EnergyAustralia | EMobility

21st September 2021

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Bus Operators EV Strategy - Issues to consider

- Future operating network
- Parallel operating systems
- Fleet profile and OEMs
- Depot infrastructure
- Organisational development – skills for tomorrow
- Bus contracting
- Financing
- Energy supply
- Technology providers – Operational Intelligence
- Corporate Social Responsibility

Bus Depot

Case Study: October 2020

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Case Study – what did we do?

DEPOT - We worked with a Melbourne bus operator at one of their depots.

DATA - We pulled per second data on 20 buses for 20 days.

ANALYSIS - We analysed this data for route shape, timing and travel dynamics.

SIMULATION - We simulated out to 365 days, including temperature profiling – calculating total and maximum demand.

ENGINEERING - We ran a full engineering assessment on site – EVSE review, EPC and site-specific work.

GRID - We negotiated a hard quote from Jemena (DNSP) for transformer installation.

COSTS - We completed a deep dive on purchase, fuel and maintenance costs.

TCO - We completed a TCO (total cost of ownership) comparison of diesel v electric buses over 18 years.

Electric Buses are cleaner, greener and, in many cases, demonstrably cheaper

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Case Study – what did we learn?

Operating a bus fleet is not as simple as it sounds.

Dead running, AC loads, driver behaviour, rail replacement.

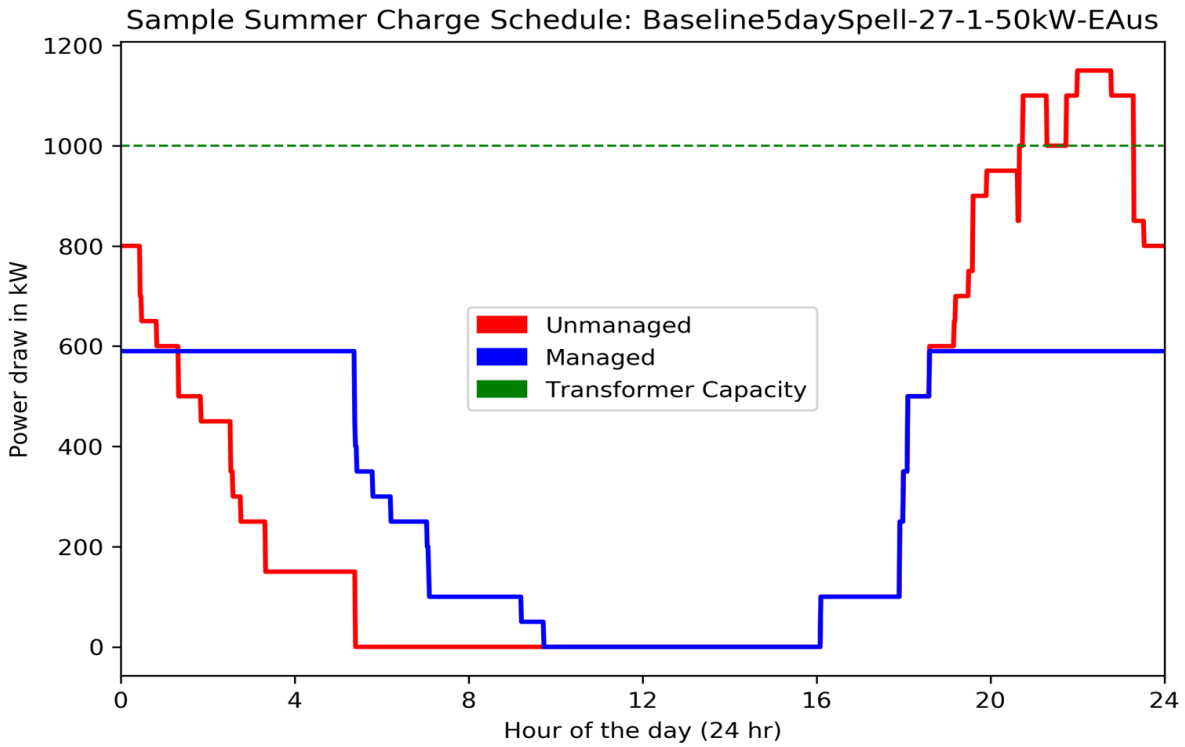
There's a material difference between managed and unmanaged fleet charging.

Depot real estate is very, very tight.

TCO is at parity, or better – right now.

