

The future for heavy electric vehicles in New Zealand

25 October

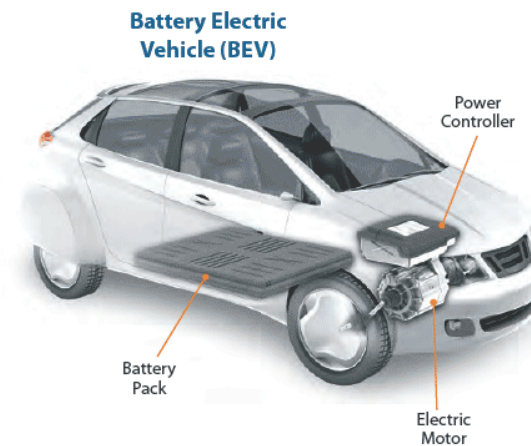
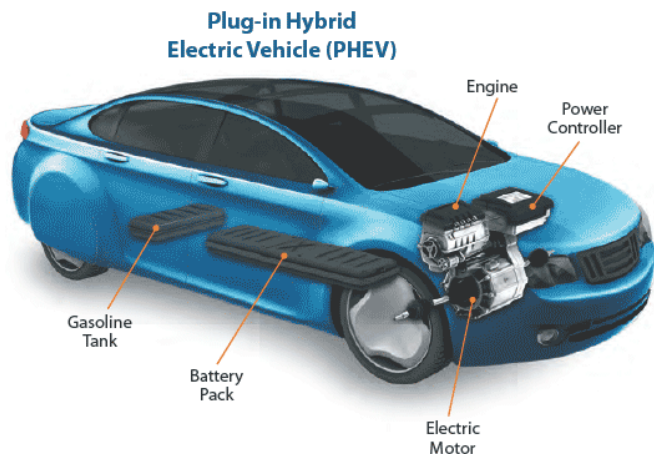
IRTENZ Conference

