Low emissions fleet assessment
Project report
May 2018

1. Purpose of this report

This report outlines the findings of the tailored fleet assessments to assist five NAGA councils to transition to low emission fleets. The project was carried out with funding from the Collaborative Councils Sustainability Fund, and delivered by Ndevr Environmental.

2. Background

The Northern Alliance for Greenhouse Action (NAGA) is a network of nine councils in north metropolitan Melbourne and the Moreland Energy Foundation, working together to respond effectively to climate change. Members include Melbourne, Yarra, Manningham, Banyule, Darebin, Moreland, Nillumbik, Hume and Whittlesea. NAGA advocates on behalf its members, develops and implements projects, shares information through workshops and conferences, and conducts research, all with the aim of supporting councils to mitigate and adapt to climate change.

In order to meet Victoria's ambitious net zero by 2050 emissions reduction target, it is necessary to accelerate the uptake of low emissions forms of transport. Transport emissions make up 20% of emissions from the NAGA region, and can comprise of between 6-25% of council corporate emissions. Councils across the NAGA region have already made much progress in reducing emissions from other sectors such as through energy efficiency in council buildings and streetlight changeovers, yet transport emissions remain a challenging sector. Several councils have demonstrated leadership through the introduction of electric vehicles and hybrids. Despite this, there remains significant financial, cultural, governance and organizational barriers to effecting change in local government fleet management.

This project aims to understand the feasibility of reducing passenger and light commercial fleet emissions across five councils and produce a business case for implementation.

3. Scope

This project covered council's corporate light vehicle fleet, including passenger vehicles and light commercial vehicles (LCVs). The following five Council's had feasibility studies and business cases completed for reducing emissions in their fleet:

- Darebin City Council
- Manningham City Council
- Moreland City Council
- Nillumbik Shire Council
- Yarra City Council

4. Global, federal, and state policy

4.1 Global

A global driver for reducing greenhouse gas emissions is the Paris agreement from COP 21 to keep the global emissions rise to less than 2 degrees C, revised to 1.5 degrees C at COP 23.

Transport causes 25% of global emissions, and many countries have introduced vehicle emission standards to reduce these emissions. 80% of the global automotive market is covered by some form of CO_2emissions standard. These are from countries as diverse as the US, EU countries, Mexico, Japan and Saudi Arabia.[1]

[1] ClimateWorks (2016) The path forward for electric vehicles in Australia

As part of meeting Paris obligations and local legislation and policy, countries such as the UK, Norway, India and The Netherlands have also committed to banning petrol and diesel cars in the near future.

4.2 Federal

At a Federal level, the Ministerial Forum on Vehicle Emissions has carried out recent consultations on introducing Australian vehicle emissions standards, strengthening noxious emissions standards and improving fuel quality. The average efficiency of new light vehicles sold in Australia has improved from 252gCO2-e/km in 2002 to 184gCO2-e/km in 2015.[2] This is still substantially higher than the proposed new emissions standards, and international averages.

4.3 State

In the ACT, all newly leased government passenger fleet vehicles to be zero carbon from 2021, and there is a stamp duty exemption on new vehicles with an emissions rating of less than 130gCO2-e/km.

The NSW government has committed to achieving net zero emissions by 2050 in its Climate Change Policy. The Queensland government also has new targets to ensure the global average temperature increases remain below 2 degrees C.

In Victoria, the Climate Change Act 2017 commits government to emissions reduction targets, including Victoria being net zero emissions by 2050. Parliament's inquiry into EVs reported in May 2018. Victoria has the largest hybrid fleet of an Australian government, but currently has no electric vehicles on the approved fleet vehicles list.

5. Market context

5.1 Types of vehicle

The term "low emission vehicle' refers to vehicles producing less than the average vehicle emissions. This includes electric vehicles (EVs), hybrid variants (both plug-in (PHEVs) and non-plug in), and fuel cell vehicles. There are 5,000 EVs in total in Australia, of the 18 million vehicles in total across the country.

