Implementation Timeline

Phase	Focus Areas
2025–2027	Policy adoption, light fleet replacement, pilot trials (including home charging), feasibility study, initial infrastructure rollout
2027–2030	Scale up electrification to Utilities, trucks, and plant; expand charging; secure co-funding
2030–2035	Complete fleet conversion, optimise infrastructure, embed as business-as-usual

These recommendations provide a clear and achievable path forward. With strong internal governance, phased investment, and proactive employees' engagement, Council can strategically lead a structured and financially responsible transition to a fully zero-emission fleet.

Appendix 1 - Detailed Market Analysis

The decarbonisation of local government fleets is no longer a forward-looking aspiration — it is a critical operational imperative. As transport accounts for over 20% of Australia's total greenhouse gas (GHG) emissions and continues to grow as a proportion of national output, fleet transition initiatives present an unmatched opportunity for local government leadership.

This appendix of the report delivers a comprehensive, evidence-based overview of the current low to ZEV (Zero Emission Vehicle) market and its relevance to local government operations. Leveraging insights from our experience across fleet decarbonisation, the document integrates national policy direction, fleet segment readiness, vehicle availability, charging infrastructure, technology maturity, whole of life costs and operational benchmarking.

Low and Zero Emission Vehicle Technologies

The transport sector is undergoing a significant technological transformation, with a global shift away from internal combustion engines (ICE) toward low and zero emission vehicle technologies.

These technologies reduce or eliminate tailpipe emissions, reduce operating costs, reduce noise and support national and local commitments to carbon reduction.

For local governments like Council, low and zero emission vehicle technologies represent an opportunity not only to meet sustainability goals but also to modernise operations, reduce exposure to fuel price volatility and demonstrate civic leadership.

This section introduces the major categories of low and zero emission technologies currently relevant to fleet operations, outlines their key characteristics and assesses their maturity and applicability in an Australian local government context.

The primary types of low and zero emission technologies include Battery Electric Vehicles (BEVs), Plug-in Hybrid Electric Vehicles (PHEVs), Hybrid vehicles, Hydrogen Fuel Cell Electric Vehicles (FCEVs) and synthetic or renewable fuels. Each of these technologies offers a unique blend of advantages and limitations, which must be considered when aligning them to fleet operational roles and infrastructure constraints.

Hybrid and Range Extended Electric Vehicles

Hybrid vehicles and range-extended electric vehicles (REEVs) integrate internal combustion and electric drive technologies to reduce emissions and improve fuel efficiency. They are often positioned as interim solutions for decarbonising fleets, particularly where battery electric vehicles (BEVs) are not yet commercially viable for specific roles.

Types of Hybrid and Extended Range Vehicles:

- Conventional Hybrids – e.g. Toyota Prius Hybrid: Use regenerative braking and electric motor assistance to reduce fuel use but cannot be externally charged meaning they are 100% fossil fuelled.
- Plug-in Hybrids (PHEVs) – e.g. Mitsubishi Outlander PHEV: Feature a larger battery, chargeable via the grid, and offer 50–100 km of electric-only range before switching to the engine.
- Range-Extended Electric Vehicles (REEVs) – e.g. BMW i3 REx: Operate primarily as BEVs with a small petrol generator used to recharge the battery only when depleted.

Benefits

Hybrid vehicles offer several practical benefits as transitional technologies. They typically deliver 20–30% fuel and emissions savings in urban light-duty applications and can achieve 15–20% reductions in medium-duty vehicles such as refuse trucks or tippers, particularly under stop-start conditions.

Their familiar operational profile requires no new infrastructure, making them easy for fleet operators and drivers to adopt with minimal disruption. Additionally, hybrids and plug-in hybrids (PHEVs) can provide short-term bridging solutions in fleet segments where battery electric models are not yet commercially viable. For example, 4WD Utilities or specialised light-duty plant can help Council being its emission reduction journey without compromising operational coverage.

Limitations

Despite their benefits, hybrid vehicles have several strategic limitations. All hybrids — including REEVs — remain dependent on fossil fuels, which limits their alignment with long-term net-zero fleet goals. Plug-in hybrids and REEVs also rely on consistent charging behaviour to deliver emissions benefits; without regular charging, they often revert to inefficient internal combustion operation. This issue is well documented in fleet settings, where undercharging is common. Additionally, hybrid drivetrains involve greater mechanical complexity, increasing maintenance demands and the risk of faults over time.

PHEVs and REEVs operate primarily on electricity but must be plugged in regularly to achieve emissions savings. In Council fleets with moderate daily range requirements, return-to-base operations and depot charging potential, they offer no meaningful advantage over BEVs.

Their added mechanical complexity and residual fuel dependence make them increasingly obsolete in scenarios where BEVs already meet range, payload, and uptime needs.

Current Truck Hybrid Market

Hybrid drivetrains in medium-duty trucks including refuse trucks, tippers, and street sweepers have demonstrated real-world fuel and emissions reductions of 15–25%, especially in urban environments with frequent braking and idling.

However, global trends show that hybrid truck platforms are yet to take off or are being phased out:

OEM/Model	Weight	Status	Notes
Volvo FE Hybrid	26t	Discontinued	Replaced by BEV
MAN TGM Hybrid	12–26t	RandD only, no rollout	Focus shifted to BEV
Scania Hybrid Trucks	18–26t	Limited market availability	BEV platforms prioritised
Renault Trucks D Hybrid	18–26t	Replaced by Z.E. BEV range	BEV now standard
Hino Hybrid	7.5–12t	Still produced in Japan	Available in Australia

Despite their technical viability, OEMs are now investing almost exclusively in full battery-electric or hydrogen platforms for heavy vehicles, driven by policy alignment and global fleet demand.

This trend raises concerns about long-term parts availability, support, and residual value for any new hybrid truck acquisitions.

Hybrid Conclusion

Hybrid, PHEV and REEV vehicles occupy a transitional space in the evolution of fleet decarbonisation. They offer real-world emissions reductions and fuel savings over traditional internal combustion engine (ICE) vehicles, particularly in urban, stop-start driving conditions. For cars and ute applications, conventional hybrids can achieve 20–30% fuel savings, while in medium and heavy-duty trucks, hybrid drivetrains have demonstrated 15–20% reductions.

These benefits are attractive for Council seeking to take immediate action on emissions reductions while managing budget and operational constraints. Hybrid vehicles require no major infrastructure upgrades, and their operational familiarity helps reduce transition risk for drivers and fleet managers. In certain vehicle classes where battery electric vehicle (BEV) models are not yet commercially available or proven, hybrids can serve as short-term bridging solutions that deliver measurable improvements while maintaining operational continuity.

However, despite these tactical advantages, hybrid technologies present several structural limitations that restrict their long-term value. All variants remain reliant on fossil fuels, which is fundamentally incompatible with net-zero fleet commitments. PHEVs and REEVs, while more electrified, require consistent charging to deliver their intended environmental benefits — a condition often unmet in real-world fleet operations. If not plugged in regularly, they default to inefficient combustion mode, offering little or no advantage over standard ICE vehicles.

Hybrid systems also introduce added complexity, with dual powertrains that can increase servicing needs and total cost of ownership. Most significantly, the global market is rapidly shifting away from hybrid development, particularly for heavy and medium-duty vehicles. Major original equipment manufacturers (OEMs) are retiring hybrid truck platforms in favour of full battery-electric or hydrogen fuel cell solutions. This trend is being driven by government policy, funding programs, and emissions regulations that favour zero-emission technologies.

For local governments hybrid vehicles may play a role in specific medium-duty applications where BEV alternatives are not yet practical — but this role should be limited, time-bound and clearly linked to a broader electrification roadmap.

In summary, hybrids can support immediate emissions reductions and operational continuity where required, especially in hard-to-electrify segments. However, their reliance on fossil fuels means they should be treated as transition tools. Council should plan to phase out hybrid use over the medium term, as BEVs become the dominant, lowest-cost, and policy-aligned solution for mixed fleets

Biodiesel and Renewable Diesel Vehicles

Biofuels are often considered transitional alternatives to fossil diesel, particularly for existing diesel fleets. Two main biofuel types are relevant:

- Biodiesel: A blendable biofuel (e.g. B5, B20, B100) made via transesterification of plant or animal fats.
- Renewable Diesel (HVO): A hydrotreated, drop-in fuel that is chemically identical to fossil diesel made from waste or virgin animal or crop oils.

While both offer varying levels of lifecycle carbon reduction, their roles in fleet decarbonisation differ significantly.

Biodiesel

Biodiesel is available in Australia, especially at low blends (up to B20). However, its use presents notable limitations:

- Engine compatibility is constrained: Most modern OEMs only support up to B20 (20% biodiesel). Use of B100 (100% biodiesel) can void warranties, cause injector fouling, clog filters, and increase maintenance unless engines are specifically adapted.

- NOx emissions can increase with biodiesel, especially at high blend levels, which may require changes to engine calibration or exhaust treatment.
- Supply is small-scale: Australian biodiesel production is modest, using limited waste feedstocks. Expansion risks competition with food production if virgin oils (e.g., canola, soy) are used.
- Fleet asset risk: Vehicles running B100 or high blends may require dedicated fuelling infrastructure and modified maintenance regimes, making them vulnerable to fuel supply constraints or regulatory shifts.

Renewable Diesel (HVO)

Renewable diesel (HVO) is fully compatible with all diesel engines and infrastructure. It offers excellent cold weather performance, long shelf life, and up to 90% lifecycle CO_2 reduction when produced from waste feedstocks.

However, its strategic value is constrained by major supply limitations:

- Feedstock scarcity: Sustainable HVO relies on used cooking oil, tallow, and other waste oils — all of which are already in high demand globally.
- No Australian production currently exists, and local feedstocks could only support a small fraction of national diesel demand.
- Agricultural land constraints mean HVO cannot be scaled up via crop-based oils (e.g. canola) without displacing food production or causing significant land use change. For Australia to switch to 100% renewable diesel from virgin feedstocks, over 30% of Australia's total arable land would need to be converted.
- High cost ($3.00–$3.50 AUD/L) and limited availability mean HVO is increasingly reserved for hard-to-electrify sectors (e.g. long-haul freight, aviation, military).

Future allocation is likely to prioritise national and strategic operations, not general municipal or short-range fleet use.

Biodiesel and Renewable Diesel Comparison

Attribute	Biodiesel (B100)	Renewable Diesel (HVO)
OEM Support	Limited to B20	Full drop-in compatibility
GHG Reduction (Lifecycle)	50–75%	80–90% (waste feedstocks) 45-55% (virgin plant oils)
Cold Weather/Storage Performance	Poor	Excellent
Availability in Australia	Small-scale	Extremely limited
Scalability Beyond Niche Use	Not viable	Not viable
Risk of Stranded Assets	Moderate–High	Low–Moderate
Strategic Fit	Limited transitional role	Niche support for non-BEV assets

Biofuels Conclusion

While biofuels have been promoted as transitional or complementary solutions for reducing emissions in existing diesel fleets, their long-term role is fundamentally limited by a combination of technical, economic, and environmental constraints.

Biodiesel, particularly in high blends like B100, poses clear operational challenges. Most modern engines are not certified beyond B20 without significant warranty implications or maintenance adjustments. The emissions benefit of biodiesel is modest at low blend levels and heavily dependent on feedstock sustainability. As such, biodiesel remains a niche option, more suited to short-term legacy fleet support or closed-loop operations, such as in oil waste collection, rather than forming a core part of a forward-looking decarbonisation strategy.

Renewable diesel (HVO) presents a stronger technical case, offering excellent drop-in compatibility, long shelf life, and high lifecycle emissions savings when derived from sustainable waste feedstocks like used cooking oil or tallow. However, these feedstocks are both limited and contested resources. Australia lacks any significant domestic HVO production capacity, and global supplies of sustainable feedstocks are already heavily utilised, particularly by European and North American freight and aviation sectors. Scaling HVO production to meet even a fraction of Australia's diesel demand would require unsustainable expansion into virgin oil crops which introduces unacceptable land use, biodiversity, and food security risks.

Looking ahead, biofuels — especially HVO — are likely to be strategically allocated to sectors where no practical alternative exists, such as long-haul freight, aviation (via Sustainable Aviation Fuel), and remote industrial operations. This will limit their availability and affordability for public or private usage. Even under optimistic cost-down assumptions, biofuels will remain more expensive per kilometre than battery electric and traditional diesel in most Council fleet contexts.

Hydrogen Vehicles

Hydrogen technologies are often proposed as future solutions for decarbonising transport, particularly in segments where battery electric vehicles (BEVs) face limitations. Two hydrogen drivetrain types are being explored:

1. **Hydrogen Fuel Cell Electric Vehicles (FCEVs)** – Use compressed hydrogen to produce electricity in a fuel cell, powering an electric motor.
2. **Hydrogen Internal Combustion Engines (H_2-ICE)** – Burn hydrogen in a modified internal combustion engine (ICE), generating mechanical power.

Both eliminate tailpipe CO_2 emissions, but differ significantly in energy efficiency, emissions, infrastructure needs, commercial availability, and operational risk. For Council, neither is suitable in the current market or infrastructure environment.

Hydrogen Fuel Cell Vehicles

FCEVs offer long range and fast refuelling (3–5 minutes), making them attractive in high-uptime or long-haul freight use cases. However, their use in Council is highly constrained:

- Refuelling infrastructure is virtually absent: Only five hydrogen stations are operational in Australia, with none in the Council region. Global rollbacks — such as Shell's closure of all hydrogen stations in California — highlight the fragility of the supply network.
- High vehicle and fuel costs: FCEVs cost 2–3 x more than diesel or BEV equivalents, and hydrogen costs $10–15 per kg, translating to $10–15/100 km, far higher than BEV running costs of $2–4/100 km.
- Limited vehicle availability: Models like the Toyota Mirai and Hyundai NEXO are only available in fleet trials — not for commercial purchase.
- Efficiency is poor: The total well-to-wheel efficiency of FCEVs is only 30–40%, meaning most of the input energy is lost during hydrogen production, transport, and conversion in the vehicle (see Figure 1).

- Fleet risk: Hydrogen vehicles purchased with a 6–8 year asset life depends on fuel access over that entire period. If refuelling infrastructure is removed or fails — as has occurred overseas — the asset becomes stranded with little to no resale value.

