Electric vehicle infrastructure that councils should know about

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RCA presentation

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Auckland Transport

An Auckland Council Organisation

What is an Electric Vehicle?

- Uses electric motors to drive the wheels
- Uses electricity as the “fuel”
- Uses a battery as the “tank”

Not a new idea

- Popular from the 1880's – 1910's

Thomas Parker, 1895

Thomas Edison, 1913

New Zealand's EV advantage

EQUIVALENT TO PAYING **30c** per litre

90% of travel by car in NZ is less than **90km**

80% fewer CO_2 emissions

than a petrol vehicle when used in NZ

Electric Vehicles
Drive the Future

Background

- In May 2016, the Government announced its electric vehicle uptake package.
- It aims to increase the uptake of electric vehicles by addressing barriers that have prevented households and businesses from choosing electric, including:

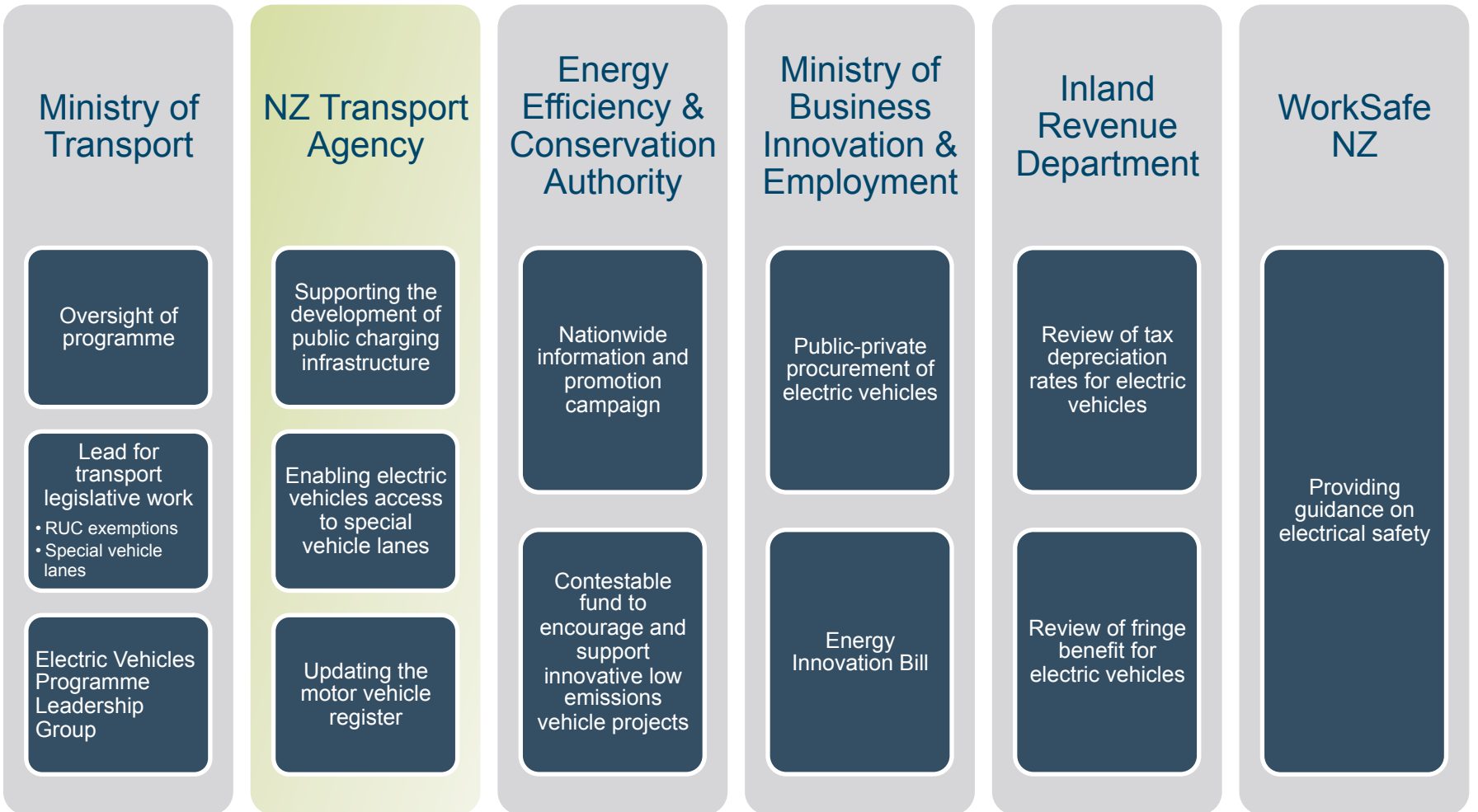
64,000 electric vehicles by **2021**

- the limited supply of electric vehicle models in New Zealand
- a lack of awareness and misconceptions about electric vehicles and
- a lack of widespread public charging infrastructure.