While EVs make up less than 1% of cars produced worldwide, total worldwide sales have grown by 40% as technology costs have declined and there are more and better performing models available[3]. Despite this global increase in sales, the Australian market has not followed, and actually dropped in 2016.

[2] National Transport Commission (2017) Carbon dioxide emissions intensity for new Australian light vehicles 2016
[3] International Energy Agency (IEA) (2017) Global EV outlook 2017

Although availability of vehicles suitable for council fleet is relatively low in Australia, there are a number of low emission vehicles that would be suitable, such as:

- Mitsubishi Outlander PHEV
- Hyundai Ioniq Range
- Renault ZOE
- Renault Kangoo
- Tesla Model 3
- BMW i3

Through the course of this project, not only did the Renault Zoe and Renault Kangoo become available for purchase in Australia, Nissan announced that the Nissan Leaf 3 will come on to the Australian market during financial year 2018 / 19.

5.2 Charging infrastructure

PHEVs and EVs require charging infrastructure. There are three levels of recharging available, varying in the output of voltage and amps, and therefore charging time:

- Level 1 trickle charging (AC). EVs can be charged from a wall power socket involving voltages of 240 volts and transfer rates in the order of 15 amps; this process takes approximately 8 hours and is suited to a domestic environment.
- Level 2 fast charging (AC). This form of recharging uses the same voltages as trickle charging but involves higher electric currents (typically 30–80 amps); and takes approximately 3 - 4 hours to recharge.
- Level 3 rapid charging (DC). This form uses high voltages (around 400 volts) and high transfer rates (up to 600 amps); and takes in the order of 30 minutes to recharge. Tesla also offers their own superchargers which is reported to add 270kms of range to Tesla vehicles in only 30 minutes.

There are currently multiple plug standards and some vehicles may be compatible with multiple plugs. There is currently a push to implement a single standard before the mass rollout of public EV charging infrastructure, as replacement and retrofitting is expensive[4].

[4] ClimateWorks (2016) The path forward for electric vehicles in Australia

Table reproduced from Feasibility Studies for each Council

Charging Outlet	Power	Capacity	Best location	Plug	Standards
Level 1 Trickle Charging (AC)	Wall socket: 240V, 15A 2.5-7kW	7.5-15km/h Full charge in ~8hrs More suitable for PHEVs with smaller battery sizes or if longer charging time is available.	Parking lots, apartment buildings, at home – overnight charging	Type 1 – J1772 - Single phase	Level 1 Trickle Charging (AC)
				Type 2 – Mennekes - Single and 3-phase	Tesla, Renault
Level 2 Fast Charging (AC)	Charging station: 240-400V 15-30A 7-25kW	18-40km/hr Full charge in ~3.5hrs	Parking structures near a tourist destination, winery, shopping centres, cinemas, restaurants - several hours / top-up charging	Type 1 – J1772 - Single phase	Level 2 Fast Charging (AC)
				Type 2 – Mennekes - Single and 3-phase	Tesla, Renault
Level 3 Rapid Charging (DC)	Charging station: 400-500V 100-125A 25-135kW Tesla SuperCharger (135kW)	70km/10min 420km/hr 80% charge within 30min Short periods of time	Highway rest stops, other spots where drivers plan to spend short periods of time. Charging spots are more attractive if there are amenities provided at the site	CHAdeMO Level 3	Rapid Charging (DC)
				CCS Combo - AC compatible, therefore Type 1 and 2 variants	Volkswagen, BMW, Ford, Hyundai
				Tesla Supercharger » Uses Type 2 plug	Only work with Tesla cars; incompatible with other cars even if they have a type 2 plug.

6. Feasibility stage

6.1 Process

The first stage of the project was initial information gathering and analysis to develop feasibility studies. This was done through:

- Staff surveys
- Data collection on number, type, use and mileage of light passenger fleet
- A meeting of all teams involved in fleet, where initial findings were presented. The meeting was an opportunity to engage with other councils doing similar work and learn from others.