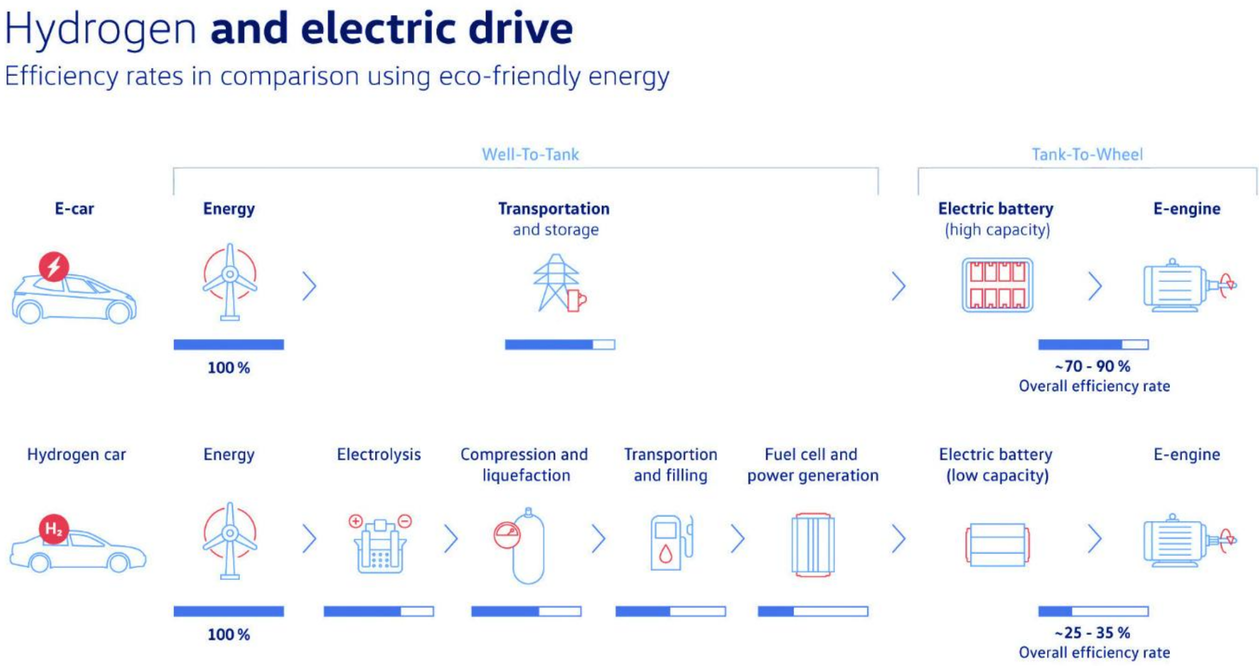


Figure 40 FCEV well-to-wheel efficiency, Source. Volkswagen

Hydrogen Combustion Vehicle

Hydrogen combustion (H_2-ICE) involves burning hydrogen in a modified ICE platform. While it offers fast refuelling and a similar operational feel to diesel, its disadvantages outweigh the benefits:

- Lowest energy efficiency: H_2-ICE has a well-to-wheel efficiency of only ~20–25%, due to both upstream energy losses and inefficient combustion. It is less efficient than FCEVs and diesel, and significantly less efficient than BEVs.
- NOx emissions still occur, requiring after-treatment systems to meet air quality standards. This makes it not truly zero-emission.
- Vehicle availability is effectively zero in Australia. While some RandD efforts are underway (e.g. Toyota, MAN, Cummins), there are no commercially available H_2-ICE vehicles currently.
- Same fuel dependency and risk: Like FCEVs, H_2-ICE vehicles rely on scarce hydrogen refuelling infrastructure. Any service disruption makes the vehicle unusable.

No cost or emissions advantage over diesel, and inferior whole-of-life cost performance compared to BEVs.

Hydrogen Cost-Down Potential

Hydrogen costs are expected to decline over the next decade, but barriers remain. Most projections centre on green hydrogen (produced via electrolysis powered by renewable electricity), as the only genuinely zero-emission pathway.

Category	2025 Estimate	2030 Target	Notes
Green H_2 production cost (AUD/kg)	$8–12	$3–5	Requires low-cost renewables (<$30/MWh) and large-scale electrolysers

Delivered cost at pump	$10–15	$5–8	Includes compression, storage, and distribution costs ($2–5/kg)
Cost per 100 km (FCEV)	$10–15	$5–8	Still higher than BEVs unless subsidised
Fuel cell vehicle cost	2–3× diesel/BEV	1.3–1.5× diesel	Needs major volume and supply chain scale-up

Key dependencies for hydrogen cost reduction include the industrial-scale manufacturing of electrolysers, access to low-cost renewable electricity, and high utilisation rates of production and refuelling infrastructure (ideally exceeding 60% capacity factor).

Realising cost reductions also depends on strong government policy support — such as subsidies, guaranteed demand, or offtake agreements — and the adoption of hydrogen across multiple sectors, including freight transport, industrial processes, and power generation, to achieve the scale necessary for economic viability.

Even under favourable assumptions, hydrogen is unlikely to match BAU economics for Council fleets, due to inherent efficiency losses and infrastructure costs.

Hydrogen Comparison vs BAU

Attribute	Fuel Cell (FCEV)	Hydrogen Combustion (H_2-ICE)	Diesel Internal Combustion
Tailpipe CO_2 Emissions	None	None	High (2.7 kg/L)
Other Emissions (e.g. NOx)	None	Yes – NOx	Yes – NOx, PM, CO
Well-to-Wheel Efficiency	30–40%	20–25%	30–40%
Refuelling Time	3–5 minutes	3–5 minutes	3–5 minutes
Fuel Availability (AU)	Extremely limited	Same (same hydrogen dependency)	Universal
Fuel Cost (per 100 km)	$10–15	$10–15+	$5.50–7.00
Vehicle Availability	Fleet trials only	Not commercially available	Readily available
Vehicle Cost (New)	2–3× diesel	Not available	Baseline
Maintenance Cost	Low (electric driveline)	High (ICE maintenance)	High
Asset Stranding Risk	High	High	Low
Operational Suitability	Poor	Poor	Good

Hydrogen Conclusion

Hydrogen combustion vehicles combine the operating emissions and inefficiencies of diesel with the fuel supply risks of hydrogen infrastructure. With the lowest energy efficiency of all drivetrain types, no commercial availability, and no emissions advantage over fuel cells, H_2-ICE is not a viable technology path for Councils.

Fuel cell vehicles may have niche applications in high-uptime, long-haul transport but are similarly constrained for local government use by infrastructure immaturity, high cost, and low efficiency. The forward risk of asset stranding cannot be understated with overseas examples pointing to hydrogen vehicles having no hydrogen supply. In a Council application hydrogen supply would have to be contractually locked in for the duration of the asset life to derisk this presenting a significant barrier to entry.

Battery Electric Vehicles

Battery Electric Vehicles (BEVs) are powered exclusively by electricity stored in onboard batteries, using electric motors for propulsion. They emit no tailpipe emissions, produce minimal noise, and offer significant operational efficiencies compared with internal combustion engine (ICE) vehicles and hybrid technologies. Among all current low and zero-emission technologies, BEVs are the most mature, commercially available and operationally suitable option for most Council fleet applications.

Unlike transitional technologies such as hybrids, or speculative options like hydrogen, BEVs have already reached widespread market adoption and cost competitiveness in multiple vehicle segments. They are especially well-suited to urban, stop-start, and return-to-base operations, which characterise much of Council's fleet use profile.

Benefits

BEVs offer a range of compelling benefits for Council:

- High energy efficiency: BEVs convert approximately 80–90% of the electricity drawn from the grid into motion — compared to 30–40% for diesel and hydrogen fuel cell vehicles, and even less for hydrogen combustion.
- Cost down potential for BEV is high: with less moving parts and batteries becoming cheaper, the potential for BEV to reach a capital cost better than parity with ICE and hybrid is likely. Already some passenger EVs are at parity with their ICE equivalents in Europe.

PRESS RELEASES

28 Aug 2024

VAUXHALL FRONTERA: FIRST CAR TO ACHIEVE ELECTRIC & INTERNAL COMBUSTION ENGINE PRICE PARITY

- **Vauxhall offers list price parity between electric and petrol hybrid Frontera models – eliminating the list price premium that usually applies to electric cars**
- **The average list price difference across the market between an electric and petrol car is currently 31% - reduced to 0% with New Frontera**

Figure 41 Vauxhall Fonterra Hybrid and BEV Price Parity in UK

- Lowest running costs: With off-peak charging, BEVs typically cost just $2–4 per 100 km to operate, compared to $5.50–7.00 for diesel and $10–15 for hydrogen.

- Reduced maintenance burden: BEVs have fewer moving parts, no engine oil, and no exhaust systems. This can result in 40–60% lower maintenance costs over the vehicle's lifetime.
- Low noise and zero local emissions: BEVs support quieter, cleaner communities, improving amenity in high-density areas and sensitive sites like schools and parks.
- Charging flexibility: Depot-based overnight charging aligns well with Council fleet return-to-base patterns. Load management and solar integration further improve cost-effectiveness and sustainability.
- Strong model availability: The Australian market now offers over 200 BEV models across passenger, SUV, van, and light truck segments. Medium and Heavy-duty trucks are also emerging with real-world capabilities offering range and payload suitable for Council operations.

Limitations

Despite their significant advantages, BEVs do present operational and infrastructure challenges that must be carefully managed during transition planning:

- Upfront capital cost: While WOLC is increasingly favourable, BEVs typically carry a higher purchase price than diesel equivalents, especially in heavier vehicle classes.
- Charging infrastructure requirements: Depot electrification requires investment in grid upgrades, charger hardware, switchboard expansion, and civil works — often with multi-year planning horizons.
- Depot layout and space constraints: Installing chargers may reduce usable parking capacity or alter depot traffic flow. Charging bays often require setbacks, bollards, and clearances, resulting in the loss of one or more parking spaces per charger if not planned efficiently. Councils with constrained depot layouts may need to consider reconfiguration or off-site options.
- Grid capacity and peak load impacts: High-powered chargers can create significant additional demand. Without managed charging or energy storage, this may increase peak load charges or trigger expensive network upgrades.
- Range and payload limitations in specific use cases: While BEVs meet the needs of most Council vehicles, some specialist fleet tasks — such as high-GVM tippers, trailers, or remote area runs may still exceed current BEV capabilities.
- Vehicle availability gaps: As of 2025, not all vehicle types (e.g. 4x4 dual-cab Utilities, heavy-duty plant with PTOs) are available as BEVs in the Australian market. This limits electrification in certain asset classes for now.
- Battery degradation and residual value uncertainty: Long-term battery health is improving, but concerns around resale value, battery warranties, and residual performance persist in some fleet decision-making processes.

These limitations are not prohibitive but require proactive infrastructure design, phased vehicle procurement strategies, and whole-of-life cost analysis to ensure successful and sustainable BEV adoption.

Suitability for Council Operations

The operational characteristics of BEVs align particularly well with Council fleet usage:

- Daily driving distances typically fall well within BEV range (200–400 km).
- Depot-based parking enables low-cost overnight charging.
- Predictable duty cycles allow for optimised charging schedules and battery sizing.
- BEV variants are now available in key categories including passenger cars, vans, SUVs, 4x2 Utilities, light trucks, and increasingly medium and heavy-duty trucks.

Where BEVs are not yet available or fit-for-purpose hybrid technologies may temporarily fill the gap — but these exceptions are shrinking with each model year.

BEV Conclusion

Battery electric vehicles represent the most mature and strategically aligned zero-emissions technology currently available to Councils. They deliver the lowest operating costs, highest energy efficiency, and clearest pathway to achieving net-zero fleet targets, while also improving driver experience, public amenity, and air quality.

Unlike hydrogen or biofuels — which face supply, infrastructure, or cost constraints — BEVs are already operationally proven, widely supported by OEMs, and backed by national and state-level policy incentives.

It is recommended that BEVs should form the foundation of Council's fleet transition strategy, particularly across light-duty, pool, maintenance, and urban logistics vehicles. Where gaps remain, interim technologies may be deployed selectively, but the long-term direction should remain focused on full electrification.

Global Vehicle Market Outlook

Overall, the Global outlook for low and zero emission vehicles support the notion that BEV will become the dominant vehicle choice by 2040. Figure 42 shows that fuel cell vehicles will form a very small portion of vehicle sales and that plug-in hybrids will be a transitional solution, almost disappearing from the market by 2035.

This demonstrates the expected trajectory is focussed on BEV with hybrid having an important but diminishing role by 2040.

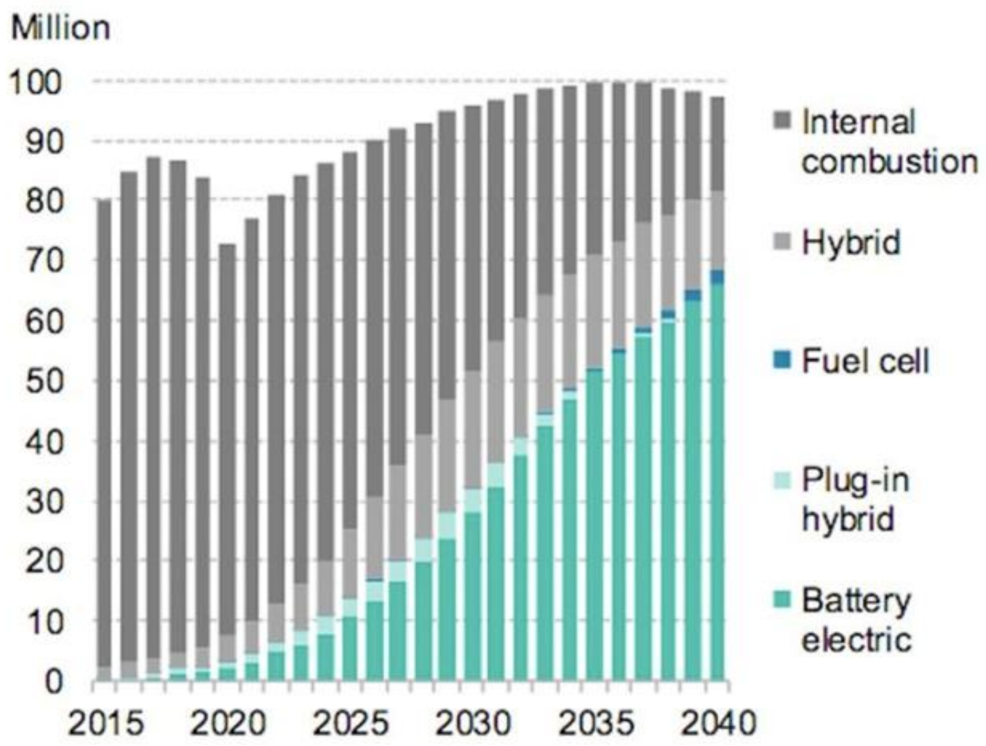


Figure 42 Historic and Projected Vehicles Sales by Type (Bloomberg, 2024)

Federal and State Targets

The Australian Federal Government and the Victorian Government have committed significant support to the transition to Zero Emission Vehicles. They have also put supporting policy in place to drive uptake of Zero Emission Vehicles to reach Australia's legislated target of Net-Zero by 2050.

Following the recent Federal election, climate policy is unlikely to change negatively during the next 3 years before the next Federal election in 2028. It would also be unlikely that any future Australian Government significantly rolls back these targets with the opposition parties currently also committed to Net Zero.