- This will ultimately:
- reduce greenhouse gas emissions from New Zealand's transport sector, which currently accounts for 17 percent of our greenhouse gas emissions
  - maximise our renewable energy – more than 80 percent of our electricity comes from hydro, geothermal and wind and
  - reduce our reliance on imported fossil fuels.

80% fewer CO_2 emissions

than a petrol vehicle when used in NZ

Cross-agency EV programme overview



Opportunities

1. Cheaper Fuel
2. Quieter
3. Cleaner & Healthier
   - 80% renewable electricity generation
   - 60% less CO_2-eq emissions over lifespan
   - Substantial reduction in air quality emissions
4. Quicker
5. Smarter

$0.16 / km
($2.00 / litre)

vs

$0.04 / km
($0.25 / kWh)

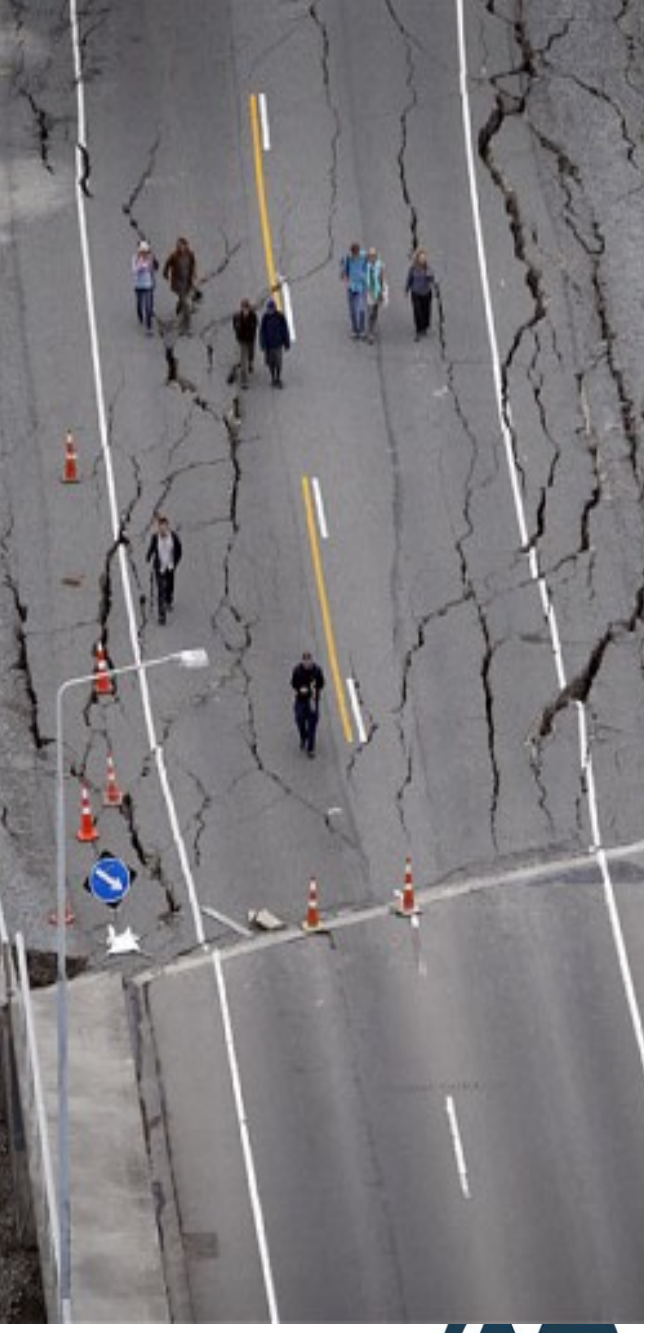
Challenges

1. Alignment across public and private sector & working in partnership
2. Fit for purpose legislation, policy and regulation
3. **Provision of charging infrastructure**
4. Limited driving range (120 – 500km)
5. Achieving “interoperability” in a contestable market
6. vehicle availability, cost and maintenance
7. Lack of information and promotion
8. Lack of financial incentives

