
ClimateWorks
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ClimateWorks Australia was co-founded by Monash University and The Myer Foundation
and works within the Monash Sustainable Development Institute

Electric vehicle ready local government fleets

Finances and vehicle availability

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Founded in 2009 through a partnership with The Myer Foundation and Monash University and working within the Monash Sustainable Development Institute.

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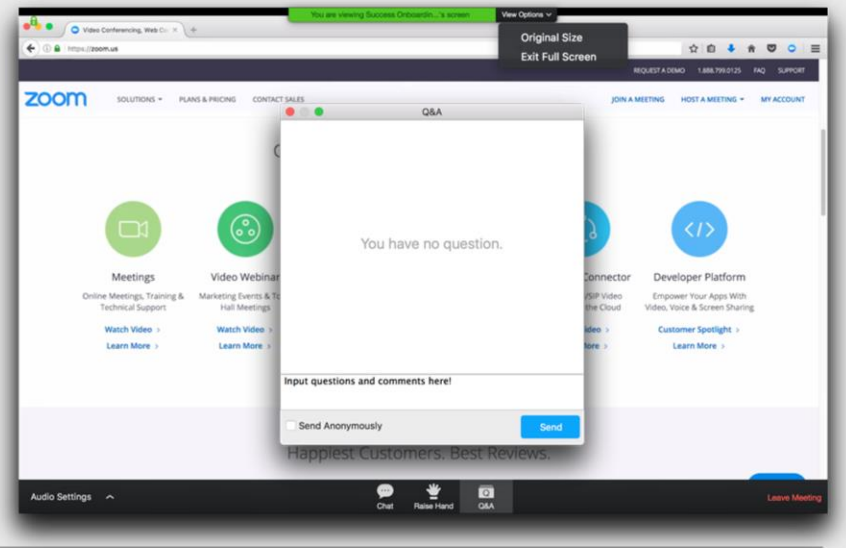
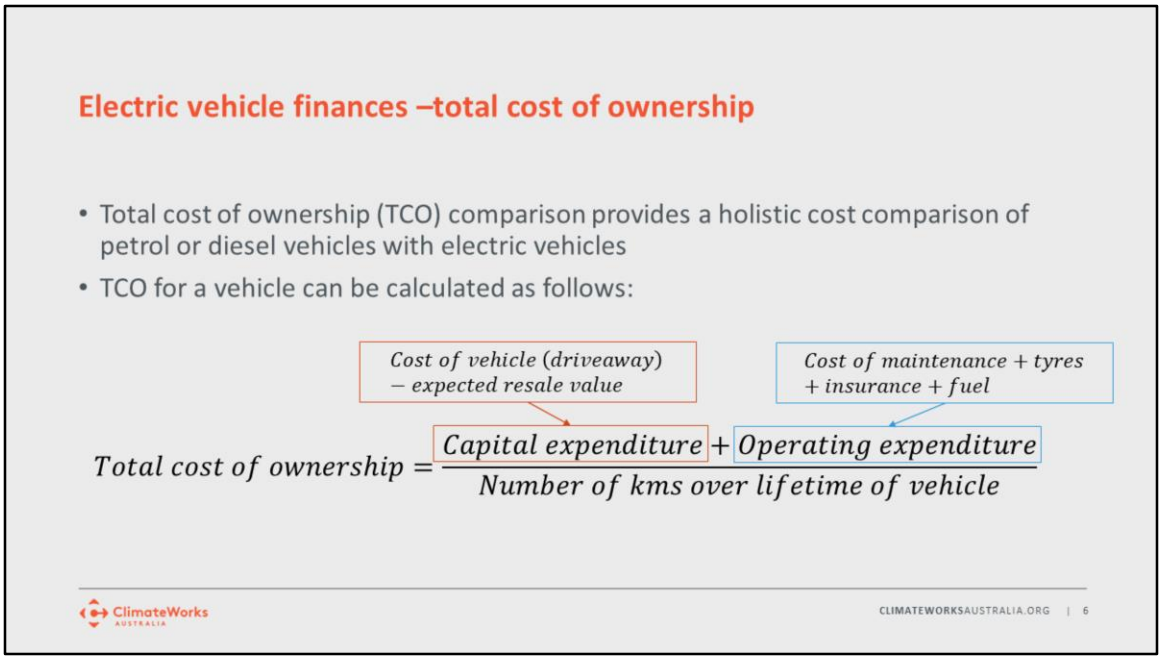
Participation and interaction



ClimateWorks, the EV Council and MAV have received funding from the Victorian Government for a project to enable greater uptake of electric vehicles in local government fleets

We believe that we're well placed to fulfil this role:

