Decarbonising fleets and reducing costs - is it possible?

Sustainable Choice Forum 2020

Workshop Agenda

1. About Evenergi
2. Local government fleet transitions
3. Barriers and opportunities
4. Case study
5. What next?

Who we are

NSW business working with major governments and corporate customers in, the United Kingdom, Australia, Singapore, Denmark and France

Helping transport authorities, government stakeholders, light fleet and heavy fleet operators in the rapid migration to low emission vehicles, and designing of low emission transport systems

EVENERGI

A Software as a Service company and eMobility consultancy, driving towards a sustainable future

Local government : Key to transitioning

Local Governments are uniquely positioned to lead the transition to an efficient, productive and sustainable mobility future

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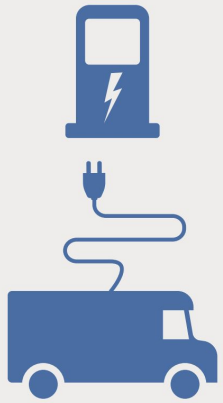
What are the drivers of adoption for Electric Fleets

MOTIVATORS FOR FLEET ELECTRIFICATION



- 83% Sustainability and environmental goals
- 64% Lower cost of ownership
- 30% PR/Reputation
- 29% Current or potential regulation
- 16% Increased vehicle uptime
- 13% Prepare for an autonomous vehicle future
- 1% Data for route optimization

BARRIERS TO FLEET ELECTRIFICATION

- 55% Initial purchase price prohibitive
- 44% Inadequate charging infrastructure – our facilities
- 35% Inadequate product availability
- 32% Inadequate charging infrastructure – public
- 24% Difficult to get buy-in from top leadership
- 23% We outsource our fleet operations
- 14% Difficult to calculate total cost of ownership
- 11% Uncertain regulatory environment
- 11% Maintenance costs/needs unknown
- 7% Technology changes too quickly

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Could there be an article like this in 2023?

Local Government losing thousands on gas Guzzlers

By TOM SMITH

Despite warnings from many quarters, the Trojan local government faces a huge backlash from constituents as they pay thousands extra each month for petrol vehicles, and are facing write-downs on hundreds of Petrol vehicles that can no longer be sold.

Local resident Graham McKnow-itall said

"Our government Failed to act on vehicle electrification and could be spending that money on roads and infrastructure"

Reuters

This article has been fabricated

What will happen if you don't move?

- Demand driven - staff will ask why you are not able to access the latest and greatest technology?
- Economics - longer term business cases for organisations will quickly become best return on investment and **lowest on the marginal abatement curve**
- An integrated part of the transition to a shared, electric and autonomous

What is the current national position?

The number of **DC charging** stations is outlined below:

State	NSW	ACT	VIC	SA	QLD	TAS	NT	WA	Total
# of sites	37	5	17	4	27	2	0	18	110
# of stations	110	10	47	14	45	2	0	23	251

The number of **AC charging** stations is outlined below:

NSW	ACT	VIC	SA	QLD	TAS	NT	WA	Total
539	34	356	184	321	54	5	186	1,679

Overarching EV policies

	WA	ACT	NSW	NT	QLD	SA	TAS	VIC
EV target								
Government fleet target		✓	✓		✓	✓		
Public outreach and education campaign			✓		✓	✓	✓	
Electric Public Transport (e.g. buses) procurement plans			✓			✓		
EV readiness requirements for new building/ precinct developments		✓						
Public EV charging network investment		✓	✓		✓	✓	✓	✓
EV inclusion in government purchasing preferences		✓				✓		

Consumer Policies

	WA	ACT	NSW	NT	QLD	SA	TAS	VIC
Home charging installation subsidy						✓		
EV registration exemption/discount		✓			✓			✓
Stamp duty exemption for EVs		✓						
Other EV purchase incentive								
Preferential lane access for EVs (e.g. bus lanes)		✓						
Toll discounts for EVs								
Preferential EV parking access or free/ discounted parking						✓		
Discounted/free public EV charging						✓		
Other non-financial incentives					✓			

What is the current national position?

NSW is taking the lead on Electrification in Fleets

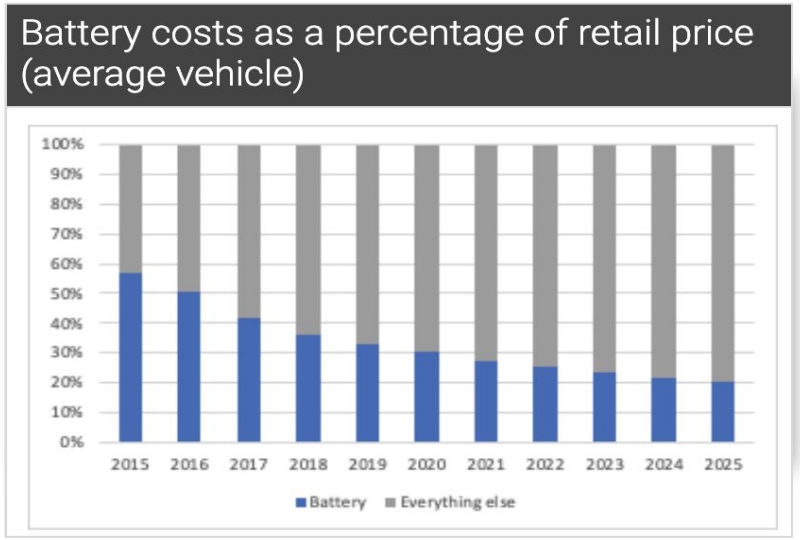
NSW GOVERNMENT

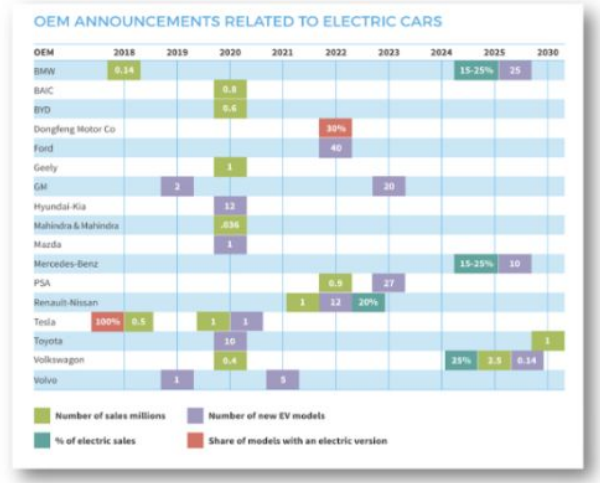
Department of Planning, Industry and Environment

Net Zero Plan Stage 1: 2020–2030

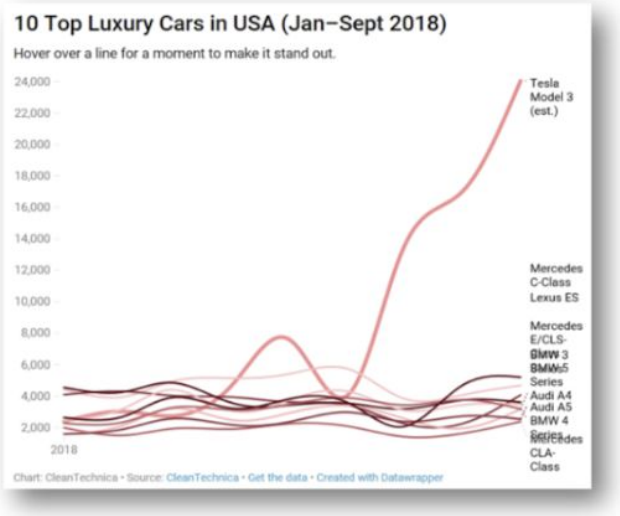
What are the key drivers for acceleration?

