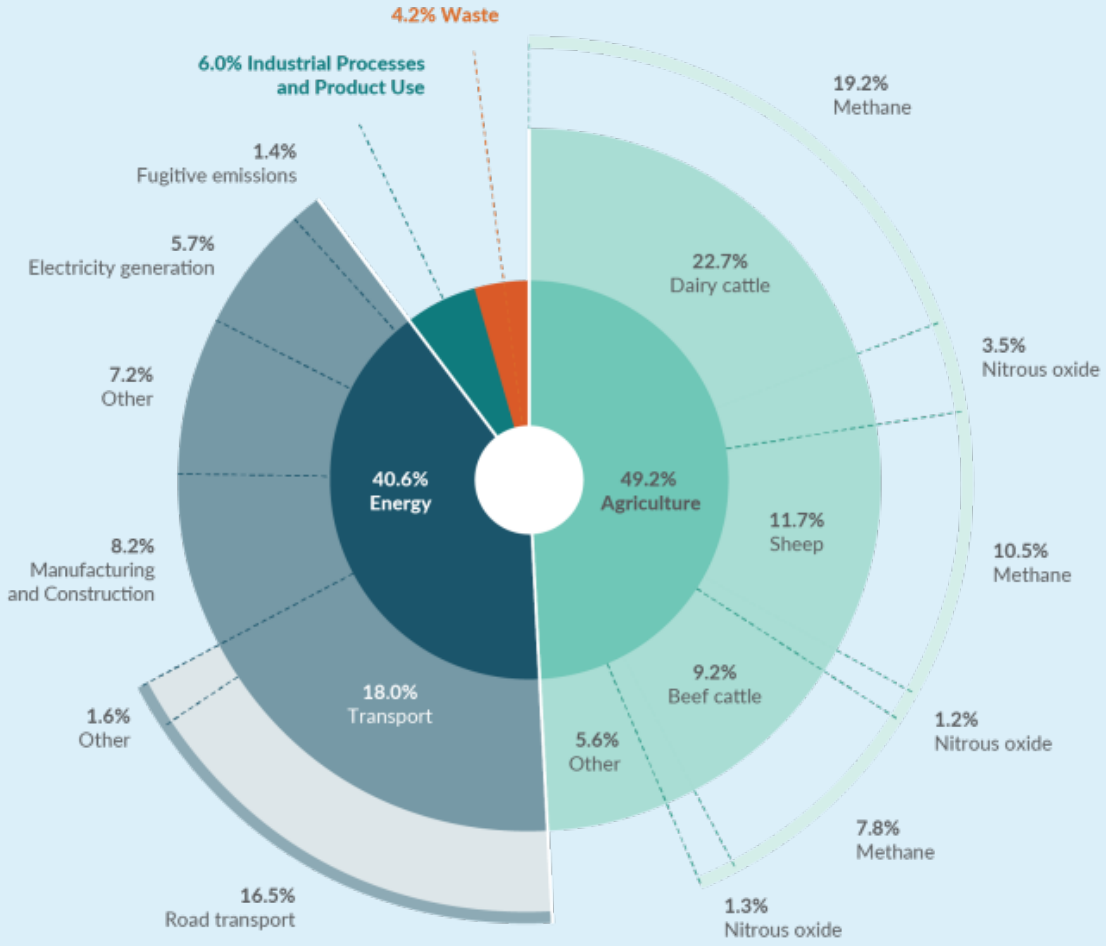
ENERGY AND TRANSPORTATION

Andrea Raith

Department of Engineering Science and Biomedical Engineering, University of Auckland

Energy and Transport in NZ



- The Transport sector is one of NZ's largest sources of greenhouse gas emissions
  - *~18% of total domestic emissions*
  - *~44% of emissions in Energy Sector*
- Transport responsible for ~36% of NZ total energy consumption[1]
- Need to decarbonise transport sector to reach net zero greenhouse gas emissions goal

Source: https://environment.govt.nz/publications/new-zealands-greenhouse-gas-inventory-19902021-snapshot/

[1] IEA NZ 2023 Energy Policy Review

Figure 56: Transport emissions[45]

