Driving the electric future

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Transport emissions in New Zealand

Overview:

- New Zealand's almost 4 million vehicles represent 17% of our emissions.
- Electric cars are "zero emission", cheap, fantastic to drive, but missing.
- Light vehicles are 80% of road emissions. This means a marathon job shifting families and fleet owners to electric. Heavy vehicles are the other 20%.
- Current (introduced May 2016) policy likely to reach 64,000 electric vehicles by 2021 and should trigger social awareness and acceptance of the vehicles but will it generate meaningful emission reductions any time soon?
- The 2030 and 2050 UN agreements won't be easy.
- If we want significant transport emission reductions then stronger policies will be necessary longer term (e.g. strongly taxing vehicles that emit).

Transport is a key emissions issue & opportunity

- 17% of NZ gross CO_{2e} emissions (14 of 81 million tonnes, 2014)
- 24% of NZ net CO_{2e} emissions (14 of 57 million tonnes, 2014)

- 91% of transport emissions are road-based (12.8mt)

- 100 kilometres of driving = 23 kilograms of CO_{2e}

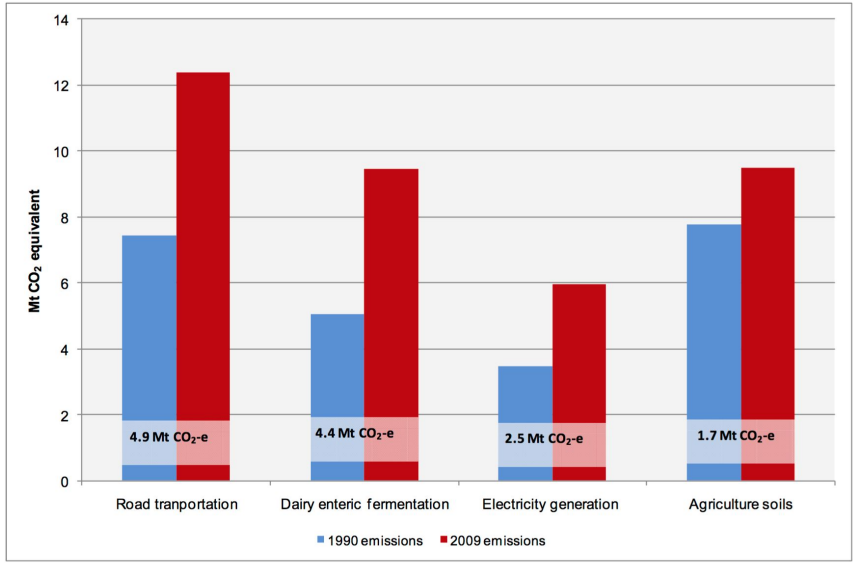
- Average car drives 12,000 km/year, i.e. 2.8 tonnes CO_{2e} (more than the vehicle weighs).

http://www.mfe.govt.nz/publications/climate-change/new-zealands-greenhouse-gas-inventory-1990-2014-snapshot

Transport CO_2 emissions need a U-turn

Risen almost every year since 1990, and forecast to be higher still come 2020

Figure 2: Change in emissions for the largest drivers of an increase in New Zealand's total emissions