EV Charging Infrastructure

Good management is the art of making problems so interesting and their solutions so constructive that everyone wants to get to work and deal with them. *Paul Hawken*





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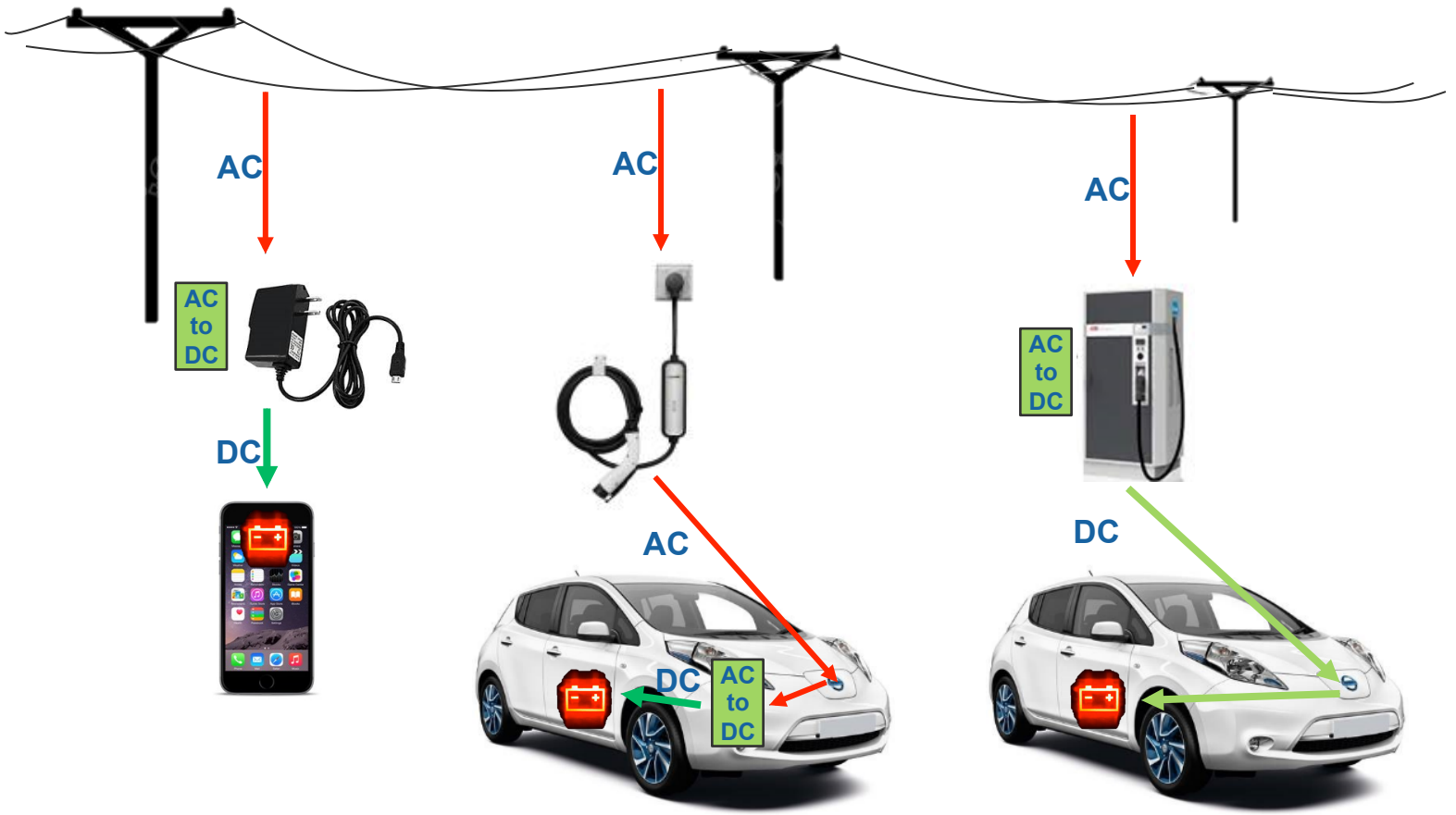
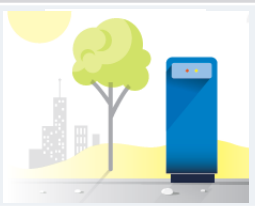
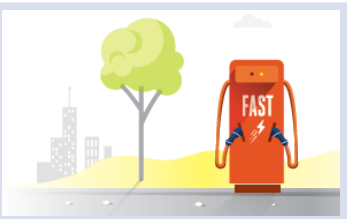
Different cities have different needs.