We can solve the challenges of electrification – but not all bus operator challenges

Case Study – Managed v Unmanaged Charging



Full Year Simulation		Managed	Unmanaged
Peak	MWh	966	1,286
Off-Peak	MWh	1,689	1,379
Total		2,655	2,665
Demand	kWh	730	1,100
Demand (0.9 PF)	kVA	811	1,222
Energy Cost	$ pa	$ 291,287	$ 352,927
Unmanaged premium			$ 61,640
Unmanaged premium %			21%

There are two important variables that a managed charging service optimises for:

Maximum demand charges

Peak v Off Peak consumption charges

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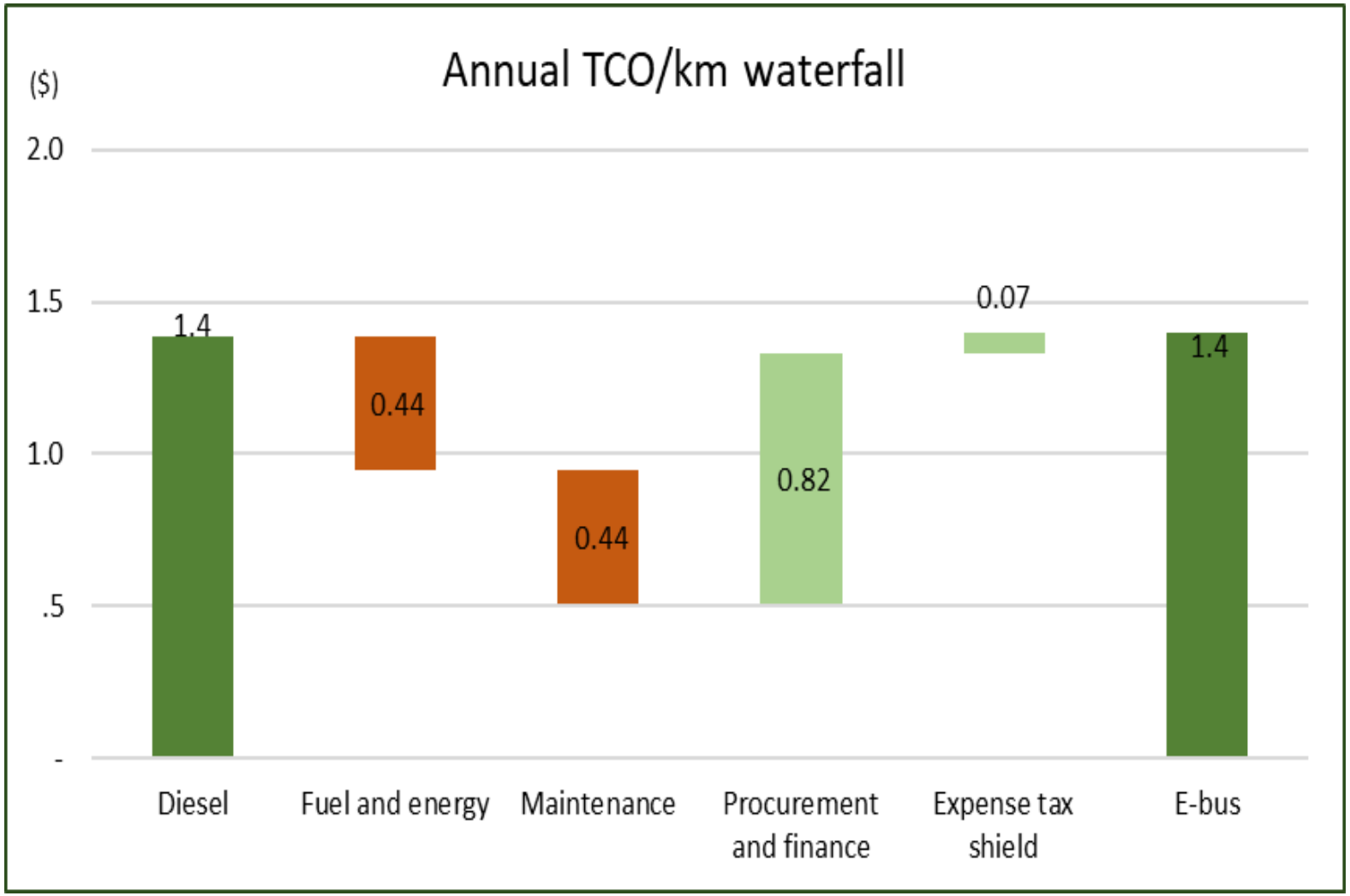
Case Study – TCO Comparison Waterfall



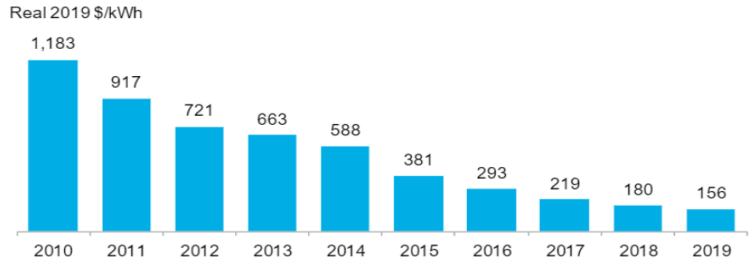
TCO price parity exists now for electric buses. In addition, we expect TCO to favour electric buses in the future due to:

1. Battery prices continuing to decline through to 2030.
2. Retail prices of electric buses declining (from $650k) due to demand;
3. Government mandated transition to electric.

