Decarbonisation, Disruption, Disconnection

Mike Underhill

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Decarbonisation

Climate Change Quiz

1. Are we facing climate change?
2. Is the cause man-made?
3. Is there still plenty of capacity to put more carbon into the atmosphere?
4. Does NZ have an active climate change mitigation strategy?
5. How important is decarbonising energy?

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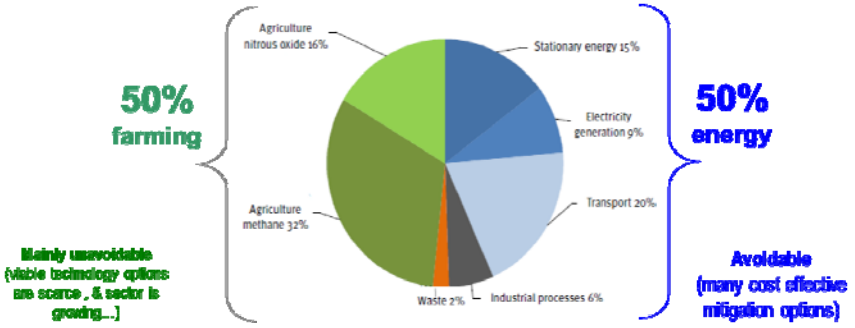
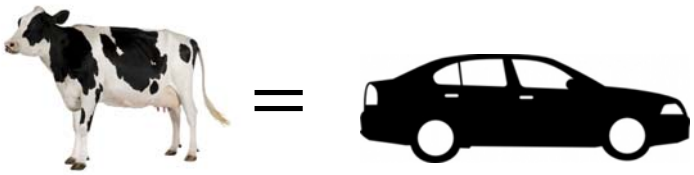
NZ's carbon and greenhouse gas emissions





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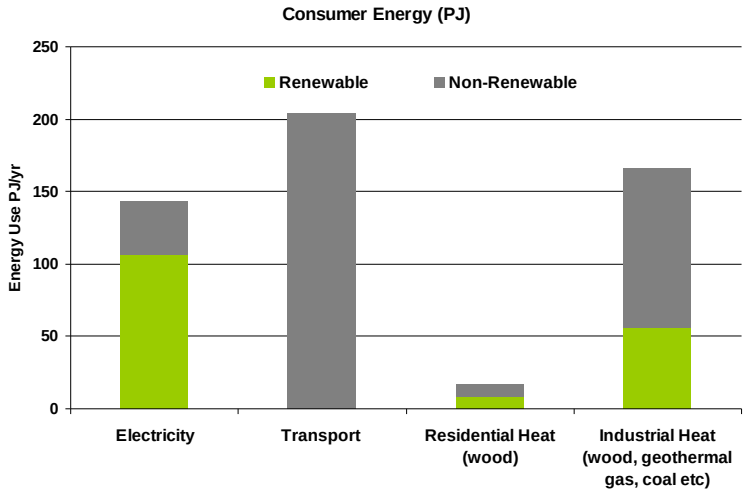
Where the carbon lies in energy



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Electricity

- Highly renewable in NZ.
- Currently 77% generated from renewable sources, and aiming for 90%.
- One of the highest proportions of renewables in the world.
- Plenty more large scale affordable renewable options left to meet future demand.

Electricity in NZ is effectively a renewable energy.

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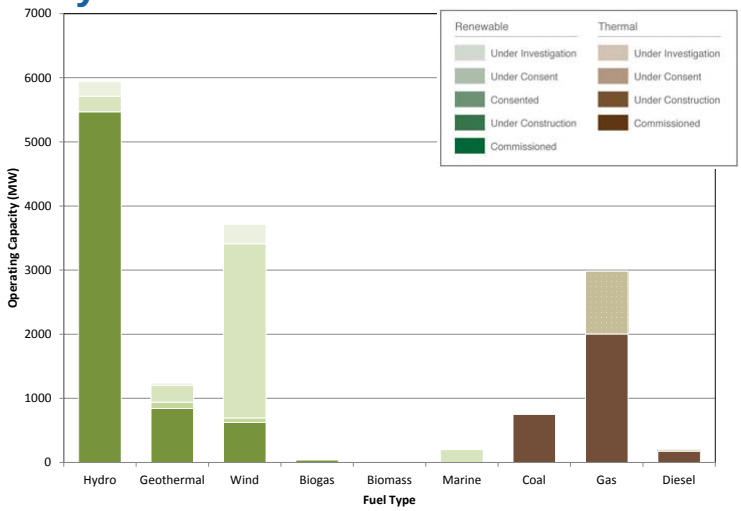
Future electricity demand likely to be met by renewables – without subsidy