- Costs reach parity
- Manufacturer commitments
- Global emission standards
- Disruptive entrants



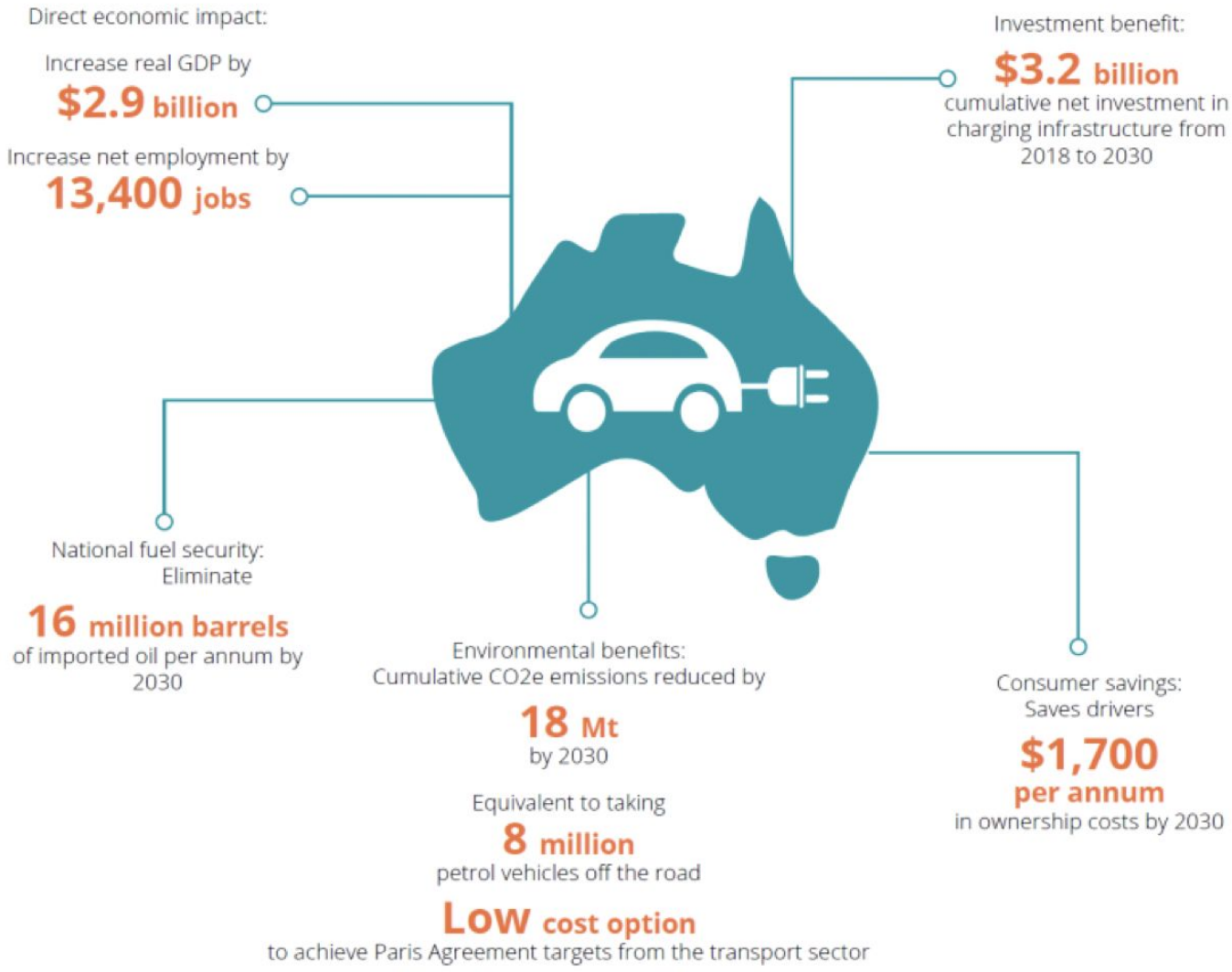


Country	Target	Year
China	100%	TBC
UK	100%	2040
France	100%	2040
Norway	100%	2025
Netherlands	100%	2025
Japan	20-30%	2030
India	30%	2030
New Zealand	64,000	2021
USA	3.3m	2025
Germany	6m	2030



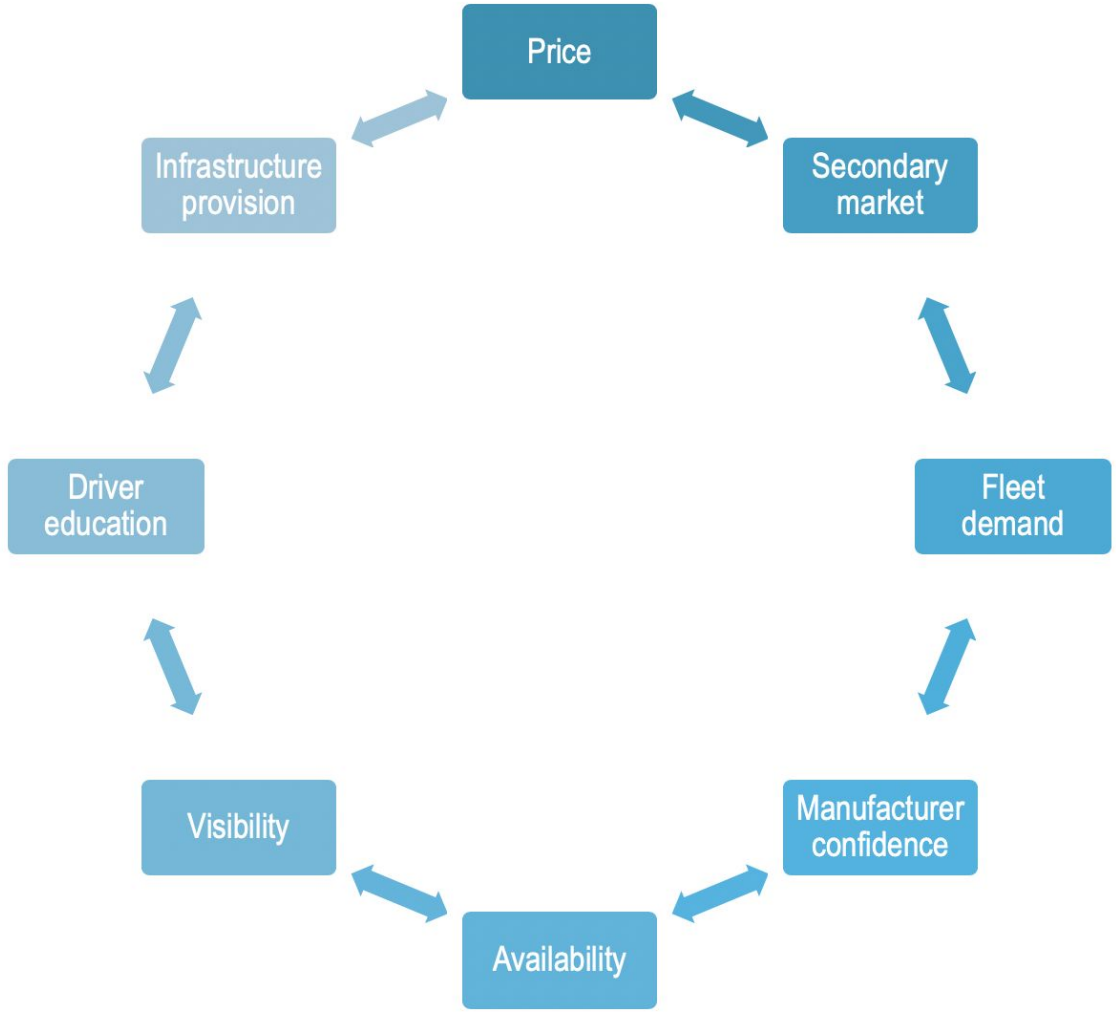
What are the key drivers - national interest?