Charging often comes up in questions



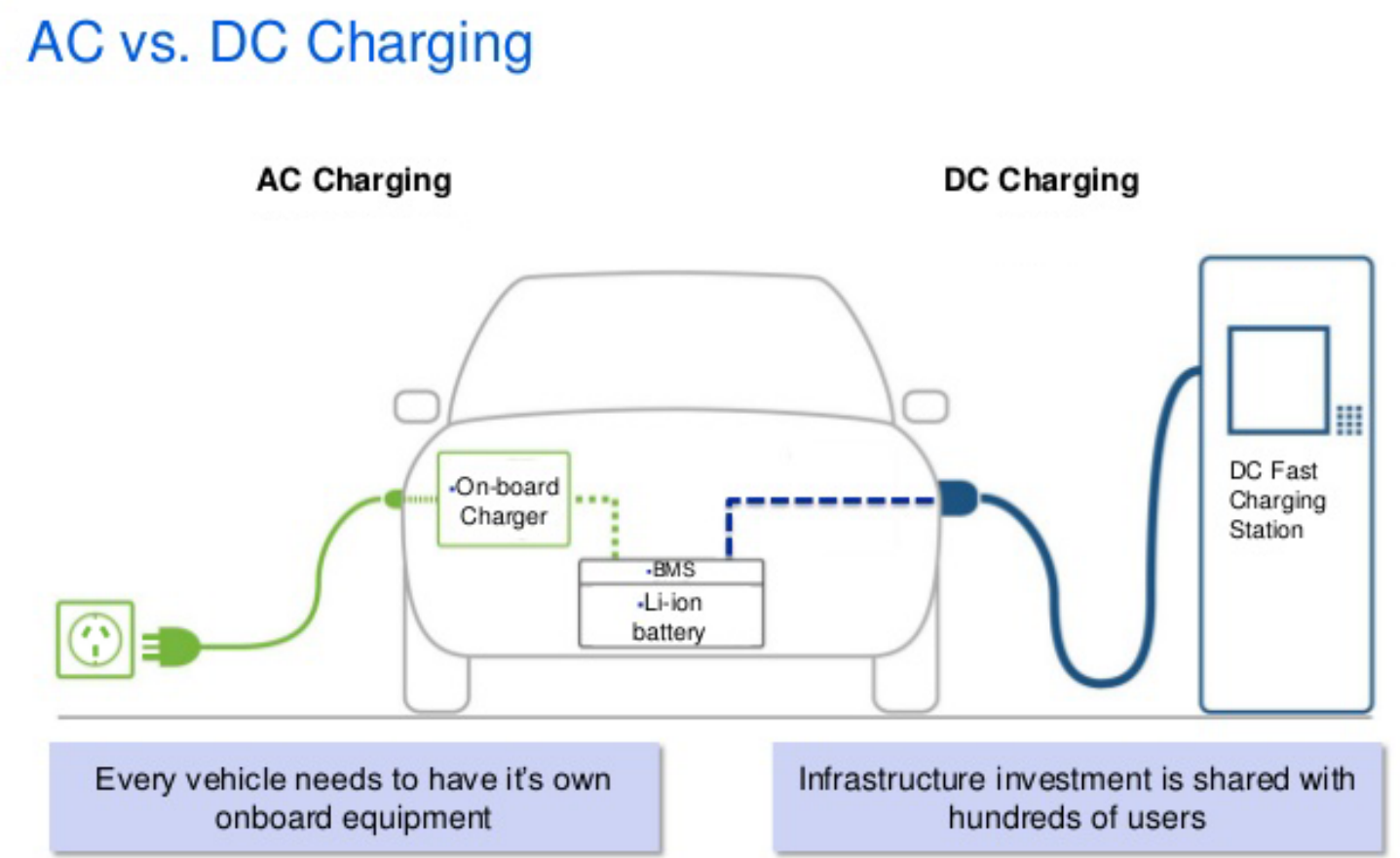
Charging options and speeds

Option	Power	Speed	Time to add 100km of range
 	1.7kW	Trickle	10hr
 16A 	3.3kW	Slow	6hr
	3.3kW	Slow	6hr
	7kW		3hr
	22kW	Medium	1hr
	43-50kW	Fast	20min (80% charge)
	100kW+	*not available yet except Tesla "Superchargers"*	-

