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Battery Storage and Grid Integration Program
An initiative of The Australian National University

# **Clean transport**: FACTS & vehicle-grid integration

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# Outline

- **Transport**
  History & trajectory

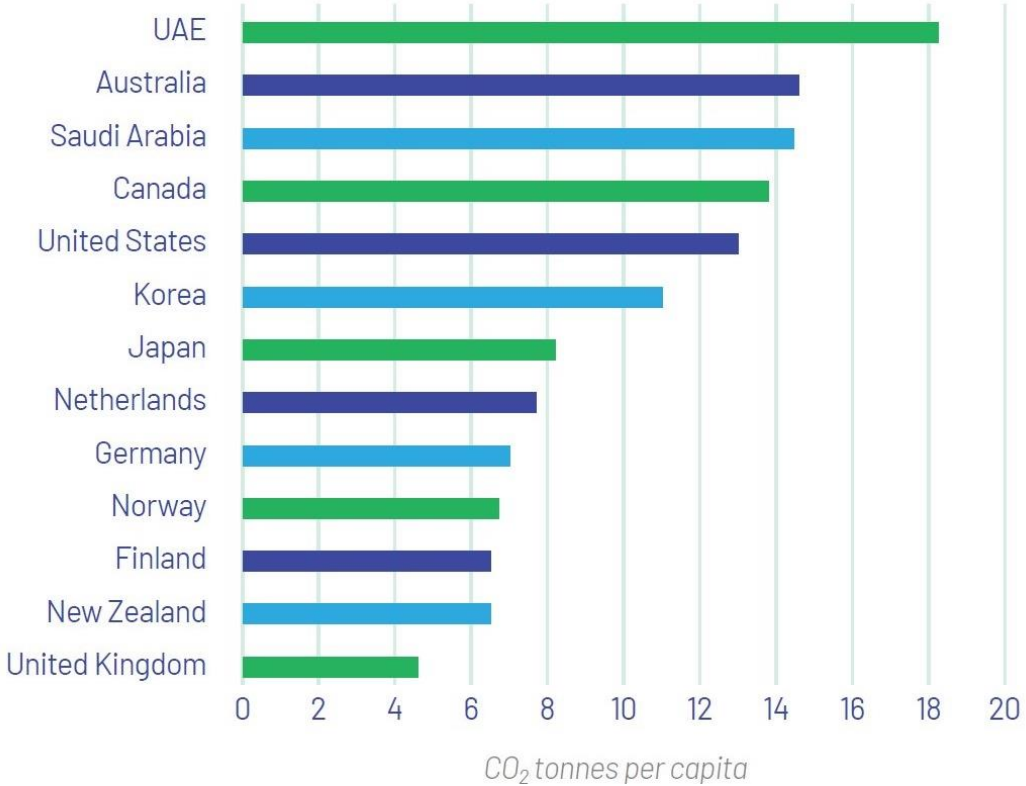
- **FACTS**
  Framework for an Australian Clean Transport Strategy

- **Vehicle-grid integration**
  Vehicles to be ‘grid-worthy’
  Grid to be ‘vehicle-worthy’

# International standing

Figure 1.

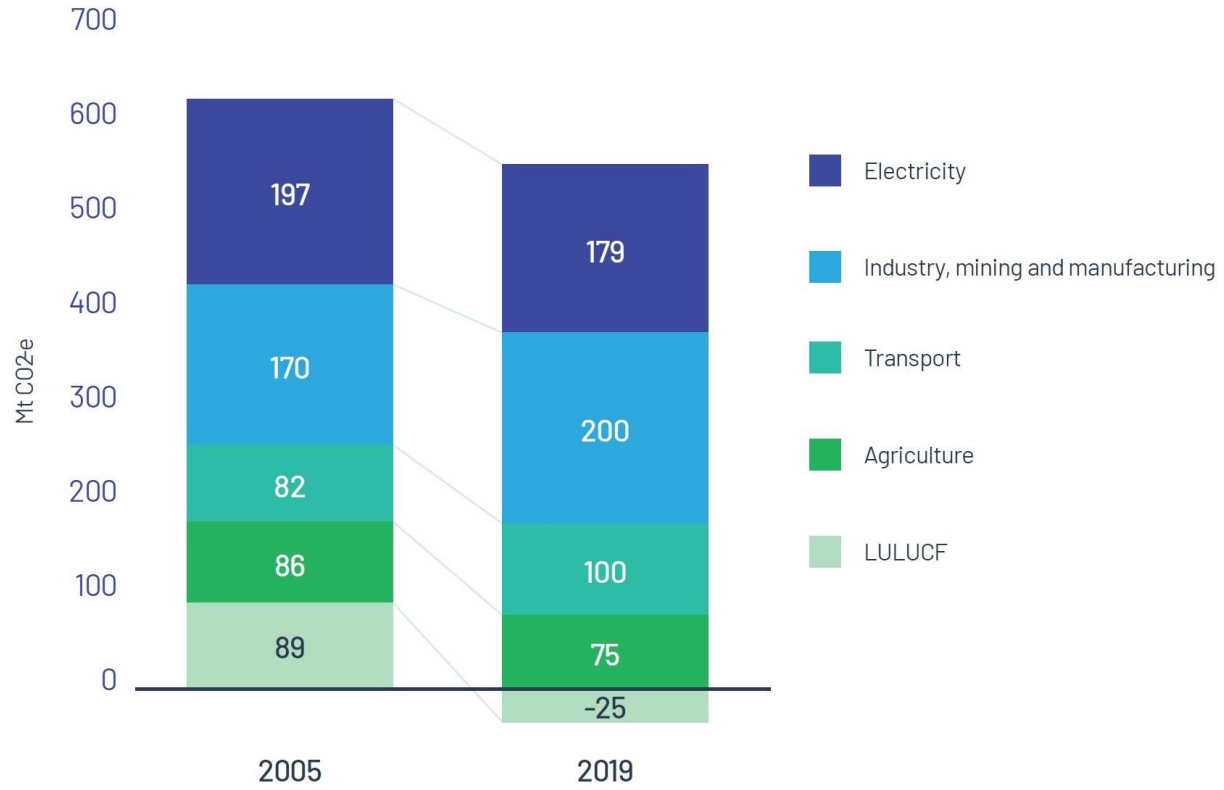
*Carbon emissions from fuel combustion per capita for select countries (IEA, 2020c)*