Jörn Scherzer, Relationship Manager Transport



What counts as an EV

Uses an external source of electricity, for some or all of its motive power



Mitsubishi Outlander



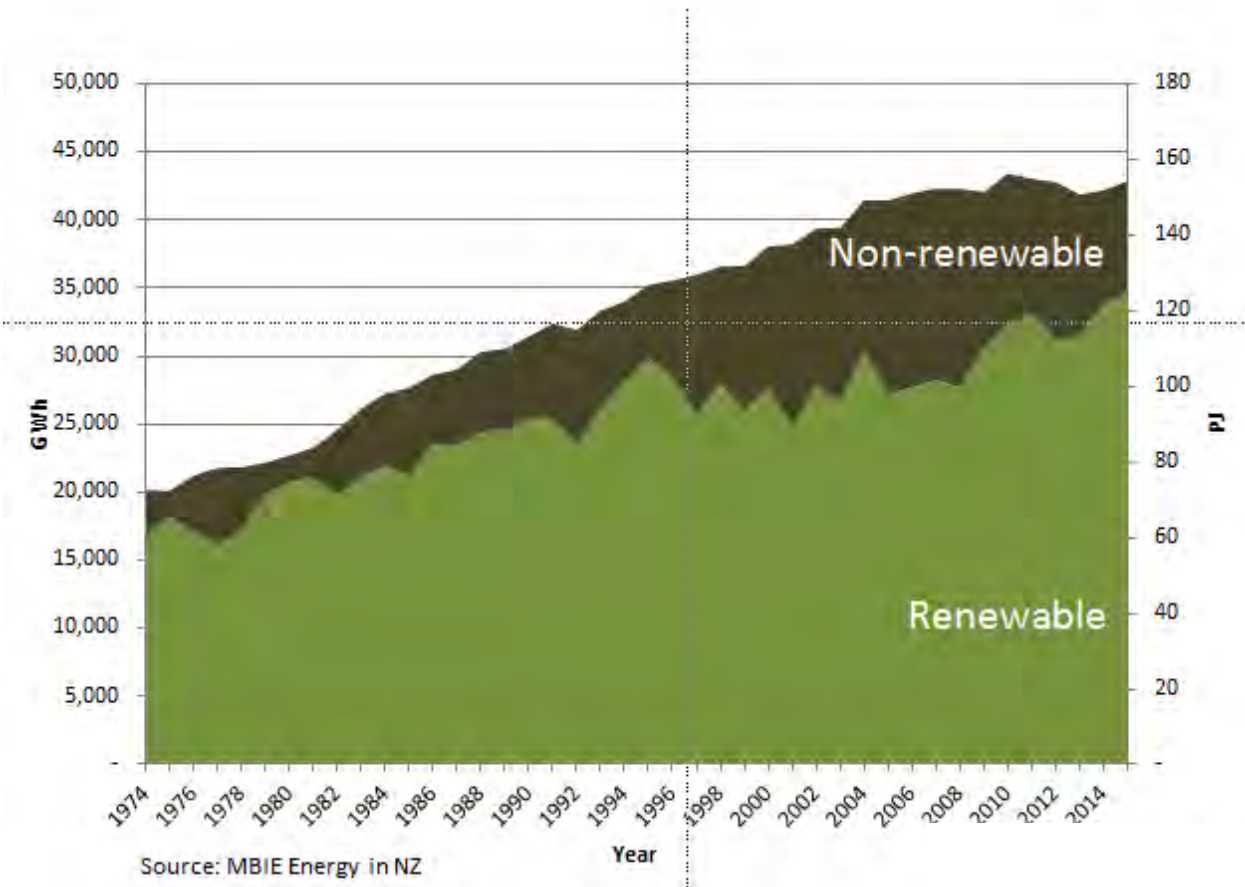
Nissan Leaf

Conventional hybrids are not EVs


Because they don't use an external source of electricity



Why EVs?