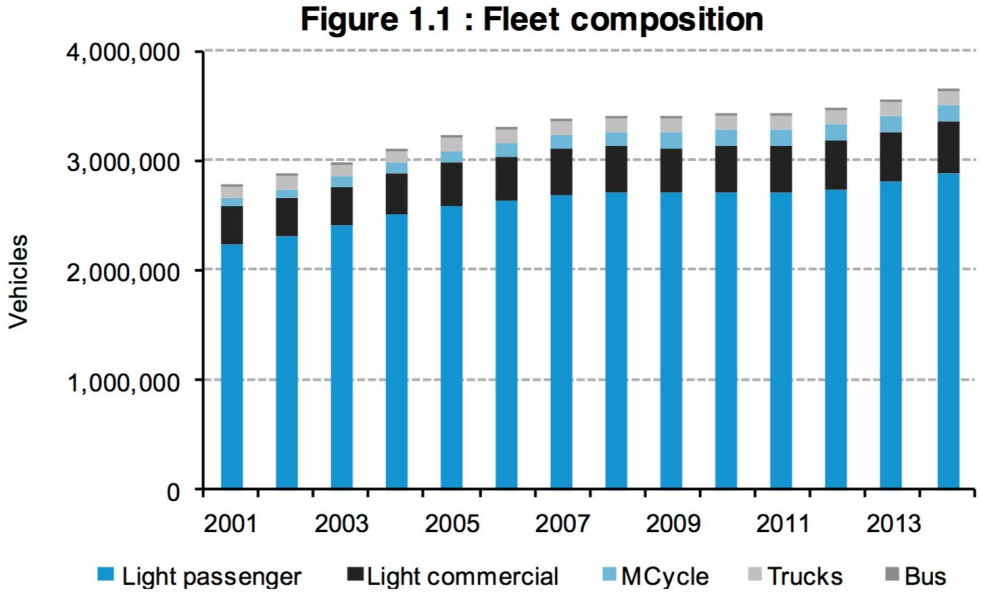


http://www.mfe.govt.nz/sites/default/files/greehouse-gas-inventory-2011-questions-answers.pdf

MfE Inventory released May 2016 show a continued increase 2009-2014 and forecasted increases through to at least 2020

Vehicle count growing despite alternatives promoted

Population growth & high car ownership … versus use of public/active transport



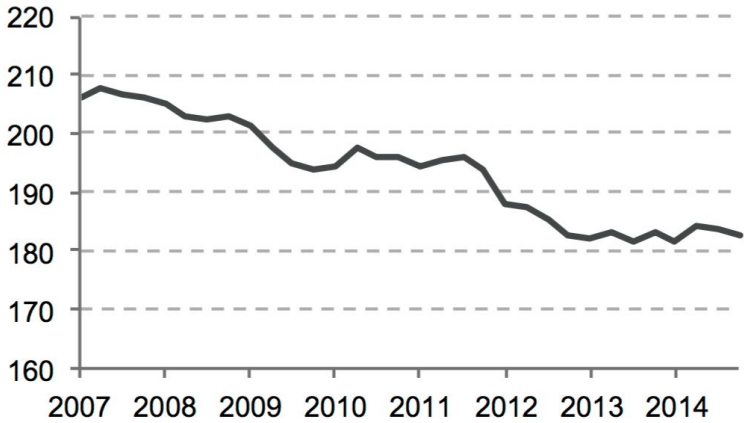
http://www.transport.govt.nz/assets/Uploads/Research/Documents/NZ-Vehicle-Fleet-2014-final.pdf

Cars have stopped getting cleaner

If we had vastly more than 1200 electric cars on our road, this would be different:

CO_2 emissions of light vehicles registered

The CO_2 emissions (grams per km driven) of light vehicles entering the fleet dropped in 2011 and 2012 but have remained steady since then.



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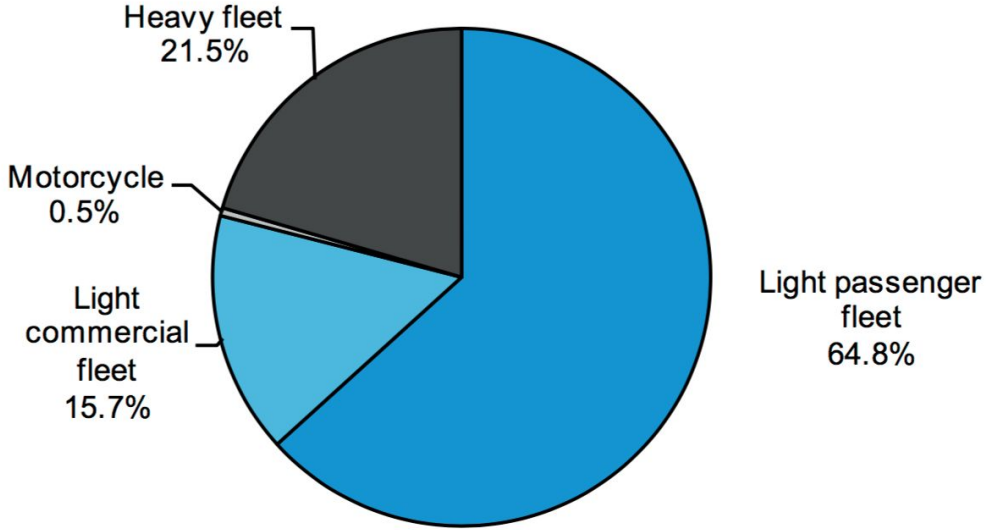
Everyone is involved in the transport emissions issue

- Families
- Fleet owners
- Public transport
- Freight

Figure 1.10 : 2014 CO_2 emissions



Source : Vehicle Fleet Emissions Model

http://www.transport.govt.nz/assets/Uploads/Research/Documents/NZ-Vehicle-Fleet-2014-final.pdf

Be patient? Significant behavioural change needed.