# Transport emissions are rising

Figure 2.

*Reported change in emissions by sector: 2005 - 2019 in Mt $CO_2$-e (Commonwealth of Australia, 2021a).*



# Forecasts aren’t promising

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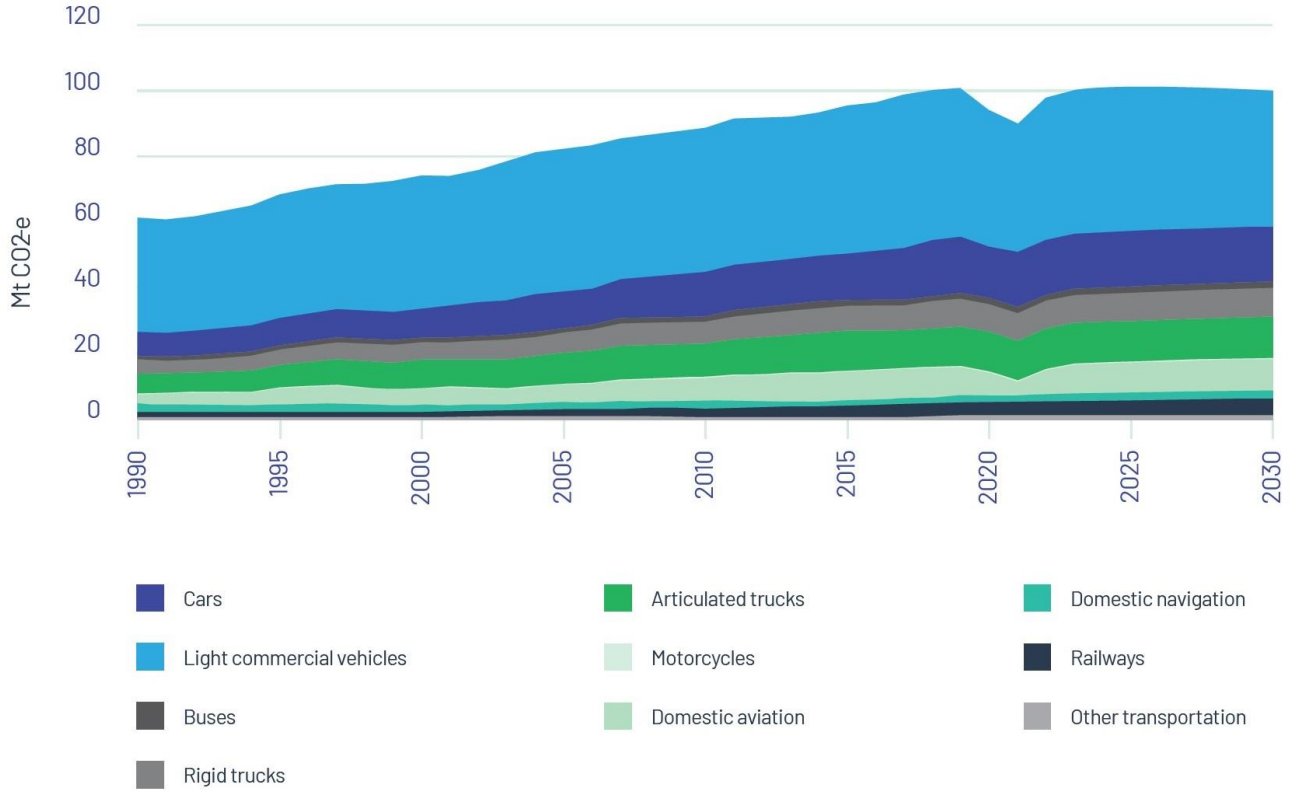
**Figure 3.**
*Historical and projected transport emissions by mode (Commonwealth of Australia, 2020).*