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Transport – high carbon sector

- Nearly 100% of transport energy use is imported
- New Zealand has options to transition to indigenous renewable transport fuels
  - including electricity
  - longer term to biofuels.
- Transport is a key sector to solve if we are serious about climate change mitigation

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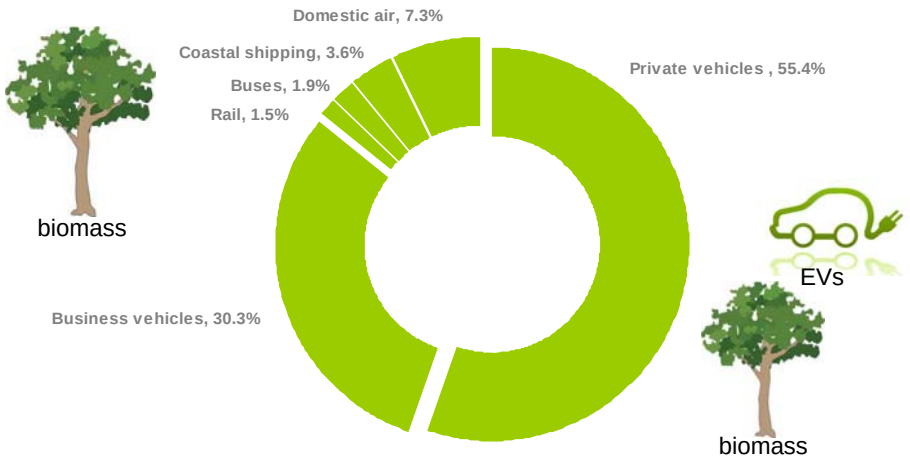
‘Greening’ our road transport



Scion report: enough marginal land to fuel 100% of our heavy fleet with renewable diesel (i.e. trees in the tanks)

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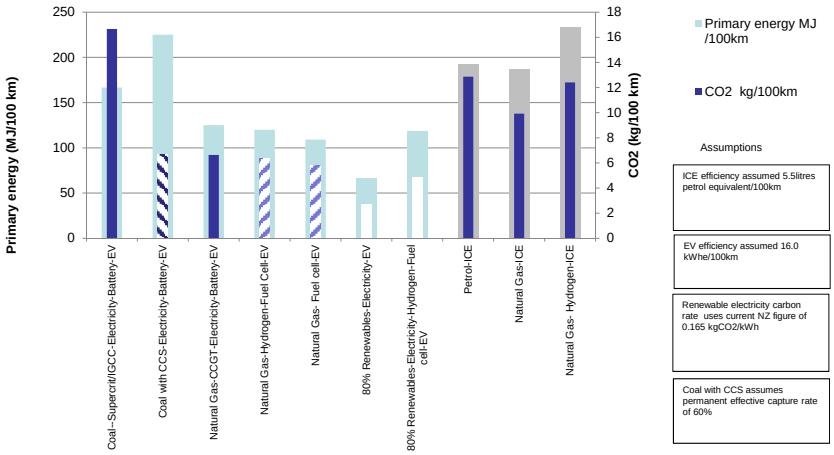
Hydrogen – is it an option for NZ?

Short answer is NOT AT PRESENT



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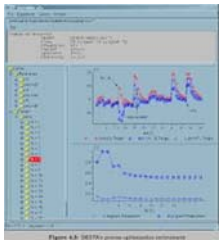
Process heat




Cleaner fuel sources Increasing complexity and 'bravery

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Improving maintenance, monitoring, operations and design

Heat energy – multiple options

- Bigger than electricity sector.
- Significant use of coal, gas and other fossil fuels in food processing and other industrial applications.
- Renewable heat alternatives include wood energy and other bioenergy options, co-generation and direct use of geothermal heat.
- Electricity is an option for some applications such as induction heating.

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Induction heating

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The Energy Picture

Energy Type	% Renewable
Electricity	78
Transport	0.1
Industrial heat	25
Total energy	**35**

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Decarbonisation Challenge

Energy Type	% Renewable (NOW)	% Renewable (MOVE TO)
Electricity	78	90
Transport	0.1	30
Industrial heat	25	40
Total energy	**35**	**50**

***PLUS* 100% energy efficiency**

NZ energy ⇨ 60% renewable

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Decarbonisation

Taking

- oil out of transport
- coal out of heat
- transport into electricity

Brands our food and protein exports in carbon-conscious world.

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Disruption

Disruption

- Disruptive technologies: New ways of doing things that disrupt or overturn the traditional business methods and practices.

  For example, steam engine in the age of sail, and internet in the age of post office mail.