80%
fewer
CO₂
emissions

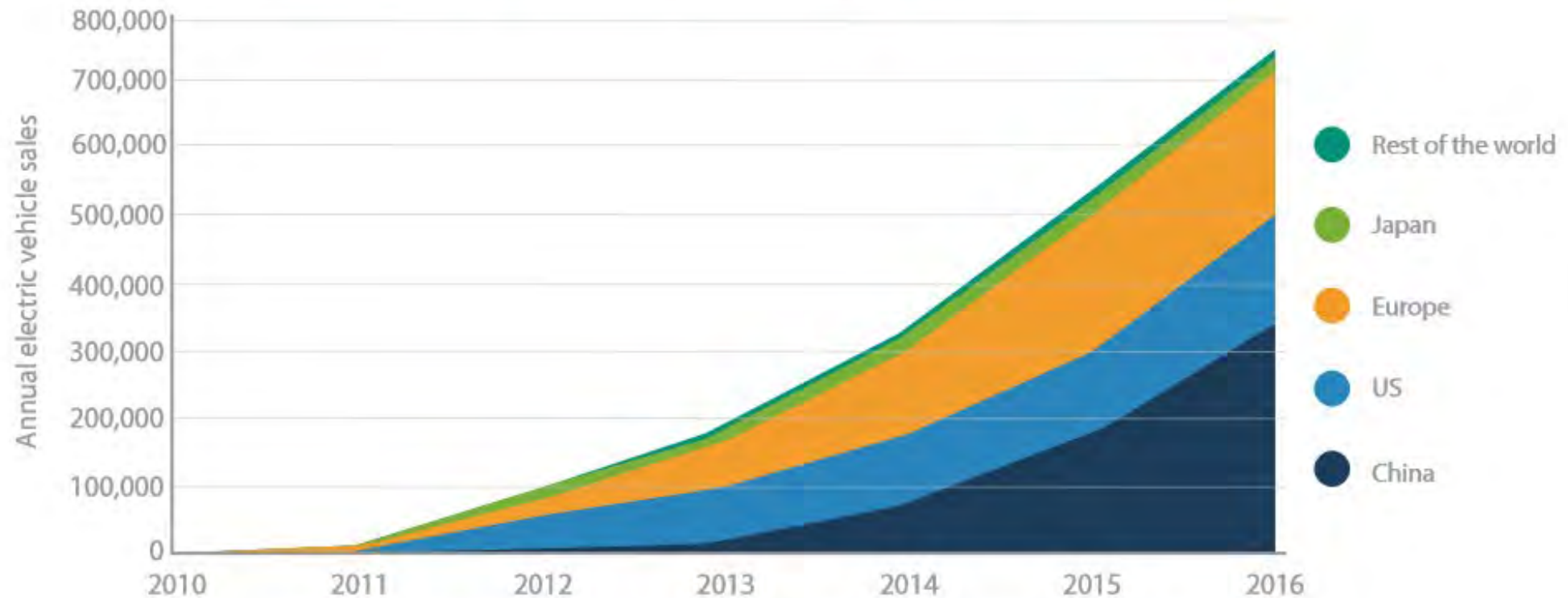


than a petrol vehicle
when used in NZ

- No noise
- No harmful exhaust emissions
- Low maintenance

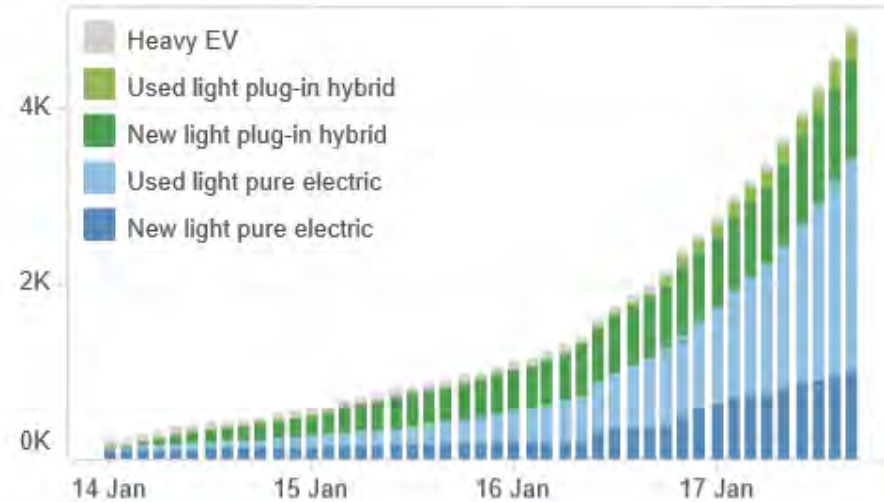
EV growth globally

Global EV Sales by Country/Region 2010-2016¹⁵

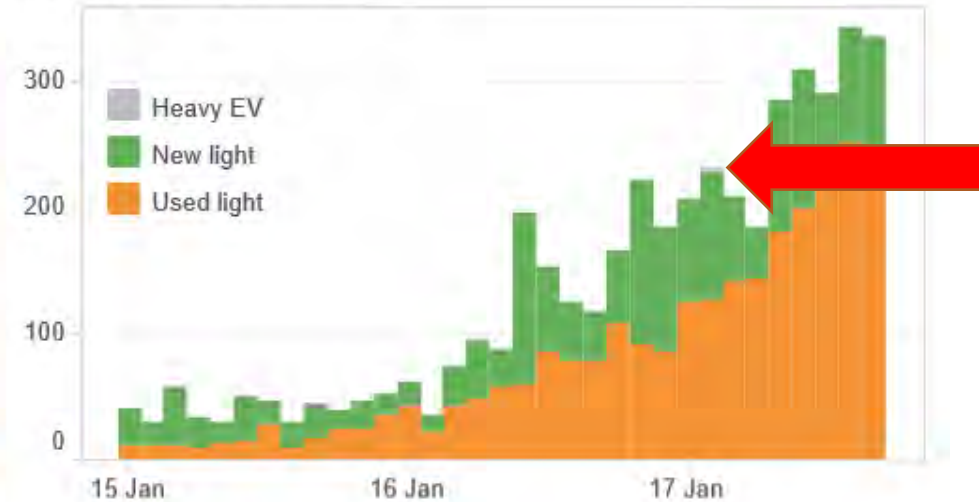


EV growth in New Zealand

EV fleet size



Monthly EV registrations



- EV numbers growing exponentially, most growth is due to used imports
- Pure EVs are more popular than PHEV
- **Heavy battery electric vehicles still in the starting blocks**

Why is there so much growth in light “used” EVs?

Nissan e-NV200 GX 2015 Listing #: 1219334895

Asking price: **\$26,500** Listed more than a month ago [Watchlist](#)

MotorWeb Basic Report [Get vehicle report](#)

Check out our **Nissan** reviews and advice. [Read more](#)

On road costs: Included

Kilometres: 2,374km

Body: Blue, 5 door, Van

Transmission: Automatic

Import history: Imported

Stereo description: CD(s)

Features: ABS brakes, Central locking, Power steering, Climate Control, Immobiliser, Traction Control




Photo 1 of 20

Fuel Economy info: **6 FUEL ECONOMY** (Source: Energywise)

EV

Nissan Leaf S 2015 Listing #: 1357713572

AA & MTA ASSURED DEALER

Asking price: **\$19,990** Listed more than a month ago [Watchlist](#)

MotorWeb Basic Report [Get vehicle report](#)

Check out our **Nissan** reviews and advice. [Read more](#)

On road costs: Included

Kilometres: 14,450km

Body: White, Hatchback

Fuel type: Electric

Transmission: Automatic

Stereo description: CD(s)

Features: ABS brakes, Air conditioning, Central locking, Power steering, Electric Mirrors, Electric Windows, Remote Locking




Photo 1 of 11

Fuel Economy info: **4 FUEL ECONOMY** (Source: Energywise)

Volkswagen Caddy 1.2 TSI Man 2015 Listing #: 1307462743

FACTORY WARRANTY, RUBBER FLOOR LINER, MESH BARRIER

Asking price: **\$24,990** Listed more than a month ago [Watchlist](#)

MotorWeb Basic Report [Get vehicle report](#)

Check out our **Volkswagen** reviews and advice. [Read more](#)

On road costs: Included


Kilometres: 10,280km

Body: White, Van

Fuel type: Petrol

Engine size: 1197cc

Transmission: Manual



Fuel Economy info: **4 FUEL ECONOMY 6.6L / 100KM** (Source: Energywise)

ICE

Toyota Corolla GX 1.8 Auto 2015 Listing #: 1378426815

SIGNATURE CLASS, LATEST SHAPE, NZ NEW

Asking price: **\$20,990** Listed within the last 30 days [Watchlist](#)

MotorWeb Basic Report [Get vehicle report](#)

Check out our **Toyota** reviews and advice. [Read more](#)

On road costs: Included

Kilometres: 41,997km

Body: Silver, Hatchback

Fuel type: Petrol

Engine size: 1798cc

Transmission: Automatic




Photo 1 of 20

Fuel Economy info: **4 FUEL ECONOMY 6.1L / 100KM** (Source: Energywise)

There are many other models, but some don't sell so well yet

\$70k (new) vs \$45k (new parallel-import)



Sub-compact



Compact



SUV



Sports



Large



Van



But what about larger vehicles? (i)



About 3,000 Streetscooter Work vans in operation in Germany



But what about larger vehicles? (ii)



FUSO eCanter, 7.5t

But what about larger vehicles? (iii)



But what about larger vehicles? (iv)



?

or buses?