The process involved staff from teams such as environment, procurement, fleet, assets, human resources and sustainable transport.

Images from fleet meeting at Moreland City Council, reproduced from Feasibility Studies

6.2 Data findings

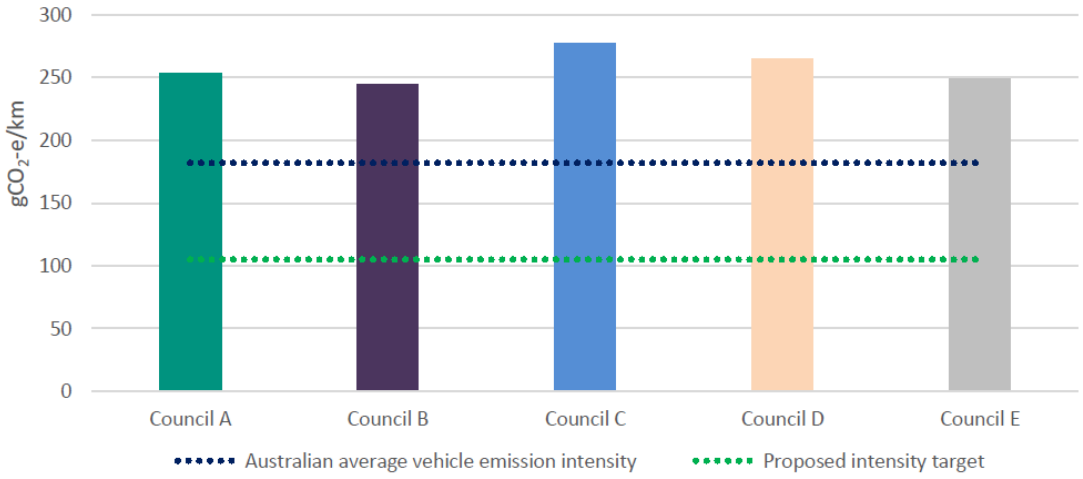
Across the five participating councils, there were 674 vehicles in total in their light passenger fleet: 462 passenger vehicles and 212 LCVs.

In total, these vehicles travelled 9,784,688 km in 2016-17, using approximately $1.2M in fuel, and producing 2,499 tCO2e.

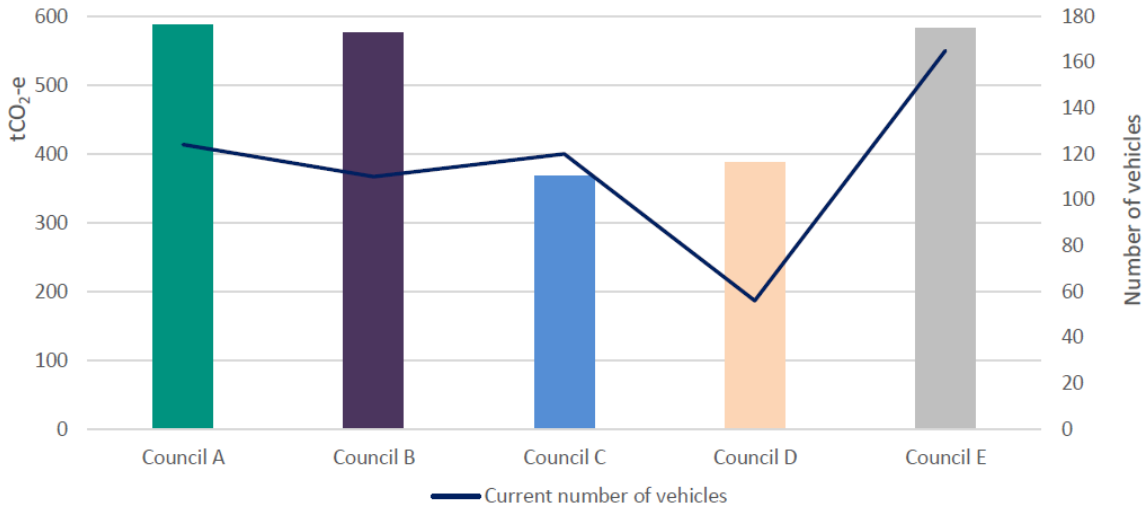
Fuel use was a mix of ULP, diesel and LPG.