Becoming obsolete: Telephones, postal service, DVDs

AC/DC Electrocuting the elephant

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Electric vehicles

- EVs are a disruption to the transport system, but also will impact the electricity system
- One of the few new significant sources of load
- New electric issues:
  - 50KW fast charging stations
  - Time of day charging
  - Home storage systems

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EVs are the growth opportunity

- Typically 3100kwh/annum.
- Decarbonises the transport sector.
- Reduces oil imports.
- Improves energy security.
- Mitigates climate change.
- Reduces pollution.
- Battery and vehicle prices falling.

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New Zealand's EV advantage

- No initial need for infrastructure
  - 230 Volt
  - 85% of households have garages
- NZ user demand
  - 39km a day average travel distance
  - 52% of households have 2 cars or more
- 300,000 vehicles would only need another 180MW of generation
- **30 cents per litre**.

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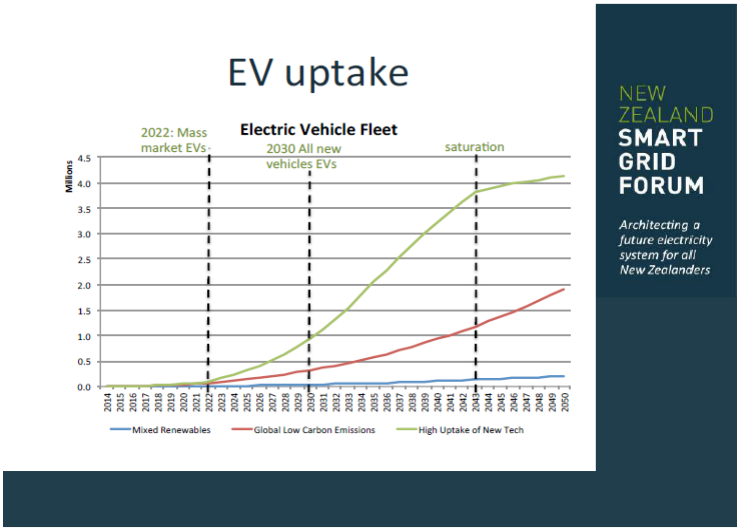
Electric vehicles



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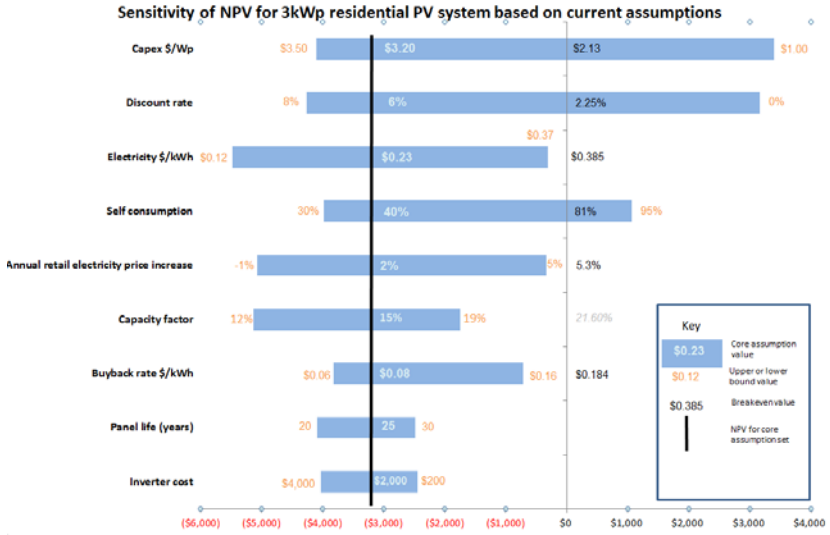
PV uneconomic – but uptake still growing



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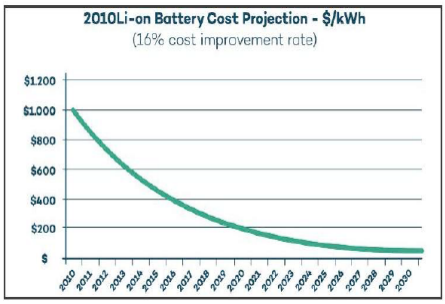
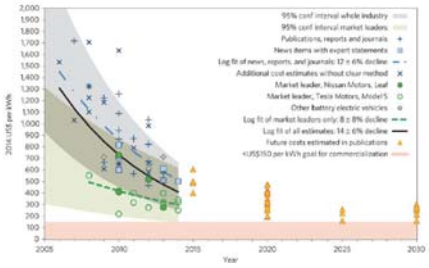
Battery storage

- Battery storage is getting cheaper.
- Importantly, it is getting cheaper faster than expected.
- Affordable home battery storage will completely change the electricity supply model.
- There are signs that the public is ‘ready and waiting’.