- ClimateWorks has a lot of experience building relationships with government and business to work towards sustainable solutions
- The EV Council has great connections in with manufacturers and charging infrastructure providers
- MAV has excellent connections into local councils, and knowledge of local government



Through our work on this project, we've established that one of the biggest barrier for Councils who want to bring EVs into their fleet is purchase cost.
While we increasingly have cheaper EV models coming onto the market, there's still a difference between the upfront cost for an electric vehicle in comparison to an internal combustion engine vehicle.
This is why, as part of this project, we've been focusing on comparing the total cost of ownership, rather than the purchase price.
The total cost of ownership calculations takes into account all of the different costs associated with a vehicle over its lifetime, including purchase price, fuel costs, resale value, maintenance and tyres.
Electric vehicles generally have lower servicing costs than internal combustion engine vehicles, because their motors don't have as many parts.
Electric vehicles also have lower fuel costs than internal combustion engine vehicles because they are very efficient, and because electricity is cheaper per unit of energy in comparison to petrol (check this).
This means that a total cost of ownership allows you to better understand the financial benefits of electric vehicles when selecting which vehicles to purchase for your fleet.
As you can see from the equation, total cost of ownership can be calculated by

adding capital expenditure to operating expenditure and dividing this by the number of kilometres the vehicle will travel over its lifetime.

The capital expenditure is equal to the cost of the vehicle minus the expected resale value.

The operating expenditure is equal to the cost of maintenance plus the cost of tyres, insurance and fuel.

Process for comparing total cost of ownership for councils

Comparing total cost of ownership for electric vehicles and internal combustion engine vehicles, we:

- Collected data from 18 participating councils
- De-identified the data and provided it to manufacturers via the EV Council.
- Manufacturers provided costs associated with their electric vehicles
- Calculated both fleet TCOs and vehicles on the market TCOs
- Councils who provided data have received individualised TCO comparisons and a TCO calculator

This webinar is largely focused on presenting the results of this process.

Council fleet assessment data summary

	Hatch	Sedan	SUV/ Wagon	Ute	Van	Minibus
Number of vehicles (total)	147	279	313	547	70	44
TCO ($/km)	$0.29 - $0.43	$0.29 - $0.62	$0.46 - $0.61	$0.35 - $0.68	$0.33 - $0.65	$0.50 - $1.12

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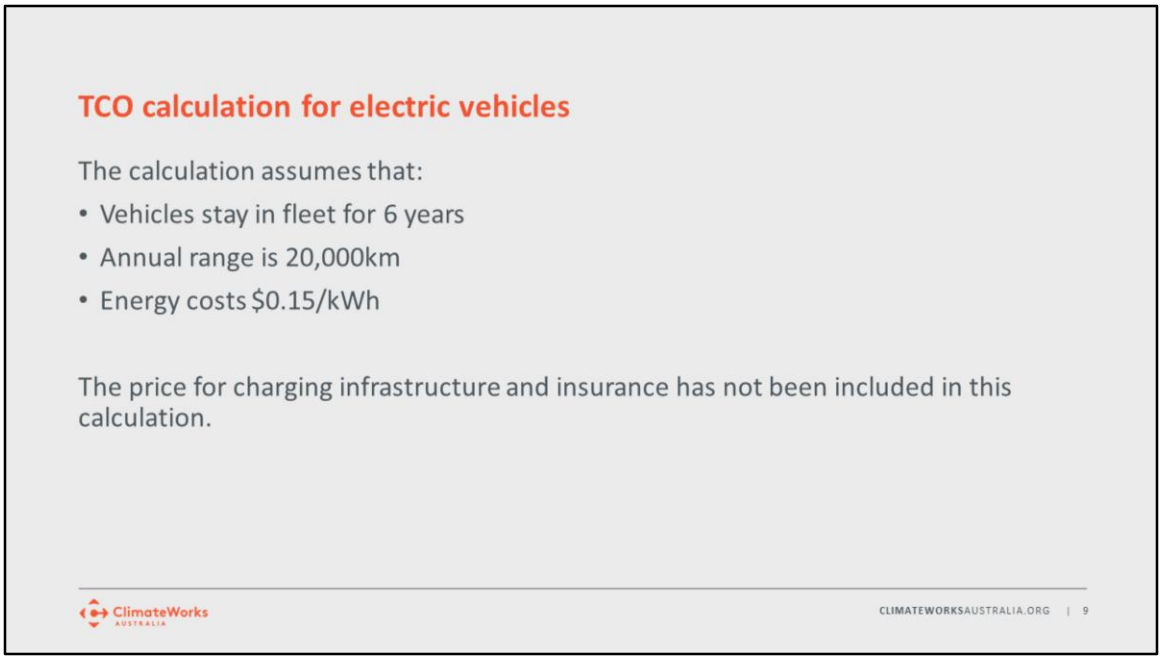
So we will start of by showing you the data we collated from councils and provided to manufacturers.
You can see from this table, that even just in 18 councils, there are a lot of vehicles up for replacement in the next few years
There's also a range of total cost of ownership, which vary considerably between councils, as you can see from the bottom row, and between different vehicle types.
As you'd expect, hatchbacks have the lowest total cost of ownership over their lifetimes, ranging from $0.29 to $0.43 per kilometre, while mini-buses are the most expensive, ranging from $0.50 to $1.12 per kilometre.