Battery prices

Battery prices fell again in 2019, dropping 13% year-over-year to $156/kWh. Since 2010, battery prices have fallen 87% and are nearing levels where the upfront costs of EVs will be competitive with internal combustion engine vehicles (ICE) without subsidies.

Figure 36: Volume-weighted average lithium-ion pack price



Source: BNEF.

TCO parity is further confirmed by various studies, including by BNEF, Canberra Transport, TfNSW and others.

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An Electrification Solution

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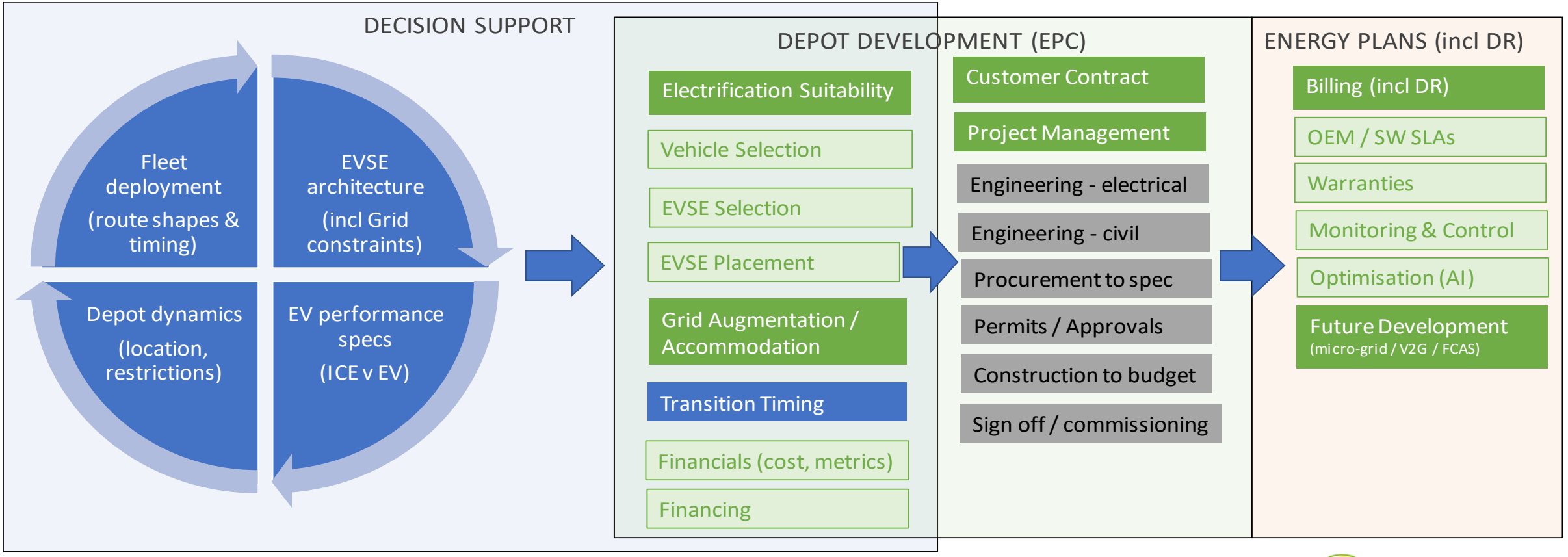
An Electrification Solution – what we can offer

Stage 1
Decision Support - TCO

Stage 2
EPC & Grid connection

Stage 3
CHaaS – own and operate



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An Electrification Solution – CHaaS

Providing a Charging as a Service (CHaaS) retail contract over the term of the transit contract that includes:

1. Optimising energy charges down (peak, off peak, maximum demand suppression) including carbon offsets or pure energy (see next page)