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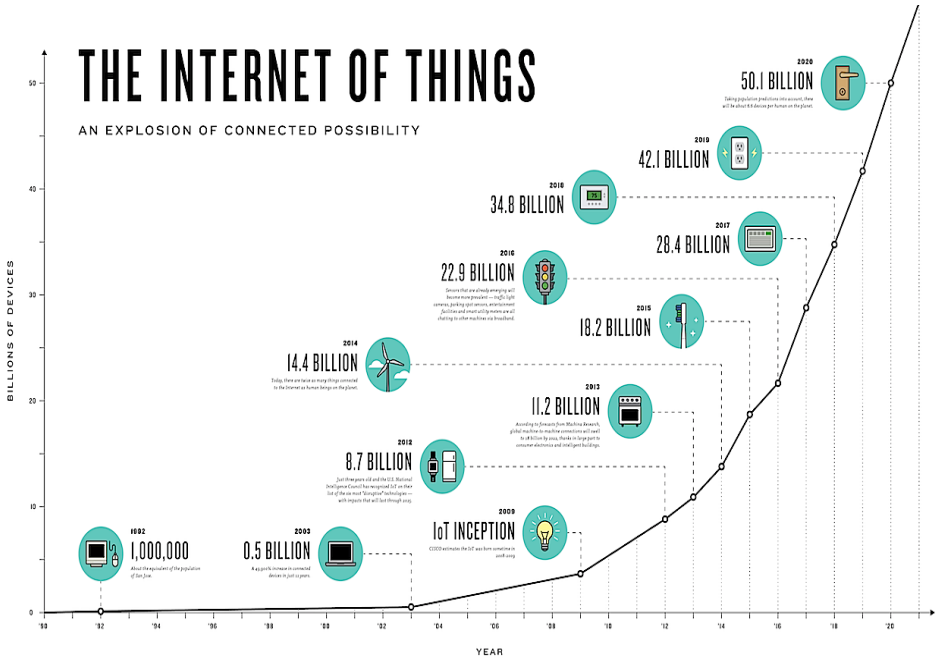
Sens



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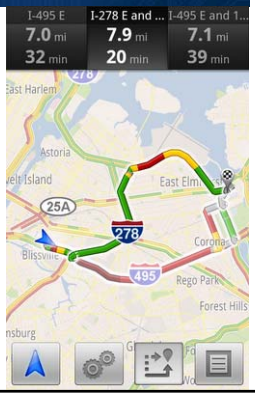
Sensors

- Connectivity is also growing exponentially
- The cost of sensors and connected devices continues to fall
- Things which were previously ‘impossible’ to measure and control are now routine
- New business models are emerging very quickly



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Disconnection

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Residential Electricity Trends

Appliances	↓
Heating	↓
Energy-use behaviours	↓
Houses	→ More efficient but bigger
EVs	
PVs	↓ ↓

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But …

- PVs well short of national benefit.
- Falling battery prices and ex EV batteries are being perceived as providing viable source for home storage.
- PVs plus storage not generally viable for homeowners but
  - increasing numbers are installing PVs.
- Typical roof space easily big enough to provide energy for car plus home.
- PV + storage + energy efficiency + woodburners **>** car + home electricity use.
- Technology will make this happen.

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Why customers should stay connected?

- Security of supply.
- Proven reliable *no* hassle supply.
- Choice of suppliers.
- Increasingly innovative offerings.

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Why would customers disconnect?

- Because they can.
- Disillusioned with electricity sector.
- Worried about rising price and “decreasing reliability” ….. may well be media driven perceptions.
- Disruptive fast moving technology will address reliability and negative concerns about alternative energy.
- Those that disconnect will pass on higher fixed costs to those remaining which fuels more disconnections.

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Don’t believe it won’t happen!

- Your long term asset investments won’t offer protection …. unless you sink the costs.
- Look at postal infrastructure, and telephone infrastructure – unthinkable 20 years ago.

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What can be done

- Customer focussed
  - Satisfaction, value for money, positive media presence
- Customer loyalty is the key.
- Embracing and providing new technology services
  - Renewable highway, PVs, storage
- Packaging associated services eg internet

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Conclusion - The three Ds are upon us.

- Actions are required now!
- The future will occur with or without the electricity sector.
- Disconnections can start a death spiral.
- Exploit the positives:
  - ❖The cornerstone for decarbonisation
  - ❖Branding our food exports
  - ❖Enabling the introduction of EVs
  - ❖This sector can ‘own’ the new technologies.

and also

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Conclusion

Winning back
the hearts and minds
of the customers is critical!

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