Legislated Net-Zero by 2050

Introduced National Vehicle Efficiency Standards in 2025 to drive EV uptake

$250m via ARENA for Zero Emission Vehicles

FBT Exemption for Electric Vehicles

Net Zero by 2045

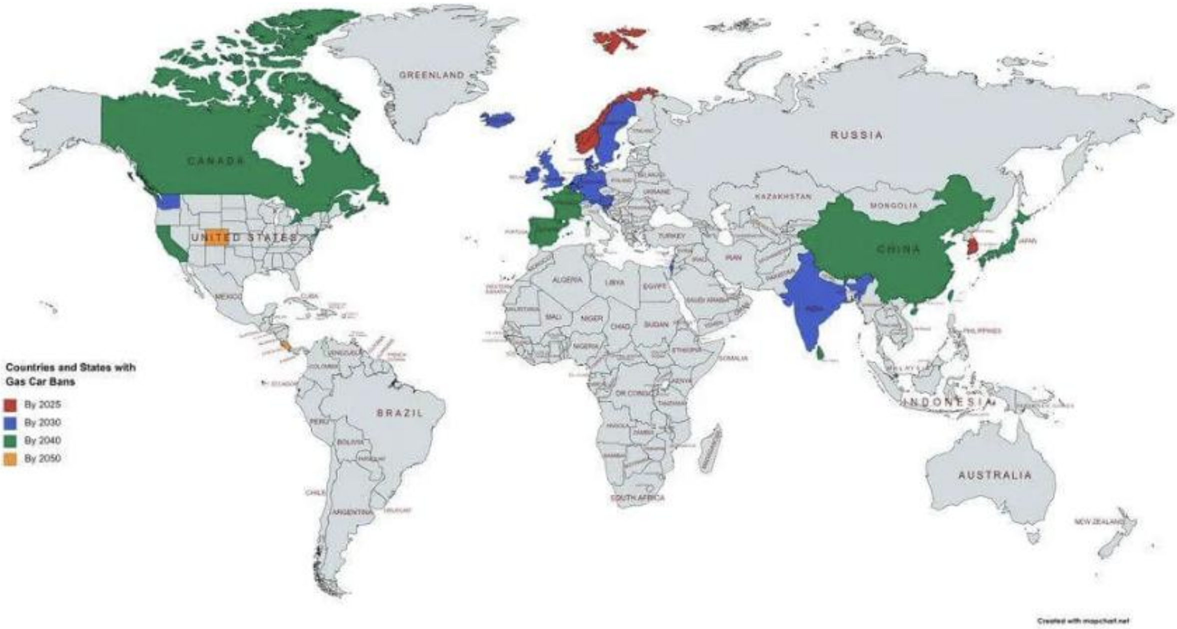
Zero Emission Vehicle Roadmap

- 50% of new light vehicle sales zero emission by 2030

- Government fleet to transition to 100 % zero-emission light vehicles by 2035

Global ICE Vehicle Phase Out

Many Governments globally have begun to phase out ICE vehicles in favour of Zero Emission Vehicles. Another right-hand drive market, the UK, has banned the sale of petrol and diesel vehicles, including hybrids, by 2035. This provides significant directives to vehicle manufacturers.



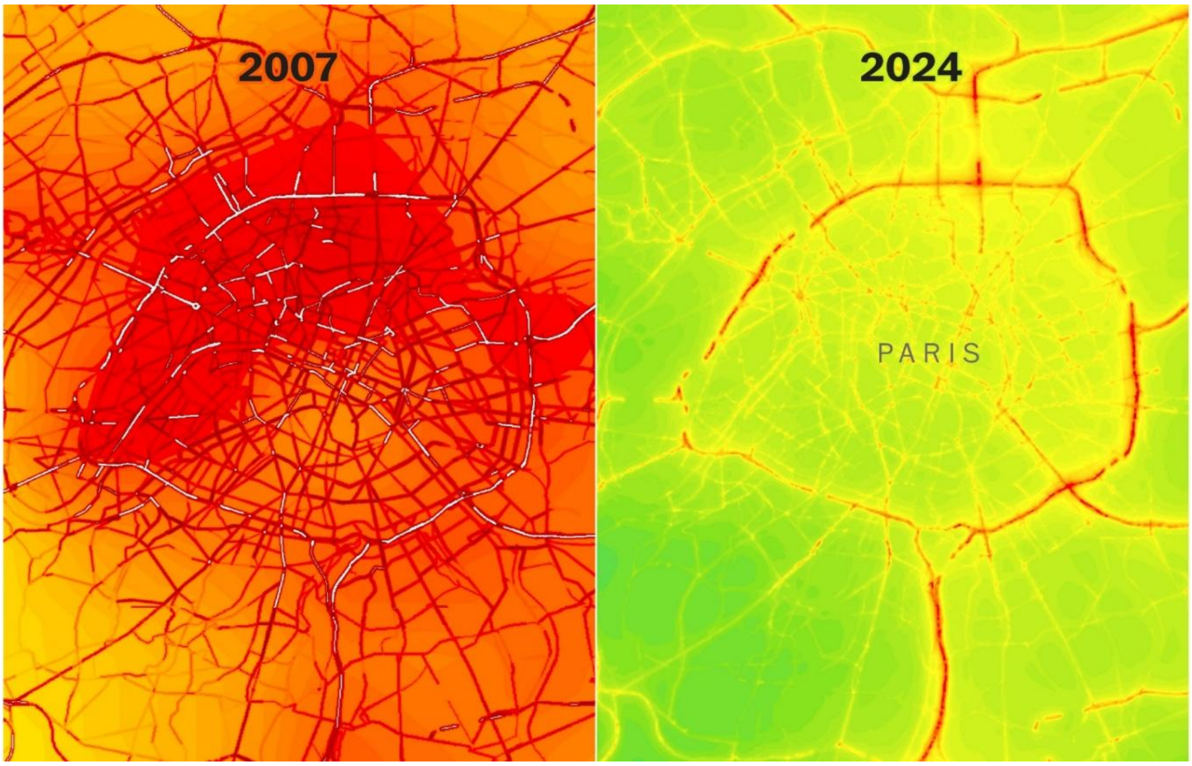
Map of countries and states with future ICE bans [FROM - chargedfuture.com/countries-and-states-with-gas-car-bans]

Low Emission Zones

Low Emission Zones (LEZs) are increasingly being used in major global cities to reduce urban air pollution by restricting access for high-emitting vehicles. Cities such as London, Paris and Amsterdam have implemented strict emissions-based entry requirements, supported by financial penalties and surveillance technology.

In London, the Ultra Low Emission Zone (ULEZ) applies 24/7 across the city and requires vehicles to meet Euro 6 diesel or Euro 4 petrol standards or incur a daily charge. There are no exemptions in place for local government fleets, meaning that Council-operated vehicles must also comply or face the same financial penalties as commercial fleets. This has driven many London boroughs to accelerate their fleet electrification and retrofit programs.

Paris's ZFE (Zone à Faibles Emissions) uses the Crit'Air rating system to progressively ban the most polluting vehicles, with a target to phase out diesel vehicles by 2024 and petrol vehicles by 2030. Amsterdam plans to introduce a full Zero Emission Zone for commercial vehicles in 2025, supported by financial incentives and infrastructure upgrades. The image below shows the air pollution in Paris following a phase implementation of a low emission zone.



These international examples demonstrate the role LEZs can play in driving transport decarbonisation and air quality improvements. For Australian Councils, they provide a clear indication of a potential future policy pathway.

The absence of exemptions for Council fleets in overseas LEZs, highlights the need for Councils to proactively transition to compliant, low- and zero-emission vehicles — particularly for operations in or near central business districts. Strategic planning and infrastructure investment will be essential to avoid exposure to future compliance risks.

Electric Vehicle Technology

Electric Vehicle Segments

Electrification is not limited to passenger cars; fleets comprise a diverse range of vehicles, each with distinct challenges and opportunities.

Key categories include:

- **Light-Duty Vehicles (LDVs):** Pool cars, passenger vehicles, and some tool-of-trade vehicles are among the easiest to transition due to widespread EV model availability and well-established charging networks.

- **Commercial Vans and Light Trucks:** Used in delivery, maintenance, and municipal services, these vehicles require careful consideration of range, payload capacity, and charging locations.

- **Heavy Vehicles and Specialist Trucks:** Waste collection trucks, road maintenance vehicles, and heavy-duty transport have higher energy demands, necessitating tailored charging solutions and potential technology diversification (e.g. battery-electric, battery swap and range extender options).

- **Earth Moving and Construction:** With high torque, electric motors offer a significant advantage over combustion engines regarding performance in earth moving and construction. Many vehicles are now available in EV including excavators, tractors, wheel loaders, concrete agitators and tippers.

- **Small Plant and Tools:** Councils and service providers increasingly electrify small assets such as utility buggies, lawnmowers, mowers, chainsaws and forklifts to achieve significant emissions reductions in non-road operations.

All vehicle segments have electrified options available, however, suitability for your operation requires detailed range and operational analysis to be completed.

Consideration of electrification for smaller plant and equipment can be an easy win for the environment and equipment operators.

EV Technology Improvement

It should be noted that Electric Vehicles are around 10 years into a 40-year transition. The technology is developing quickly and preconceived ideas of EV technology based upon 1st generation technology persist. This is why it is important that EV Transition planning is made using the most recent information with a view of the technology available.

To illustrate this, two examples are provided below of the technology development showing the capability difference between 1st generation and current technology.

Cars

Nissan LEAF 1st Gen 2013
- Battery 24 kWh
- Range 130 km

Nissan Leaf 2nd Gen 2017
- Battery 40 kWh
- Range 275 km

Nissan LEAF 3rd Gen 2025
- Battery 63 kWh
- Range 450 km



Waste Trucks

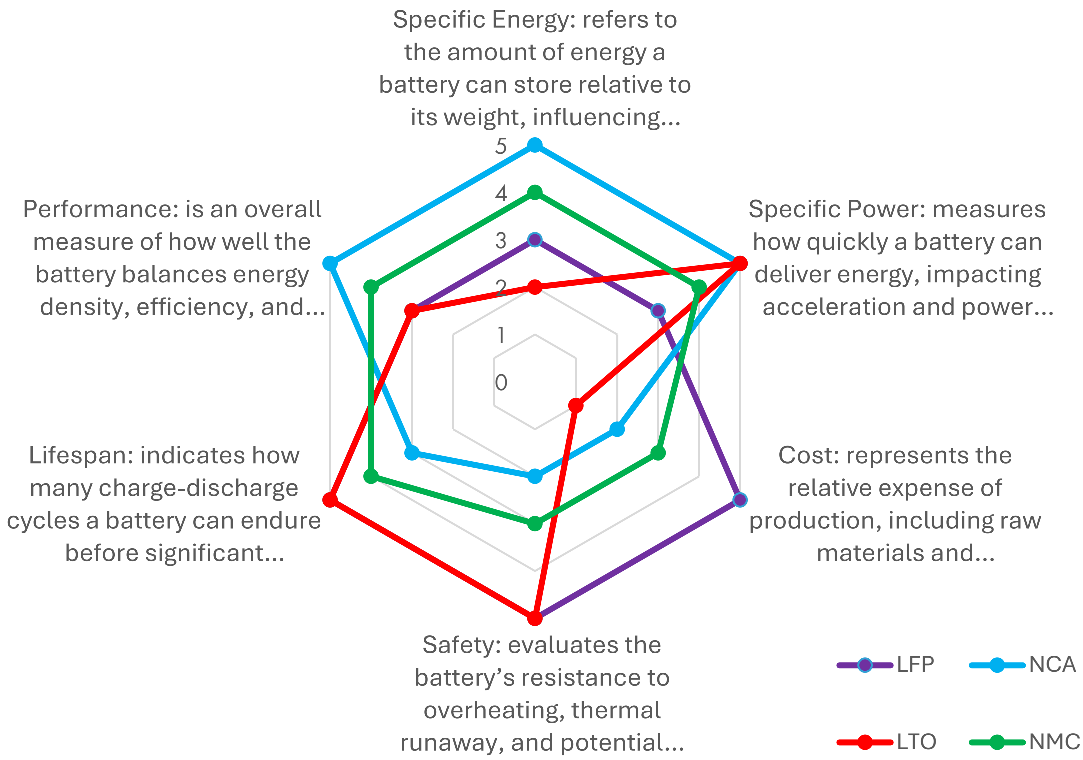
SEA Electric 1st Gen 2020
- Battery 138 kWh
- Range 70 km

Daimler eEconic 2025
- Battery 336 kWh
- Range 175 km

Battery Technology

Several battery chemistries are used in EVs, each with distinct trade-offs in energy density, cost, lifespan, and safety. Lithium-ion (Li-ion) batteries are the most used due to their high efficiency and reliability, with key subtypes including Nickel Manganese Cobalt (NMC), Nickel Cobalt Aluminium (NCA) and Lithium Titanium Oxide (LTO) each with their own unique characteristics and applications.

However, by far the most common of the Lithium-ion batteries are Lithium Iron Phosphate (LFP) batteries, which provide enhanced thermal stability, a longer lifespan and lower costs, making them popular across mass market vehicle applications despite their slightly lower energy density.



Future battery technology development focuses on increased energy density, faster charging, improved safety, and sustainability, with solid-state batteries and lithium-sulphur batteries being key areas of future innovation, potentially revolutionising electric vehicles and energy storage.

EV battery technology has rapidly developed with LFP batteries being the most prevalent, fleet operators can be confident that current technology is safe and durable for most applications.

Future developments will only improve the technology making more use cases suitable for electrification.

Battery Degradation

Early concerns about EV battery degradation have largely been disproven by real-world data and recent studies. Contrary to initial fears that batteries would rapidly lose capacity within a few years, research shows that modern EV batteries maintain their performance for much longer than anticipated.

Many EVs on the road today are surpassing 300,000 km with minimal degradation, reinforcing the viability of electric fleets.

Mitigants to excessive EV battery degradation are shown below:

Real-World Data

A study of over 6,000 EVs found that most retained at least 90% of their original capacity after 160,000 km, with many still performing well beyond 300,000 km.

Research from large-scale fleet and consumer data sets, including studies by Recurrent, Geotab, and Tesla's fleet analysis, indicates that EV batteries degrade at a much slower rate than initially expected.

Battery Management Systems

Modern EVs are equipped with intelligent BMS software that optimises charging patterns, reducing stress on battery cells. Smart thermal management ensures batteries operate within an optimal temperature range, significantly slowing capacity loss over time.

EVs now limit fast charging rates when the battery is too hot or too cold, preventing unnecessary strain

Warrantied vs Actual Degradation

Many vehicles have a warrantied degradation such as a guarantee that the battery will retain 80% after 5 years. This does not mean that the actual degradation will hit this level.

Vehicle & Battery manufactureres are increasingly offering longer warranties on batteries, typically much longer than conbustion engines.

Fast Charging Impact

While frequent DC fast charging does generate more heat, it does not dramatically degrade batteries when used within manufacturer guidelines.

Recent tests on vehicles that regularly use high-powered charging networks show only slightly higher degradation rates compared to vehicles that primarily use AC home or depot charging.

Fleet operators can largely consider battery degradation to be a non-issue, especially when battery warranties exceed the length of time vehicles are retained within the fleet.

For the purpose of achieving the best residual value upon disposal, utilising battery health certificates can provide significantly better results at point of sale.

EV Running Costs

One of the greatest advantages of electric vehicles is their high efficiency compared to ICE vehicles. EVs convert approximately 80-90% of the electrical energy from the grid to power at the wheels, compared to just 20-30% for ICE vehicles using petrol or diesel.

This stark contrast arises primarily because EVs experience fewer energy losses—no combustion process, less heat generation, and minimal mechanical friction due to fewer moving parts. Consequently, EVs offer superior energy efficiency, leading to lower operational energy costs.

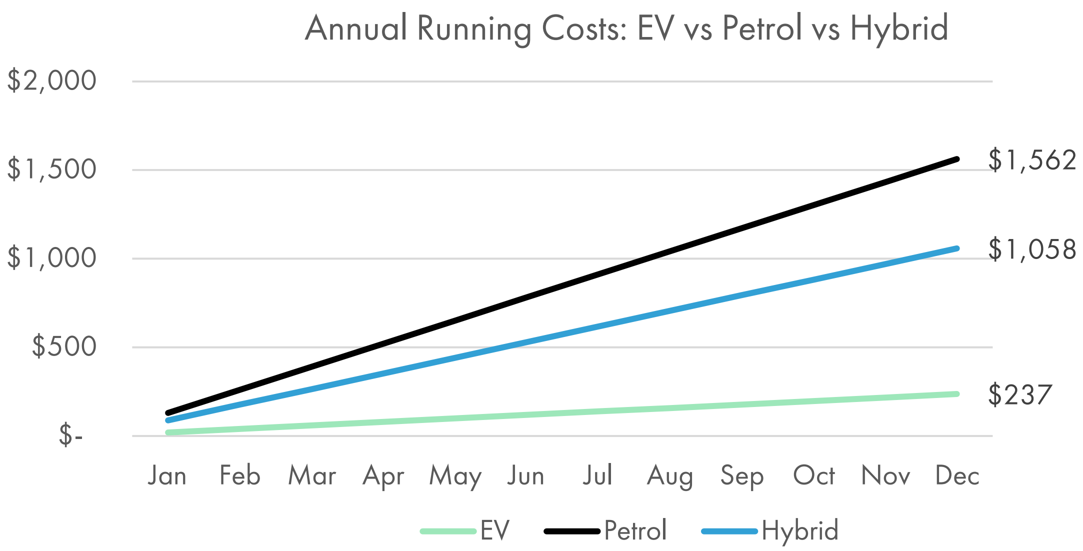
In a typical Council who can charge EVs on off peak electricity, the input cost of electricity offers significant savings over petrol or diesel vehicles.