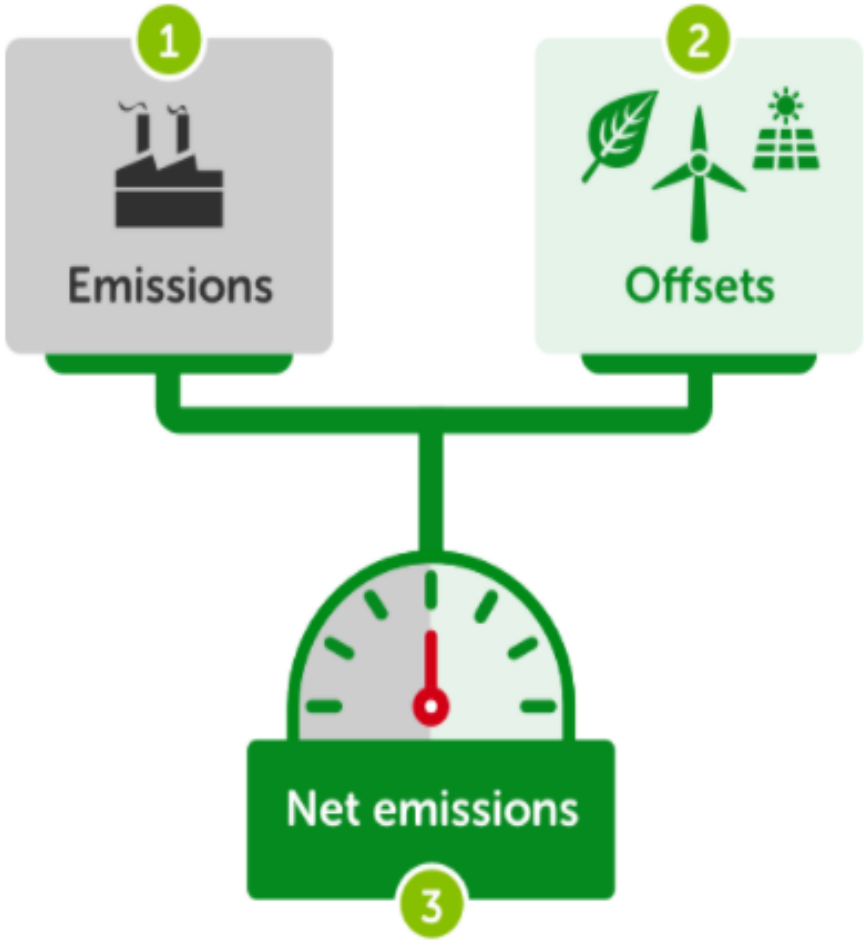
2. Up to 5+5+5 arrangement: fixed pricing for 5 years followed by price review.

3. Bundling of electrification CAPEX and charging back to operator as OPEX.

4. Optimise EVSE and wear warranty, performance KPI and downtime risks.

Sustainable Energy Solutions for Large Business Customers

Offset - Large Business Carbon Neutral Electricity



1. If you're using energy generated from fossil fuels, this releases carbon into the atmosphere.
2. To reduce the environmental impact of your carbon emissions, we purchase certificates from carbon reduction projects which remove or cancel the equivalent amount of greenhouse gases released i.e. 'offset' emissions.
3. The resulting 'net' level of those emissions is zero.

Power sourced directly from the grid is currently about 24% renewable* or 'green' – we can help you get to 100%.

*source: 2021 Australian Energy Statistics (Electricity, 4 June 2021, The Hon Angus Taylor MP, Minister for Energy and Emissions Reduction - https://www.minister.industry.gov.au/ministers/taylor/media-releases/2021-australian-energy-statistics-electricity

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Sustainable Energy Solutions for Business & Resi Customers

Purchase renewable energy via our PureEnergy plans

Purchasing supports the production of electricity from government accredited renewable sources (such as solar, wind, hydro and biomass) over and above mandatory targets.

Our PureEnergy plans

GreenPower	Residential green energy options	Green energy charges*
10% GreenPower Accredited	PureEnergy10	$0.0495 X (10% x total usage)
20% GreenPower Accredited	PureEnergy20	$0.0495 X (20% x total usage)
100% GreenPower Accredited	PureEnergy100	$0.0495 X (100% x total usage)

*Prices include GST. Green energy charges apply in addition to your electricity rates. Prices effective 2 Jan 2018. Prices are subject to change.

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Site audits

Site reports on selected depots - help inform decision making processes around “electrifying” their depots/fleets

- Current site electrical architecture
- Modelled electrical needs of a future electric bus fleet
- Electric Bus selection (preferred supplier or EnergyAustralia can recommend.)
- Grid connection: current and proposed
- EVSE costing (preferred supplier or EnergyAustralia can recommend.)
- High level proposal of EVSE placement
- High level costings for EVSE, electrical and civil works
- Significant issues call outs