ZEV INTEGRATIONS
ENABLING ZEVs NOW

Whitepaper

COUNCIL FLEET EMISSIONS REDUCTION PLANNING

Building a Plan for Success - setting the foundations to a de-risked and lower cost transition for council transport assets.

December 2024

Contents of this Whitepaper

This whitepaper provides actionable advice to help councils navigate fleet decarbonisation, based on real-world experience from dozens of successful transition plans.

It discusses:

- Why Council needs to plan for the transition to an electric fleet, now.
- What are the trends in the vehicle market.
- How the industry is ready to support council applications.
- How to plan for the transition the simpler way.
- Addressing the concerns around; risk, practicality, environmental factors and operational change
- The realities of several typical barriers faced by council fleets in their transition away from CO2 emitting fossil fuels.

Who this Whitepaper is for:

- Council sustainability managers and officers
- Council fleet managers and co-ordinators
- Council asset and capital works leaders
- Council senior leaders

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1. Introduction

As local governments commit to reduce their carbon emissions and mitigate climate change, transitioning to a low-emission fleet is fast becoming a critical element of council sustainability strategies. With transportation accounting for a significant portion of greenhouse gas emissions, councils have a unique opportunity to make a meaningful impact by adopting cleaner, more efficient vehicle technologies.

However, navigating the complexities of fleet transition can be daunting, particularly for councils with limited resources and expertise. To access government incentives, meet evolving regulatory requirements, and unlock the economic and environmental benefits of a sustainable fleet, councils must first establish the foundations for change and develop a robust transition plan.

It is common for sustainability and fleet/asset managers to be at the centre of developing Council's transition plan and it can be daunting. With new topics to learn and challenging information to navigate it certainly leaves the best of us with a steep learning curve.

Within this guide, we provide a structured framework, practical tools, and expert insights to develop a successful fleet transition plan that suits your fleet and council governance procedures. By following this guide, councils can avoid some pitfalls and take steps towards a more sustainable, efficient, and cleaner fleet. It will also save time and money in developing your plan.

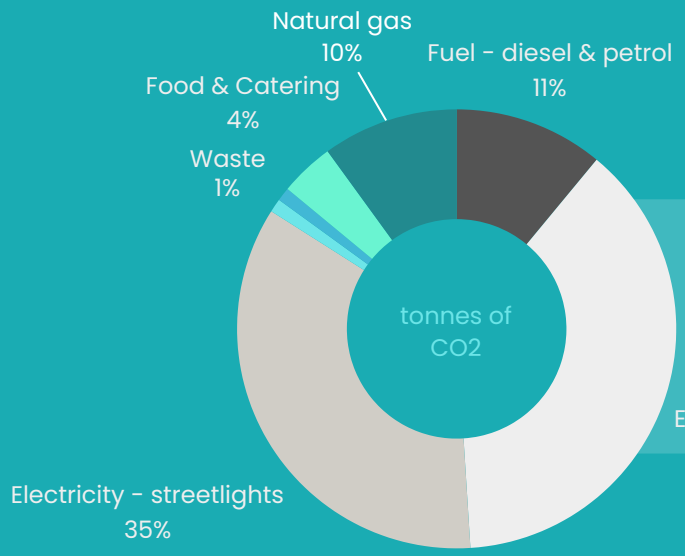
2. Why Councils Need a Fleet Plan

Councils face the need to decarbonise across their operations with Councillor Resolutions, both Commonwealth and State Net Zero legislation and community expectation driving change. As Councils address their Scope 2 emissions from electricity, Scope 1 emissions from operational fleets become one of the greatest sources.

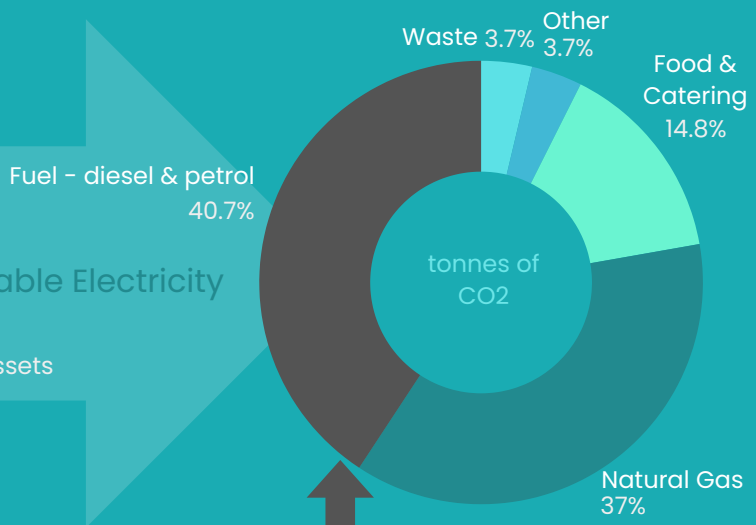
Most Councils are reducing their electricity emissions with power purchase agreements (PPAs), often reducing their original emissions baseline by over half. As can be seen on the below right graph, this leads to the Scope 1 emissions from fleet fuel becoming a top emissions category.

To meet Net Zero commitments, fleet emissions must be addressed and a transition to electric vehicles charged with renewables can be a viable pathway. Councils need to start planning now to begin the transition to low carbon fleet. Typically Council cannot make change without supporting resolutions and a plan being approved. This whitepaper can support the development of that plan.

Typical Urban Council CO2 Emissions Baseline with Grid Electricity



Typical Urban Council Emissions After Renewable Electricity Procurement



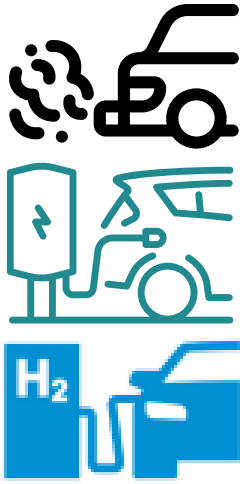
True fleet emissions reductions can be achieved by avoiding vehicle use, shifting to lower carbon modes, improving efficiency or lastly switching to low or zero emissions fuels - electric vehicles on renewable energy is the solution after initial efficiency is achieved.

Emissions-Reducing Powertrain Technologies

As councils transition to a low-emission fleet, understanding the various powertrain technologies available and their acronyms is important. The primary options include:

- Internal combustion engine (ICE) vehicles : the incumbent technology that typically run on petrol or diesel and emit exhaust from a tailpipe.
- Hybrid Electric Vehicles (HEVs): Combining internal combustion engines with electric motors, HEVs reduce emissions and improve fuel efficiency by about 25% in most applications.
- Battery Electric Vehicles (BEVs): are powered solely by electric motors and rechargeable batteries, BEVs produce zero tailpipe emissions and offer significant operating cost savings.
- Plug-in Hybrid Electric Vehicles (PHEVs): use an ICE and a small battery that can be externally charged to provide hybrid power.
- Hydrogen Fuel Cell Electric Vehicles (FCEVs): Using hydrogen to generate electricity, FCEVs emit only water vapor and heat as exhaust.
- Electric Vehicle (EV): Refers to BEVs, PHEVs and FCEVs

Each powertrain technology has its advantages, disadvantages, and suitability for different fleet segments or tasks. A balance of practicality, emissions reduction potential and cost will need to be struck on each vehicle in the fleet to determine the most effective solution for Council's fleet. This is explored in section 5 of this paper.