So we then took this data to the manufacturers to find out how their electric vehicles stack up, in comparison to the current vehicles available in fleet.
Before we jump into the manufacturers' responses, there's just a few quick points to note.
From looking at councils' data on vehicles that are currently in their fleets, we found out that councils have really different requirements in terms of how much they are driving their vehicles and how long they're holding onto them for.
As such, we asked the vehicle manufacturers to provide information for a vehicle that is driven 20,000 km a year for 6 years, and with electricity costs of 15c per kWh
If you want to change those parameters to match the vehicles in your fleet, then you can start looking at this through the "TCO Calculator" tab in the spreadsheet that we've sent back to you.
We also haven't included the price of charging infrastructure and insurance in the calculation. This is because councils will be managing charging infrastructure in different ways, and you might not necessarily need a whole new charging station for every EV you buy.
Insurance is also managed very differently across different councils, so you'll need to take this into account in your calculations too, but noting that it shouldn't be too different for an EV in comparison to a petrol or diesel vehicle.

Summary

	Hatch	Sedan	SUV/ Wagon	Ute	Van	Minibus
Council data (TCO $/km)	$0.29 - $0.43	$0.29 - $0.62	$0.46 - $0.61	$0.35 - $0.68	$0.33 - $0.65	$0.50 - $1.12
Renault	$0.31 (ZOE)				$0.38 (Kangoo Z.E)	
Hyundai		$0.42 (Ioniq PHEV) $0.31 (Ioniq BEV)	$0.34 (Kona)			
SEA					$0.23 (E4V)	$0.23 (E4B)
Mitsubishi			$0.45 (Outlander PHEV)			
Tesla		$0.86 (Tesla Model S Dual Motor)	$0.94 (Tesla Model S 5 Seat Dual Motor)			

This slide shows the results of all of the responses we received from manufacturers, as well as the collated data from councils.
For the councils, we provided a TCO range based on the lowest and highest cost vehicles in the council data provided
You can see that for all of the different vehicle segments, there are electric vehicles on the market that fall within or below the range for the TCOs of vehicles currently in council fleets.

Responses from manufacturers

Renault

	Hatch (ZOE)	Van (Kangoo Z.E.)
Drive away price	$48,869	$50,261
Expected resale value after 6 years, 120,000	$17,800	$11,400
Annual servicing	$230	$210
Costs of replacing 4 tyres, fitted	$1,000	$1,000
Battery capacity (kWh)	41	33
Real world range on full charge (km)	300	200
TCO (based on 6 years, 120,000km)	$36,909	$45,091
TCO ($/km)	$0.31	$0.38
TCO ($/km) council fleet	$0.29 - $0.43 (hatch)	$0.33 - $0.65 (van)

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This is the response we received from Renault.
Renault has an electric hatchback (Zoe) and an electric van on offer in Australia
You can see that both vehicles cost around $50,000 each
For both vehicles, Renault expects to be able to resell them for 20 to 30% of their original price
They have a range of 200 - 300km
And a total cost of ownership of 31c per km for the Zoe and 38c per km for the Kangoo

Responses from manufacturers

SEA

	Van (SEA E4V)	Minibus (SEA E4B)
Drive away price	$89,000	$99,000
Expected resale value after 6 years, 120,000	$70,000	$80,000
Annual servicing	$280	$280
Costs of replacing 4 tyres, fitted	$1,000	$1,000
Battery capacity (kWh)	105	105
Real world range on full charge (km)	350	350
TCO (based on 6 years, 120,000km)	$38,080	$38,080
TCO ($/km)	$0.23	$0.23
TCO ($/km) council fleet	$0.33 - $0.65 (van)	$0.50 - $1.12 (minibus)

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We also received a response from SEA electric
SEA electric are able to provide a van and a minibus for $89,000 and $99,000 respectively
SEA have provided their expected resale value, and they seem to be very optimistic about the capacity of these vehicles to retain their value, with their calculation suggesting that the van will only lose 21% of their value after 6 years
Range of around 350km
Total cost of ownership of 23c per km which is very competitive compared to the vehicles currently in council fleets.