A detailed understanding of the relative cost of electricity including any electrical losses is required to accurately determine the cost of energy and provide input into Whole of Life Costs calculations.

Example

	BYD Atto 3 EV 	Toyota Corolla Petrol 	Toyota Corolla Hybrid 
Cost per unit (kWh or litres)	$0.100	$1.75	$1.75
Inc. Electrical Losses (15% site and charger losses)	$0.117	n/a	n/a
kWh/km or litres/100km	14	6.2	4.2
Monthly kilometres	1,200	1,200	1,200
Monthly Energy Cost	$19.76	$130.16	$88.17

Fuel Usage data derived from real world test data (Australian Automobile Association)



Electricity and Fuel Costs have typically increased historically at similar rates. Price shock events which impact them such as geopolitical or natural events impact both and are very hard to predict or forecast. For example, the Ukraine war has been the major driver for increases in both electricity and fuel costs from 2021 which was not able to be predicted.

Electricity Costs

Historically over the last 10 years wholesale electricity prices in Victoria have increased at an average annual rate of 4.45% according to data from the Australian Energy Regulator. However, it should be noted that typically Councils are able to purchase electricity over a longer-term contract which would typically not expose them to short term fluctuations in the wholesale market. This is evident in Council's current renewable electricity contract via a long-term power purchase agreement through VECO.

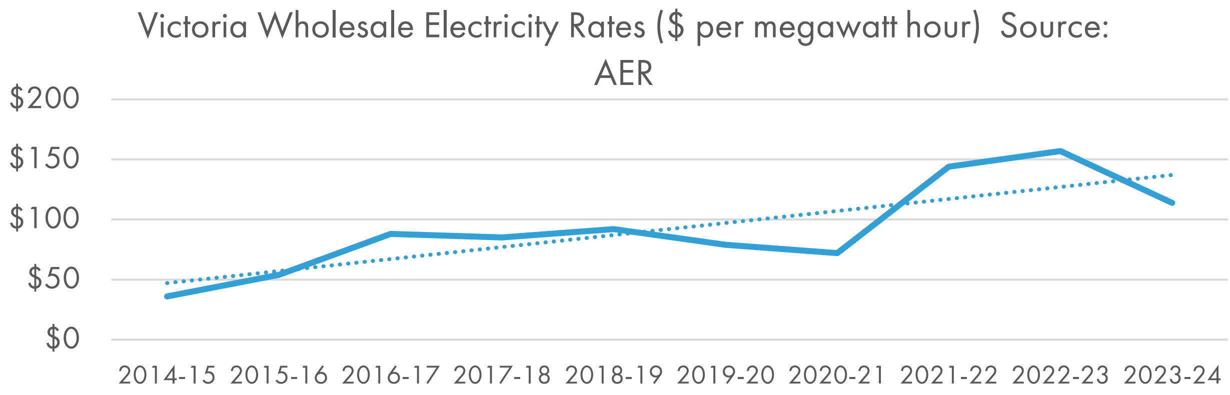


Figure 43 Victoria Historic Wholesale Electricity Rates (AER)

According to projections from the Australian Energy Market Commission (AEMC) their 10-year outlook projects a 9% decline in electricity rates in Victoria by 2034 with the major drivers being increased renewable energy penetration and smarter electrification solutions including large scale and small scale batteries.

Fuel Costs

Data from the Australian Institute of Petroleum (AIP) shows that over the same 10-year horizon diesel has increased at an annualised rate of 6.84% and petrol at 6.72%. Fuel costs are typically more susceptible to outside influences given less than 30% of Australian fuel is refined in Australia and 80% of our crude oil is imported, this provides a significant risk to fuel security.

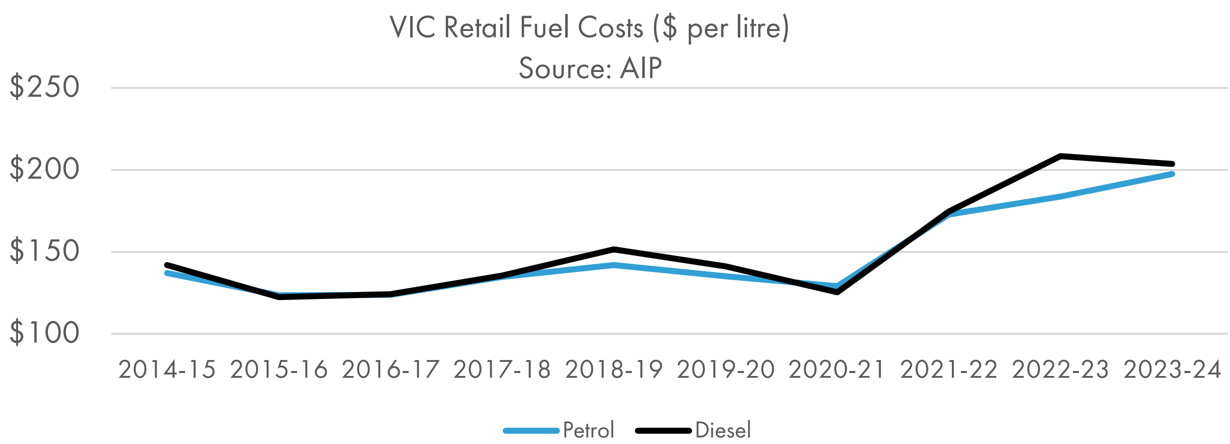


Figure 44 Victoria Retail Fuel Costs (AIP)

EV Maintenance

Electric Vehicles (EVs) require significantly less maintenance compared to internal combustion engine (ICE) vehicles due to their simpler design and fewer moving parts. EVs eliminate the need for oil changes, timing belts, exhaust systems, and complex transmissions, reducing the frequency and cost of servicing.

Regenerative braking reduces wear on brake pads, extending their lifespan by up to five times those on ICE vehicles. Cooling systems for battery packs require periodic checks, but overall, EVs experience lower wear and tear.

Additionally, software updates can improve performance remotely, reducing the need for physical services. With fewer mechanical failures and lower servicing costs, EV maintenance offers a cost-effective advantage, making electrification a compelling choice for fleet operators when a vehicle WOLC is considered. The example below illustrates this for a vehicle available in Australia with dealer service schedules. It should also be noted that the EV is services every 30,000km whereas the hybrid requires serviving every 12 months.

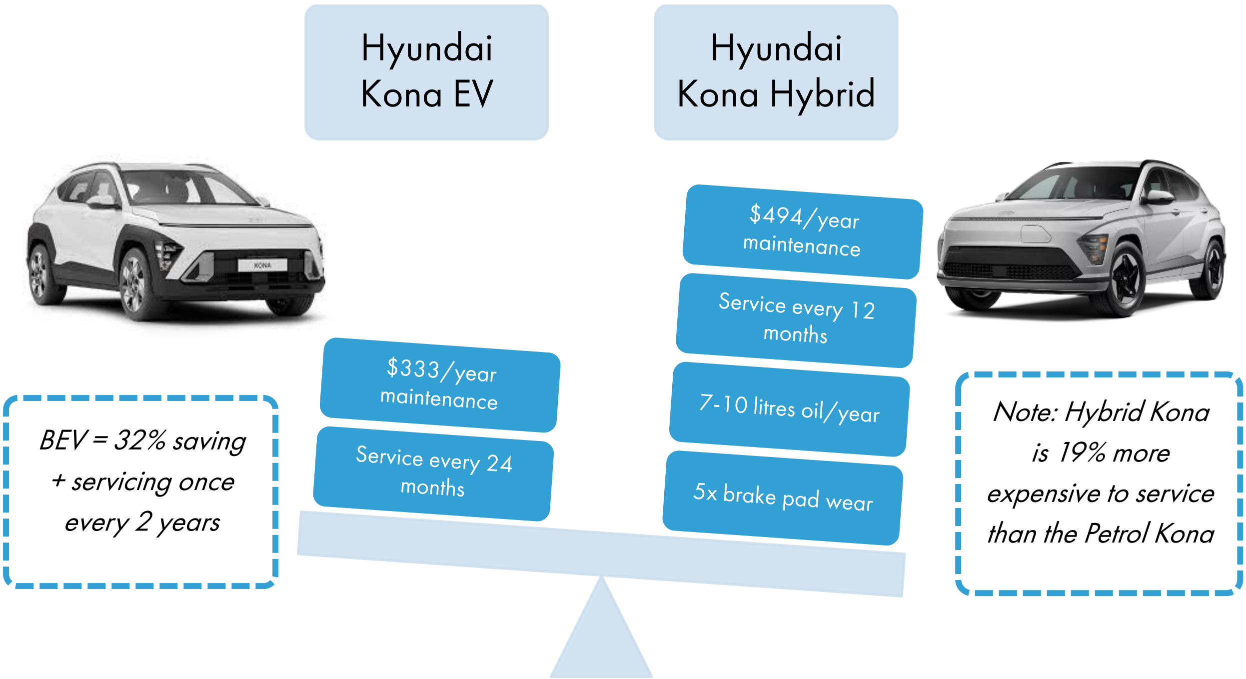


Figure 45 Hyundai 60,000km Servicing Costs Comparison

One current issue being experienced within the industry is the difference in service requirements between legacy vehicle OEMs and newer EV manufacturers.

Dealerships who typically obtain around 50% of their profits from vehicle maintenance are challenged by the increase in EVs and have pressured vehicle manufacturers to keep service intervals and servicing costs artificially high to protect their revenue streams.

Some even advise that the service intervals of an EV should be the same as an equivalent ICE vehicle which should be questioned.

It is recommended Council take advantage of the significant maintenance savings available via a switch to EV and be aware of excessive and costly maintenance schedules imposed by dealerships of legacy OEMs

EV Pricing

The major contributor to EV pricing is the cost of batteries, however, significant battery price reductions have occurred in the past 10-years with a significant decline in battery costs from over USD$800/kWh to USD$115/kWh.

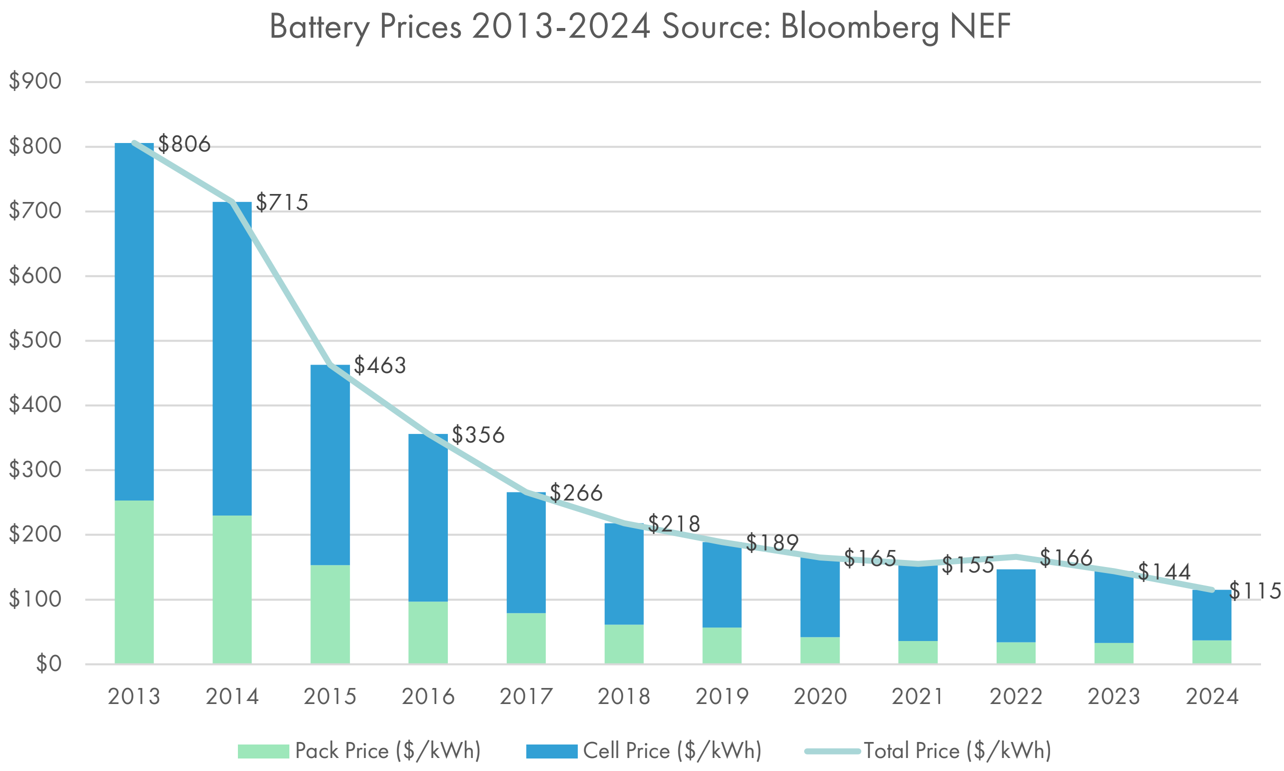
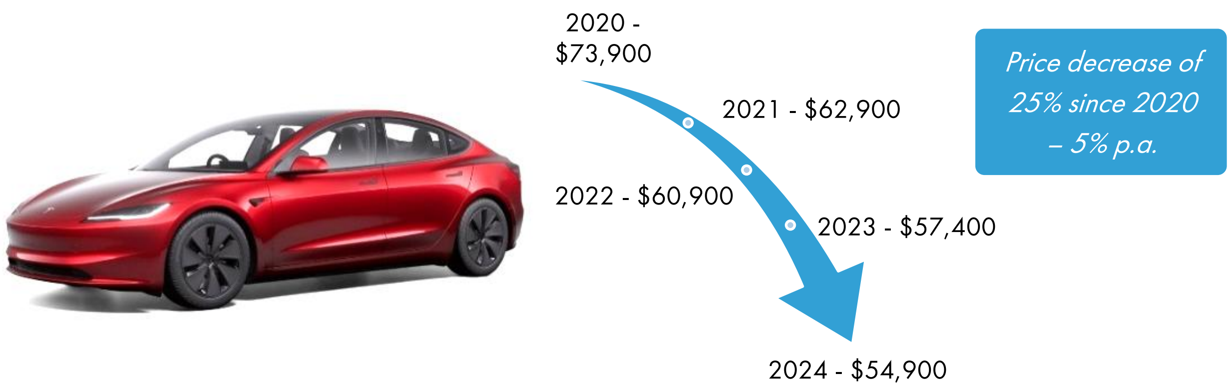


Figure 46 Battery Price 2013-2024 (Bloomberg New Energy Finance, 2024)

We have already seen significant drops in the price of new electric vehicles, especially with competition increasing from newer entrants to the market. We expect that trucks, commercial vehicles and more niche applications will follow a similar pricing trajectory to cars as supply ramps up bringing down the gap between EV and ICE.