- Economic
- Energy grid impacts
- Fuel security



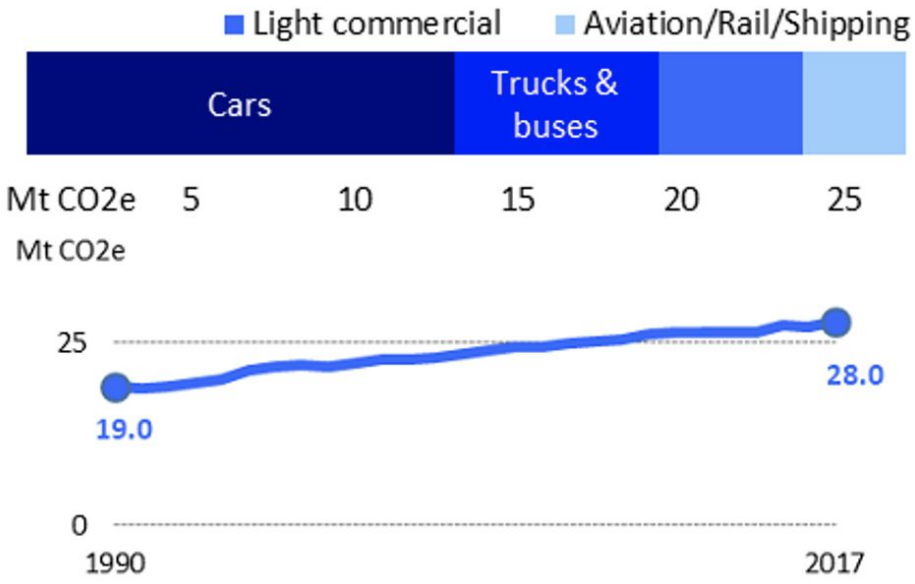
Why do fleets matter?

- Focus on TCO
- Higher utilisation
- Sustainability drivers
- Feed secondary market
- One champion can affect thousands of orders



What are the environmental benefits?

Transport is NSW's 2nd largest emitter and is growing. Councils can have impact on promoting active transport, passenger vehicles, trucks and buses



What are the environmental benefits?

- Far superior cradle to grave emissions
- Part of an end to end social shift to renewable value chains

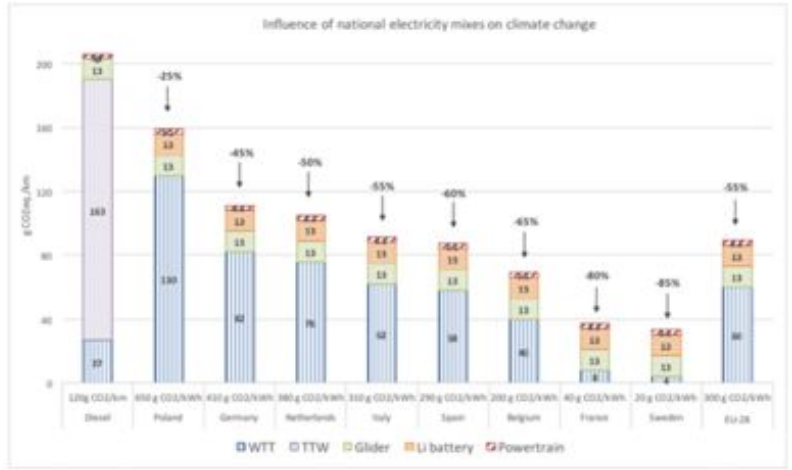


Figure 3: Influence of the carbon footprint of national electricity grid on the comparison of life-cycle GHG emissions of BEVs

Case study : Victorian outer metro and regional councils

- Commissioned to create an all-encompassing Fleet Transition Plan for a Victorian outer metro council
- Commissioned to create an integrated low emission vehicle transition plan for a regional Victorian council
- The Victorian outer metro council targeted complete fleet electrification by 2030, or soon where possible, at the lowest possible cost
- The regional Victorian council sought to understand the most appropriate pathway
- Partnership between sustainability and fleet with support of council Executive
- Significant buy-in across the councils

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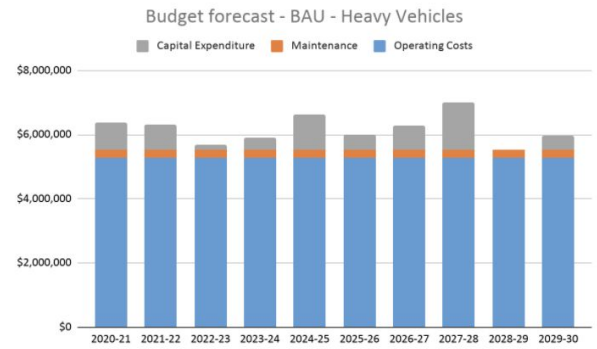
Are they good for our finances - a case study

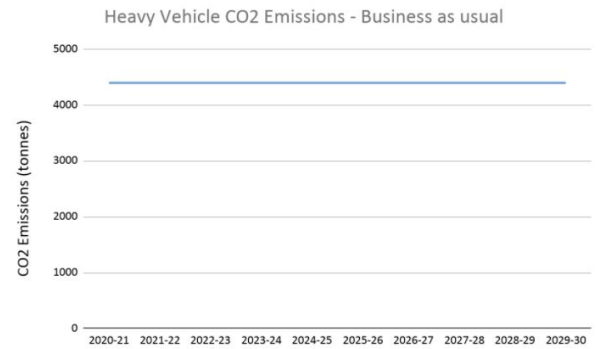
- The optimised Fleet Transition Plan shows an 11% reduction of total fleet costs of ownership between 2020-30
- Operating costs show the biggest savings with over 12% vs the BaU plan
- Total cumulative emission over the 10-year period are reduced to 45% of previous levels, with emissions by 2029-30 reduced to zero