The Benefits of Zero Emissions Vehicles

There are many benefits from the use of zero emissions vehicles, particularly when charged with renewable energy. The Commonwealth Government's National Electric Vehicle Strategy outlines these benefits in more detail.

The benefits are particularly impactful for local government with benefits to amenity through reduced health impacting pollutants of several types. The inherent efficiency of EVs is core to delivering these benefits and reducing the energy required to carry out tasks.

The issues that these benefits overcome are often externalised, meaning others pay for the damage that is done. These costs should be factored into fleet transition plans and decision making. This is outlined further in section 5 of this paper.


Greater efficiency


Quieter inside and out

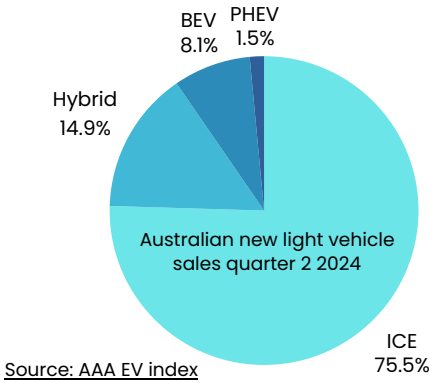

Energy independence


Reduced air pollution


Carbon emissions


Safety by design

Australian EV sales and infrastructure is racing ahead



Source: AAA EV index

Light Vehicle Sales

Australian light EV sales have doubled each year since 2018 and in 2024 there has been a tempering while still growing.

Plug-in vehicles (BEV and PHEVs) sales are near 10% of all light vehicles. Fringe benefits tax exemptions for most plug-in vehicles has certainly boosted private business and novated lease purchases.

The market continues to mature with many new EV focussed brands entering the Australian market.

New light vehicle sales 1st half 2024

- Norway 91.9%
- China 35.2%
- UK 24.7%
- USA 9.2%

Source: PwC 2024, Electric vehicle markets analysis

Plug-in light vehicle sales around the world continue to increase at different rates depending on incentives, model availability and conditions.

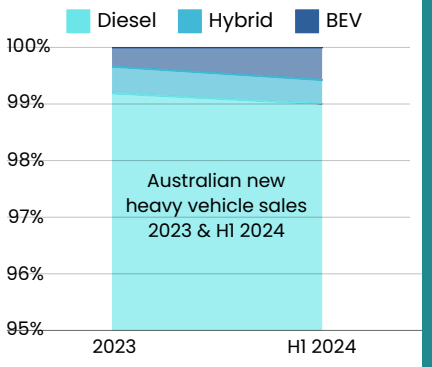
The figures for each country to the left represent plug-in light vehicle sales share in the 1st half of 2024. Norway has reached effective saturation while China adds over 1 million new EVs to its roads each month. The UK follows major western European markets at around 1/4 of new sales being able to charge externally. The USA has a similar uptake to Australia despite a very different landscape to the EV market.

Heavy Vehicle Sales

99% of new Australian heavy vehicles remain fully diesel powered. Hybrid trucks have made gains in the light truck segment. Battery electric trucks are starting to be offered in more segments and offering competitive payloads.

Combined low and zero emissions trucks are now at 1% sales share. The majority of electric trucks have been sold in the under 8t GVM classes but 15t GVM and prime movers are now available.

Freight fleets have now tried and tested electric trucks with challenging tasks and payloads which can provide Councils with confidence they are up to the task



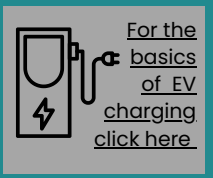
Source: TIC T-Mark data

EV Infrastructure is wide spread

There are now over 1,000 fast charging plugs installed across Australia. They connect all major routes and are spread across our cities.
The charging gaps of 2018 are resolved and longer trips are very achievable for most routes.

Some of the installed fast charging can support light trucks but large heavy vehicle compatible sites are yet to be rolled out.

Public charging can offer a backup to council fleets but it should not be relied on for the majority of charging and dedicated access should be planned.



For the basics of EV charging click here

Source: Plugshare.com, gathered November 2024

How a purchasing decision now may affect your emissions goals in 2030 and beyond?

When purchasing a vehicle for the fleet, its in service operational emissions may not be directly considered. In some cases with cars a more efficient vehicle may be chosen but in trucks it is not easy to compare models.

Most Councils buy trucks for between 6 and 10 year ownership periods. This means that new truck purchasing decisions made now have emissions consequences in the future. Buying a new diesel truck today will lock in those operational carbon emission depending on the truck's size, use and life in fleet.

The following are the typical range of emissions by vehicle size based on the typical fuel consumption a truck this size would use in Council ownership of 6-10 years :

- Light diesel tipper truck 45-125t CO2e
- Medium diesel tipper truck 90-152t CO2e
- Large diesel tipper truck 106-177t CO2e

A truck added to the fleet in 2025 may be in the fleet in 2035 and put pressure on the emissions reductions targets resulting in the need further offsetting and additional cost.

Electric deployments of all kinds

Electric truck models are available in many segments and being applied to many applications across Australia. Trucks of all sizes are being built with different bodies for various tasks and operating across the nation daily. The 4.5t to 15t GVM classes are well represented and 23t GVM rigid trucks have become available. Prime movers are now hitting the road in local applications, typically depot to depot tasks.