An example of this is the pricing seen for the Tesla Model 3 RWD in Australia:



EV Residual Values

Residual value uncertainty remains one of the most discussed financial risks in fleet electrification. Early data show that many first-generation EVs have depreciated more quickly than comparable internal-combustion (ICE) models, however, this is now far better understood and largely reflects market dynamics rather than technical shortcomings.

Battery health has proven highly durable, with most modern EV packs retaining more than 90 % of capacity after 200,000 km which is well within the expected service life of Council vehicles. Lower residuals have instead been driven by the rapid fall in new-EV prices, the introduction of cheaper and longer-range models and the pace of technological change that makes early vehicles appear outdated. For example, Australian auction data in 2025 show 3- to 5-year-old EVs typically retaining 35–55 % of original price compared with 50–70 % for equivalent ICE vehicles. Similar trends were observed in the UK and Europe as markets adjusted to steep manufacturer price cuts and an influx of ex-lease EVs.

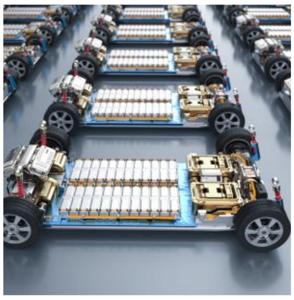
These early declines mirror the first years of other technology transitions and are now showing signs of stabilising. In both Australia and Europe, used-EV demand is expanding, new-EV price cuts are moderating, and tools such as battery State-of-Health certificates are boosting buyer confidence. As the technology matures and consumers become familiar with charging, maintenance and performance, EV residual values are expected to converge gradually with ICE over the second half of the decade.

For fleet operators, the key is to model residuals conservatively in the near term, for example, assuming a 20% residual value discount for EVs compared to a comparable ICE vehicle and to revisit these assumptions regularly as disposal data become available.

Importantly, resale risk should be managed within a whole-of-life cost framework rather than in isolation. Strategies such as longer replacement cycles, battery-health certification at disposal and structured buy-back or leasing arrangements can mitigate financial exposure. Over time, as policy settings and market confidence strengthen, residual value volatility is expected to lessen, allowing Councils to focus on operational efficiency and emissions outcomes rather than short-term resale uncertainty.

Whilst there are uncertainties related the EV residual values due to the pace of technological improvement, there are ways to mitigate this risk by taking a conservative residual value position when undertaking WOLC calculations or increasing asset life.

EV Myths and Realities



Myth: "*EV Batteries won't last*"

Reality: Many manufacturers now offer 8 year, 300,000 km battery warranties. The largest battery manufactuere in the world CATL plan to offer a 10 year 1 million km battery this year.

Myth: "*EVs regularly catch fire*"

Reality: According to data from the US National Transportation Safety Board, EVs are 20 times less likely to catch fire than ICE vehicles.

Myth: *"EVs pollute more than ICE over their lifecycle"*

Reality: Whilst EVs do require around 1.5x more carbon in manufacture, studies show that the carbon debt is paid off after only 15,000 km of driving

Myth: *"Old EV batteries will be a toxic hazard"*

Reality: The battery recycling industry is expanding rapidly. 2nd life applications for used EV batteries are plentiful and recycling can reclaim up to 95% of the critical minerals cobalt, nickel, manganese & lithium.

Myth: *"EVs move emissions from tailpipes to powerstations"*

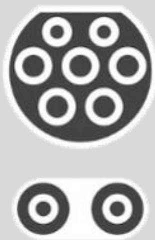
Reality: In Australia renewable energy has a 40% share of the National Energy Market. However, carbon emission per kilometre are still lower even when using electricity generated by coal power stations.

EV Charging

Charging Types and Plugs

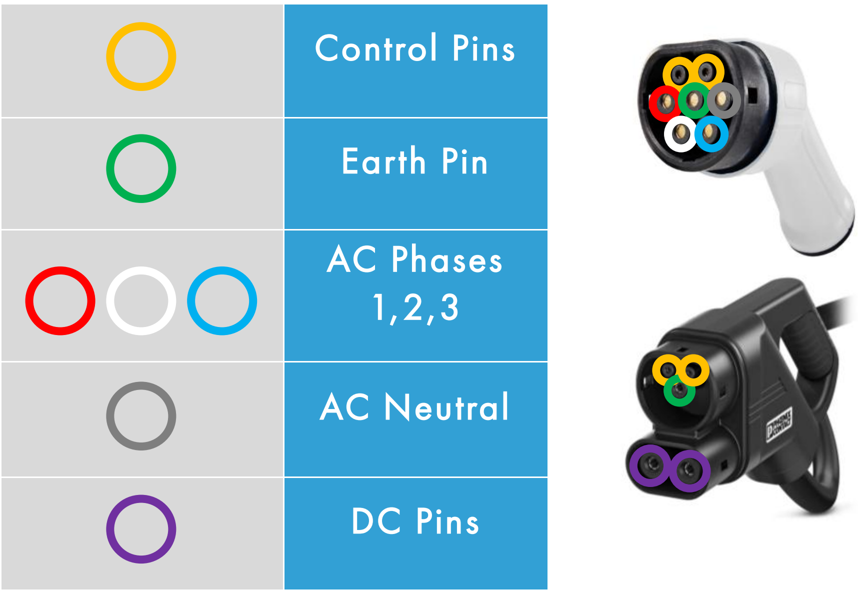
Electric Vehicle charging in Australia has been refined into broadly **three** categories which are defined by their speed and use of AC or DC charging current.

Regarding plug types, initially there were a range of options from various manufacturers, such as the Nissan Leaf (CHAdeMO), but these are largely being phased out now that the majority of EVs use one of two types in Australia.

	Level 1 Charging	Level 2 Charging	Level 3 Charging
Description	A regular power point at home or work	A dedicated EV charger	A fast charger in a public charging or depot setting
Current Type	AC	AC	DC
Charging Speed	1.4 kW to 3.7 kW	7kW to 22kW	25kW to 350kW
Connector	Type 2	Type 2	CCS2
Plug			
Notes	The type 2 plug is for AC charging up to 22kW	The type 2 plug is for AC charging up to 22kW	The CCS2 (Combined) plug allows either AC or DC charging on the same vehicle.
Example (source EVSE)			

The image below shows a typical car charging port equipped with a CCS2 connector, which allows the vehicle to utilise either a Type 2 AC connection or a DC connection. Note that either the Type 2 (AC) plug and the CCS2 (DC) are both able to fit into the vehicles charge port.

The Type 2 and CCS2 plugs share the same control and earth pins with only the omission of the four AC pins on the CCS2 plug.



It is recommended Council focus on procuring EVs with a Type 2 (AC only) or CCS2 (AC or DC) charging socket. These are the standard connectors available in Australia and available on all new electric vehicles sold today. Cross capability of charging infrastructure across vehicle segments should always be prioritised when specifying vehicles.

Charging Speeds

Whilst a charger may be rated to a specific power, the actual charge rate that it can achieve will be dictated by the vehicle in question.

There are two main factors which influence how fast an EV will charge at a given charger:

1. **Maximum Charge Rate**
   A vehicle may be plugged into a 350kW fast DC charger but the vehicle may only be able to charge at a maximum charge rate of 80kW. Similar to DC, a rated AC charge rate might be 11kW which will be the maximum charge rate even if the vehicle happens to be plugged into a 22KW AC charger. Understanding maximum charge rates is important to understand the sizing of chargers and charge times able to be acheved.

2. **Charge Curve**
   Whilst a vehicle has maximum charge rate, the maximum rate is unlikely to be achieved at all times during the charging cycle. Batteries require the charge rate to be varied during the charge cycle depending upon various factors including State of Charge and temperature.

   A typical EV charge curve is shown below for illustrative purposes.

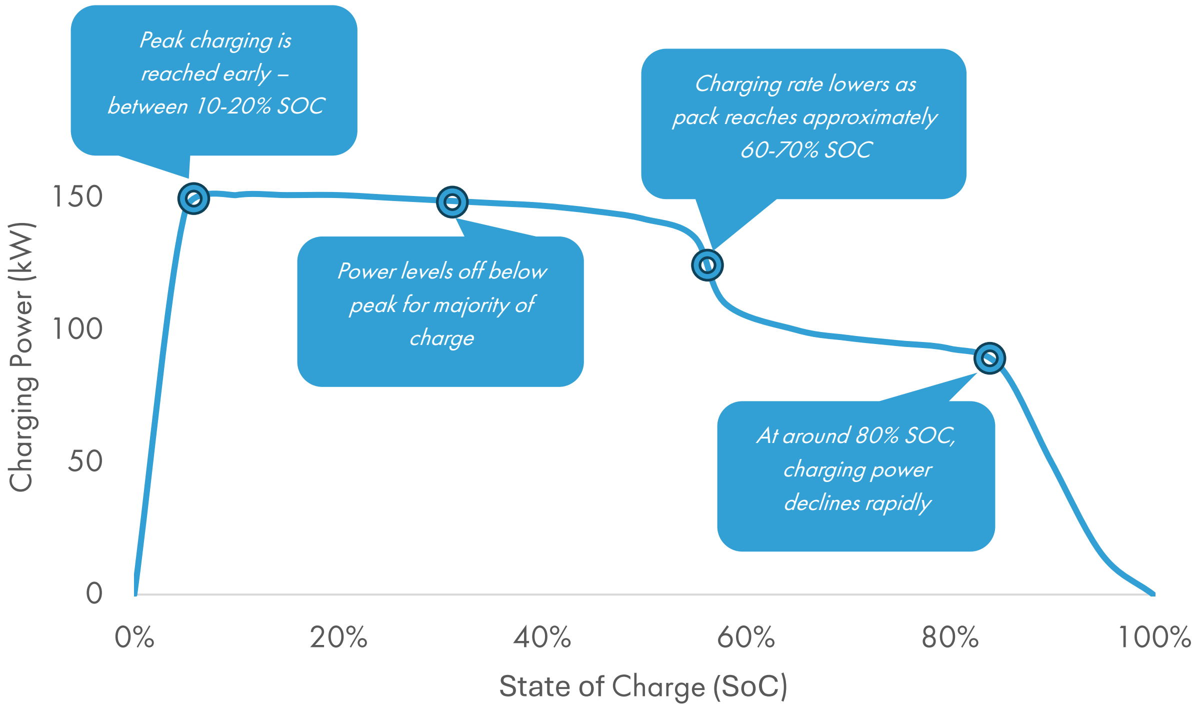


Figure 47 Typical EV Charging Curve

Broadly speaking calculating the time taken for an EV to charge from a given SoC can simply be estimated by dividing the maximum charge rate by the amount of kWh required to be added to the battery.

Example Charge Speed Calculation: Foton T5

Max Charge Rate AC: **11kW**

Battery Size 81kWh

Est. Time to Charge 20-80%: **4.4 hours**

(81kWh x 60%= 48.6kWh, 48.6kWh/11kW = 4.4 hours)

Max Charge Rate DC: **85kW**

Battery Size 81kWh

Est. Time to Charge 20-80%: **34 minutes**

(81kWh x 60%= 48.6kWh, 48.6kWh/85kW = 34 minutes)

This does not consider any charge rate ramp up or down time but provides a close proxy for charging time. Understanding the DC charge curve will be important for time critical operations where a fast DC charge beyond 80% SoC is required to complete operations within a scheduled rest stop.

EV charging speeds can vary significantly but, in most applications, consideration of the specific battery charge curve is not necessary to design an effective EV fleet.

Charging Load Control

When planning and designing a charging solution it is important to consider the site's current electricity usage profile and how EV charging can fit into this.

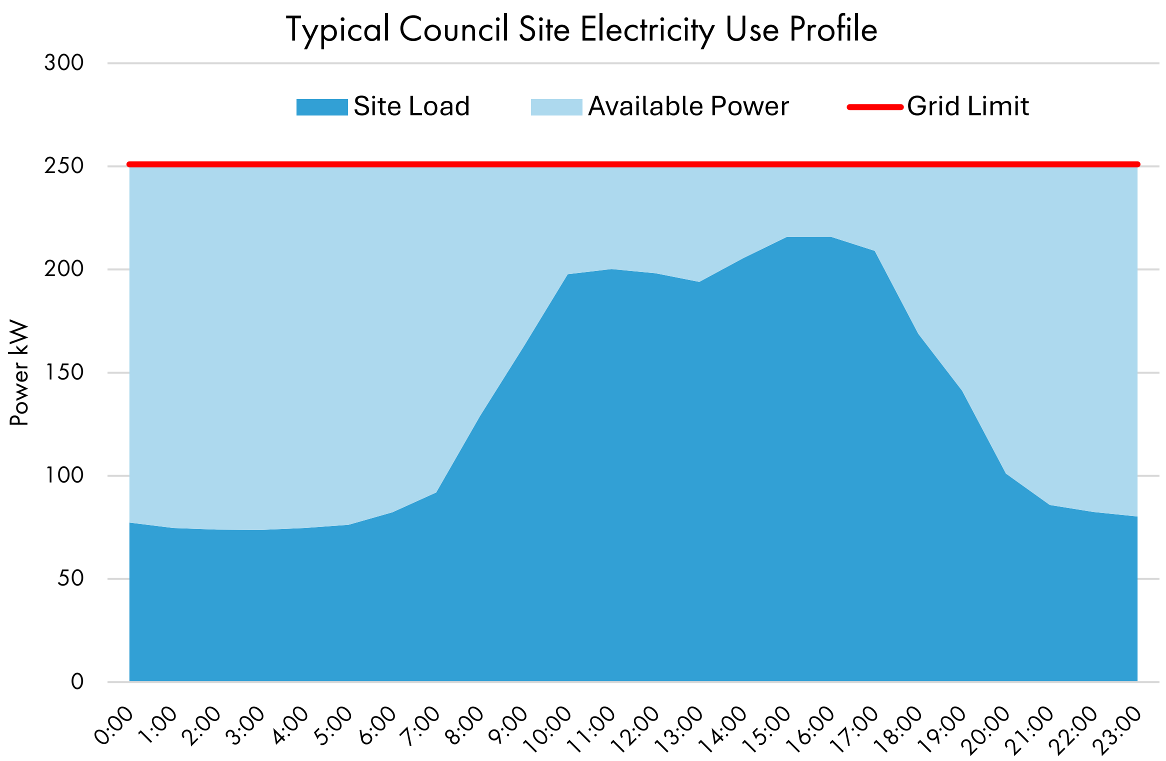
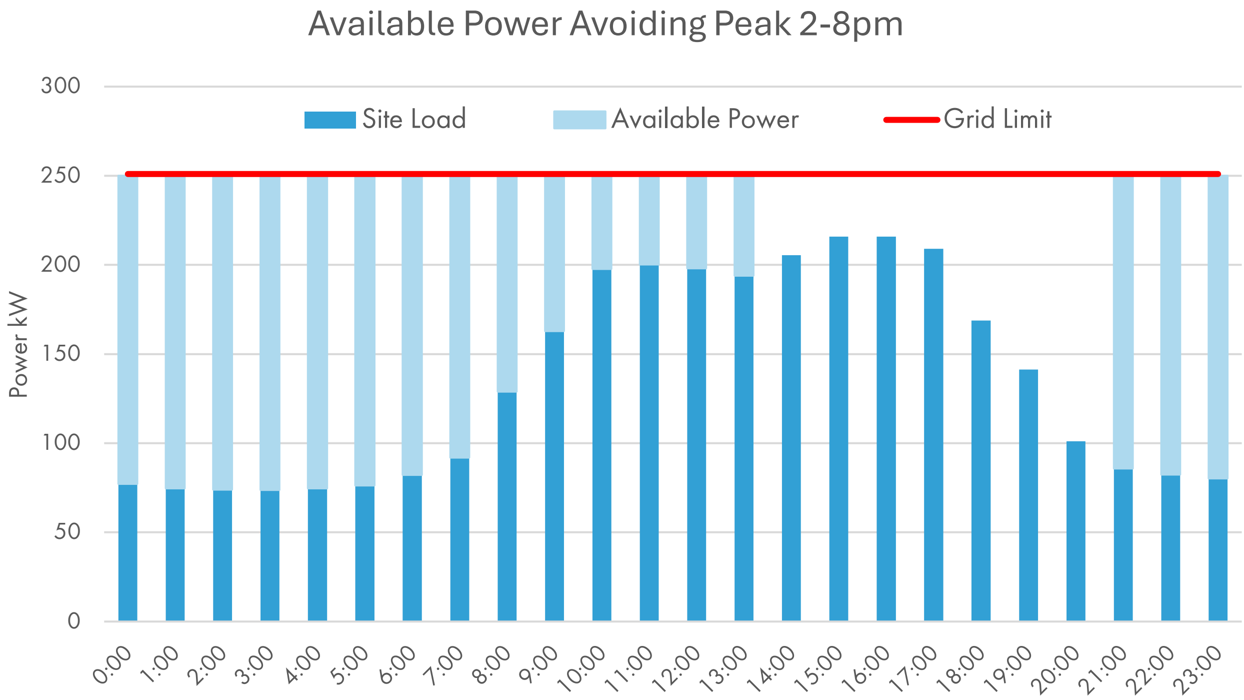


Figure 48 Typical Council Site Electricity Use Profile

In the example above, the site has a peak power consumption of 215 kW with a grid connection limit of 250kW. This means that at 15:00, the available power to charge EVs is only 35kW. If five 11kW AC chargers were to be plugged in at 15:00, it is likely that the grid limit would be breached, and the site's circuit breakers would trip.