10 year heavy vehicle finance and emissions budgets

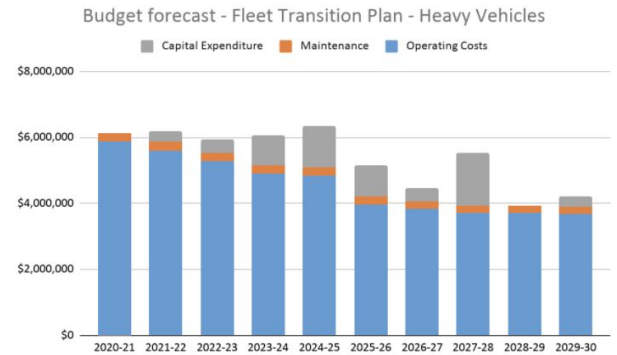
10 year business as usual financial budget



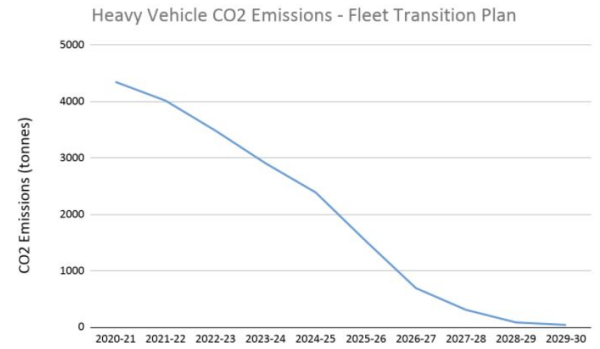
10 year business as usual emissions budget



10 year Fleet Transition Plan financial budget



10 year Fleet Transition Plan emissions budget



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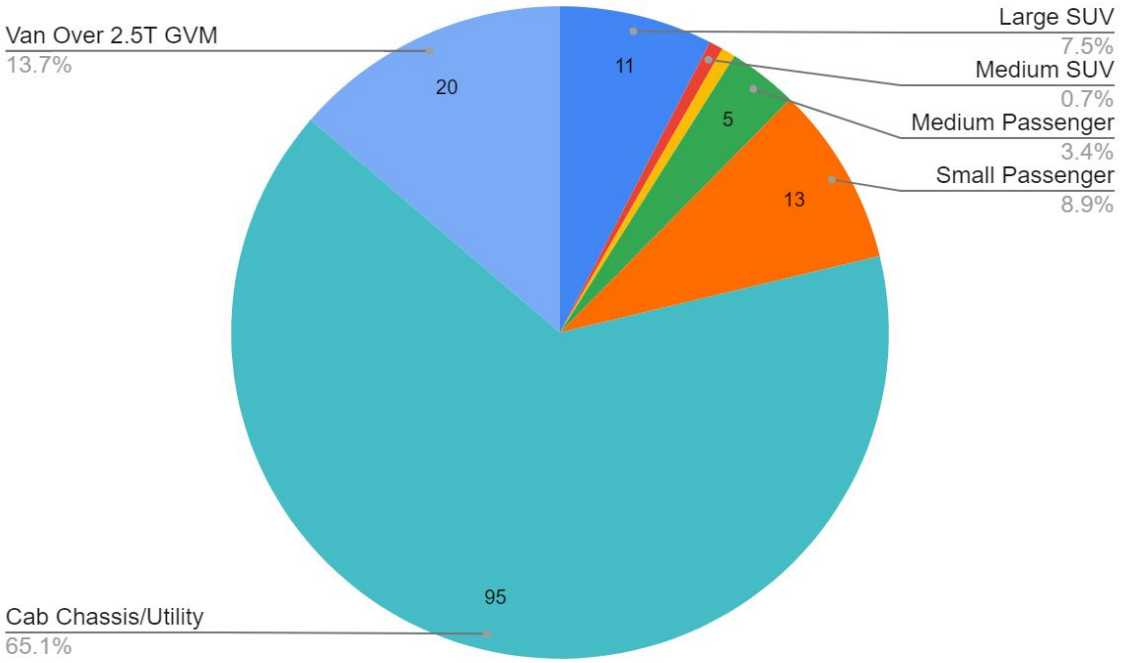
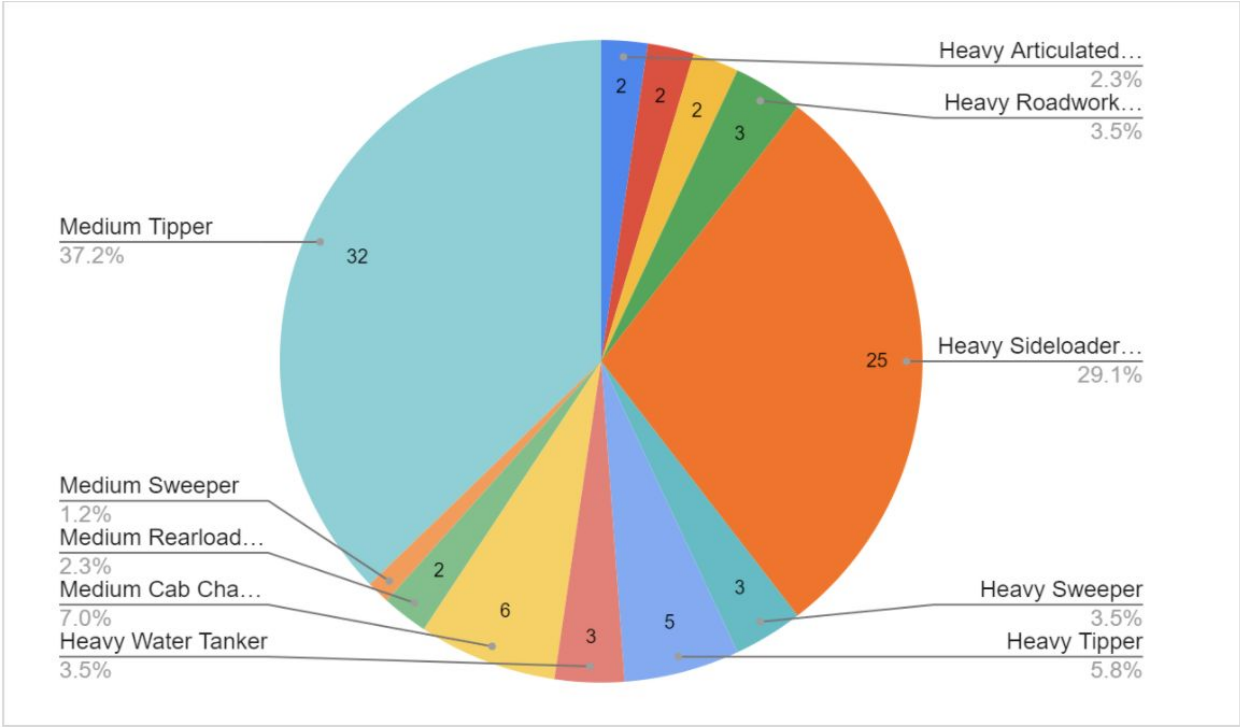
Case study - Profiling fleet makeup and emissions performance