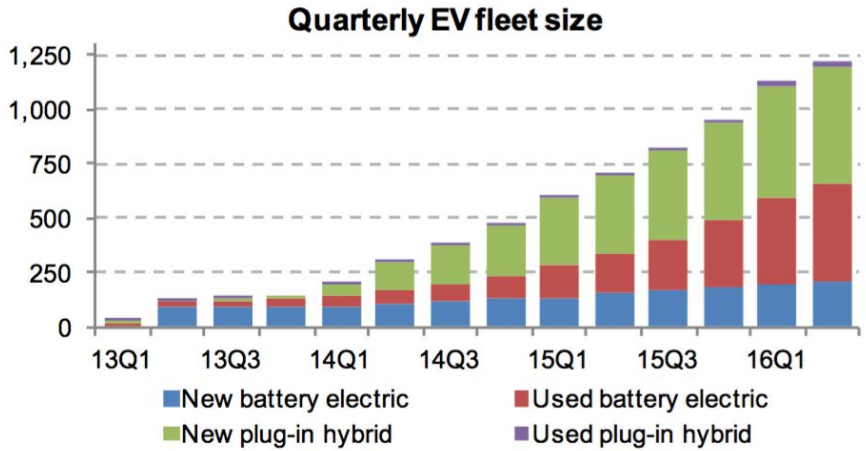
Vehicle Age	Share
Up to 1 year old	3.7%
Up to 2 years old	6.9%
Up to 3 years old	9.9%
Up to 4 years old	12.5%
Up to 6 years old	17.3%
Up to 8 years old	25.1%
Up to 10 years old	35.8%
Up to 15 years old	58.5%
Up to 20 years old	81.5%

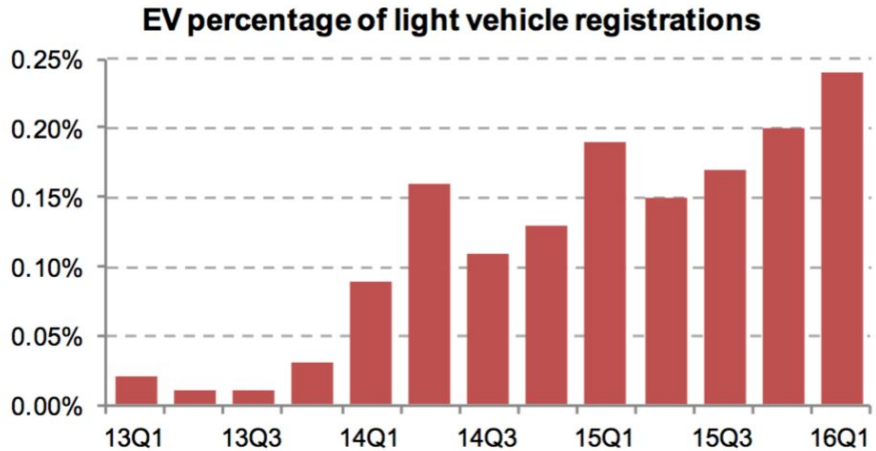
(Light vehicles)

Even if **every** car bought for the next 10 years was electric, we'd be only a third the way there.
Given this, eventually we do need to get to reach a point where every new vehicle bought is electric.

http://www.transport.govt.nz/assets/Uploads/Research/Documents/NZ-Vehicle-Fleet-2014-final.pdf

Light electric vehicle growth





Well under 1% car purchases are electric, but it's early days and accelerating.