Load control and planning can stop this occurring by making sure that EV chargers are automatically ramped down by a load management system. Using a load management system would allow all the available power to be utilised for EV charging which can negate the need for expensive grid upgrades, provided the operational demands of the fleet allow this.

Load management can also be utilised to reduce electricity consumption from EV charging during periods of peak electricity pricing. For example, in the scenario below the peak period for electricity charges is between 14:00 and 20:00. The load management system would be able to start EV charging at 20:00, avoiding the peak power charging periods to significantly reduce EV operating costs.



Detailed modelling is required to understand how EV charging can fit into your current electricity grid limit and indeed determine whether additional power is required in the form of a grid upgrade or external power source such as batteries or solar.

Less total power is required to charge EVs than you may expect.

Even if site's total loads are high, vehicles can be charged effectively with load control on many sites without the requirement to upgrade the grid connection

Vehicle Dwell Time

Understanding your vehicle's dwell time is imperative to designing a fit-for-purpose charging solution which is both cost effective and operationally sound. Dwell time is the amount of time a vehicle is sitting idle and able to charge.

The example below illustrates how consideration of dwell time can affect the cost of a charging solution and significantly improve economics.

Many fleets make the mistake of installing chargers which are too fast, and therefore expensive, when fast charging is not required for their operational profile.

Volvo FL Electric

Battery Size 280 kWh

Max Charge Rate AC: **22 kW**

Est. Time to Charge 20-100% AC: **10.2 hours**

Max Charge Rate DC: 150 kW

Est. Time to Charge 20-100% DC: 1.5 hours

	Charging Solution A	Charging Solution B
Vehicles	10 x Volvo FL	10 x Volvo FL
Dwell Time	12 hours	3 hours
Charging Solution	10 x 22kW AC Chargers	10 x 150kW DC Chargers
Peak Power Required	186 kW	746 kW
Indicative Cost of EV Chargers Only ex installation and grid upgrades	$15,000	$600,000

When designing a charging solution, it is best practice to choose chargers which are only as fast as is necessary for the operation – reducing cost and complexity.

For most Council applications an overnight 7kW AC charger is all that is necessary.

Vehicle Market Analysis

Cars

Electric passenger vehicles are now a mainstream part of the Australian automotive market. As of mid-2025, EVs account for 12.1% of new vehicle sales nationally, with over 120,000 units sold in the first half of the year alone. In Victoria, uptake is even stronger, reaching 12.9% of all new sales — a 40% increase from 2024 levels. The Australian market now offers over 140 electric car models, spanning compact hatchbacks, SUVs, sedans, and light commercial vehicles — many of which are well-suited to Council fleet needs.

Importantly, affordability has improved significantly. Several electric models, including the BYD Dolphin and MG4, are now priced under $30,000, bringing them within range of comparable internal combustion vehicles on upfront cost. As battery prices continue to decline and competition among manufacturers intensifies, price parity across more vehicle classes is expected within the next 2–3 years.

The combination of growing availability, improving affordability, and strong national and state policy support has made the light-vehicle segment EV-ready for Council operations. Transitioning passenger cars to electric is now a low-risk, high-impact step toward achieving zero-emissions fleet goals.

Examples

Kia EV5	BYD Dolphin
	
MG4	**Tesla Model Y**
	

Utilities

The electrification of utility vehicles remains in its early stages in the Australian market, with limited availability of full battery electric models and sparse sales data reported to date. However, the segment is evolving rapidly. The recent launch of the plug-in hybrid BYD Shark has generated interest among fleet operators, and several aftermarket EV conversions of popular ute platforms are also emerging as transitional options.

Looking ahead, the pipeline for factory-built electric Utilities is strengthening. Toyota has confirmed an electric Hilux is in development for launch in 2026. Meanwhile, Isuzu's electric D-MAX, already available in right-hand drive configuration in the UK, signals growing readiness for global markets like Australia. These developments suggest that while electric Utilities are not yet widely available domestically, viable options are approaching and may support broader fleet uptake from 2026 onward.

Examples

BYD Shark PHEV	Ford Range PHEV
	
Isuzu D-Max EV - 2026	Toyota Hilux EV - 2026
	
Kia Tasman EV - 2026	LDV eTerron 9- Coming late 2025
	

Vans

Electric vans are emerging as a critical category for fleet electrification due to their widespread use in Council operations, from trades and maintenance to community services and deliveries.

The Australian EV van market has matured rapidly over the last 12–24 months, with several commercial van EV models now available and more expected by late 2025.

Vans are another sector like cars which are close to parity on price with ICE alternatives, especially at the smaller end of the market.

Examples

Peugeot ePartner	LDV eDeliver 7
	
Farizon SuperVan	**Mercedes eSprinter**
	

Light and Medium Duty Trucks (4,500 kg – 9,000 kg)

Electric light trucks are gradually entering the Australian market. The expansion of electric commercial vehicle offerings, including vans and small trucks, suggests an increasing recognition of their potential benefits such as reduced emissions, reduced noise and lower operating costs.

Nonetheless, broader adoption is tempered by considerations like higher upfront costs, incumbent OEMs not currently offering an EV solution and charging infrastructure requirements.

Examples

Foton T5	FUSO eCanter
	
JAC N75	**Farizon H9E**
	

Heavy Trucks (12,000kg +)

The heavy truck segment (vehicles weighing over 9,000kg) is seeing gradual penetration of electric alternatives, particularly for specific applications such as waste collection, freight, and urban delivery logistics.

Electrification in this segment has typically been slower due to the significant energy demands, payload considerations, and infrastructure requirements. However, technological advancements, regulation changes, government incentives, and rising sustainability pressures are increasing availability and adoption.

Currently in Australia, Volvo, Daimler and Foton offer commercially available heavy electric trucks however more, manufacturers are beginning to enter the market which will drive down prices.

Electric heavy trucks offer notable operational advantages, including reduced noise pollution, lower maintenance costs, and significantly decreased emissions. Pilot programs and trials, such as the ARENA-funded Team Global Express Electric Truck Project, demonstrate growing feasibility and scalability within Australian logistics operations.

Within a Council, heavy trucks would tend to be limited to waste applications including large road sweepers. In this application solutions are available but may not be competitive on a WOLC basis.

Examples

Daimler eActros	Volvo FE
	
Foton eAuman D	**Scania 25P – Trials Currently**
	

Construction and Earthmoving

The electrification of construction equipment is gaining momentum globally. Companies like Volvo, Komatsu, CAT, JCB and XCMG have introduced electric compact excavators and wheel loaders that offer zero emissions and reduced noise, enhancing suitability for urban projects.

In Australia, Volvo and Komatsu has begun importing these electric machines, with plans for local manufacturing in the coming years. This development presents opportunities for Councils to adopt cleaner machinery for construction and maintenance activities.

Many of these options are currently not commercially available in Australia but are likely to arrive later in 2025 and 2026.

Examples

Volvo L25 Electric Wheel Loader	Bobcat T7X Electric Track Loader
	
Komatsu Electric Excavator	**Wacker Neuson RD28e Electric Roller**
	

Groundskeeping and Minor Plant

Electric groundskeeping equipment, including mowers, trimmers, and blowers, is increasingly available in the Australian market. These tools offer benefits such as reduced emissions, lower noise levels, and decreased operating costs. Adopting electric groundskeeping equipment can contribute to Councils' sustainability goals and improve the quality of public spaces.

Many Councils do not specifically track their fuel usage from this type of equipment, however, a typical single ride-on lawnmower can use the equivalent fuel as up to 15 small cars across a year as shown below.

This means that electrification of these assets can have an outsized impact on the Council's emissions and fuel spend.

Typical Diesel Mower		Small Petrol Car	
Litres per hour	5.4	Litres/100km	4.8
Hours per year (4 per day)	880	Kilometres per year	10,000
Emissions per year	12,830 kg	Emissions per year	1,100 kg
Result: One ride-on lawnmower may produce eleven times more emissions per year than a single small car			

Examples

John Deere TE Utility	Ecoteq R96 Ride-On Lawnmower
	
New Holland T4 Tractor	**Stihl Battery Landscaping Equipment**
	

EV Charging Infrastructure

The global EV charging infrastructure market is rapidly expanding, with a diverse and competitive landscape of manufacturers producing a wide range of charging solutions for fleet, commercial, and public use. Australia's charging market has matured significantly in recent years, underpinned by local investment, the entrance of international manufacturers and increasing government support.

EV chargers are broadly categorised by power level (AC or DC), use case (home, depot, public), and smart capabilities (load control, back-end data integration). The suitability of equipment varies depending on fleet composition and operational needs. For Councils like Whitehorse, understanding the market and key suppliers is essential to making scalable, futureproof investments.

Leading Charger Manufacturers, Suppliers and Geographic Origins

JET Charge Australia (Distributor, Installer and Financier) JET Charge is a leading infrastructure integrator and technology provider. While they don't manufacture chargers themselves, they partner with global OEMs like Kempower and ABB to supply and install hardware across commercial, government, and residential sectors. They also offer smart load management systems and home charger subscriptions.	JET CHARGE
EVSE Australia (Distributor, Installer and Financier) EVSE provides a broad portfolio of chargers (AC and DC) from global manufacturers. Their local presence makes them a key supplier for public and Council installations, particularly for depot-based AC charging infrastructure.	EVSE.com.au
Origin Energy Australia (Energy Provider, Installer and Financier) Origin Energy is a key player in the Australian energy and mobility ecosystem, offering integrated electric vehicle solutions including charging infrastructure, mixed fleet electrification and energy retail services. While not a hardware manufacturer, Origin partners with leading OEMs to deploy fleet charging systems and manage energy use through their Virtual Power Plant (VPP) and energy-as-a-service models. Their strength lies in bundling electricity supply, hardware, and software into scalable packages suitable for Councils.	origin
ABB Switzerland (Charger OEM) A global leader in power and automation, ABB manufactures AC and DC chargers (up to 350kW) used in public networks and depot applications. Their solutions are known for industrial robustness and are used in many Council and commercial fleet projects globally.	ABB

Autel China (Charger OEM) Autel is a fast-growing global EV charger manufacturer offering AC and DC charging products with a focus on smart, connected systems. Their MaxiCharger range supports dynamic load balancing, user authentication and OCPP compliance. Autel has entered the Australian market through distributors and is increasingly deployed in Council, retail, and fleet environments.	AUTEL®
Zerova Taiwan (Charger OEM) Zerova specialises in high-capacity DC charging infrastructure for commercial and fleet applications. Their product line includes up to 480kW ultra-rapid chargers with modular architecture. Zerova is gaining attention for supporting multi-vehicle simultaneous charging and advanced energy management. Their solutions are suited to depot and transit-scale installations and are increasingly seen in large-scale infrastructure builds across the World.	ZEROVA
Siemens Germany (Charger OEM) Siemens offers integrated charging systems for fleets, including AC Wallboxes and DC hubs, with advanced backend energy management software. Their focus is on larger fleets and depot installations requiring load control and grid optimisation.	SIEMENS
Kempower Finland (Charger OEM) Kempower specialises in modular DC fast charging systems, particularly suited to bus and truck fleets. Their systems are scalable and offer dynamic load balancing, valuable for future heavy vehicle fleet transition plans.	KEMPOWER

Australia's EV charging infrastructure market has developed rapidly in recent years. There are many reputable providers of charging solutions to suit various applications and budgets.

European manufacturers remain premium products, but this does not necessarily mean they are better, especially when Chinese manufacturers are often able to provide superior local support at a lower price point.

EV Charging Trends and Considerations

When considering the fleet charging requirements, it is important to consider a range of solutions including within the depots, public charging and at home charging. This is particularly important for fleets who may not have all vehicles returning to base each day. Key considerations are.

- **Smart Charging:** Increasing demand for chargers that integrate with energy management systems (EMS), vehicle telematics, and scheduling software.
- **Depot Electrification:** Growth in large-scale, multi-charger depot layouts with load balancing, solar integration, and staged grid upgrades.
- **Public Network Expansion:** NRMA, Chargefox, and Evie Networks continue to grow regional and metropolitan fast-charging corridors.
- **Vehicle-to-Grid (V2G):** Emerging interest in V2G-capable chargers, particularly for Council depots aiming to support grid services or emergency backup.
- **Home Charging:** As take-home fleet vehicles are common in Council operations, home charging has emerged as a critical piece of the electrification puzzle. Recent innovations include smart home charging systems that allow Councils to reimburse employees for electricity use. Providers like JET Charge and Origin Energy offer home charging-as-a-service, bundling hardware, installation, energy tracking, and maintenance into a managed package.

Given this dynamic and complex market, Council should assess charging vendors based on:

- Local support and service capability
- Compatibility with a mixed fleet of light and heavy vehicles
- Scalability of charger network
- Integration with energy and data systems
- Ability to charge wherever the vehicle is parked overnight

Future investment decisions should prioritise cross compatibility (CCS2 or Type 2 connectors and OCPP charging protocol), open standards, smart metering and compatibility with existing and future depot layouts to enable a flexible and resilient electrification strategy.

EV Deployment Case Studies

Melbourne Councils – ARENA-funded EV Fleet Transition Project

A collaborative initiative involving Melbourne's western Councils, Wyndham City, Moonee Valley City, and Brimbank City, was supported by the Australian Renewable Energy Agency (ARENA) to facilitate fleet electrification. The Councils, members of the Western Alliance for Greenhouse Action (WAGA), leveraged ARENA's $2.2 million funding to strategically transition their vehicle fleets to electric alternatives, aligning with broader regional sustainability goals.

Key Features:

Collaborative Transition Approach: Joint efforts by multiple Councils under WAGA, ensuring a cohesive regional strategy and shared knowledge base.

Charging Infrastructure Development: Installation of dedicated EV charging stations across Council depots and facilities, tailored to operational requirements and future scalability.

Integration with Renewable Energy: On-site solar arrays and battery storage at key locations, minimizing reliance on grid power and maximizing environmental benefits.