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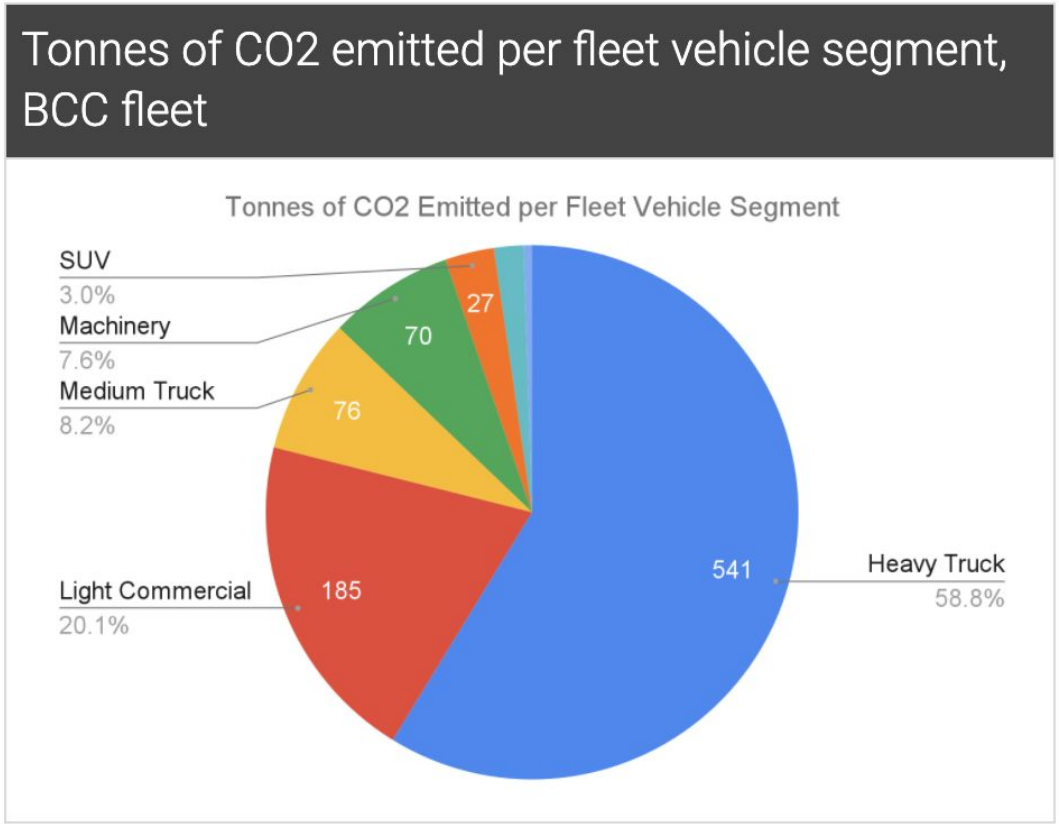
Case study - Profiling fleet makeup and emissions performance

Tonnes of CO2 emitted per fleet vehicle segment, BCC fleet



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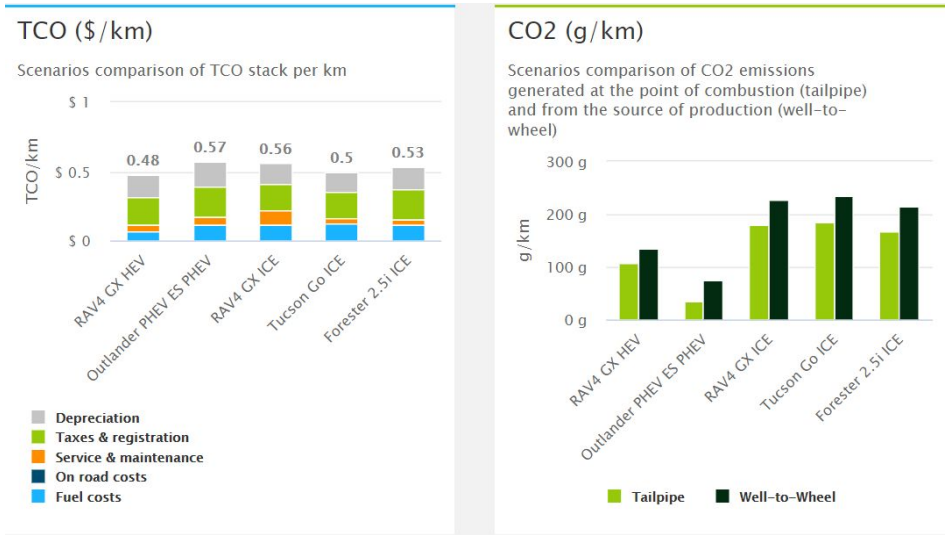
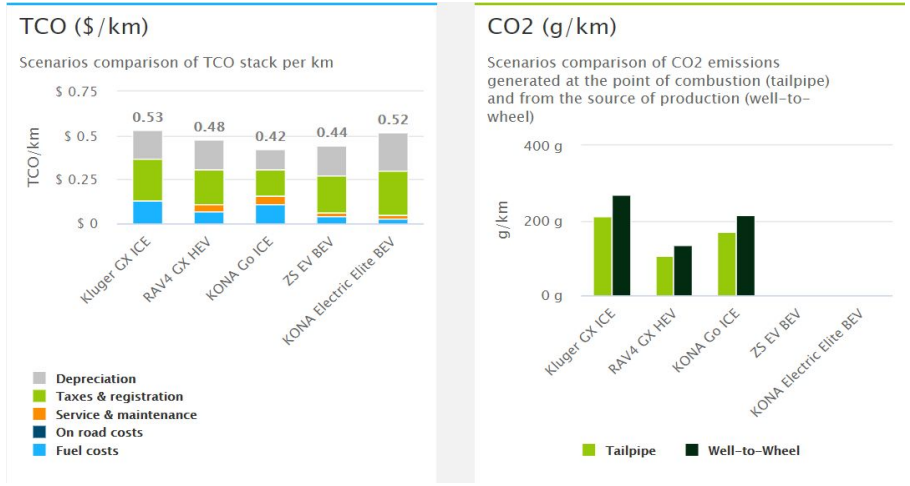
Case study - Profiling fleet makeup Cost parity

Asset segment	Estimated TCO parity for EVs	Asset segment	Estimated TCO parity for EVs
Large Passenger	2025/26	Medium SUV	2025/26
Medium Passenger	2024/25	Small SUV	2024/25
Small Passenger	2023/24	LCV Ute	2026/27
Light Passenger	2022/23	LCV Van	2026/27
Large SUV	2026/27	LCV Commuter (Bus)	2026/27