Responses from manufacturers

Mitsubishi

	Outlander PHEV
Lease price per month	$630
Petrol + Electricity costs	*$1,920+$2,250
Annual servicing	Included
Costs of replacing 4 tyres, fitted	Included
Battery capacity (kWh)	*10
Real world electric range on full charge (km)	*40
TCO (based on 3 years, 60,000km)	$22,680
TCO ($/km)	$0.45
TCO ($/km) council fleet	$0.46 - $0.61 (SUV)

*our estimates, not provided by Mitsubishi

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This is the response from Mitsubishi:
Mitsubishi have the Outlander which is a plug in hybrid SUV
Mitsubishi were not able to provide data in the format requested
However, they did provide information about the cost of leasing an Outlander Plug in hybrid SUV, and we used this information to construct a total cost of ownership
An Outlander costs around $630 per month to lease, including servicing and tyres
We calculated electricity and petrol costs
This results in a TCO of around 45c per km, which is still cheaper than the range of council TCOs that we calculated for vehicles in the SUV/Wagon segment.

Responses from manufacturers

Hyundai (unable to respond; estimates based on international pricing)

	Ioniq – PHEV	Ioniq – BEV	Kona
Drive away price	$40,000	$45,000	$50,000
Expected resale value after 6 years, 120,000	$12,000	$13,500	$15,000
Annual servicing	$500	$300	$300
Costs of replacing 4 tyres, fitted	$1,000	$1,000	$1,200
Battery capacity (kWh)	9	28	64
Real world range on full charge (km)	40	180	400
TCO (based on 6 years, 120,000km)	$50,400	$37,200	$40,800
TCO ($/km)	$0.42	$0.31	$0.34
TCO ($/km) council fleet	$0.29 - $0.62 (Sedan)		$0.46 - $0.61 (SUV)

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Hyundai were also unable to provide a response, however, we did develop an estimate of total cost of ownership based on published information

Hyundai have three electric vehicles available: PHEV and BEV versions of the Ioniq (sedan) and an electric SUV, Kona.

Relatively cheaper electric vehicles with purchase prices ranging from $40,000 to $50,000

Electric ranges between 40km for the Ioniq PHEV and 500km for the Kona

TCOs between 31c per km and 42c per km

Ioniq BEV and Kona relatively competitive compared to vehicles currently in local government fleets in the Sedan and SUV/Wagon segments

Responses from manufacturers

Tesla

	Tesla Model S Dual Motor	Tesla Model S 5 Seat Dual Motor
Drive away price	$142,685	$154,447
Expected resale value after 6 years, 120,000	$49,853	$53,990
Annual servicing	$856	$988
Costs of replacing 4 tyres, fitted	$1,300	$1,700
Battery capacity (kWh)	75	75
Real world range on full charge (km)	480	417
TCO (based on 6 years, 120,000km)	$103,379	$113,021
TCO ($/km)	$0.86	$0.94
TCO ($/km) council fleet	$0.29 - $0.62 (Sedan)	$0.46 - $0.61 (SUV)

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Tesla responded late, and is at a significantly higher total cost of ownership.
Given the later date we were unable to include this is the TCO comparison data in the spreadsheet.

Responses from manufacturers

Nissan

Cannot provide information on the new Leaf model now, but hoping to be able to provide more information by late November.

Emissions reductions

Electric vehicle: zero emissions over its lifetime

Internal combustion engine vehicles:

	Hatchback/Sedan	Ute/van/minibus
Emissions (tCO2)	21	26

Assumes electric vehicle is charged from on-site renewables or Green Power, internal combustion engine vehicle travels 120,000 km over lifetime, with fuel efficiency of 8L/km for a hatchback or 10L/km for a ute, van or minibus

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An electric vehicle charged from on-site renewables or Green Power is assumed to produce zero emissions over its lifetime
An internal combustion engine vehicle with a fuel efficiency of x L/km travelling 120,000 km over its lifetime, will produce emissions of about x t CO2
Savings per electric vehicle are expected to be around x tCO2
Given that local governments across Australia purchased more than 9000 cars in 2017, this represents an opportunity for substantial emissions reductions

Budgeting for electric vehicles

TCO of electric vehicle higher than TCO for internal combustion engine vehicle

→ Gap budget

TCO of electric vehicle lower than TCO for internal combustion engine vehicle

→ Savings towards gap budget

Note: Data presented based on averages. When considering replacing a vehicle in your fleet with an electric vehicle, it's important to use the TCO calculator for a specific comparison.