(Comparison: In Norway, light electric vehicles are rising above 30% of monthly car sales, but the average petrol vehicle there is taxed at least NZD20,000 higher than an electric.)

http://www.transport.govt.nz/assets/Uploads/Research/Documents/EV-report/Monthly-light-vehicle-registrations-201604-final.pdf (April 2016)

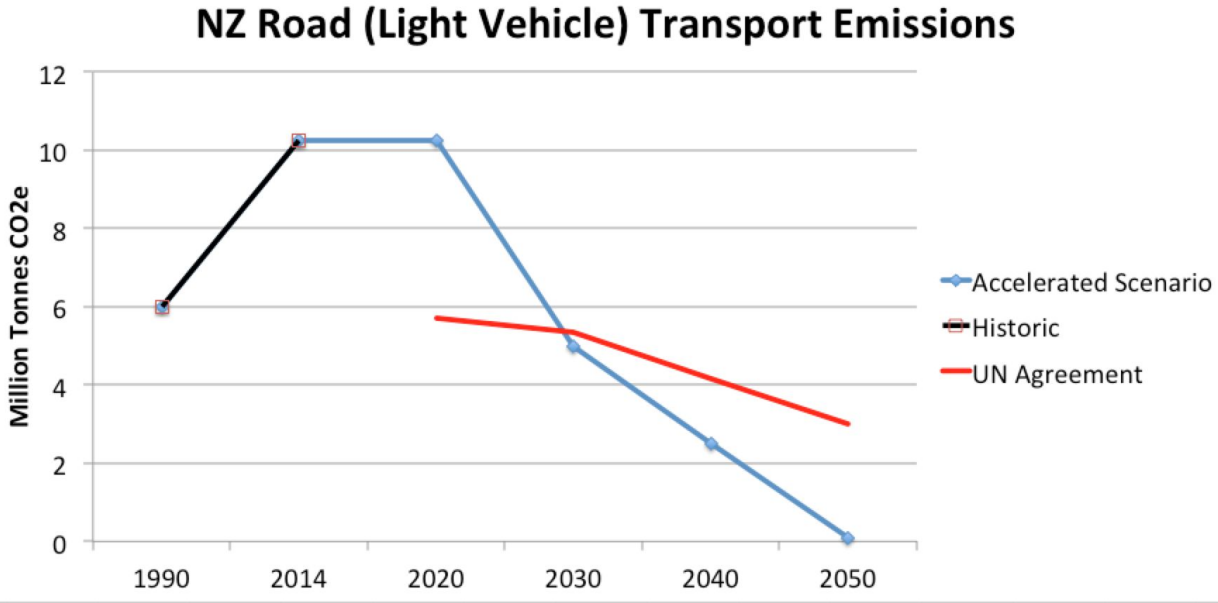
Scenario 1 - Business as Usual

- Government has just introduced new policies (May 2016; see www.transport.govt.nz/ev/)
  - Target of 32,000 light EVs (1% of fleet) in 2020 and 64,000 (2%) in 2021
  - Road User Charge exemption introduced 2009 remains to 2021
  - Funding for education & innovative projects ($30M), review of taxes, bulk-buy investigation
  - Potential for EVs to use high occupancy and bus lanes
- Currently light road vehicles produce ~10.2* million tonnes per year (2014, but increasing)
- Hitting 2021 vehicle fleet target only equates to ~0.1 million tonnes CO_{2e} reduction.
- A net increase of over 64,000 light vehicles by 2021 is likely. Meaning same number of petrol/diesel vehicles on our roads. Thus unlikely to reduce emissions in the fleet, yet.
- Current policies are not durable; there is uncertainty over what happens post 2020.
- Cheaper, longer distance, different electric vehicle types are expected to enter the market over next 5 years and will be key to the existing target being met.
- That all said, the policy should be effective in normalising electric vehicles and allowing stronger measures and adoption to follow.

*2014 MfE figure of 12.8Mt, minus 20% heavy.

Scenario 2 - Accelerated Growth

- **Goal 1:** Match UN 2030 goal (89% of 1990 emission levels by 2030, which means beating a 5.3Mt target)
  Issue: This is a halving of emissions from 2014 level (10.2Mt). Very quick turnover needed to reach 50% electric fleet.*
- **Goal 2:** Reach zero gross emissions. Because transport can whereas other sectors (agriculture) probably can't.
  Issue: Assume 50,000 fossil-fuelled cars remain, i.e. about 0.1 million tonnes p.a., for hobbyists or specialist vehicles.



*2014 MfE figure of 12.8Mt, minus 20% heavy.

Scenario 2 - Accelerated Growth

How?