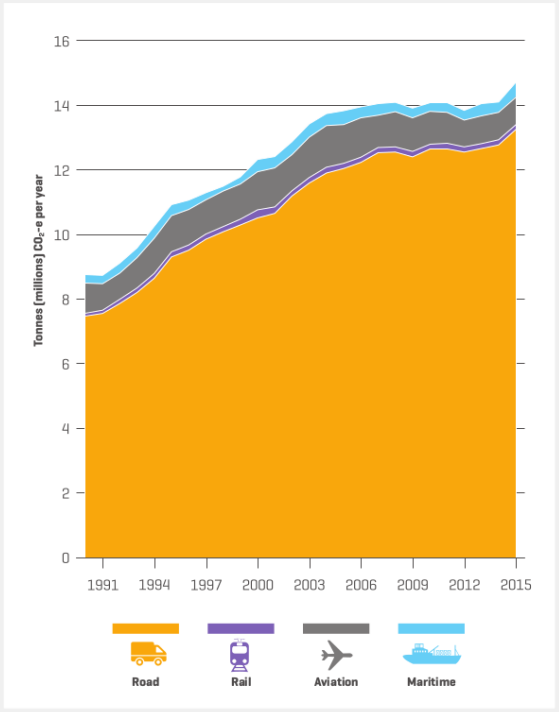
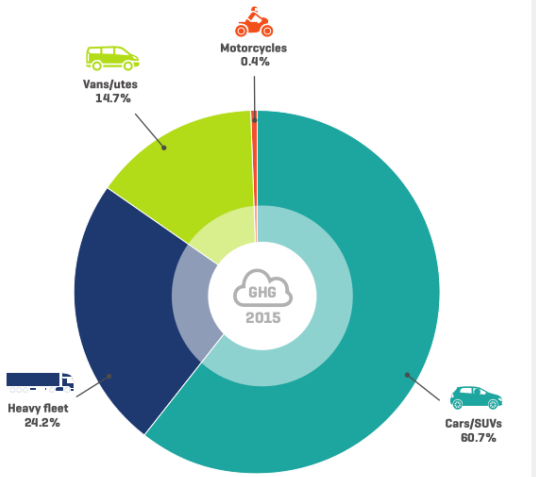


Figure 55: Composition of GHG emissions in the road transport sector[44]

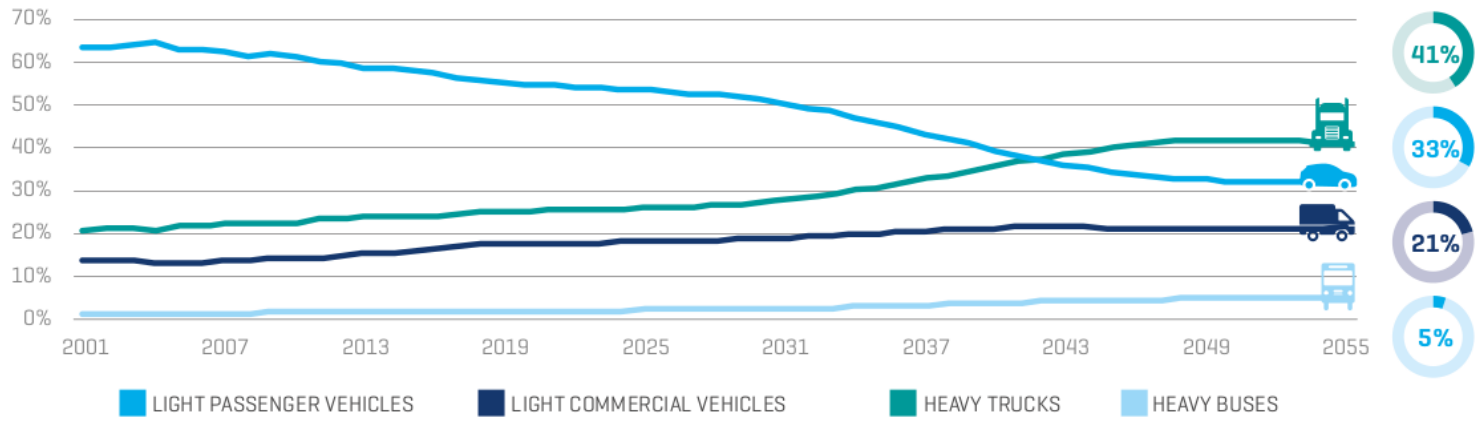


Source: MoT Transport Outlook 2017

NZ Transport Sector

- Transport sector emissions mostly due to road transport (16.5% of 18%);
- ~60% of emissions due to light passenger vehicles.
- Transport sector energy source 99% fossil fuel-based. [1]
- Freight projected to dominate emissions in future

Fig 12. Projected percentage of GHG emissions from road transport



[1] IEA NZ 2023 Energy Policy Review

Source: MoT Green Freight Working paper 2020

Reducing emissions associated with transport

Private Transport

- Mode change:
  - *Walk and cycle*
  - *Public transport*
- Reduce travel
- Urban design

- Electrify private / public transport

Freight Transport

- Reduce?
- Mode shift?
- Alternative green fuels

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Infrastructure, Climate Response and Resilience