ADL& BYD, 100% electric



ADL "Plug-in hybrid" with inductive charging



BYD, 100% electric (several thousand in operation)

NZ's first 100% battery electric bus



What are the barriers for uptake of heavy EVs

- Higher purchase cost
- Axle weight limits in NZ
- Limited range
- Limited supply from Western vehicle manufacturers; focus is still on niche products or sectors (eg buses for urban transport)
- Technology anxiety / risk aversion: “*show me someone in NZ that’s done it, show me real data*”
- Charging standards
- Auxiliary units can have significant impact on energy consumption (eg air compressor, chiller, heater)

Potential charging infrastructure demand

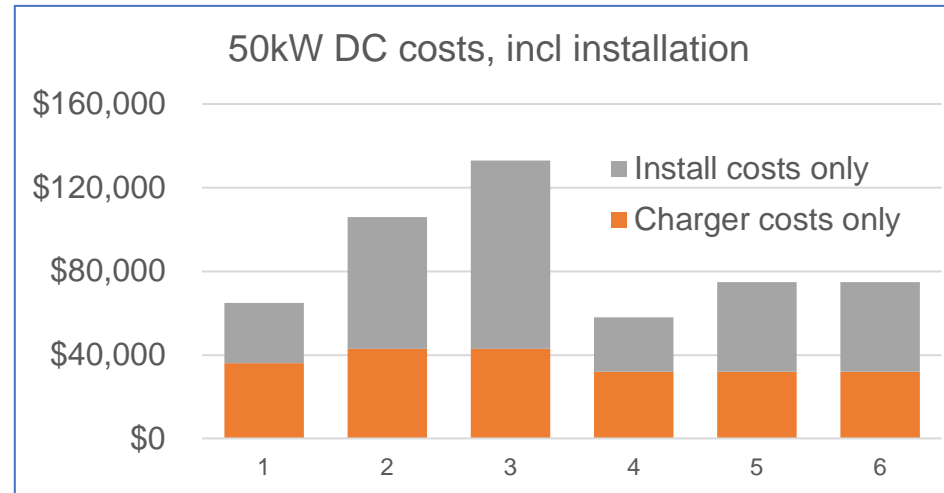
Fleet assumption: 20 delivery trucks @ 150kWh



- Overnight re-charge at 22kW AC:
 - = 0.44 MW load added to network
 - ~ 130 Nissan Leafs charging at the same time
 - ~ average demand of about 400 households
- Potential day top-up at 50kW DC (lunch time):
 - = 1MW load added to network
 - ~ 300 Nissan Leafs charging at the same time
 - ~ average demand of about 1,000 households