- Tax policies under review (announced May 2016) are calibrated such that it is modelled to **double the target** (256,000 EVs by 2021), e.g. by positive discrimination of EVs regarding depreciation, FBT, potentially GST.
- By 2020, introduce progressively a long term policy that **removes the financial attraction to petrol/diesel vehicles**. (Likely a fee at point of purchase - or per annum - or both, tied directly to emissions rating of a vehicle. This encourages fuel economy on any fossil fuel vehicles bought, too.)
- Long term (2025+) this price point would need to rise such that driving fossil fuel vehicles is **cost prohibitive**.
- Above could operate as "**feebate**"; where emissions income used to lower EV prices.
- RUC exemption is extended from 2021 to 2030. If uneconomic it is phased out in stages.
- This aligns us with global transport emission reduction initiatives such as www.zevalliance.org.
- Scenario relies on electric vehicles become socially normative, with a range of vehicle types and price points (2020?).
- Notes:
    - The low cost of ETS is not sufficient. (At current price of $15 this equates to a mere $30 per vehicle per year. A 10x increase is still an insignificant $300 per year.)
    - Renewable biofuel may play a role however note greenhouse gases are emitted by a biofuel vehicle.

Comprehensive research into NZ EV policy found at: http://www.waikato.ac.nz/__data/assets/pdf_file/0007/278080/Electric-Vehicle-Policy-New-Zealand-in-a-Comparative-Context.pdf

Cross sector issues

Electricity Sector:

NZ electricity demand since 1990 met primarily by increasing coal and gas generation. If all vehicles went electric, we would add 10% to demand, which could lead to higher grid emissions and making EVs seem “dirty”. Creation of more renewable supply (wind, etc) would make electric vehicles even cleaner to operate than they are today, supporting psychology of an EV purchase. Creation of new renewable supply seems tangled with uncertainty over Tiwai smelter and Huntly gas/coal station closures. Closure of Tiwai Point would cover three quarters of whole country driving electric.

Recharging via solar is of limited value residentially (cars are away) however can make sense at city carparks, or if homeowner stores solar to a home battery for discharge into car.

Urban design and social issues:

Electric Vehicle “perks” may demand further incentives be placed on public transport and cycling to encourage current users not to regress to private (yet electric) vehicles.
Self-driving vehicles may create significant social and urban planning changes.

Mini snap shot of electric vehicle market...

Nissan Leaf

2011+

Roomy hatchback (5 seats) and better range (117-175 km)

Best selling globally and in New Zealand.

$20,000+ used (Nissan has sold all its stock)

Tesla Model S

2011+

400km range

$120,000+

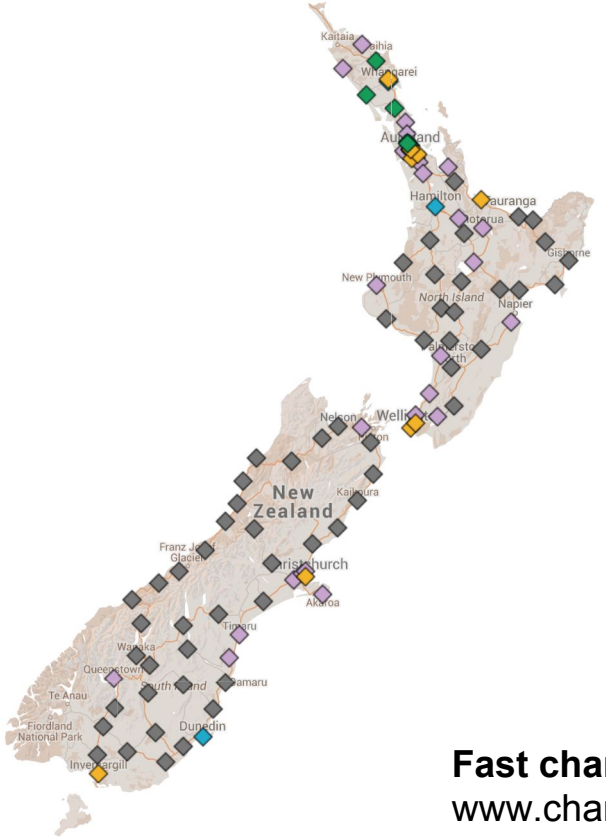
5-7 seats & faster than a $900,000 performance car.

Hi-tech (auto pilot)

Selling faster than the Leaf. Owners obsessively happy.

Nationwide car charging locations well underway...

Slow charging
Plugshare.com



Fast charging
www.charge.net.nz