Technical Components:

- 65 light and 7 heavy BEVs supported.
- AC Level 2 charging stations across Council-owned facilities
- Selected DC fast charging stations at strategic operational depots
- Renewable energy systems, including solar photovoltaic arrays and energy storage solutions

Outcomes:

- Substantial progress towards municipal carbon emission reduction targets
- Proven feasibility of multi-Council coordinated fleet electrification efforts
- Established best-practice frameworks for regional government collaboration on sustainability and EV infrastructure projects

This project provides a strong blueprint for collaborative regional EV transition initiatives, showcasing effective strategies in infrastructure, renewable energy integration, and coordinated governance.

WALGA – Accelerating Local Government Transition to BEVs

The Western Australian Local Government Association (WALGA), in collaboration with 22 local Councils, initiated a project to accelerate the transition of municipal fleets to battery electric vehicles (BEVs). Supported by funding from the Australian Renewable Energy Agency (ARENA) and the Western Australian State Government, this initiative aims to overcome barriers to EV adoption and promote sustainable transportation within local government operations.

Key Features:

Collaborative Procurement:
WALGA coordinated the collective procurement of 129 BEVs and the installation of 105 charging stations across 22 participating local governments.

Comprehensive Charging Infrastructure: The project involves deploying 83 AC chargers (7-22kW) and 22 DC fast chargers (24-60kW) at approximately 70 sites.

Financial Support:
The initiative is backed by $3.51 million from ARENA and $1 million from the WA State Government, contributing to the total project value of $12.26 million.

Technical Components:

- Introduction of 129 light BEVs into local government fleets.
- Installation of 105 charging units, comprising both AC and DC chargers.
- Implementation of dynamic load management systems to optimize energy usage.

Outcomes:

- Significant decrease in greenhouse gas emissions from local government operations.
- Lower fuel and maintenance costs leading to long-term financial benefits for participating Councils.
- Establishment of a collaborative framework for local governments to share insights, challenges, and best practices

This project serves as a pioneering model for regional collaboration in fleet electrification, demonstrating the effectiveness of aggregated procurement and shared resources in overcoming common barriers to EV adoption within local governments.

JET Charge and IAG Fleet Electrification Project

JET Charge partnered with IAG, Australia's largest general insurer, to transition approximately 650 fossil-fuel-powered fleet vehicles to electric and hybrid electric vehicles by 2030. Funded by ARENA's Driving the Nation Fund, the initiative includes the installation of home charging infrastructure for IAG employees through JET Charge's innovative Charging as a Service (CaaS) program, JET Charge+.

Key Features:

Domestic Charging Infrastructure: Smart chargers installed at employee homes, offering daily convenience and avoiding costly public charging.

Comprehensive Management: JET Charge manages installation, maintenance, and relocations, addressing employee turnover and residential moves.

Streamlined Reporting: The Illuminate platform by JET Charge provides detailed emissions and usage data, supporting accurate emissions reporting and fleet management.

Technical Components:

- Smart EV charger and residential installation
- Cellular connectivity and annual maintenance
- Integrated solar metering for homes with over 5kW solar capacity
- Monthly emissions and reimbursement reporting

Outcomes:

- Anticipated 47% average Scope 1 emission reduction per vehicle transitioned
- Enhanced operational efficiency and reduced costs through managed, domestic charging solutions
- Simplified infrastructure management, allowing IAG to focus on achieving its net-zero emissions targets

This case study demonstrates a scalable and user-friendly approach to managing extensive fleet electrification through residential charging solutions and comprehensive service management

Team Global Express – ARENA Electric Truck Project

Team Global Express, supported by the Australian Renewable Energy Agency (ARENA), executed Australia's largest electric truck trial within the logistics sector. The project deployed 60 battery-electric trucks across several depots, integrating extensive charging infrastructure.

Key Features:

High-Capacity Charging:
Strategically positioned DC fast chargers at major logistics hubs enabled efficient, rapid vehicle turnaround.

Infrastructure Enhancement:
Significant upgrades to depot electrical infrastructure, including onsite renewable energy sources such as solar arrays and battery storage solutions, enhanced energy resilience and sustainability.

Operational Scalability:
The project evaluated short-haul urban logistics feasibility, highlighting scalable infrastructure approaches for larger fleet transitions.

Technical Components:

- DC fast chargers installed at critical operational points
- Onsite solar arrays and battery storage for renewable energy integration
- Enhanced depot electrical infrastructure supporting high-volume EV charging

Outcomes:

- Achieved substantial operating emissions reductions
- Demonstrated clear operational feasibility for short-haul electric truck logistics
- Provided valuable insights into charging infrastructure scalability and operational integration for future electric vehicle deployments

This initiative has set important benchmarks for the future adoption of electric heavy vehicles in Australia's logistics sector.

ACT Government – Zero-Emission Fleet

The ACT Government is leading government fleet electrification in Australia with a commitment to achieving a fully zero-emission fleet by 2040. The strategy includes detailed fleet assessments, comprehensive planning of charging infrastructure, and an ambitious schedule for vehicle replacement, prioritising electric and hydrogen-powered vehicles.

Key Features:

Comprehensive Charging Network: Installation of DC fast chargers at key government facilities and depot-based AC chargers to enable overnight charging, ensuring operational efficiency.

Renewable Energy Integration: Significant investment in renewable energy, including solar photovoltaic (PV) systems and energy storage solutions at fleet depots, reducing reliance on grid power.

Structured Transition Planning: Detailed assessment and phased implementation, facilitating a smooth transition with minimal disruption to daily operations.

Technical Components:

- DC fast charging stations at strategic locations
- Depot-based AC chargers for consistent overnight vehicle charging
- Integrated solar PV systems with battery storage solutions

Outcomes:

- Substantial reduction in fleet emissions, significantly contributing to climate targets
- Proven operational readiness and enhanced fleet performance
- Established benchmarks for policy-driven fleet electrification, infrastructure scalability, and sustainable energy integration within government operations

This comprehensive approach positions the ACT Government as a leader in sustainable fleet management, showcasing effective strategies that balance operational effectiveness with environmental responsibility.

Woolworths Home Delivery Fleet Electrification

Woolworths embarked on a significant electrification of its home delivery fleet, integrating battery-electric delivery trucks into its logistics network. The project aimed to reduce urban emissions, align with Woolworths' sustainability commitments, and improve local air quality.

Key Features:

Strategic Charging Infrastructure: DC fast chargers installed at central delivery hubs, supported by intelligent load management to optimize energy use.

Renewable Energy Integration:
Deployment of rooftop solar installations at major distribution centres, significantly decreasing grid dependency and enhancing overall sustainability.

Operational Efficiency:
Enhanced fleet management, resulting in increased utilization rates and reduced emissions, validating the practicality and benefits of electrification for retail delivery operations.

Technical Components:

- DC fast chargers at logistics centres
- Intelligent load management systems
- Rooftop solar panels for renewable energy supply

Outcomes:

- Markedly reduced emissions from urban deliveries
- Improved air quality and sustainability profile
- Demonstrated effectiveness and scalability of fleet electrification strategies

Set a strong precedent for other retail operators to transition their delivery fleets to electric vehicles, underscoring both economic and environmental benefits.

Funding the Transition and Grant Opportunities

Transitioning to an electric vehicle fleet requires careful financial planning, including leveraging available subsidies and incentives to offset costs. In Victoria there are currently no specific state based low and zero emission vehicle funding opportunities at present.

ARENA (Australian Renewable Energy Agency)

The Australian Renewable Energy Agency (ARENA) supports the acceleration of low-emissions technologies, including zero-emission transport systems. For Councils seeking to implement electric fleet infrastructure or innovative operational models at scale, ARENA offers co-funding opportunities through competitive grant rounds.

ARENA's funding is guided by the principle of accelerating innovation, with a strong preference for projects that demonstrate transformational impact, scalability, and replicability. In the context of fleet electrification, this includes large-scale depot charging deployments, integration with behind-the-meter renewables (solar PV and battery storage), and advanced fleet management or energy optimisation systems.

Key funding eligibility criteria include:

Innovation requirement: Projects must demonstrate a novel aspect in terms of business model, technology application, or integration approach. Routine or off-the-shelf fleet upgrades are not eligible.

Minimum funding request: ARENA typically only considers funding proposals seeking **more than $1 million** in grant contributions.

Minimum project capital expenditure (capex): Eligible projects generally must exceed **$2 million** in total capex, reflecting the need for scale and complexity.

Co-funding ratio: ARENA funding must be matched by recipient contributions. Most successful projects receive 30–50% of their budget from ARENA, with the remainder from Council, industry partners, or finance.

Council could explore ARENA funding opportunities in future fleet phases, particularly if:

- Multiple depots are electrified with smart energy systems
- Integration with solar and battery storage is proposed
- A novel first of its kind deployment at scale e.g. a whole fleet of electric waste trucks
- A consortia model is used involving suppliers, utilities, or neighbouring LGAs
- Monitoring and reporting systems demonstrate transferable insights for other Councils

Early engagement with ARENA and pre-feasibility planning is essential. Application rounds are highly competitive, and successful proponents typically provide robust modelling, emissions savings analysis, and risk management frameworks.

Charging Infrastructure Funding Models

There are many providers of charging infrastructure solutions which can provide significant benefits when considering a transition to EVs. As charging infrastructure is a new asset class for Council's there can be benefits in outsourcing the funding, monitoring and maintenance of this infrastructure to external expert providers.

	Capital Expenditure	Finance	Charging as a Service
Description	Direct capital expenditure where the Council invests upfront in purchasing, installing, and owning the EV charging assets. This model involves a one-time investment for the hardware and any associated infrastructure upgrades.	A financing approach that spreads the cost of EV charging infrastructure over time through loans, leasing arrangements, or other funding mechanisms. This model reduces the immediate budget impact by converting a large upfront cost into manageable periodic payments.	A service model where a third-party provider installs, owns, and maintains the EV charging infrastructure. The Council pays a subscription or usage-based fee, while the provider manages day-to-day operations, maintenance, and technology upgrades. Performance guarantees are usually negotiated with the provider paying penalties if charging infrastructure is offline or vehicles are not charged
Benefits	Full asset ownership and control Potential tax benefits through depreciation Long-term cost savings if utilisation is high	Lower initial cash outlay, preserving liquidity. Predictable payments that can be budgeted over several years Potential access to government incentives or green financing options	Minimal or zero upfront investment and reduced financial risk. Access to expert management and the latest technology Scalability and flexibility in service provision Suitable for critical charging provision in public transport and other public services.
Drawbacks	High initial capital outlay, which may strain budgets. Risk of technology becoming outdated Responsibility for ongoing maintenance and upgrades Risk of vehicles not charging and affecting critical services	Additional costs from interest or financing fees Long-term contractual obligations Complexity in managing and negotiating financing agreements. Responsibility for ongoing maintenance and upgrades	Reduced control over the physical infrastructure. Dependence on the service provider's performance, financial viability, and technology roadmap Long-term contractual commitments that may limit flexibility May be overkill for negligible risk and low complexity operations

Example	Council is directly purchasing and installing EV charging stations at its depots and public parking areas, thereby owning, maintaining, and managing the equipment over its lifecycle. A separate O&M contract could be put in place with the charging infrastructure provider.	Council securing a green loan or entering a lease agreement to fund the installation of EV chargers, with repayment terms structured over a multi-year period to align costs with operational savings.	Council partnering with a CaaS provider such as Origin, JetCharge or EVSE, where the provider installs and maintains the network of chargers across Council depots and public spaces, and the Council pays a recurring fee for the service.

Leveraging FBT

FBT is a tax employers pay on benefits provided to employees (or their associates) in addition to wages or salaries. These benefits may include company cars, private use of assets, or expense reimbursements.

FBT is calculated on the taxable value of the benefits and is separate from income tax. In Australia, the FBT year runs from 1 April to 31 March, and specific exemptions, **such as for eligible electric vehicles**, can apply under certain conditions.

FBT Exemption for Battery Electric Vehicles

In 2022 the Australian Federal Government passed the *Treasury Laws Amendment (Electric Car Discount) Act* which provides an FBT exemption for eligible vehicles, to drive uptake.

There is no specific end date for the FBT exemption for electric vehicles however '*The government will complete a review into this exemption by mid-2027 to consider electric car take-up'.*

Eligible Vehicles

- Must meet the criteria of a car under the legislation – carry a load of less than 1 tonne and fewer than 9 passengers including the driver.
- Must be a battery electric, hydrogen fuel cell or plug-in hybrid car.
- The car must have been first 'held **and** used for the first time' on or after 1 July 2022
- Original retail price (first sale of the car) must be below the Luxury Car Tax (LCT) threshold for 'Fuel efficient vehicles' in the year in which the car was purchased:
    - FBT year 2022-2023 = $84,916
    - FBT year 2023-2024 = $89,332
    - FBT year 2024 -2025 = $91,387

Ineligible Vehicles

- E-Bikes, motorcycles and vehicles designed to carry over 1 tonne or 9 passengers or more.
- Hybrid cars
- Car with an original purchase price over the LCT threshold for the year in which it was purchased.

Changes from FBT Year 2025-2026

From 1st April 2025 new plug-in hybrids are no longer be able to claim an exemption from FBT.

Existing vehicles which meet the eligibility criteria and were held and used on or before 31st March 2025 will be able to continue to claim the FBT exemption.

FBT Implications for EV Charging

The FBT implications related to the charging of eligible EVs, and plug-in hybrids are complicated and require careful consideration on the part of employers. There are three charging locations which need consideration, and each has its own unique nuances:

- Workplace Charging
- Public Charging
- Home Charging

Workplace Charging

Workplace charging is an exempt benefit. Electricity provided to your employees to charge an electric car is a car expense (fuel) and is exempt from FBT.

Public Charging

Like workplace charging the provision of a public charging card, subscription or membership is exempt from FBT as it qualifies as a car expense (fuel).

Home Charging

Where FBT liabilities become more complicated, is when they are charged at the employees' home. The FBT implications and consideration can be split into the electricity used to charge the EV and the home EV charger.

1. Electricity used at home to charge EVs

   In the same way that electricity used to charge an Electric Vehicle at the Workplace or Public charging is classified as a car expense, electricity used to charge an EV at an employee's home is exempt from FBT. However, the calculation of the proportion and cost of electricity consumed at home versus workplace and/public charging needs to be determined.

   If possible actual electricity costs can be used, this may be provided via an in-vehicle-monitoring-system (IVMS) or a smart meter enabled EV charger and calculated on actual electricity costs as evidenced by the employee's electricity bill.

   However, in order to streamline the approach, the ATO has also provided a cents per kilometre rate specific to home EV charging:

Rate applying to fringe benefits tax year or income year commencing on and after	EV home charging rate
1 April 2022	4.20 cents per km

   There are two ways that this can be applied in practice, and the method will be determined by whether the portion of charging which occurred at home or at public charging stations can be accurately determined or not, as such:

a. The home charging % can be accurately determined by the vehicle or via an IVSM or other device, then the home charging rate can be applied to the portion of annual kilometres charged at home and the actual public charging charges can be used together.
b. The home charging % cannot be accurately determined then you can use the home charging rate if the public charging station cost is disregarded or use the public charging costs but only if the EV home charging rate is not applied.

2. Charging infrastructure installed at an employees' home

   a. Funded via purchase
   FBT Exempt – in the unlikely event that the home charging is installed at a cost of less than $300 then this is deemed a low-cost and infrequent benefit.
   Not FBT Exempt- should the value of the home EV charger be above $300 then the employer is liable for FBT.
   If the employer arranged the installation of the home EV charger then it is considered a **property fringe benefit.**
   If the employee buys and arranges the installation themselves and is reimbursed by their employer then it is deemed an **expense payment fringe benefit.**

   b. Funded via leasing or Charging as a Service (CaaS)
   If the home EV charger is provided as part of the vehicle lease or through a Charging as a Service provider, then the ATO **advises** that the cost of the home EV charger will need to be separately identified and treated as per 2a above.