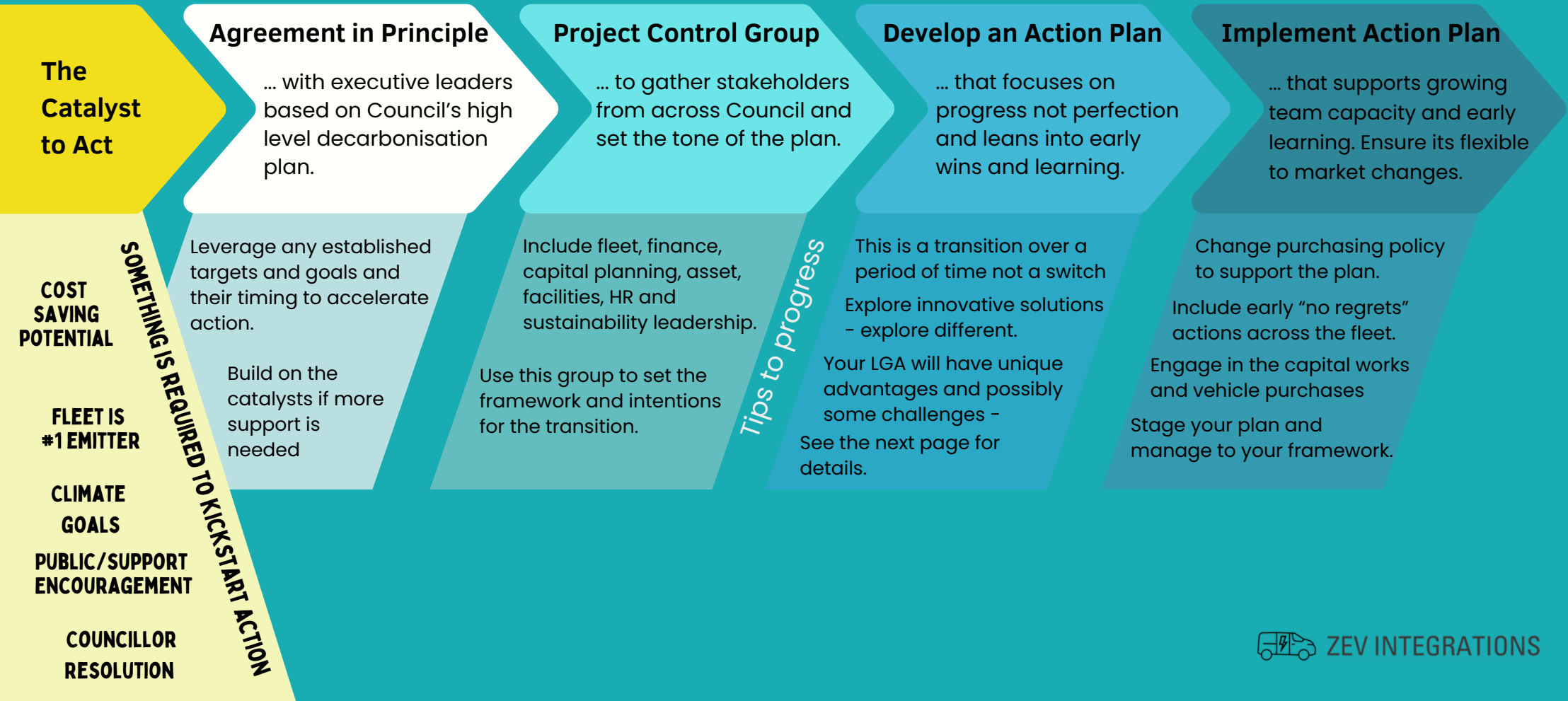
The market has changed a lot since 2018-2020 with credible choices of all sizes coming with the latest safety, technology and long warranties.

What are the stages Council needs to progress for a successful transition?

This diagram lays out the five steps essential to address for a fleet decarbonisation plan. A successful plan will address each in order, skipping steps will stall adoption and hinder engagement with any pilot vehicles.

Councils are governance based organisations with layers of consensus and decision making to be navigated. Council cannot make a change from the status quo unless a specific process is followed and approval provided. Especially where a change may have perceived or actual greater risk, financial or operational impacts.

Before embarking on developing a plan or considering a pilot vehicle, council needs a catalyst to act and initiate change. Council's catalyst can come from several factors and often a combination of them will galvanise support to progress. With drivers for change established you can proceed with the planning process. The process is a transition not a switch to new vehicle types, ensure your plan is adaptable.

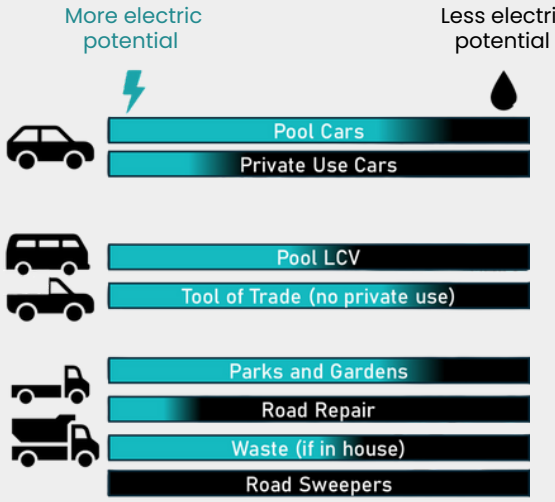


Councils have unique opportunities that support EV adoption - What are yours?

Councils have certain attributes stemming from their operations that support EV adoption that other fleets may not benefit from. These unique advantages can offer greater benefits to the business case and operational adoption of an EV. When developing your plan consider how these may reduce perceived barriers to adoption and encourage earlier uptake.

Advantages may include:

- Councils have long term strategies and can amend ownership periods to maximise EV total cost of ownership.
- Council's fleet operates mostly inside LGA in predictable patterns.
- Many vehicles operate a predictable roster e.g. parks & gardens, mowing, cleaning
- Depots and sites are owned and controlled by Council with very knowledgeable capital works teams to support upgrades.



Indicative potential to transition each example fleet segment today

The graphic above reflects the relative electrification potential of different Council fleet vehicle types. This considers the typical model availability, charging requirements and parking locations of these types of vehicles.

A Transition Not a Switch

Council fleets are complex with many "mini fleets" within the fleet, from cars to trucks (of all sizes) to plant and equipment. The transition plan needs to consider each cohort separately, addressing technical suitability and transition feasibility for each.

Some segments like pool cars, tool of trade commercial vehicles and parks and gardens vehicles are more likely to be compatible to transition now. Larger road sweepers with their high energy and mass requirements are not likely to be suitable for electrification in the near term.

Segments of vehicles will become more viable to transition as the market matures, offering greater capabilities and total cost parity. The reality is that no council fleet could be completely transitioned to zero tailpipe emissions fuels in 2025. More challenging tasks will see suitable models become available later this decade and into next.

Council should develop a plan with this in mind.

Tip:

Don't let the barriers impacting the most challenging vehicles hold back progress on segments that are suitable for transition now.

Case study:
Experience of a Council navigating change

MANNINGHAM

Background

- Manningham Council is situated around 20km WNW of Melbourne, Victoria and has a mix of urban and rural suburbs.
- In 2021 Council adopted climate mitigation targets that include achieving carbon neutral council operations by 2028.
- This resolution was the catalyst for the development of the fleet decarbonisation plans and associated action across the board.
- Council has recently procured 100% renewable electricity to complement solar installations on their buildings.
- In 2021 Council commenced their fleet transition with light vehicles and have since replaced early examples with newer EVs and added a light truck to the fleet (see lower right).

Planning the change

- Following the resolution, early decision forums agreed new purchasing policies that have driven EV purchases across the fleet.
- Council runs a 20 year fleet replacement plan that supports a 10 year budgeting cycle. The nearest 5 years of the fleet plan is more fixed and the future remains flexible to meet changing needs.
- The planning phase was not arduous, it focussed on the needs of council with effort on developing supporting purchasing policy and business cases to meet climate action goals.
- Heavy vehicles have been investigated with several models considered - fleet team focussed on identifying where a suitable model would fit.
- Engaging staff with EV experiences and pilots have been shown to be the most effective change management tool.

Learnings and insights

- Planning doesn't need to be extensive with the right rules in place.
- Some staff have fixed beliefs about EVs and it is difficult change them when you are fighting social media - these people may never change.
- Yet there have been many staff that had not imagined taking on an EV only to spend time in one and not look back.
- In recent years many more models have become available for all segments offering practical and financially acceptable solutions.
- Council has now achieved 95% electrified light vehicle fleet and experienced one purchase cycle of EVs with good residual value results.
- *One piece of advice*: Give it a go, just put one EV in your light and heavy vehicle fleet where it will fit and learn from the experience.