Whether the vehicles were home garaged or council garaged was split as follows:

The average greenhouse gas emissions of each vehicle in the fleets is 235gCO2e/km for passenger vehicles and 324gCO2e/km for LCVs. This is significantly over the national light vehicle average of 184gCOe/km.



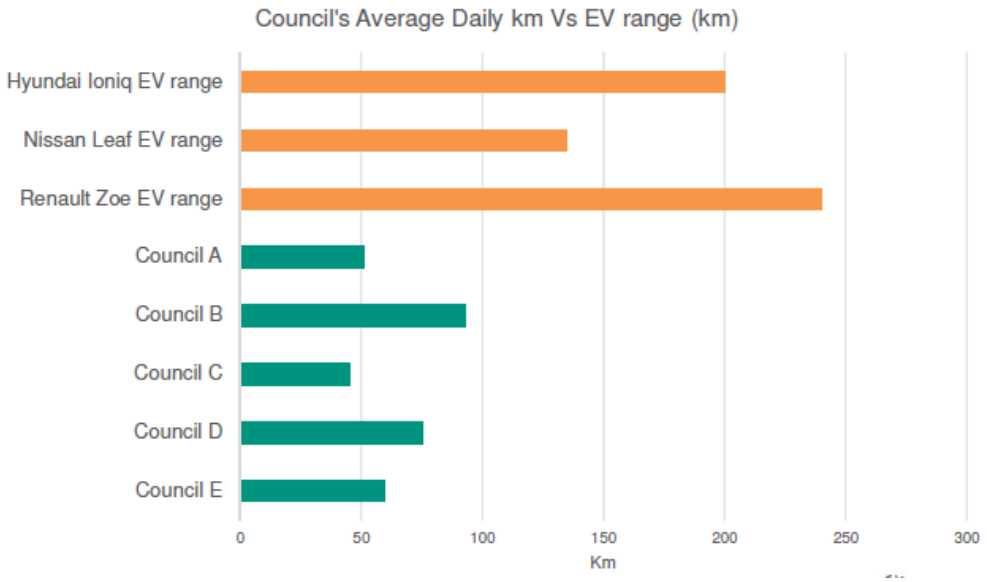
The study highlighted how there wasn't always a direct relationship between fleet size and carbon emissions.



Even where total emissions for a fleet was low, in the case of at least one council individual vehicle emissions intensity was high, highlighting opportunities for improving emissions from fleet.

There were 4 EVs and 43 hybrids across the fleets at the time of the feasibility study (December 2017).

90% of all fleet vehicles travel less than 120km a day, which is well within minimum electric vehicle range.



6.3 Other findings

- All councils have environmental policies and targets for fleet
- The survey identified that staff felt there was "room for improvement" in the fleet vehicle selection process
- The biggest concerns about incorporating electric vehicles into the fleet were range anxiety and cost
- Paying fringe benefit tax (FBT) distorts vehicle selection
- There is significant scope to downsize fleet
- Employee staff vehicle selection often does not come under councils' procurement policies
- Fleet performance does not align with environmental targets
- In many councils there was a lack of a fleet policy, or of enforcement of the fleet policy
- Not all vehicles were fit for purpose

6.4 Recommendations for reducing emissions in fleets

- Reduce the need to drive
- Improve efficiency of the trip, including car pooling and good trip planning
- Use the lowest emission vehicle fit for purpose

- Ensure environmentally conscious driving
- Consolidate the fleet size
- Get senior management endorsement
- Engage employees in changes and get buy-in from fleet managers
- Have policies and checks in place to support the transition
- Ensure accurate data collection to enable further progress.