Charging infrastructure costs

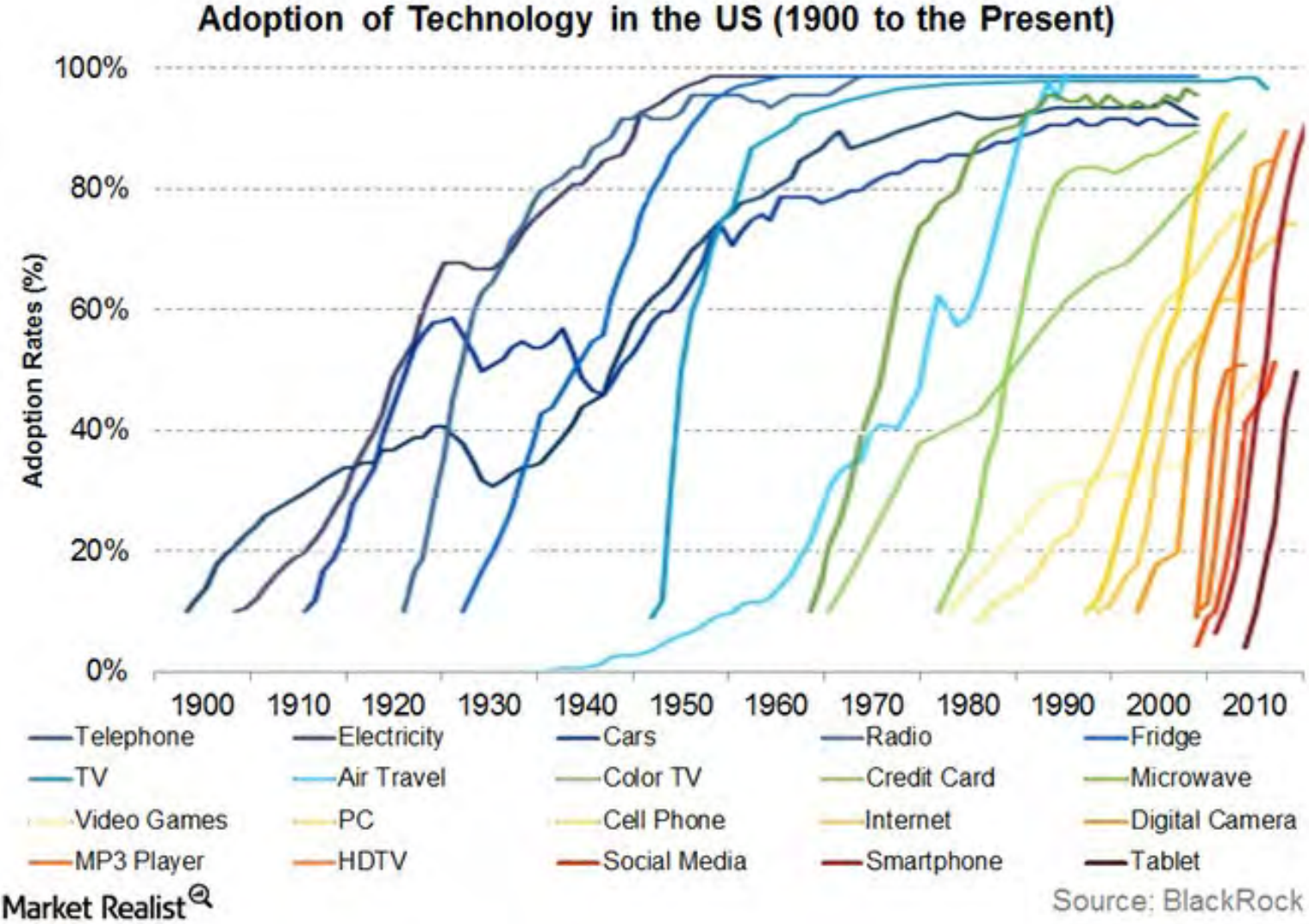
- 22kW AC: \$5-20k
- 50kW DC: \$60-140k



- Gantry systems: \$500k



Underestimating the speed of change?



Horses vs motorcars

1900



1913



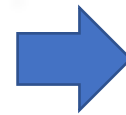
New York 5th Avenue

Mobile phones

1983



1996



2007

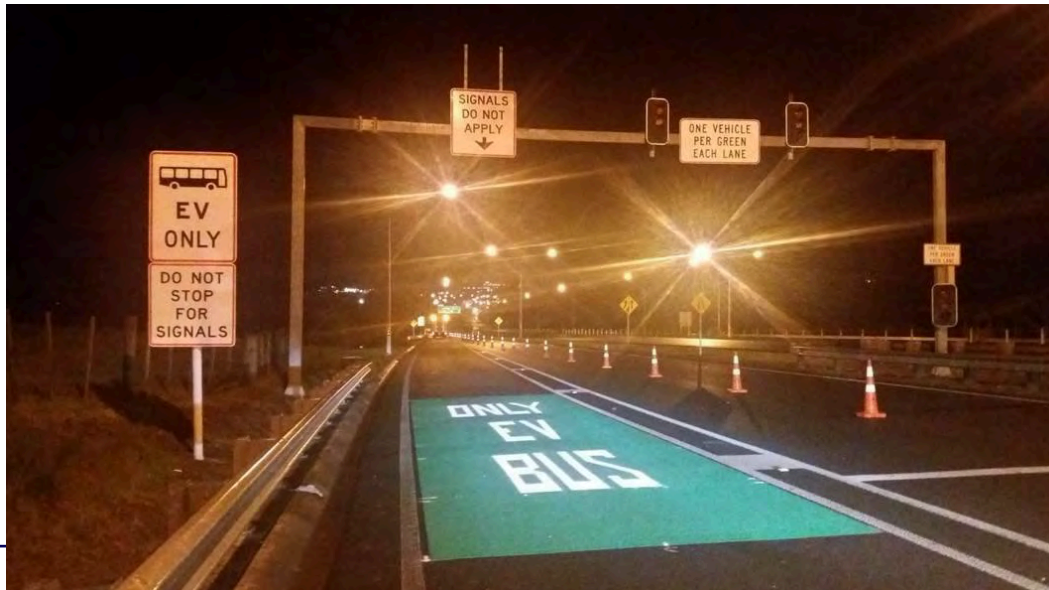


Are there opportunities for heavy EVs?