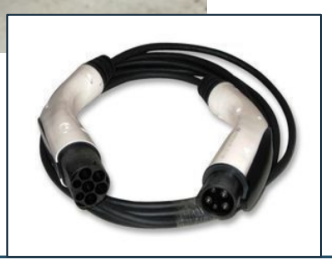
Most EV charging will be overnight

- The majority of charging EVs will likely be overnight because over 90% of trips are below 90km, well within the range of even current EV technology
- Charging overnight 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)

Charging speeds



On-route charging: Slow

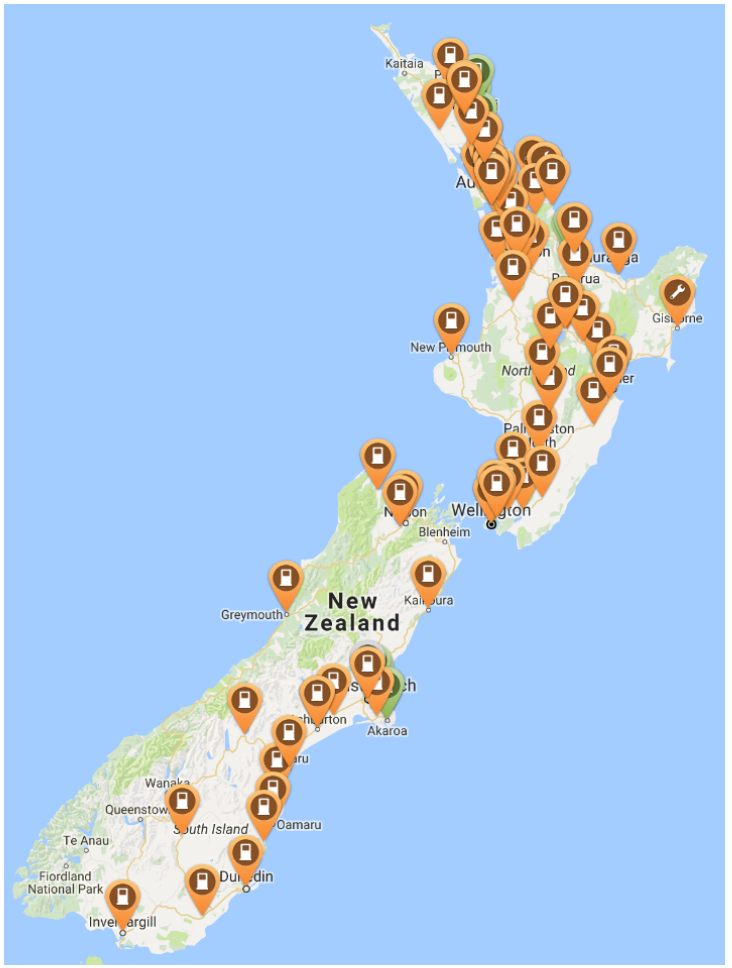


- This type of charging is more suitable for locations where drivers stop for longer or where a high turnover of users is less important.
- Filling up a Nissan Leaf could take 8 hours, so only useful as a top up
- Drivers need to bring their own cables with a Type 2 connector at one end (which fits the 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

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

Where are the charging stations



- Nearly 70 fast charge stations and 30 slow charge stations as at mid-July
- About 100 fast charge stations estimated at the end of 2017
- Coverage still limited to main cities, routes and highways
- How to find them: apps such as plugshare

Where? Approach and location criteria

1. The right amount of visible infrastructure in the right place at the right time
2. Fill strategic gaps in the growing network of EV charging points
3. Distinguish between locations for fast chargers and slow chargers
4. Favour off-street charging sites over on-street sites to:
   - minimise cost (access to land, bylaw changes, required consenting, safety mitigation)
   - minimise on-street parking issues (infrastructure interfering with pedestrians, loss of productive existing bays, traffic flow impacts)
5. Target major busy, accessible day time destinations. Assume that many EVs, including fleet vehicles, will be charged at home base
6. Busy, visible and publically accessible charging sites
7. Clustering around EV current and future owners