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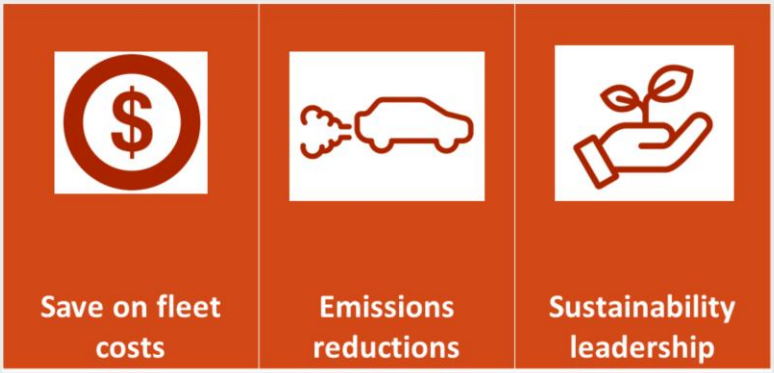
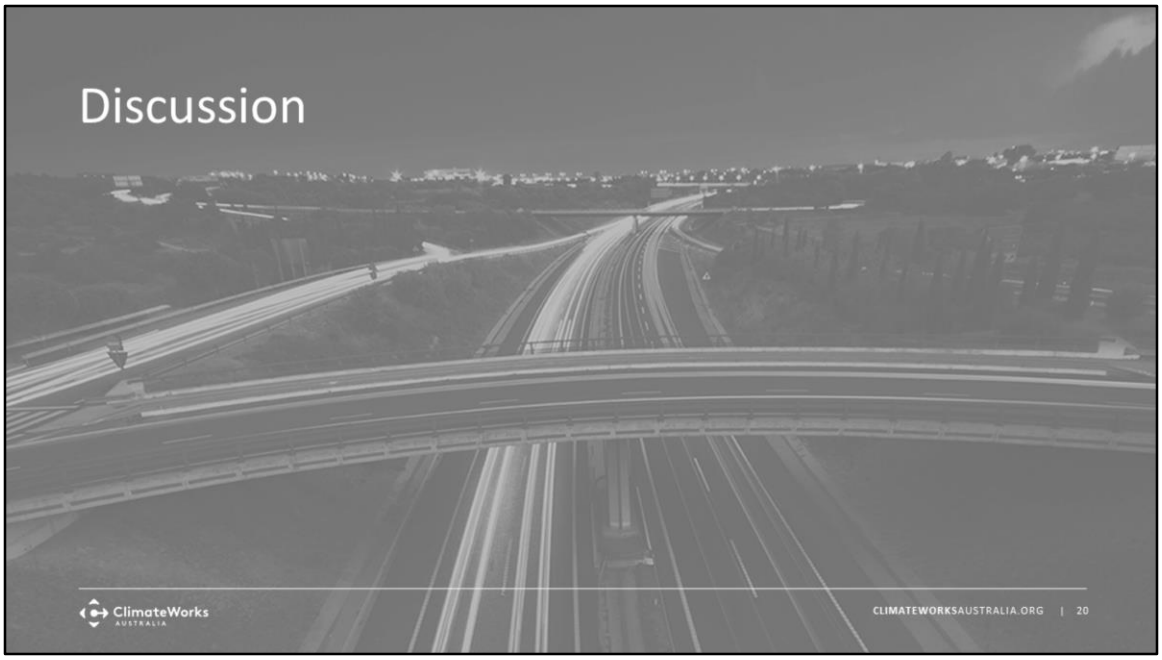
Where applicable, a budget could be set aside to cover the small gap between the TCO of an internal combustion engine vehicle and an electric vehicle
e.g. Renault Zoe is as little as 2c/km more expensive than many ICE hatchbacks)
Assuming that the vehicle is driven 20,000km a year, that is an extra cost of just $400 per year
For vehicles where electric vehicles have a lower total cost of ownership than the internal combustion engine vehicles they are replacing, the savings could be used to finance other electric vehicle purchases.
(e.g. our calculation of the TCO for a Kona suggests that it will be cheaper than SUVs currently in local government fleets by between 12c/km and 27c/km)

Opportunities for Councils




Discussion
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Next steps

- Charging infrastructure webinar – end of November
- Circulation of Nissan Leaf TCO information – TBC (end of November)
- Survey on project outcomes – December and January
- Publication of project report – February 2019
- Recommendations on collective procurement – February 2019

We're also available to provide advice or discuss EV opportunities for your local government fleet.

Contact Us

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