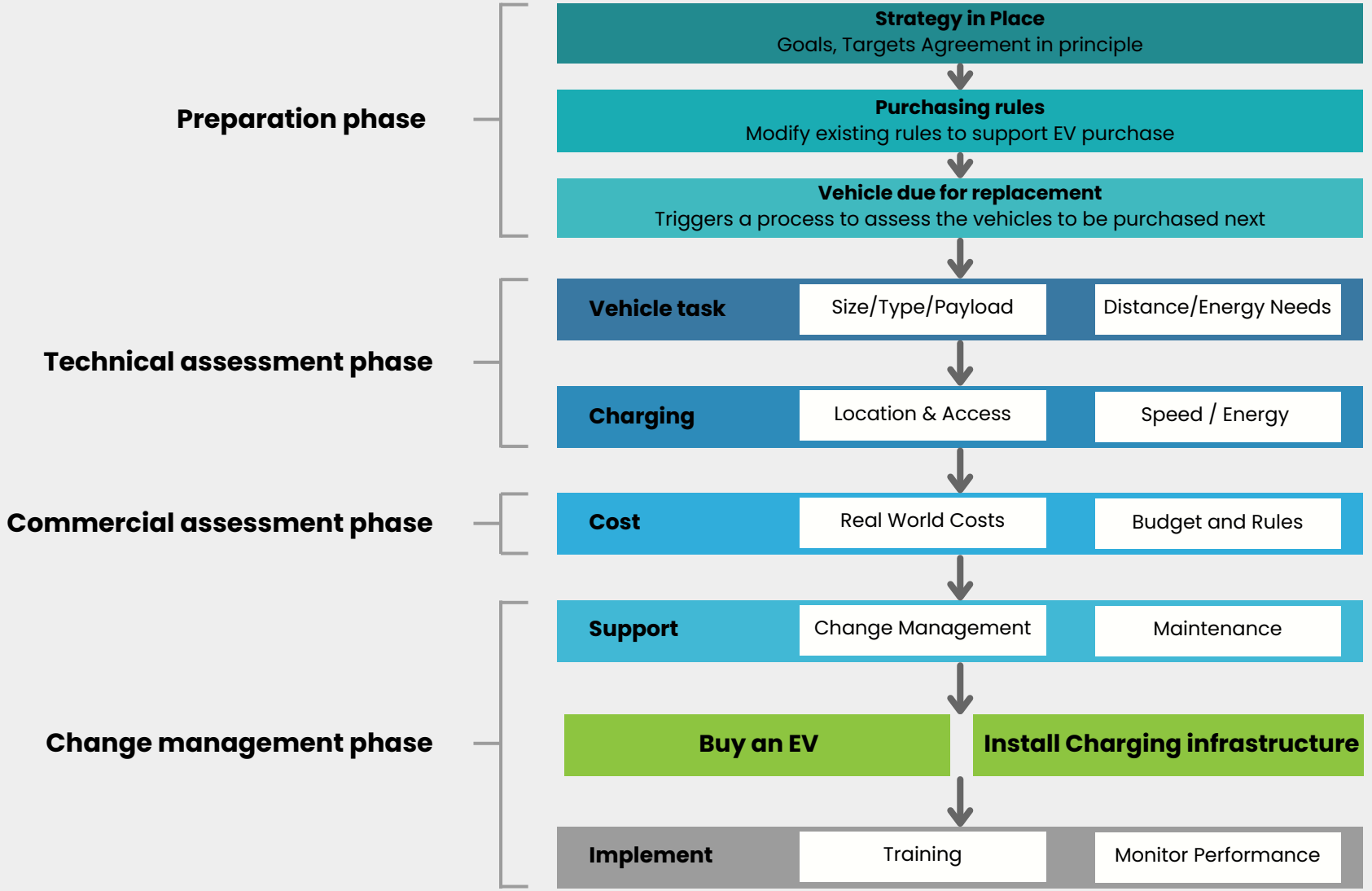
Manningham Council's latest EV addition,
Foton T5 parks and gardens tipper

Thanks to Adrian English-Russell, Fleet Co-ordinator for his insights on Manningham Council's EV journey.

Your path through the plan

The path though a streamlined plan is outlined below. The process is somewhat linear where the strategy needs to precede all other elements however, there will be times where you may need to return to an earlier step and iterate. An example is where a purchasing rule is found to preclude an EV purchase when assessing the cost such as a capital cost limit or shifting a vehicle size class for a task to access an EV. This process can be used for each single vehicle or in bulk for a group or class of vehicle which is more effective.

Each of these phases are explored in the following section.



Preparation phase:

Strategy in Place
Goals, Targets Agreement in principle

→

Purchasing rules
Modify existing rules to support EV purchase

As mentioned earlier, It is imperative that Councils strategy and permission to proceed with fleet transition planning be in place before engaging in vehicle or charging purchasing or testing.

To recap, the process to obtain agreement to proceed will likely include:

- Use a catalyst from climate goals and councillor direction to,
- Drive a an agreement in principle from senior leadership to proceed working on a transition plan to,
- Form a project control group to steer a working group in development of a plan.

This will provide a foundation for the assessment and plan to be developed and ultimately accepted.

Council will have rules for the purchase of vehicles, plant and equipment. These may have been in place for many years, will include very practical guidelines and sometimes a few odd elements that may have crept in. Traditionally councils have had caps on luxury elements, purchase price and the existence of fleet discounts.

EVs are more expensive to buy but typically cheaper to run so where an upper price limit exists it may preclude the purchase of a competitive model. You will need to review all rules to see if they hamper EV purchase.
Equally you may look to adopt new rules to support EV adoption such as internalising externalities, creating targets by milestones and using programs like VESR to drive benchmarks.

Rules supportive of zero emissions vehicle procurement:

- Internal value placed on carbon and other pollution
- Minimum standards for vehicle emissions, for example minimum star rating on the Vehicle Emissions Star Rating
- Fleet volume or percentage targets by specified dates
- Fleet emissions target by specified dates
- Cost decisions based on total cost of ownership

Rules that impact zero emissions vehicle procurement:

- Capital cost limits applied to vehicle purchases
- No fleet discount offered means no purchase
- Excluding vehicles from some brands or countries of origin for historical reasons
- Features included in the vehicle as standard considered to be to luxury

Whatever Council's approach is, the rules will likely need amending to support EVs.

VESR® Vehicle Emissions Star Rating

Compare vehicle emissions and running costs with VESR. Developed by the NSW Government and adopted by all Australian jurisdictions, this rating tool helps you choose cleaner, more cost-effective vehicles for reduced environmental impact.

Preparation phase:

5. What is in a plan

Vehicle due for replacement
Triggers a process to assess the next vehicles

The centre piece of Council's transition plan is likely to be a planning spreadsheet based on the existing fleet replacement tracking file. this file typically offers detail of the vehicles in the fleet with replacement dates, specifications and some cost tracking data.