7. Business cases

The business cases used the findings from the feasibility stage to provide participating councils with the most feasible course of action with sufficient detail to enable them to implement improvement actions.

7.1 Value proposition

The value proposition identified for all the participating councils (and which would be relevant for many other councils) includes:

- Reducing emissions from fleet aligns with council policies
- The Local Government Act 1989 requires local governments to endeavour to achieve the best outcomes for their local community
- Supporting the state government to meet the emissions reduction target of net zero emissions by 2050
- The motor vehicle fleet is a significant contributor to air pollution – in Australia it has been suggested that vehicle emissions caused 40% more deaths than the road toll[5]
- EV batteries can be reused and recycled. This, along with the higher efficiency of an electric motor, that can be powered by renewables to reduce tail pipe emissions to zero, can significantly reduce environmental impact.
- The lower maintenance and operating costs of EVs can reduce ongoing costs
- Councils have the opportunity to show leadership by reducing emissions in their fleet. The choice of vehicle also increases vehicles available to the community, with fleet vehicles making up 80% of the second hand market

7.2 Total cost of ownership

A current barrier to the introduction of low emission vehicles is the price premium at point of purchase. At the feasibility study stage, the group were particularly interested in comparing the total cost of ownership of various low emission vehicles with their current fleet vehicles. Hybrid vehicles – the Toyota Prius, followed by the Corolla and Camry – were the lower cost smaller passenger vehicle from a financial and environmental perspective. While some of these vehicles have a higher purchase cost, the reduced operating costs compensate for this.

[5] Schofield, Walter, Silver, Brear, Rayner and Bush (2017) Submission on the Better fuel for cleaner air discussion paper

The price premium of EVs is still a cost consideration. However, assumptions that could make the calculations more favourable for EVs and for efforts to reduce fleet include:

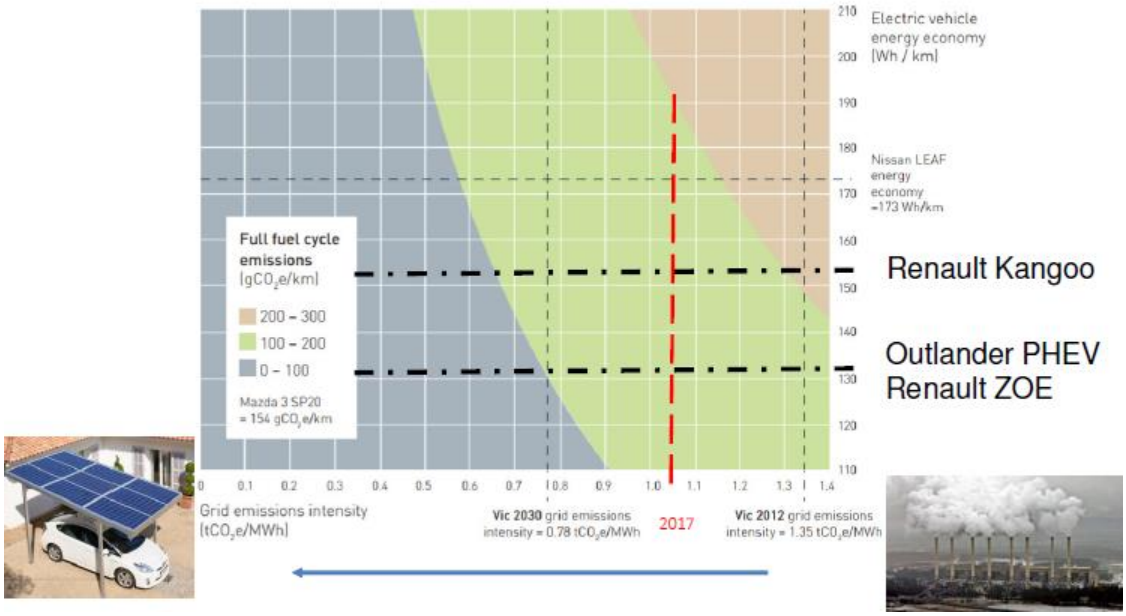
- Residual value: The calculations were based on two methods – one is Australian Taxation Office (ATO) guidelines, where vehicle assets are assumed to equal zero after 8 years. However, this does not take into account second hand vehicle demand and it is equal for all vehicles. The other is the New Zealand residual price estimate. While it has been directly adjusted to Australian prices, it is based on New Zealand market demand
- Electricity costs: The study assumes a price per kWh of electricity that councils could potentially pay less for depending on their electricity contract for the building their charging point is connected to
- Turnover of vehicles: The study assumes a four year turnover rate
- FBT: Liability costs on vehicles available for private use is not included in the calculations – if paid by council this can double the total cost of ownership