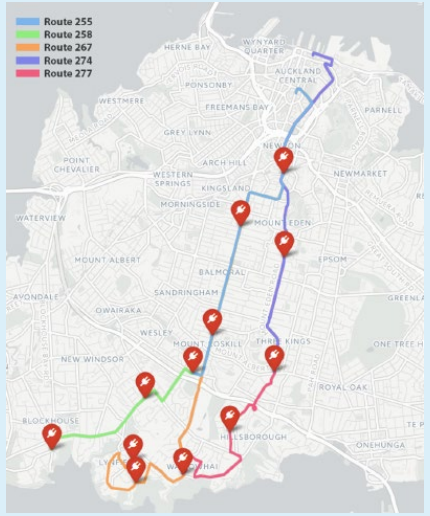
Mode Shift and Infrastructure Planning

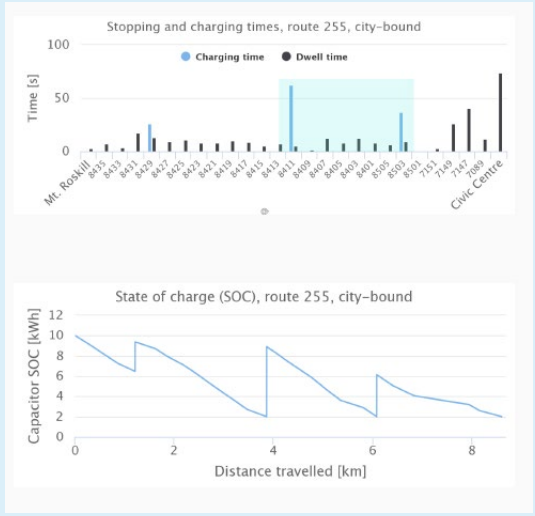
Active transportation

- Cycling & walking
- Optimise infrastructure provision

Public transport

- Link potential passengers to public transport systems
- Transport as a service
- Electrification