The EV transition plan can simply be an extension of the fleet replacement file with more columns to assess and capture EV specific elements.

Data like distance travelled can be calculated to offer insight on the average kilometres travelled on a 5 or 7 day basis as an indication of range requirements. Its not perfect but a good guide.

Other prioritisation factors such as the estimated carbon emissions related to the fuel the incumbent model has emitted could be included to focus limited funds to the best achievable abatement opportunities.

Gathering your research and data in this one file allows deeper analysis and graphical insights for any report that needs to be presented to senior leaders. Progress can also be tracked throughout your transition with trends on costs, pricing and use all in one place.

The home base location of each vehicle is important to define charging requirements.

On the simplest level this provides a volume of charging required to support vehicles over a time frame, at each location. Get granular for better resolution on this assessment by adding vehicle energy requirements per day in kWh to calculate speed and time of charge required.

Grouping car or truck types in segments of size or type of body or activity they carry out will assist with finding appropriate EV models. Use segmentation to average out the costs and behaviour to save time on assessing each individual vehicle.

The example below explains these points.

Typical data in a current replacement spreadsheet

Estimate vehicle parked time for charging

Obtain real world data

Divide day energy by resting hours for minimum charge speed. Assess max day also.

Current Vehicle	Segment	Dept	Replace timing	Home base	Odometer	Daily km avg	Min Resting hours	Lifetime CO2 estimate (t)	EV est consumption kW/100km	Energy per avg day kWh	Daily Charge rate kW	Total cost assessment
8t cage tipper	4.5-9t truck	Parks	Nov-24	Depot	50560	62	12	120	40	24.8	2.1	Include all estimated cost vs incumbent segment and compare
Mayor's car	Med Sedan	Mayoral	Dec-24	Town Hall	25235	25	6	8	15	3.75	0.6	
Plumbers van	Large van	Facilities	Jan-25	Depot	35870	43	14	42	25	10.75	0.8	
HR manager	Med SUV	Staff car	Mar-25	Private	20455	104	8	15	18	18.72	2.3	

A sample of typical data on a replacement sheet

A simple division of km travelled to date over days owned, adjust for a 5 day use vehicle for range assessment. Consider maximum day also.

Estimate lifetime CO2 emissions to consider prioritisation and abatement. Use new CO2 factors

Calculate energy used from average day and compare to usable battery. Consider maximum day also.

Technical Assessment Phase:

Vehicle task	Size/Type/Payload	Distance/Energy Needs

Vehicle task:
The primary work of a vehicle dictates all subsequent assessments in the transition. Since fleets exist to perform specific tasks, understanding the vehicle's purpose and requirements is crucial. The task of a vehicle is typically a combination of how far it needs to go and what it needs to carry. These requirements drive the size and payload and define the energy the vehicle will need (battery size). When and where the work is carried out also informs the downtime and charging location.
Time spent understanding and defining the task of a vehicle is seldom wasted in an EV transition, it will often lead to innovative options opening up for vehicles and save costs.

Size and type of vehicle:
Council fleets are diverse as are the tasks they carry out. Segmentation of the fleet is the first step to refining requirements.

Cars are typically simple to segment with industry definitions and model groups well understood. Cars have grown larger over the years and this may have led to models recently purchased being larger than really necessary for the task.

Tip: Consider shifting to a different car segment to find a suitable EV model.

Trucks are more complex with not just gross vehicle weight (GVW) but body type defining the type of vehicle required in the transition. Some trucks will need to tow equipment and have specific payload requirements. Review the true requirements of your vehicles, test them for "nice to have" or "must have" attributes. Include these in your requirements for electric trucks as you approach the market. Be as specific as possible, include fine details but also consider if an EV would remain appropriate without this attribute.
Flexibility is key to finding appropriate EVs but they must do the job they are specified for.

Distance/Energy Needs:
EVs have batteries that store the energy for the task to be carried out. Consumption, like a petrol or diesel vehicle, is measured as energy used over 100km of driving. In an EV, the units for consumption are kilowatt hours (kWh) / 100km. To calculate true range of an EV, the usable available battery energy stored is divided by the consumption. Not all of the energy in the battery is accessible, ensure this is considered in your assessments. Ask the vehicle vendor for accessible or usable energy and real world energy consumption of their models.

The task defined (discussed above) should provide a distance required to be driven between charging opportunities (typically in a shift). Distance multiplied by the real world energy consumption will estimate the energy the vehicle will need replenishing when charging. This value of energy divided by the time available to charge provides the minimum charging speed the vehicle requires.

These energy focussed equations are simple and provides all you need to define charging requirement. Aggregate the energy requirements per site (or part there of) and consider the maximum for a vehicle at the site to set the bounds of the charging requirements.

The equation to use when considering how much energy a vehicle will use during an task or shift is:

Distance travelled x consumption rate = energy required in kWh

To work out the speed or rate of charger a given vehicle will need to replenish after a task or shift is:

Energy required / hours available to charge
= minimum charge rate in kilowatts (kW)

Technical Assessment Phase:

Charging | Location & Access | Speed / Energy

Council staff naturally have a lot of questions about charging infrastructure during the electrification transition. Starting the transition with charging infrastructure can lead to costly missteps. Instead, focus on understanding your fleet's operational needs first. The task, vehicles and energy to be replenished drives charging requirements, and must be defined first.

A well calculated fleet replacement plan will provide the volume of chargers to be installed at which site on what timing. As detailed on the previous page, the rate or speed of charge comes from the vehicle energy requirements. Approaching the market of charging infrastructure providers with this data will provide Council with good cost indications.

Building and grid energy access are likely to be the greatest challenge for Council's when installing larger numbers of chargers. All sites will reach a limit of energy available at some point and every situation will be different. EV chargers can be dynamically managed via software to increase their utilisation of energy connection and should be used at all sites.

Engage charging providers for more information on options and choices.

More detailed insights on charging are included in section 6 of this paper.

A flexible option for trucks and plant

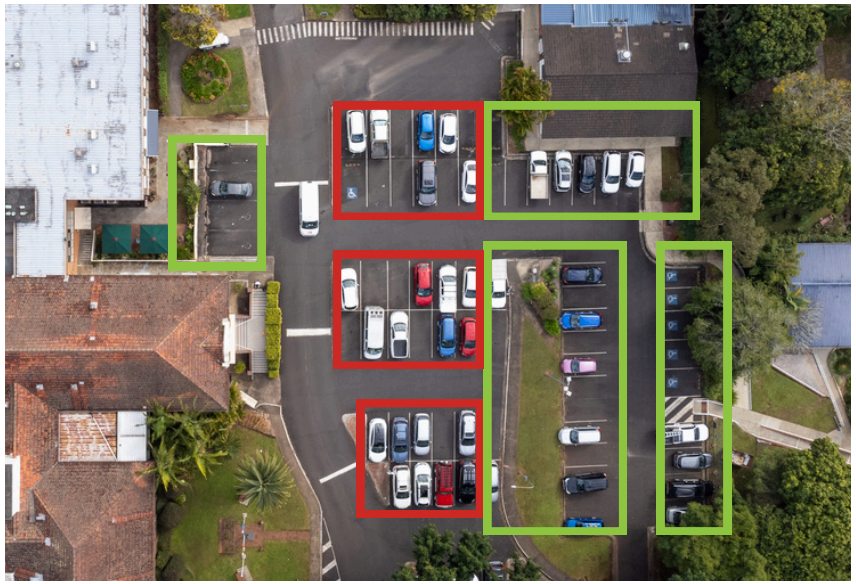
Mobile chargers that connect to established 3 phase outlets can offer low impact, fast (~20kW) and flexible solutions that support pilot deployments.