- Potentially already lower total cost of ownership for high mileage but low range applications (eg buses, waste trucks, urban delivery)
- No noise (eg night deliveries)
- No harmful emissions (lower health impact in urban centres)
- RUC exemption (until they make up 2 per cent of the HV fleet)

Auckland EVs in Special Lanes – Phase 2

- EVs are able to use 11 transit lanes on state highways in Auckland for a 12 month trial
- Lanes were selected taking into account safety and impacts on traffic flow and public transport
- For more information, visit www.nzta.govt.nz/ev-special-vehicle-lanes





Low Emission Vehicles Contestable Fund

- Funding of up to \$6 million per year to co-fund projects where commercial returns aren't strong enough yet to justify full private investment.
- Projects must contribute to the following objectives:
 - Increasing the variety and supply of electric vehicles (EVs) available – light and heavy
 - Improving the availability of servicing or charging infrastructure in areas where demand is not fully developed
 - Increasing demand for EVs
 - Developing innovative products or systems to take advantage of growing EV usage
- Round 4 from February 2018
- Information will be available at <https://www.eeca.govt.nz/funding-and-support/electric-vehicles-programme/>

Investment focus previous Round 3

Projects that:

- Support the development of the electric vehicle charging network by filling key gaps in the network.
- Facilitate the scale up of EV technology, especially in vehicle fleets.
- Enable the demonstration and uptake of light and heavy EVs and associated technologies in sectors of the economy where EVs remain relatively unproven.

Examples of potential projects for R3 investment focus

- Regional partnerships to catalyse territorial authorities and the electricity sector to build provincial EV communities, which will result in increased EV uptake, and the development of the rural charging network.
- Charging infrastructure at tourism destinations, in smaller centres, and on secondary routes to help speed up the establishment of a nationwide recharging network.
- Assisting with infrastructure costs to enable the rollout of bus fleets or large light vehicle fleets.
- Demonstration of electric trucks and electric buses in the logistics and public transport sectors.

LEV Fund approved project examples (i)

Demonstrations:

- Electric car share scheme in Wellington and Christchurch (MEVO, Yoogo)
- Rental cars (EuropCar)
- Electric delivery vans (Foodstuffs, NZ Post)
- Large passenger vans (Snap Rentals)
- ***Electric buses (AKL Transport & Tranzit)***
- ***Electric rubbish trucks (Waste Management NZ & Palmerston North City Council)***



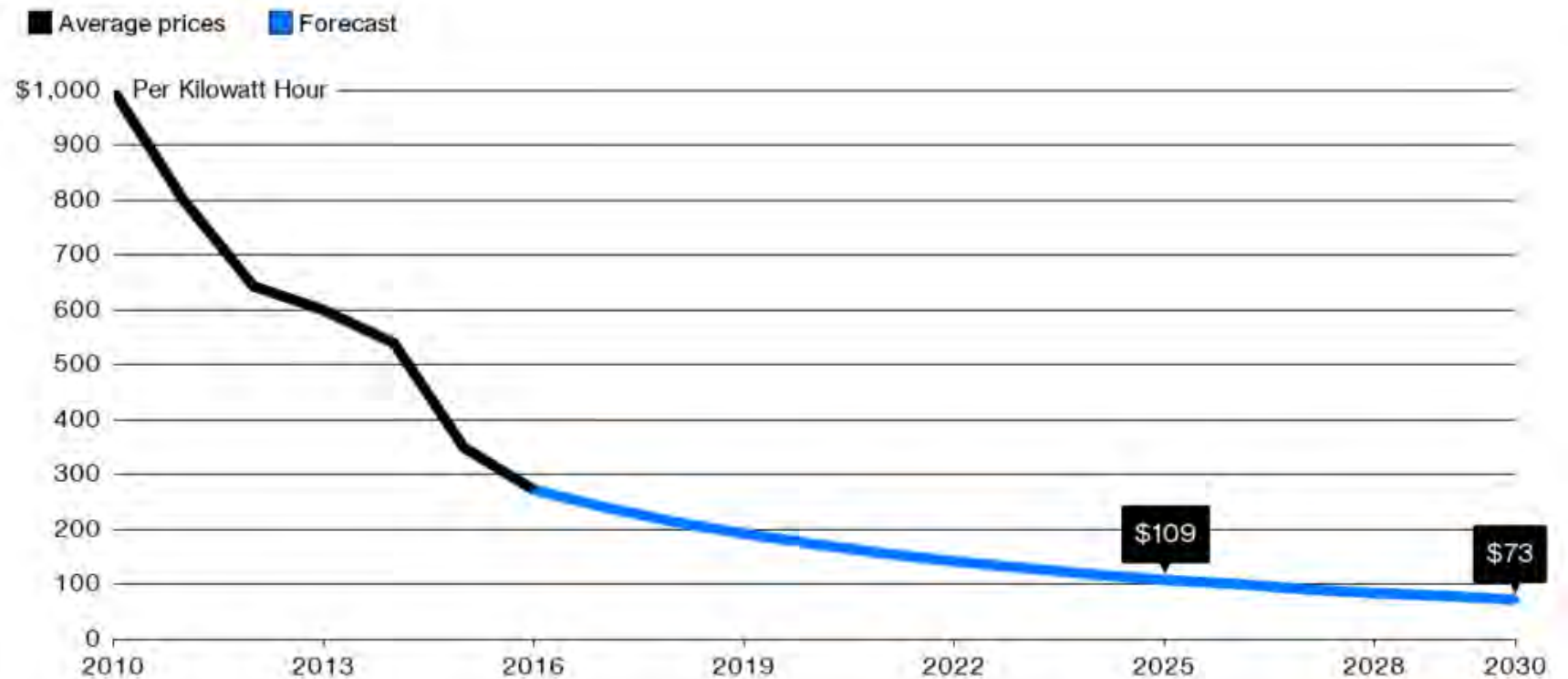
LEV Fund approved project examples (ii)