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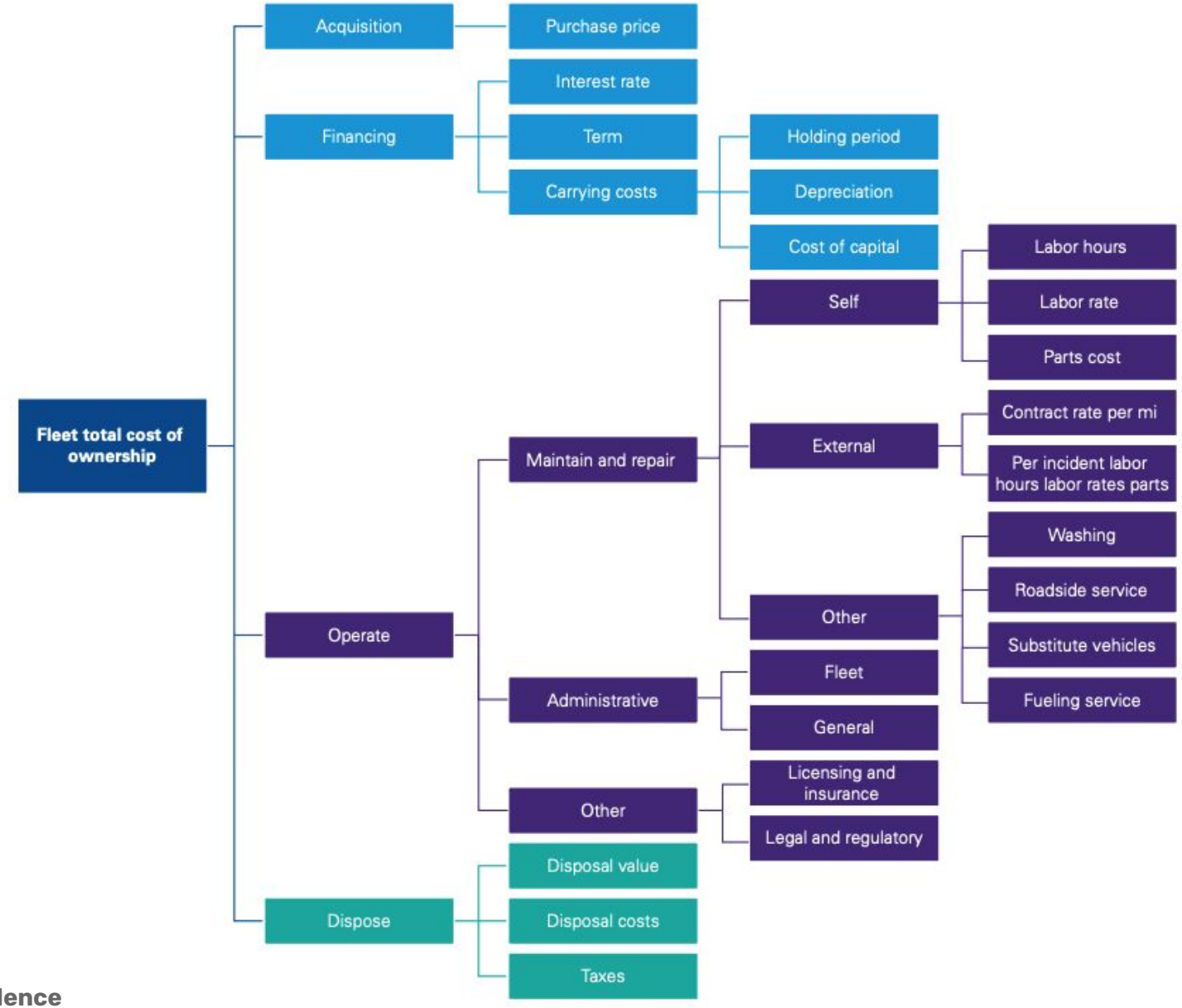
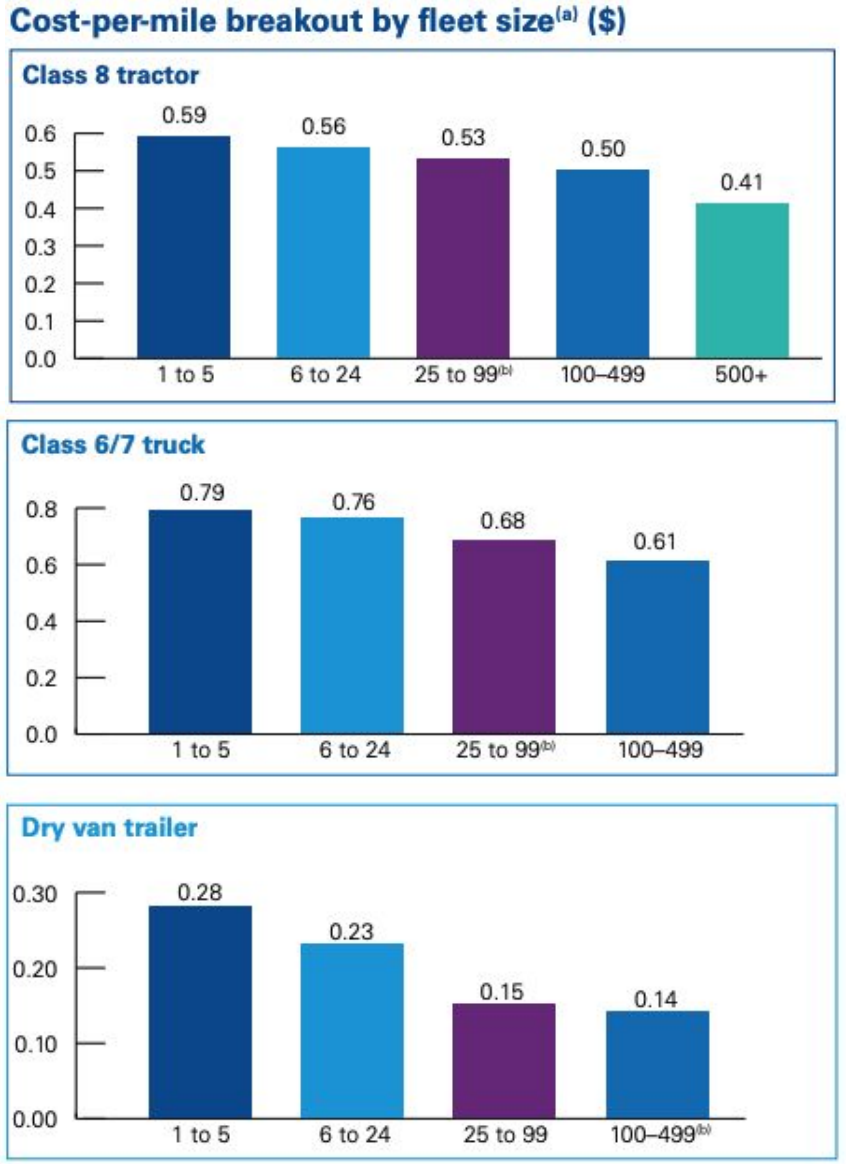
TCO of vehicles contributing factors



Main drivers of the TCO: fleet type

- Fleet size
  - There are substantial economies of scale in fleet TCO
  - In a US study financing costs for Retail, = 40% > Transportation & Utilities. But, this is likely because the average fleet size for T&U was 29, vs. 8 for Retail.
- Fleet use (mileage)
  - Logistics company is likely doing more longer driving, vs. a retail company that may be doing more starting and stopping within a smaller radius.
  - This will impact fuel and maintenance costs (i.e. braking)
- Fleet holding period
  - holding vehicles for longer can improve
- Fleet age
  - Will affect fuel efficiency (costs), maintenance and likely taxation (with regulations for efficiency increasing)
- Fleet composition (vehicle types)
  - The type of vehicle impacts directly, if a fleet is mostly composed of under 8tn trucks vs. one of 16tn+