Consider procuring a mobile unit to support early adoption and back fill sites with permanent charging once optimal site layout is clear. The mobile charger can then be redeployed to another site for the next pilot deployment.

Tips for locating chargers:
Charging units require access to energy drawn from onsite switchboards and need to be mounted adjacent to vehicle parking. Minimising cable running lengths, civil works (like trenching) and mounting infrastructure will reduce costs.

The carpark (below) shows areas where charging is typically easier and lower cost to install (GREEN). These are around the edges of carparks and next to walls and buildings. Parking spaces where charging is typically more expensive, disruptive to install and likely result in more damage to equipment and vehicles are unbounded (RED).

As Council transitions the fleet and matches new EVs to charging solutions, consider the near and long term impacts. Choosing locations in green zones will save costs in the near term and support a significant proportion of the transition



Commercial and change phases:

Cost	Real World Costs	Budget and Rules

Cost is clearly an important factor in the transition to EVs. Budgets are typically tight and the perception of EVs being expensive can be enough to cast doubt. All fleet transactions should be considered over the life of the vehicle using real world costs and energy consumption. This later factor is often overlooked or undercalculated. Calculating light vehicle fuel use and cost from government tests will under count use by between 9-20% according to the Australian Automobile Association (2024). In Council fleet assessments a difference over 30% can be routinely observed due to operational differences.

Real (not tax calculated) depreciation of a vehicle is typically the greatest component of total cost of ownership (TCO). The end of ownership value can only be estimated at the beginning of the vehicle ownership period and historical data can support as a guide. As EVs have little historical used value records and those that do exist are of very early models, a pessimistic position can be taken, quickly challenging the case for an EV. In developing your cost model consider taking a balanced view of residual value of an EV. A value of 50% from retail price after 4 years is not uncommon for EVs but it is model dependent.

Other elements to consider including in the cost model include (with links to some resources on pricing or process to do so):

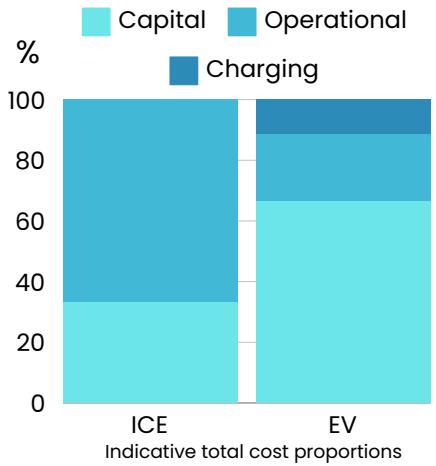
- Carbon offsets or pricing
- Actual fuel costs
- Electricity prices
- Fringe Benefits Tax
- Forward fuel price trends
- The health cost of pollution
- The cost of noise pollution on amenity
- Actual ICE maintenance costs
- Residual values anomalies
- Any insurance differences

It is important to obtain up to date pricing indication for both cars and trucks. ***A lot has changed in the market with new entrants, better products and greater competition since 2020***. Prices on some car models have dropped more than $15,000 and truck prices are around 20% lower than models from the turn of the decade. It is important to be up to date with the latest trucks and cars available in the market.

The cost tables will turn

In general, EVs flip the mix of capital and operational costs compared to ICE vehicles.

- Cars are the same up to 2 times the capital cost on vehicles with savings though running costs
- Truck capital costs are between 1.5 to 3 times depending on size and body style
- Charging costs will factor into the total cost of an EV but can be amortised over 8 years supporting more than one vehicle term.



Indicative total cost proportions

Support	Change Management	Maintenance

Supporting stakeholders will de-risk the transition and it is critical to its success. Change can be difficult and the transition of the fleet away from traditional fuels will be one of the most impactful change for fleets in decades. Taking council teams on the journey is important to support adoption and benefit from the attributes EVs offer. Its common for barriers to be raised when discussing EV adoption, often they can be addressed with information and experience, building capacity for change. This may include:

- Engaging in drive events
- Survey stakeholders
- Running Q&A sessions
- Publish insights in newsletters
- Directly address areas of concern

Ensure your plan includes opportunities for teams to ask questions and get support to answer them. Stage these engagement points throughout your transition.

Maintenance will see change but the extent and timing depend on Council's rollout. More detail on the changes with maintenance can be found in the realities section later in this paper. For planning, the main focus will be on stakeholder engagement and considering the current approach to new and early life vehicles that are under warranty. Consider the engagement Council workshops will have with any EVs entering the fleet.

Commercial and change phases:

Buy an EV

Buying EVs is both the same as buying ICE vehicles and different. Many EV manufacturers in Australia have different fleet and dealer arrangement to traditional brands. This may need adapting to as you navigate the purchasing process, it can often lead to a far more seamless experience.

Lead times have reduced for many models compared that experienced in the early 2020's, check with vendors for the current reality. Dealers will be keen to work with you to find the right vehicle so be specific on your needs. In some cases you may find yourself very well informed about the models you are considering and lead the engagement with the vendor.

Keep across the consistently changing grant and support programs that are made available from State and Federal Government agencies.

Install Charging Infrastructure

The charging infrastructure industry is very mature and ready to serve Councils. There have been thousands of chargers installed by what seems to be hundreds of providers in all types of scenarios across Australia. They will have solutions of staff at home charging as well as for depot and offices.

There are many reputable providers that Council can tender services from. The extent to which Council wishes to carry out civil or preparation works is up to the project manager and charging vendors will work with any determined requirements.

More information about charging is available on the next page.

Implement

Training

Monitor Performance

Train and support the workforce into your new vehicles and charging arrangements. Each new vehicle will need to be handed over to the end users, simply handing them the keys will greatly increase the risk of rejection. EVs only have one first chance to impress and this handover point will likely be that moment for many.

Consider running familiarisation sessions with users ahead of deliveries to allow time for information to soak in. Include familarisation with charging as this is newest aspect of operating an EV and can be one of the most satisfying benefits when the user is comfortable. There can be a significant perceived learning curve and low confidence in the beginning but experience and information is the remedy to de-risk adoption.

Continue engagement after delivery. It is best practice to monitor EV use in the first weeks up to 6 months. If telematics data is available on the vehicle, simply looking for kilometres travelled or daily activity in line with the task will suffice. Direct discussion or check-ins with users also protects utilisation and any early user challenges. Post adoption surveys are best practice to assist with sculpting future EV rollout though learning from users.