Charging infrastructure

- Slow charging:
 - 20 warehouse locations
 - selected Foodstuffs stores
 - 60 Park & Ride and prioritised parking spots in Auckland
 - Wellington residential on-street charging
- Fast charging:
 - Thames Coromandel peninsula
 - Eastern Bay of Plenty, East Cape and Gisborne
 - Taupo to Napier highway
 - Northland
 - Queenstown to Dunedin
 - Queenstown to Invercargill
 - Christchurch to Nelson



Battery technology improving



Source: Bloomberg New Energy Finance

... leading to bigger range and/or lower purchase costs

Are there other things to do in the HV space?

- Biofuels can play a useful role going forward
 - Fleet optimisation (have you got the right truck, improved routes, fuel efficient driving, etc)
- ... but do occasionally review requirements (could an electric truck already suit your requirements, especially as technology develops rapidly)

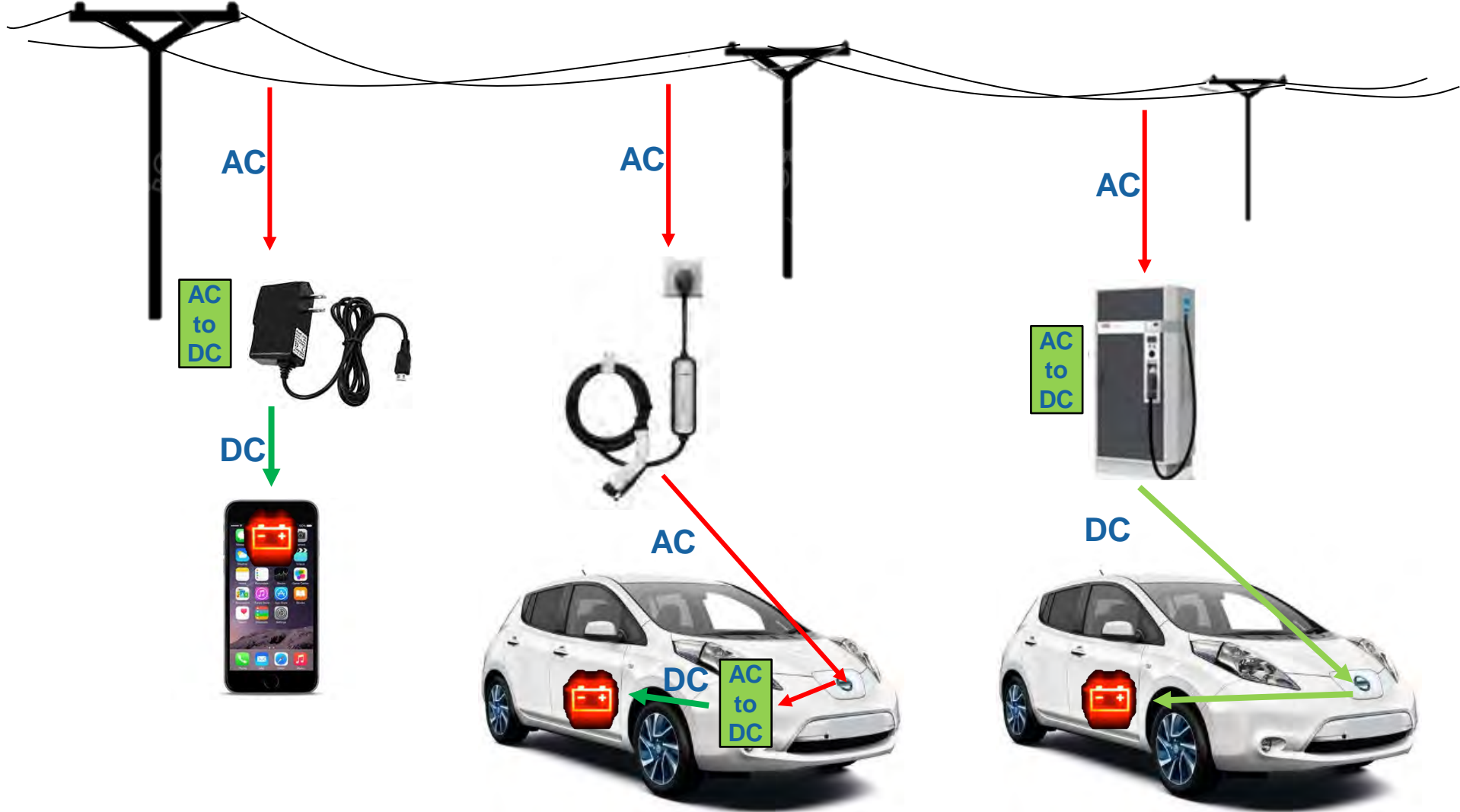
Questions?