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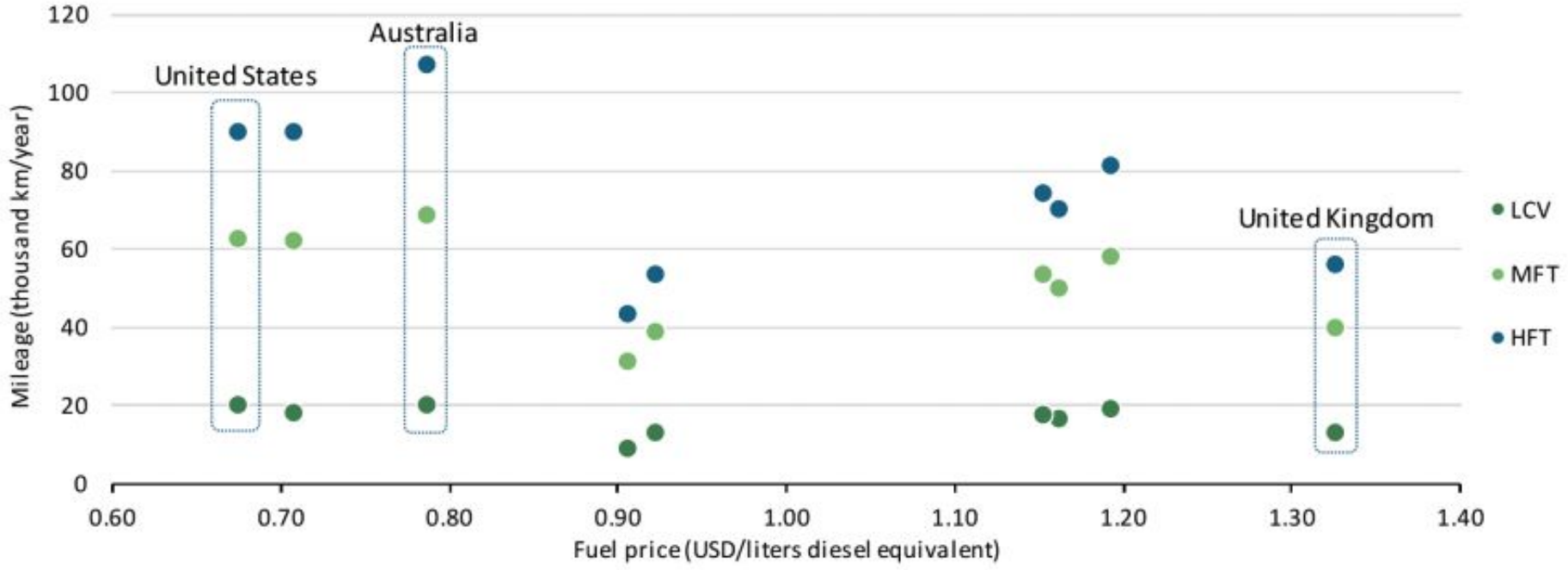
Market driver: km vs geography vs fuel costs

- km tends to be larger in countries with lower fuel prices
- Fuel taxation tends to be lower in low-density countries (longer transport distances)
- Vehicle speed also matters: poorer conditions of the road network in developing regions lead to lower speeds, thereby limiting mileage



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Heavy electric vehicles in Australia

- Local sales is the order of 100 - 200 in 2019 - in line with most European countries
- Sales dominated by powertrain specialist, SEA-Electric
- Majority of sales are existing trucks converted to electric vehicles by SEA-Electric
- Many other vehicles at the precipice, including:
    - Fuso eCanter (trialled by AusPost, first orders pending)
    - EV Automotive EC-11 van (Undertaking ADR compliance)
    - Mercedes eSprinter and eVito
    - Peugeot e-Boxer and e-Expert
    - Volkswagen e-Crafter and Volkswagen e-Transporter
- Government fleets are a key driver, along with last-mile delivery services

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Heavy electric vehicles in Australia - availability

Heavy EV models nearing commercialisation internationally		
Make	Model	Website
BYD (CHN)	T5 &T6	(no website available)
Volvo (SWE)	FL & FE	https://www.volvotrucks.co.uk/en-gb/trucks/trucks/volvo-fl/volvo-fl-electric.html https://www.volvotrucks.co.uk/en-gb/trucks/trucks/volvo-fe/volvo-fe-electric.html
Mack (USA)	LR	https://www.macktrucks.com/trucks/lr-series/lr-electric/
Fulongma (CHN)		https://www.fulongmagroup.com/
DAF	CF & LF	https://www.daf.co.uk/en-gb/trucks/electric-and-hybrid-trucks
Mercedes-Benz	eActros	https://www.mercedes-benz.com/en/vehicles/trucks/eactros-heavy-duty-electric-truck/
Scania	(no model name provided)	https://www.scania.com/group/en/home/newsroom/press-releases/press-release-detail-page.html/3669566-scania-to-deliver-75-battery-electric-trucks-to-asko-in-norway
MAN	CitE & eTGM	https://www.truck.man.eu/de/en/man-world/man-in-germany/press-and-media/Driving-the-Future_-MAN-at-COMTRANS-2019-388544.html
Mitsubishi	eCanter	https://www.mitfuso.com/en-us/models/ecanter
Tesla	Semi	https://www.tesla.com/semi
Foton	TBC	Promising 2020 arrival

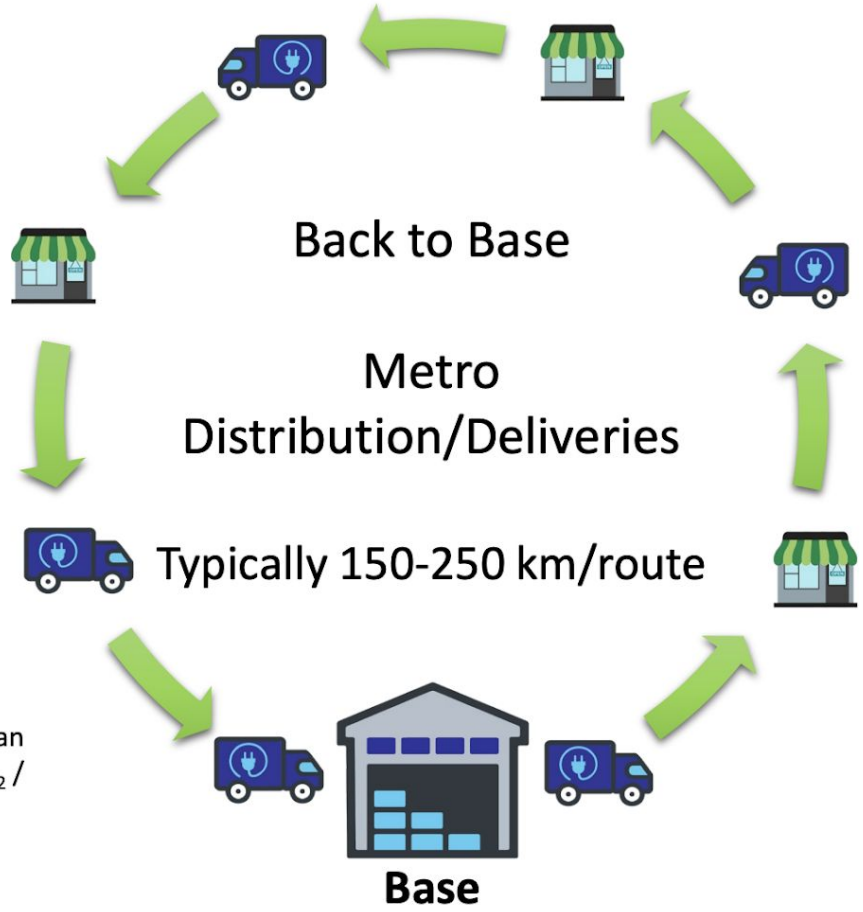
SEA Electric Drivetrain options and approximate suited GVM						
SEA-Drive® Drivetrain ID	Continuous Power	Maximum Power	Continuous Torque	Maximum Torque	Battery Capacity	Recommended GVM
120a	80kW	125kW	800Nm	1500Nm	138kWh	6.5t to 9t
120b	150kW	250kW	1230Nm	2500Nm	138kWh	9t to 14t
120c	195kW	350kW	1852Nm	3500Nm	138kWh	14t to 18t
180a	150kW	250kW	1230Nm	2500Nm	220kWh	14t to 18t
180b	195kW	350kW	1852Nm	3500Nm	220kWh	18t to 26t

Which vehicles are most likely to be electrified?