7.3 Range anxiety

As previously seen, the average range of the fleet was much less than the range of the main EVs suitable for council.

7.4 Getting to zero emissions

One of the main drivers for low emissions vehicles amongst participating councils is to reduce carbon emissions. With the current intensity of the Victorian grid, hybrid and EVs can still have an impact on emissions. However, some councils will charge using solar powered electricity. Longer term, as the Victorian grid decarbonises, by 2030 many low emission vehicles still in use will meet a standard of 105gCO2e/km whole charging from grid electricity.



8. Outcomes

Even during the project, various actions were carried out by the Councils as findings and the process itself helped them engage with relevant staff. The transition to low emission fleets amongst the five councils include:

- Setting up of fleet committees
- Reviewing fleet policies
- Updating vehicle choice lists
- Focusing on fit for purpose
- Reviewing vehicle utilisation to identify pooling opportunities
- Three councils are trialling hybrids and electric vehicles

Nillumbik Shire Council

Nillumbik are phasing out private use of vehicles, and at the end of their three years or 100,000km they will not be replaced. Council is introducing a fleet of dedicated pool vehicles housed at council offices out of business hours. The change of policy to place the FBT payment onto the employees has already helped drive a significant decrease in passenger fleet.

Nillumbik have also built a solar cover on part of their staff car park as part of wider solar upgrades. These parking spots will provide charging for EVs directly from the electricity generated by the solar panels.

Moreland City Council

Moreland Council are about to agree a new fleet policy and approved vehicle list. This will involve a vehicle list where EVs are prioritised. All passenger vehicles will have a mandatory emissions standard of 105gCO2e/km or less. Evaluation criteria for choosing a vehicle needs to include fit for purpose, safety, and environmental performance.

9. Fleet assessment tool

Ndevr produced an Excel-based tool to enable Councils to carry out their own basic fleet assessments. Using data on their own fleet, the tool provides a fleet performance summary, a performance tracking sheet and a comparison of the cost of ownership with their own fleet vehicles and other low emission vehicles.

10. Next steps

10.1 Dissemination
This report will be distributed amongst councils, and officers involved with this project will be connected with other interested councils who want to work on their own fleet. The report will be available on the NAGA website

The tool will be promoted to councils interested in analysing their own fleet.

The Victorian Greenhouse Alliances Conference 2018 will have a session on sustainable fleets, where learnings from this project will be shared.

10.2 Bulk buy
NAGA will work with partners to explore a bulk buy of EVs. The befits of this could be to prompt purchase of EVs amongst councils, bring new models on to the Australian market, and get a reduced cost for EVs and / or charging infrastructure. A number of councils have expressed an interest in this. Manufacturers have indicated they could provide charging infrastructure for a bulk buy or could potentially provide a discount for an order of 500+ vehicles.

10.3 Research
NAGA will carry out research on two particular questions arose from the study:

- Do councils need to salary package vehicles to attract good quality staff?
- What is the best way to measure Australian depreciation rates of EVs versus fossil fuel vehicles?

10.4 Advocacy
NAGA will work with other Alliances to advocate to the ATO for changes in the rules on FBT, to better promote EVs.