It is often the case that EVs become the vehicle of choice for a task where several can be chosen but on occasion EVs can be left as the last choice. There are many reasons this may happen including change itself. Best practice is to monitor activity in line with expectations and consider the success of the deployment while addressing technical or operational issues holding back the EVs potential.

The realities about... Energy and charging

Charging for EVs will be a new topic for many Councils when exploring their transition and there are many questions surrounding the topic.

The purpose of charging is to replenish energy to an EVs batteries after the vehicle has consumed it while driving and operating. The time a vehicle needs to charge is a function of the amount of energy that needs to be replenished (kilowatt hours) and the speed of charge (kilowatts).

A typical charge rate from a wall mounted AC device like that pictured (left) is 7kw and a typical battery size of a light vehicle or light commercial is 70kWh - this results in a 10 hour charge time for a full charge. Matching each vehicle's charging window to its downtime parked at your depot is the best approach for Council fleets.

Many council sites will be constrained by the amount of energy they can spare for vehicle charging but the important question is "to what end?" How many vehicles could be served on the site before upgrades are needed and to what degree could dynamic load management increase this capacity.

Dynamic charging management varies the rate of charge to keep within the constrained current availability and increase the number of vehicles that can be supported at the site, often by four times.

Upgrades to energy connections or older wiring maybe unavoidable and will often be an added cost to consider. Grid upgrades can delay transition of vehicles so early identification of constraints is valuable

It is common for fleets (including councils) to desire faster charging than required. Faster is more expensive and often unnecessary and it has resulted in some projects stalling.

As mentioned in section 5, the location of Council's charging will also have an impact on costs. In early deployments cost effective mobile DC chargers that use 3-phase wall plugs offer flexibility and mobility as the new vehicle settles in to operations.

5 Charging Tips

01

Fast as necessary, slow as possible

Fleets often get drawn into over specifying charge speeds for "but maybe one day" but that is costly. Design charging to the vehicle task.

02

Rearrange to save

Car parking arrangements may be historical or convenient but fitting charging equipment to points in the middle of the a carpark is expensive. Use the edges and walls to start and consider rearranging the layout.

03

Stage your rollout

Charging is there to support EVs, timed to roll out with the fleet. There is little benefit in having 2 chargers per vehicle for years. Consider the civil works as one project.

04

Managing loads and costs

Some Councils will have peak energy costs calculated in their electricity tariffs, managing the time of use of EV charging will impact these costs.

05

Separate Council and Public

Some Councils look to support public EV charging, and that's fine but it is not good practice to share public and depot fleet charging, there are too many conflicts.

The realities about...

Practicality

EVs offer numerous practical benefits for council fleets, enhancing operational efficiency, reducing costs, and improving sustainability.

Operational Efficiencies

- *Reduced maintenance*: EVs require less maintenance, with fewer moving parts.
- *Low centre of gravity*: providing safer dynamics with low rollover potential.
- *Greater space and storage*: with under bonnet storage and more leg room
- *Improved driver experience*: EVs provide smoother, quieter operation.

Cost Savings

- *Lower fuel costs*: through efficiency and energy cost often offsetting capital costs.
- *Minimal brake wear*: Regenerative braking enables 6-10 times reduced brake wear.
- *Lower maintenance costs*: less work results in decreased labour and parts expenses.

Sustainability and Environmental Benefits

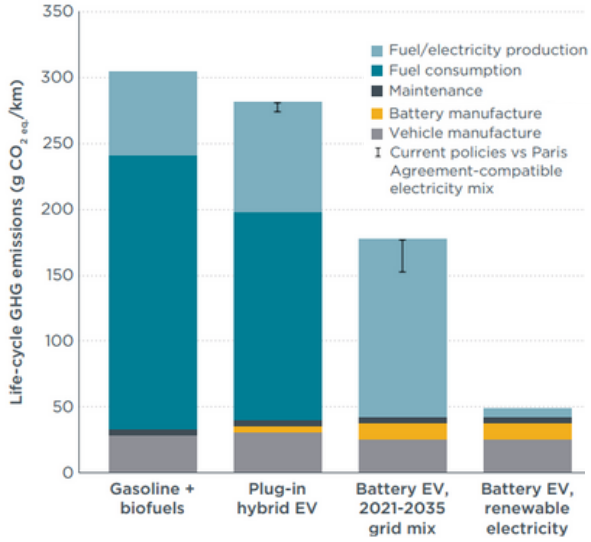
- *Zero tailpipe emissions*: EVs offer reduce air pollution and greenhouse gas emissions.
- *Utilise Renewable energy*: leverage solar or wind power for charging to decarbonise.
- *Noise reduction*: EVs minimize noise pollution, improving urban amenity.

Environment

EVs always offer a CO2 saving from their operation even from grid power, typically a 20-30% saving. Clearly, using renewable energy offers zero emission potential but often the discussion turns to manufacturing emissions.

The chart below extracted from an ICCT Life Cycle Analysis on Chinese built and operated vehicles shows their "cradle to grave" cycle. The Chinese market is most similar to Australia in the study with an equivalent high carbon intensity electricity grid (680g/kWh) and that many EVs in Australia are built in China.

The study found that over the life of the vehicles, the EV charged on grid energy emits 34-46% less than an ICE vehicle. An EV contributes 84% less emissions when charged with renewables. These trends are consistent for light and heavy vehicles.



Life cycle emissions of an SUV in 2021 in China (most relevant to Australia), ICCT Global LCA white paper 2021

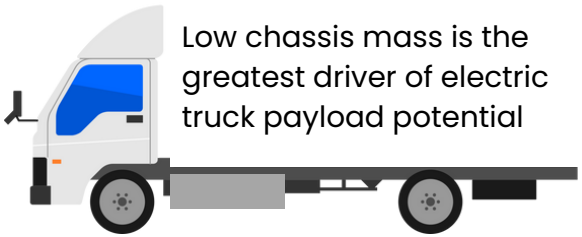
Payloads

Electric vehicles are typically considered to be heavier than their ICE equivalent and this is in some part true. Many light EVs are comparable to the ICE counterparts and the functional impact is usually operationally inconsequential.

Commercial vehicles however are more sensitive and will require analysis. Not all electric trucks on the market weight the same despite having a similar size, Gross Vehicle Mass (GVM) and battery size. The difference can be as much as 20%.

When considering the payload and towing capacity of an electric truck it is best to start by considering the chassis or tare mass that represents the base mass of the truck and its GVM. This offers the total potential payload and body mass the vehicle has to work with. Bodies will differ and a light weight version is likely to be best for an EV. Battery mass can add more than 300kg to an EV chassis if not optimised. Derivative design can add a further 200kg.

When considering electric trucks, payload should feature higher on priorities than would typically in a diesel as the variation across brands and models is so great.



Low chassis mass is the greatest driver of electric truck payload potential

The realities about...

Risk

As with any transport mode there are risks to navigate and mitigate. Council will need to be aware of the potential risks and take a measured approach to those real and perceived. EV risks to consider include:

- **Fire risk:** Although EV battery fires are rare, occurring less frequently than liquid fuel vehicle fires, their severity can be higher due to toxic fumes and intense energy release. For accurate information and guidance, consult EV FireSafe, Australia's authority on the topic, providing training and risk management tools.
- **Infrastructure and Energy Capacity:** Greater EV adoption poses challenges to local grids and onsite electricity infrastructure. Early assessment of constraints and managed charging systems are key to managing risk.