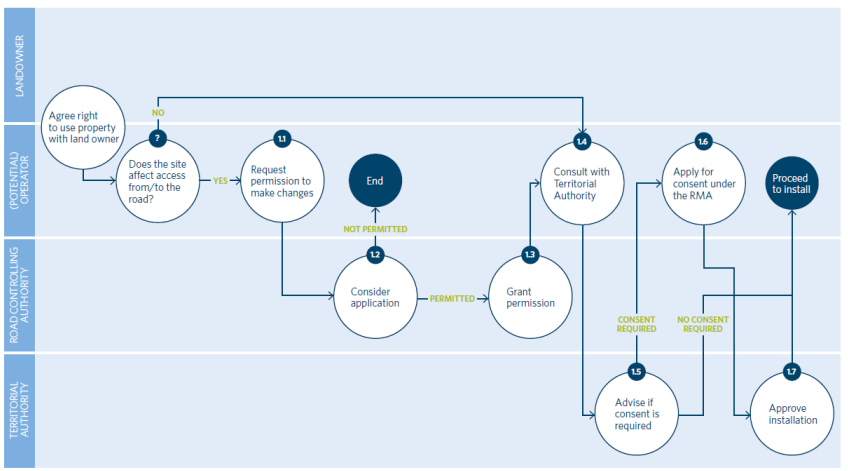
* Assume 95% of EVs will be charged at home (EECA assumption)

Guidance for public charging infrastructure network for light electric vehicles was developed by a public/ private sector group www.nzta.govt.nz/ev

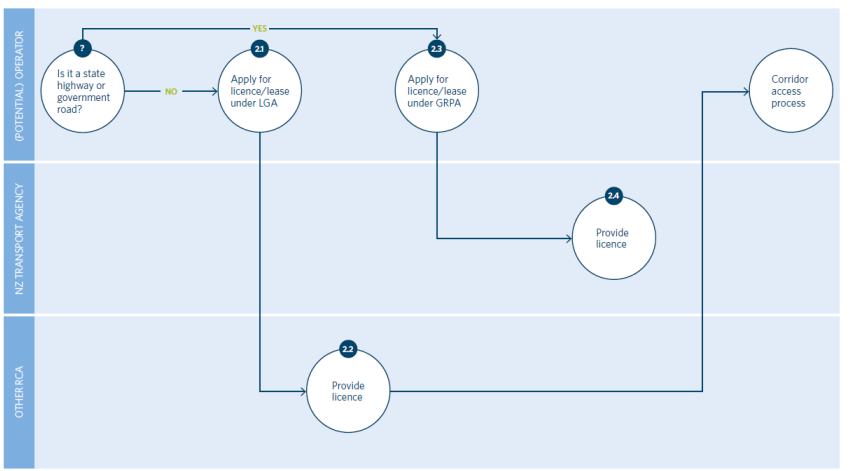
Application process and template

- NZTA has developed a high level overview of process for on-road and off-road applications

1 INSTALLING A CHARGING STATION OFF-ROAD



2 INSTALLING A CHARGING STATION ON-ROAD



- AT is has a regional application process that is more ‘fit for purpose’ in Auckland
- Common AT/AC application template for applicants

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Next steps- for charging infrastructure

NZ is a small country – can't afford ad hoc approach between different providers, with different systems, not talking to each other.

What is needed:

- **A focus on the customer** – ensuring convenient payment systems, different charging options across day and night, and overcoming 'range anxiety'…billing for electricity, interoperability/ socket type issue, role of app
- **One source of truth for public charging infrastructure**
- A **co-ordinated effort to build an integrated network** that serves all EVs
- Need clarity on the definition of an EV and the **definition of charging point as an installation**
- Agree **priority locations** – public & private off-street car parks, park & rides, company fleet car parks, commercial areas e.g.. supermarkets, malls, hospitals, service stations, new development (future proofing)
- A **combination of slow/ fast/ rapid charging stations** with maximised range of socket outlets
- Building essential infrastructure first with a phased approach to meet EV uptake
- **Future proof** -Infrastructure that is flexible to meet needs and shifts in technology shifts over time
- **Consistent policy guidance, national legal standards** and clarity about regulatory framework, operational risks and liability and **minimum standards for EV charging points**
- **Effective partnerships** between energy supply/distributors, regional, central government & the private sector
- **Who will own the infrastructure**?
- **Ensuring the grid is resilient** – to enable the location of the EV infrastructure

Change is coming

5th Ave NYC, 1900…..**Where is the car?**

Disruption

Source: George Grantham Bain Collection.

5th Ave NYC, 1913…..Where is the horse?