FBT Implications for Employees

Employers need to be aware that despite the FBT exemptions available, Electric Vehicle related expenses are Reportable Fringe Benefits for amounts over $2,000 per annum.

This amount will appear on an employee's end-of-year income statement and can therefore impact upon means tested assistance the employee is entitled to, including Medicare Levy Surcharge, tax offsets and family assistance payments, amongst others.

This amount can be significant for example adding $32,000 of reportable fringe benefit on an $85,000 electric vehicle.

Workforce Transition

To support Council's fleet electrification goals, it is essential to transition your diesel-focused mechanic workforce to proficiency in electric vehicle (EV) technologies.

This section outlines a comprehensive training and development strategy that equips your workshops and mechanics with the necessary skills to maintain and service EVs.

Skills Gap Analysis

A thorough assessment of the current workforce's competencies will identify the specific gaps between traditional diesel systems and the requirements for servicing EVs. This analysis should focus on:

- Technical Knowledge: Understanding the differences between diesel powertrains and electric drivetrains.
- Safety Competencies: Familiarity with high-voltage systems and the associated risks.
- Diagnostic Skills: New diagnostic tools and techniques specific to EV technology.

High-Voltage Safety and Electrical Training

EVs operate with high-voltage systems, making safety paramount. Training must cover:

- High-Voltage Safety Protocols: Proper handling, de-energising techniques, and the use of personal protective equipment.
- Emergency Procedures: Clear response strategies in the event of electrical faults or accidents.
- Accredited Safety Courses: Utilising programs offered by TAFE and other accredited institutions to ensure compliance with safety standards.

Fundamentals of EV Technology

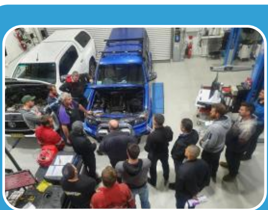
Mechanics must acquire a solid grounding in the core concepts of EV operation. This includes:

- Electric Powertrains: Understanding how electric motors differ from diesel engines.
- Battery Technology: Knowledge of battery management systems, charging methodologies, and thermal management.
- Control Systems and Regenerative Braking: An introduction to how modern EV systems optimize energy use.

Hands-On Practical Training

In addition to theoretical learning, practical training is vital. Recommendations include:

- On-the-Job Mentoring: Partnering with TAFE and EV manufacturers for real-world exposure.
- Use of Diagnostic Tools: Training on industry-specific diagnostic software and hardware to effectively troubleshoot EV systems.



Manufacturer-Specific and Advanced Training

Given the variation in EV designs:

- Proprietary Training Programs: Where available, encourage participation in manufacturer-led training to gain insights into specific diagnostic and repair protocols.
- Continuous Professional Development: Implement ongoing training initiatives to keep pace with evolving EV technologies and industry best practices.

Certification and Continuous Improvement

Achieving recognised certification in EV maintenance will help maintain high standards and ensure that the workforce remains updated on emerging technologies. It is recommended to:

- Enroll in Accredited Certification Programs: Through organizations such as TAFE.
- Schedule Regular Refresher Courses: To update skills and knowledge as the EV market and technology evolve.

Recommended EV Policies and Procedures

Having Policies and Procedures in place relating to EVs and EV charging, can provide Council with a robust organisation wide framework which will allow all employees to utilise EVs safely and effectively.

Many employees may for example not have ever used an EV, they may therefore choose an ICE pool vehicle purely due to a lack of knowledge. The following recommended Policies and Procedures provide a basis for a successful electric vehicle fleet roll-out.

Policies

- EV Fleet Allocation and Utilisation Policy
- PHEV Charging and PHEV Drive Mode Policy
- EV Charging (Depot, Home and Public Charging)
- EV Charging Allocation and Priority Policy
- Public and Third-Party Charging Policy
- Home Charging Reimbursement and Installation Policy
- Load Management and Charging Optimisation Policy

Procedures

- EV Range and Trip Planning Procedure
- EV Driver Training Procedure
- EV Charging Training Procedure
- On-Road Assistance and Breakdown Procedure
- Emergency Response and Accident Reporting Procedure
- EV Damage and Fault Reporting Procedure
- EV Charging Fault Reporting and Damage Reporting Procedure

As part of this Business Case, Australian EVS has provided Council with a suite of pre-filled template documents for use in the ongoing development of EV Specific fleet policies and procedures.

Appendix 2 – Charging Infrastructure Designs

Site Total EV Charger Capacity = 865kW

97 x 7kW AC Chargers (inc. 2 existing)

1 x 120kW DC Charger

3 x 22kW AC Chargers (existing)

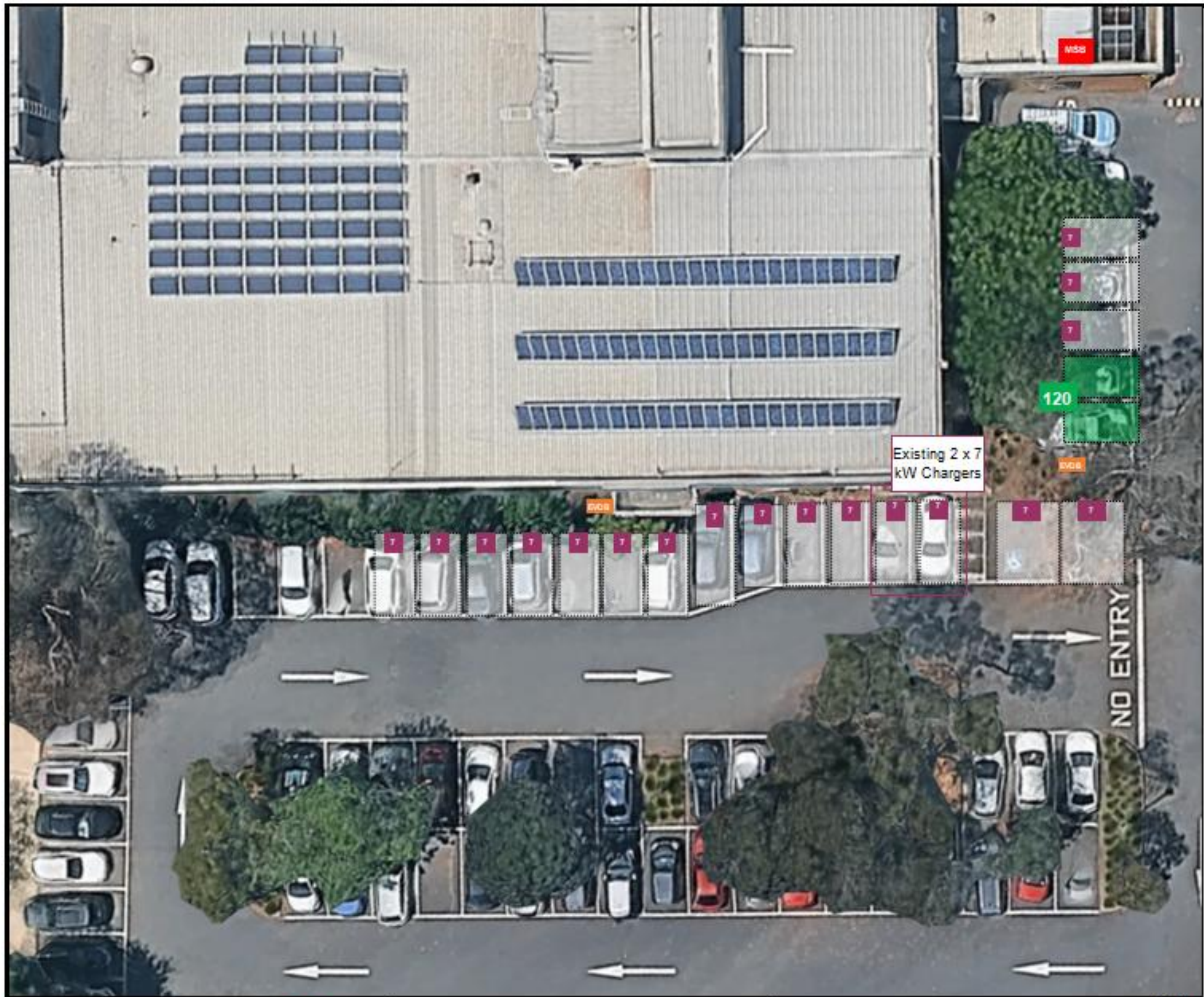
Assumes a grid connection upgrade is able to be sought from AusNet to provide 425kW of peak power requirement (400kW EV charging + 25kW overnight baseload).

Load management of all chargers required as aggregate total exceeds grid capacity.

Legend

- MSB – Main switchboard
- DB – Distribution board
- EVDB – EV Distribution board
- 7 – 7kW AC Charger
- 22 – 22kW AC Charger
- 120 – 60kW DC Charger
- EV Charging Space
- Fast Charging Space

Australian EVS DRIVING EV TRANSFORMATION	Drawing Title:	Client:	Site:	Date:
	Depot Concept EV Infrastructure Plan	Whitehorse City Council	1 Ailsa St, Box Hill South VIC 3128	20.10.25



Site Total EV Charger Capacity = 246kW

18 x 7kW AC Chargers (inc. 2 existing)

1 x 120kW DC Charger

No grid connection upgrade required,

Load management of all chargers required as aggregate total may exceed peak site power on max power days

Legend

- MSB — Main switchboard
- DB — Distribution board
- EVDB — EV Distribution board
- 7 — 7kW AC Charger
- 22 — 22kW AC Charger
- 120 — 60kW DC Charger
- EV Charging Space
- Fast Charging Space

Australian EVS DRIVING EV TRANSFORMATION	Drawing Title: Civic Centre Concept EV Infrastructure Plan	Client: Whitehorse City Council	Site: 379-399 Whitehorse Rd, Nunawading VIC 3131	Date: 20.10.25

Australian EVS
DRIVING EV TRANSFORMATION

Appendix 3 – Risk Register

Item	Activity / System	Hazard / Risk	Who is at Risk	Initial Risk Rating	Control Measures (Hierarchy of Control)	Residual Risk Rating	Responsible Person / Team
1	Fleet Procurement	Vehicle not fit-for- purpose (range, payload, towing limits)	Drivers, Operations	High	Elimination: exclude non-compliant models; Administrative: conduct trials, fit-for-purpose testing	Low	Fleet Manager
2	Procurement Strategy	Overreliance on unproven EV models or single OEM	Council operations, Finance	High	Substitution: diversify OEMs. Administrative: staged rollout with pilot programs; Engineering: secure strong warranty and support	Moderate	Procurement and Fleet
3	Financial Planning	EV cost reductions assumed but not realised	Finance, Council budget	Medium	Administrative: Whole-of-Life Cost modelling; Substitution: use external grants and incentives	Low	Finance
4	Workforce Transition	Operator resistance to EV adoption	Drivers, Mechanics	Medium	Administrative: change management, training, EV champions, demonstration days	Low	HR / Fleet Training
5	Vehicle Technology	Software/IT reliability issues causing downtime	Council operations, Drivers	Medium	Engineering: require proven software with OTA updates; Administrative: vendor service contracts; Isolation: fallback ICE/hybrid pool	Low	Fleet / IT
6	Depot Construction	Delays in depot works (approvals, contractor delays)	Council operations	High	Administrative: staged rollout, contract management with penalties, schedule buffer	Moderate	Infrastructure Projects

7	Electrical Capacity	Grid connection upgrade requirements not identified early	Council budget, Timeline	High	Engineering: early load studies and smart charging design; Administrative: early engagement with utilities; Substitution: on-site solar/battery support	Moderate	Infrastructure Projects
8	Civil Works	Hidden site conditions (utilities, rock, contamination)	Contractors, Council budget	Medium	Administrative: pre-works surveys, potholing; Contingency allowance 10–15%	Low	Infrastructure Projects
9	Charger Installation	Electrical hazard during installation (shock, arc flash)	Contractors, Maintenance	High	Isolation: lock-out/tag-out; Engineering: RCDs, isolation switches; PPE: arc-rated clothing, insulated gloves	Low	Contractors / WHS
10	Charger Operation	Charger malfunction or fire (thermal runaway, short circuit)	Depot employees, Property	High	Engineering: certified EVSE with surge protection; Isolation: fire-rated separation, bollards; Administrative: inspections, training; PPE: fire extinguishers accessible	Low	Facilities / WHS
11	Environment	Flooding, heat, lightning damaging charging infrastructure	Council, Employees	Medium	Elimination: avoid flood-prone areas; Engineering: weatherproof enclosures, lightning protection; Administrative: emergency plans	Low	Facilities
12	Daily Operations	Vehicles not plugged in at shift end	Drivers, Council services	Medium	Administrative: SOPs, signage, checklists; Engineering: smart alerts, RFID bay sensors	Low	Depot Supervisors
13	Power Supply	Grid outage during overnight charging	Fleet availability, Public	High	Substitution: backup generator or battery storage; Administrative: contingency use of public charging.	Moderate	Facilities / Operations

14	Scheduling	Inadequate alignment between charging and duty cycles	Fleet utilisation	Medium	Administrative: telematics data analysis, smart scheduling; Substitution: maintain limited ICE backup pool	Low	Fleet Operations
15	Training and Knowledge	Operator unfamiliarity or misuse of EVs	Drivers, Mechanics	Medium	Administrative: EV driver and mechanic training; Engineering: in-vehicle prompts; Administrative: refresher courses	Low	HR / Fleet Training
16	Culture and Change	Employees resistance, bypassing EVs for ICE vehicles	Council workforce	Medium	Administrative: change management programs, policy enforcement, leadership communication	Moderate	HR / Leadership
17	Cybersecurity	Charger or telematics system hack causing downtime or data loss	IT systems, Operations	Medium	Engineering: secure software, fail-safes; Administrative: updates, firewalls, manual fallback protocols	Low	IT / Fleet
18	Service Change	Service changes render charging infrastructure solution not fit for purpose	Council service delivery	High	Engineering: ensure sufficient headroom for an expansion of services of 10-20% for highest power usage categories i.e. Trucks	Low	Infrastructure Projects
19	EV Maintenance	High-voltage exposure during servicing	Mechanics	High	Isolation: shut down HV system, lock- out; Administrative: EV-trained employees only; PPE: insulated tools and arc-rated clothing	Low	Fleet Maintenance / WHS
20	EV Incidents	Battery fire/thermal runaway in vehicle	Drivers, Public, Assets	High	Substitution: prefer LFP chemistries; Engineering: fire detection/suppression; Administrative: emergency response plans; PPE: lithium fire kits	Moderate	WHS / Emergency Services
21	Depot Safety	Charging station electrical fire or explosion	Depot employees, Contractors	High	Engineering: certified installs, fault shut- offs; Administrative: inspections; PPE: fire	Low	Facilities / WHS

					extinguishers; Isolation: charger separation zones		
22	Vehicle Operation	Quiet operation and high torque causing accidents (pedestrians, sudden acceleration)	Public, Drivers	Medium	Engineering: acoustic vehicle alerting systems; Administrative: defensive driver training, signage at depots	Low	Fleet Operations
23	Environment	Damaged batteries leaking electrolyte	Mechanics, Environment	High	Isolation: quarantine damaged EV outdoors; Administrative: licensed waste disposal; PPE: chemical-resistant gloves, goggles	Low	Fleet Maintenance / WHS