Risks that get a lot more attention than they deserve include:

- **Battery degradation, recycling and waste management:** Accelerated degradation due to inadequate temperature management can reduce battery lifespan and overall vehicle performance.

To mitigate these risks, councils must invest in robust infrastructure planning, develop risk management strategies, and promote education and awareness campaigns to support a seamless transition to EVs. Effective risk management will be crucial in realising the benefits of EV adoption.

Maintenance

There are varying schools of thought on the maintenance requirements of EVs. Tesla broadly states that no regular service is required while most others have annual scheduled checks and minor interventions. Either way the service requirements for EVs are some 1/2 -2/3rds less than ICE equivalents.

Many Councils operate workshops who carry out vehicle maintenance and they will likely be able to continue this work. In most cases warranty or deep mechanical works are outsourced to dealers or specialists. Regular maintenance items can remain in the remit of the in house workshop.

EV safety and diagnostic training for technicians is now accessable in established trade colleges countrywide. Many EV service activities (tyres, suspension, lights etc) do not require specific training for a qualified technician to address.

In-House Maintenance Tips

- Audit the types of servicing activity the workshop currently carries out and consider those tasks in an EV future.
- Train technicians on safe engagement with EVs though TAFE or RTO course number AURETH101
- Review risk management and safety procedures to support safe engagement with EVs. WorkSafe QLD has good guidance on its website

Battery Life

Battery technology has changed for the better and issues with battery longevity experienced in early models is a thing of the past.

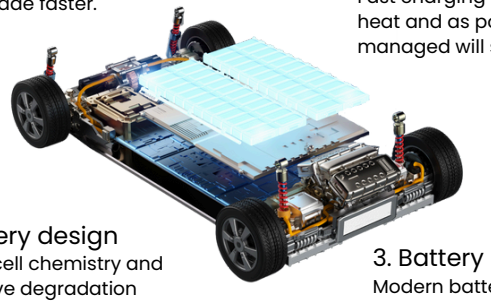
Battery degradation is mainly caused by internal chemical changes triggered by heat stress during charging and discharging. Effective battery temperature management is crucial to mitigate this issue. Fast charging has less of an effect on battery degradation that it did on early models.

All EVs come with at least 8 years battery warranty and their State of Health (SoH) can be tested through their life. If a battery is deemed no longer good for EV use (typically at 70% SoH) it can be repurposed in less intensive use applications like grid storage well before recycling is required. Many EVs have amased well over 500,000km on their first battery and still have years of use left in them.

What are the main effects on battery life?

1. Temperature
Batteries without active temperature management will degrade faster.

2. Charging habits
Fast charging will create heat and as point 1, if not managed will stress cells



3. Battery design
Battery cell chemistry and form drive degradation characteristics. It difficult to predict best and worst

3. Battery use
Modern batteries in EVs are good for about 3000 cycles that is at least 750,000kms

The realities about...

Training

All stakeholders engaged in the fleet transition will require some training, formal or informal.
To support Council's transition to EVs, a training needs analysis could be considered. The analysis would typically identify knowledge gaps and skills required for council staff, including:

- fleet managers
- operations teams
- drivers
- maintenance personnel (detailed earlier)
- administrative staff

Key training needs include EV technology, charging infrastructure, energy efficiency, and maintenance procedures.

An analysis would typically recommend a range of training interventions, including classroom sessions, on-site workshops, and online tutorials.
An implementation plan, including timelines and resource allocation, can be developed to support key milestones for delivery of training programs.

A training initiative will ensure that relevant council staff have the necessary knowledge, skills, and competencies to effectively manage and operate EVs, supporting a successful transition to a more sustainable fleet.

Neglecting training and change support in the transition plan will raise the risk of pushback or disruption.

Shifting mindsets

Fixed or limiting beliefs and mindsets pose a significant threat to a successful EV fleet transition. They are often the root cause of pushback and presented barriers. Even among staff planning and executing the transition, entrenched mindsets can hinder innovative thinking and problem-solving. For example, assumptions about EV range, charging times, charging infrastructure, or maintenance costs can lead to resistance to change.

Similarly, stakeholder scepticism can derail transition efforts. Concerns about job security, operational disruptions, or financial implications are often overstated and can fuel opposition. Where left unaddressed, these fixed or limiting beliefs can:

- Hinder strategic planning
- Distract with addressing false assertions
- Delay decision-making
- Undermine stakeholder buy-in

A transition may be faced with a long list of reasons why it is not likely to work but the vast majority will likely be misinformed and easily overcome with valid information.

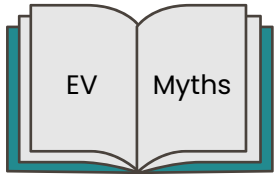
To mitigate this risk, the core transition team will need to engage in the following:

- Active listening: Engage with staff and stakeholders to understand concerns.
- Data-driven insights: Provide factual information to dispel misconceptions.
- Change management: Develop a structured transition plan, addressing doubts and uncertainties.
- Training and education: Offer workshops, training sessions, and demonstrations.
- Stakeholder engagement: Foster open communication, addressing concerns and showcasing benefits.
- Pilot programs: Implement small-scale EV deployments to build confidence.

By acknowledging and addressing limiting beliefs, Council can:

- Foster a culture of innovation
- Encourage collaborative problem-solving
- Ensure a seamless EV fleet transition

Addressing the corrosive effects of fixed mindsets is essential to ensure a successful transition to an electric vehicle fleet.



For more see the FairCharge little book of EV myths

About ..
The author

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Based in Brisbane, Australia delivering with global experience

Nathan draws on the following experience in providing the content included in this education series:

- 30 years in automotive, 9 years as an EV specialist
- 12 Council transition plans delivered
- Over 10,000 vehicle's transitions planned
- Supported all levels of Government with transport decarbonisation research & policy
- Built and launched Australia's first comprehensive electric refrigerated truck portfolio at Eurocold/Revora

"I'm driven to support others to decarbonise their fleet as soon as they can, enjoying the benefits along the way."

ZEV INTEGRATIONS
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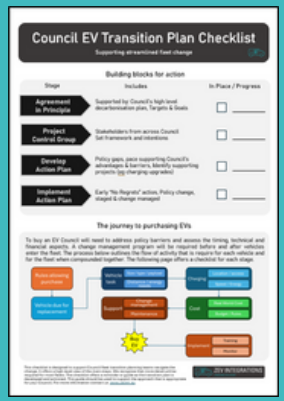
This series supporting councils to plan

This white paper is part of a series of resources developed to support councils in planning their transition based on extensive experience of its contributors.

The series includes a webinar exploring the content included in this paper available free to view on YouTube by this link or QR code:

The series also offers downloadable resources from the ZEV Integrations website with methods, links, data and a checklist to support Councils plan their EV transition.

https://zevint.au/services



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