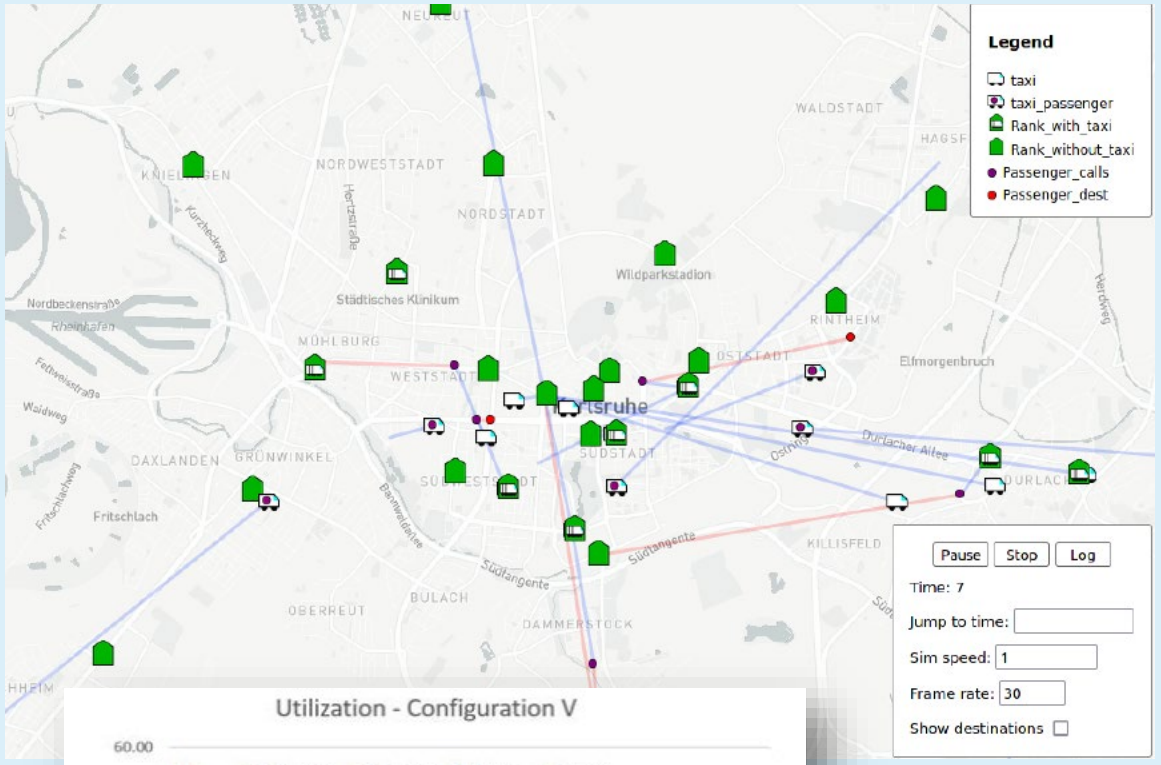


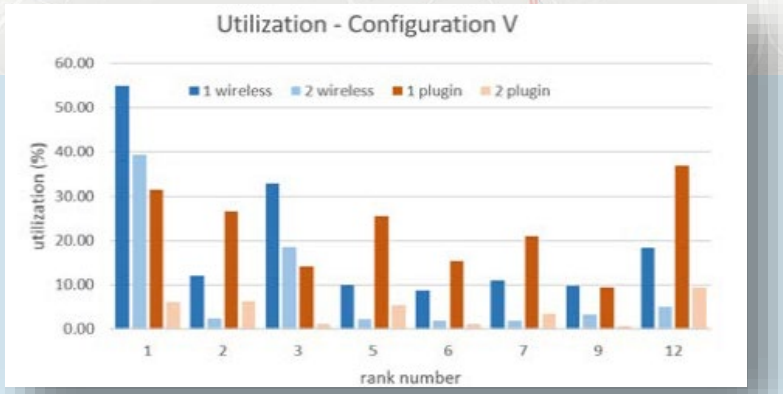


Source: Stewart, part IV project, Engineering Science, UoA

Taxi and urban freight

- Electrification of taxi fleet
- Optimisation-simulation approach
- Optimise
  - *Charging locations*
  - *Charger type (wireless / plug-in)*
- Case study Karlsruhe and Auckland

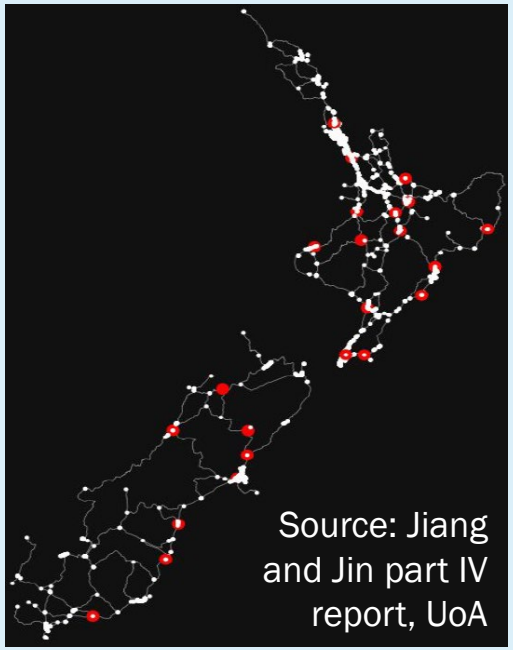




Green Fuels for Freight

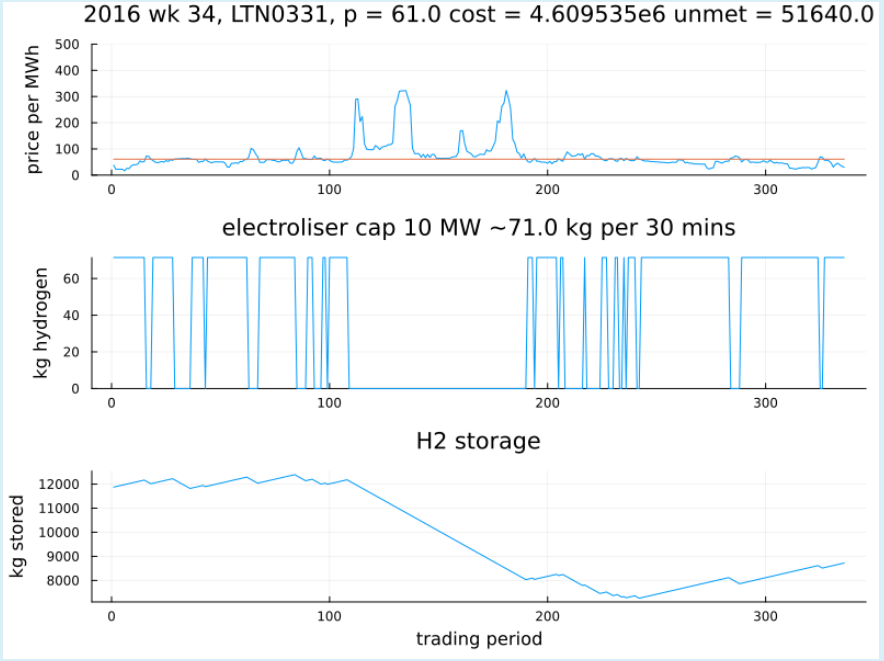
Battery-electric trucks

- Optimise charger location, type, power level; scheduling



Green Hydrogen

- HINT: NZ-German platform of green hydrogen integration



- Modelling Green hydrogen as a transport fuel
  - *Co-location of production and H2 fuelling stops*
  - *Demand-response policy enabled hydrogen generation*
  - *Capture uncertainty in electricity price and renewables generation*