- Contact: joern.scherzer@eeca.govt.nz; 027 203 46 83
- For some useful information, go to www.electricvehicles.govt.nz




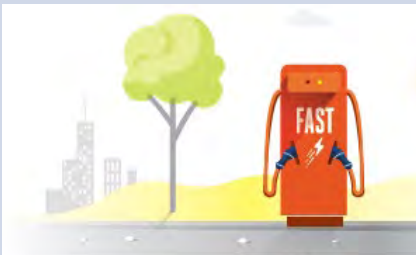


Backup slides

Charging 101



Charging options and speeds

Option	Power	Speed	Time to add 100km of range
	1.7kW	Trickle	10hr
	3.3kW	Slow	6hr
	3.3kW	Slow	6hr
	7kW		3hr
	22kW	Medium	1hr
	43-50kW	Fast	20min (80% charge)
	100kW+	<i>not available yet except Tesla "Superchargers"</i>	-



Why a lot of EV charging will be overnight

- Over 90% of trips are below 90km, well within the range of even current EV technology
- Even where trips rely on fast charging, a big chunk of charging can utilise off peak (first 120km per day for taxis)
- Charging overnight / off-peak makes sense
 - Charging overnight is convenient (it's parked up anyway, the car is full every morning)
 - Charging overnight can be significantly cheaper, taking advantage of off-peak pricing (<15c/kWh, many businesses will have significantly lower rates than this) – like filling up at 30c/litre
 - EV charging can smoothen the demand profile of the electricity grid (peak reduction, carbon savings)
- In most cases, some initial one-off investment will be required in addition to the vehicle purchase to enable overnight charging (eg new cabling, wall box)



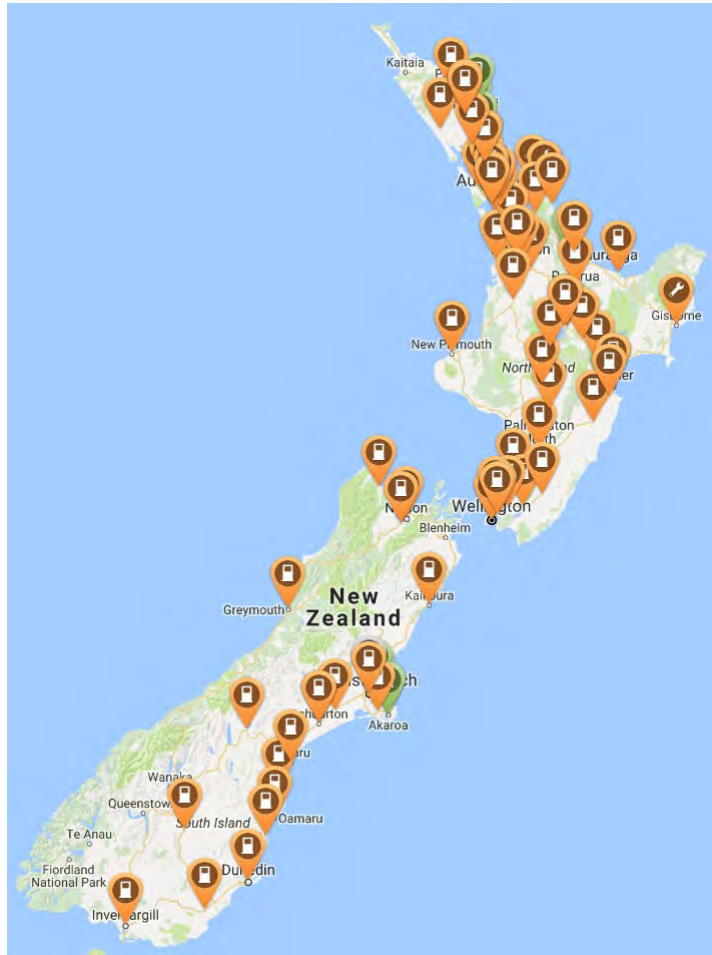
On-route charging: Fast



- This type of charging is suited to locations serving inter-city travel, where drivers want to make shorter stops
- All units have tethered cables, no need to bring your own
- Filling up a Nissan Leaf to 80% takes about 20min
- Stations have two standards



Charging stations



- About 80 fast charge stations and about 45 slow charge stations
- About 100 fast charge stations estimated at the end of this year
- Coverage still limited to main cities, routes and highways
- Who puts them in:
 - Fast charging: ChargeNet, lines companies
 - Slow: Councils, business owners, cafes, tourism attractions
- How to find them: apps such as plugshare

On-route charging: Slow



- This type of charging is more suitable for locations where drivers stop for longer or where a high turnover of users is less important.
- Filling up a Nissan Leaf could take 8 hours, so only useful as a top up
- Drivers need to bring their own cables with a Type 2 connector at one end (which fits the charging station's socket outlet) and at the other end a connector that matches their vehicle (either T2 or T1).
- These cables are often not supplied with the vehicle, but can be purchased