- Heavy vehicles have a distinct sweet spot
- Lighter duties = lower energy = slower payback
- Heavier duties = higher energy = faster payback
- Technical limitations on how heavy you can go:
  - Weight
  - Efficiency

Which vehicles are most likely to be electrified?

Start Empty - Return Full



EVERY 2 AXLE TRUCK IN A CAPITAL CITY

Start Full - Return Empty

In Australia:

- 500,000 Rigid Vehicles Registered.
- Estimated that 60% of these vehicles do less than 200klm per day, SEA's target market. 2.65kg CO_2 / litre of diesel.
- Estimated 10 Kilo-tonnes CO_2 emission per day.
- Light Duty & Medium Duty.

What does the future hold for urban diesel?

Residual valuations of 5 year old diesels?

Bans in Europe.

Statements by large transport users to migrate from diesel.

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How did the vehicles fit the duty cycles of electric vehicles?

- Our approach is to first consider technical feasibility in order to answer the question - **is this asset a straightforward replacement scenario?**
- A like-for-like replacement analysis is conducted based on operational functionality and use-case
- For one in three vehicles in the example fleet a straightforward replacement is not immediately identified (using worst-case daily range needed - see example energy consumption vs battery capacity below)
- Two-thirds of use cases required no opportunity charging to meet daily drive cycle requirements even in worst case conditions
- The remaining one-third of fleet had occasions that exceeded the battery capacity of the vehicle, but typical driving duties did not require charging during an operational shift

How did the vehicles fit the duty cycles of electric vehicles?

- Deeper analysis was then conducted on the one-third without a straightforward replacement. Fleet manager identified these use-cases as discretionary, non-core fleet activities

- Overnight charging recommended for most use cases; however the inclusion of fast charging option recommended as supplementary measure to facilitate effective mid-duty charging where needed
- Some mass-carrying capacity is lost, which can impact optimisation of some use cases
- Electric heavy vehicles can be specified for almost any conceivable use case

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Impacts to infrastructure

- Up to a ten-fold increase in demand for power was expected at the main Operation Centre, creating challenges as well as opportunities such as solar PV integration.
- Increase from ~ 90kVA current consumption to 1.2MVA could be reduced through load management to around 900kVA
- Significant upgrade to connection required, but ability to limit the upgrade to a high-range low voltage connection saves upgrade costs and ongoing costs

Case study takeaways

- Full electrification across light and heavy fleets is viable by 2030.
- There are potential opportunities for councils to derive significant net commercial benefit from the transition to an electrified fleet over the standard planning and budget horizon of ten years.
- While this may require some increases in capital expenditure in early years, this can be managed through financing structures.
- Much of this benefit comes from electrification of the medium duty vehicles. With careful planning, this can lead to overall fleet savings in the order of $millions over the 10 year budget.
- Associated infrastructure costs can exceed $1 million.
- The right policy framework is critical
- Home-charging light vehicles is a strong enabler of electrification

Potential for green finance

- Can solve the split incentive for CFO - how to manage up-front costs
- New procurement and financing model may be valuable to enable the electrical infrastructure and depot augmentation investment required
- Strong interest in ESG investment opportunities including the decarbonisation of transport from global infrastructure investors
- Infrastructure led financing models are commonly used across other modes of transport such as rolling stock
- The asset owner has the long-term asset condition front of mind

Lessons from renewable energy include:

- Long-term integrated system planning is required to avoid material infrastructure constraints
- Adhoc development can facilitate rapid deployment of new technology in the short-term but does not necessarily deliver the best long-term customer outcomes

Potential for green finance

A comprehensive independent solution	• Covering solution design, procurement, installation, financing, value capture at depot, maintenance as well as value-added services during operations • Independent solution that avoids the incumbency of operator or technology provider lead models
Overcoming complexity	• Single point of contact, coordinating all other stakeholders (subcontractors, suppliers, grid operators, …) • On-time and on-budget project and enforceable performance metrics • Responsibility for key complex processes (grid connection…)
Flexibility	• Government to retain the flexibility to change operators • Government to retain control of the technology selection over the life of the contract including the option for local manufacturing • Ability to design a system to accommodate new technology, changes to customer behavior and service patterns • Subject to final contractual arrangements, Government remain the ultimate owner of the infrastructure
Value-add options	• Real estate development and value capture on top/around depots • On-site power generation development and/or green energy supply • Deployment of charging infrastructures accessible to third-parties…
Scalable model	• The integrated solution can be scaled and deployed at the regional level or potentially aggregate multiple regions • Critical mass of the integrated solution is expected to support local manufacturing, technology R&D and training

What to do next?

- Join Charge Together Fleets - www.chargetogether.org
- Prepare for the NSW Government Fleet Transition grant
- Get buy-in to a strategic transition in your company - not a tactical implementation - a pilot is just the starting point to transition your whole fleet to sustainable alternatives that are economically viable
- Do a 10 year asset replacement plan - including running scenarios analysis with lowest cost or emissions reduction focus, based on your organisational priorities
- Work out your optimum fleet procurement and charging infrastructure strategies - in line with your asset replacement plan and incorporate into relevant policies for fleet, facilities, HR and others.
- Track and optimise the performance of your fleet from a fit-for-purpose, whole of life cost and emissions perspective as you operationalise your fleet transition to an electric, low emissions fleet

ChargeTogether FLEETS

- **BetterFleet**– Australia's first software-as-a-service Electric Vehicle transition platform
- **Knowledge base** – extensive information on all things electric vehicles
- **Regular webinar series** – EV experts present case studies and answer your questions live
- **Message forum** – network and learn with your peers
- **National procurement initiative** – explore the possibilities of collaborative procurement

BetterFleet platform

Create a powerful executive report in minutes with our Free fleet management software for Australian Fleets. Including a powerful free fleet car operating cost calculator and fully customisable new vehicle analytics tool and scenario analysis

Subscription reports

Create asset replacement plans, electric vehicle charging station infrastructure planning, sustainability reporting, advanced procurement analysis for electric trucks, electric vans and electric buses

Consulting services

Our standard fleet or low carbon transport and electric vehicle consultants create comprehensive fleet strategic plans and transition plans, grant applications and advanced trials such as vehicle to grid

A better transport future

Evenergi is a software-as-a-service company and eMobility consultancy, driving towards a sustainable future

Evenergi.com

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