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# FACTS

**“Plans are worthless, but planning is everything”**

FACTS

- developed by 18 independent experts
- cooperative actions all levels of government  together with industry
- science-based targets for decarbonising Australia’s transport sector

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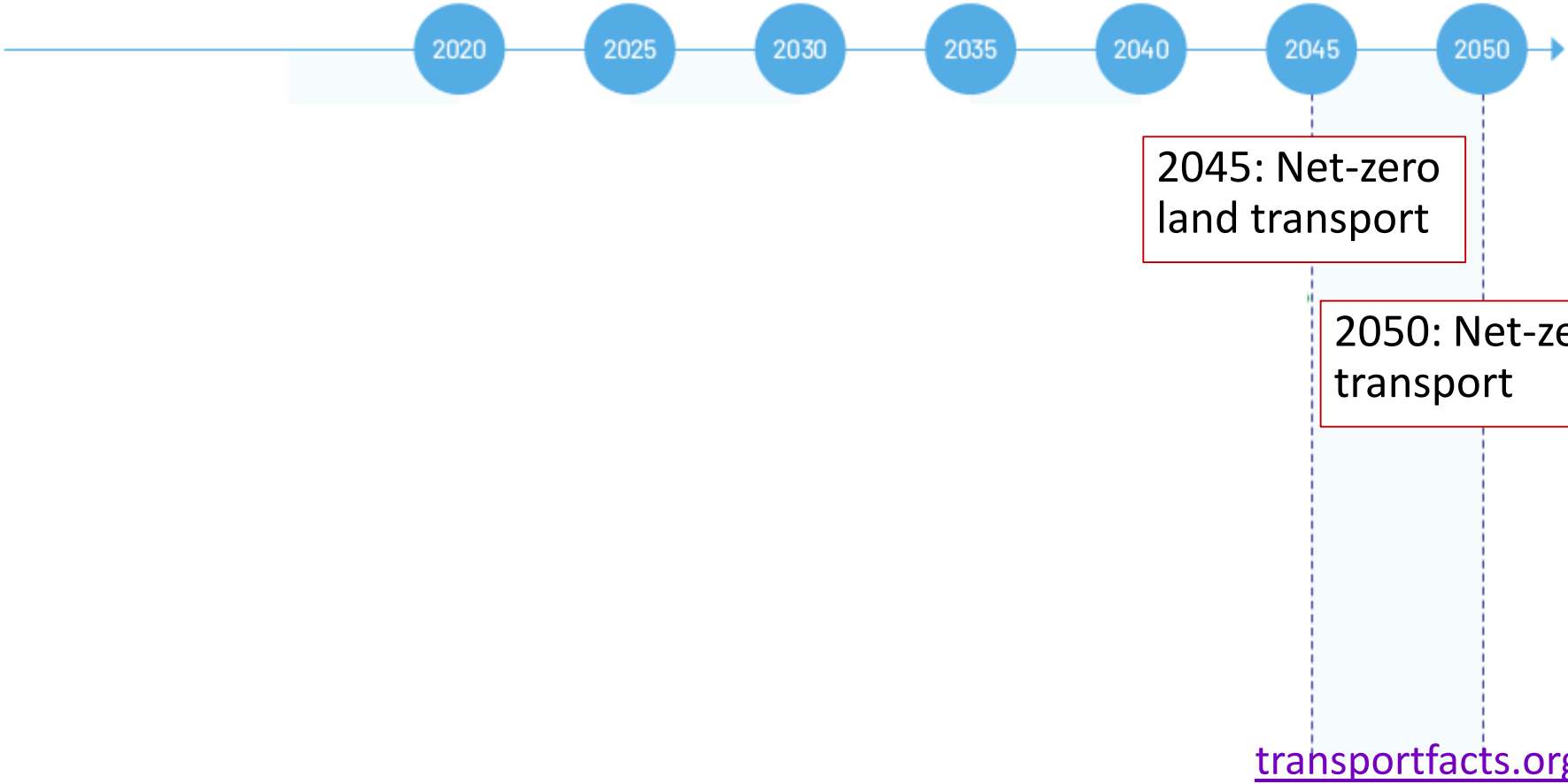
# Higher ambition



# Higher ambition

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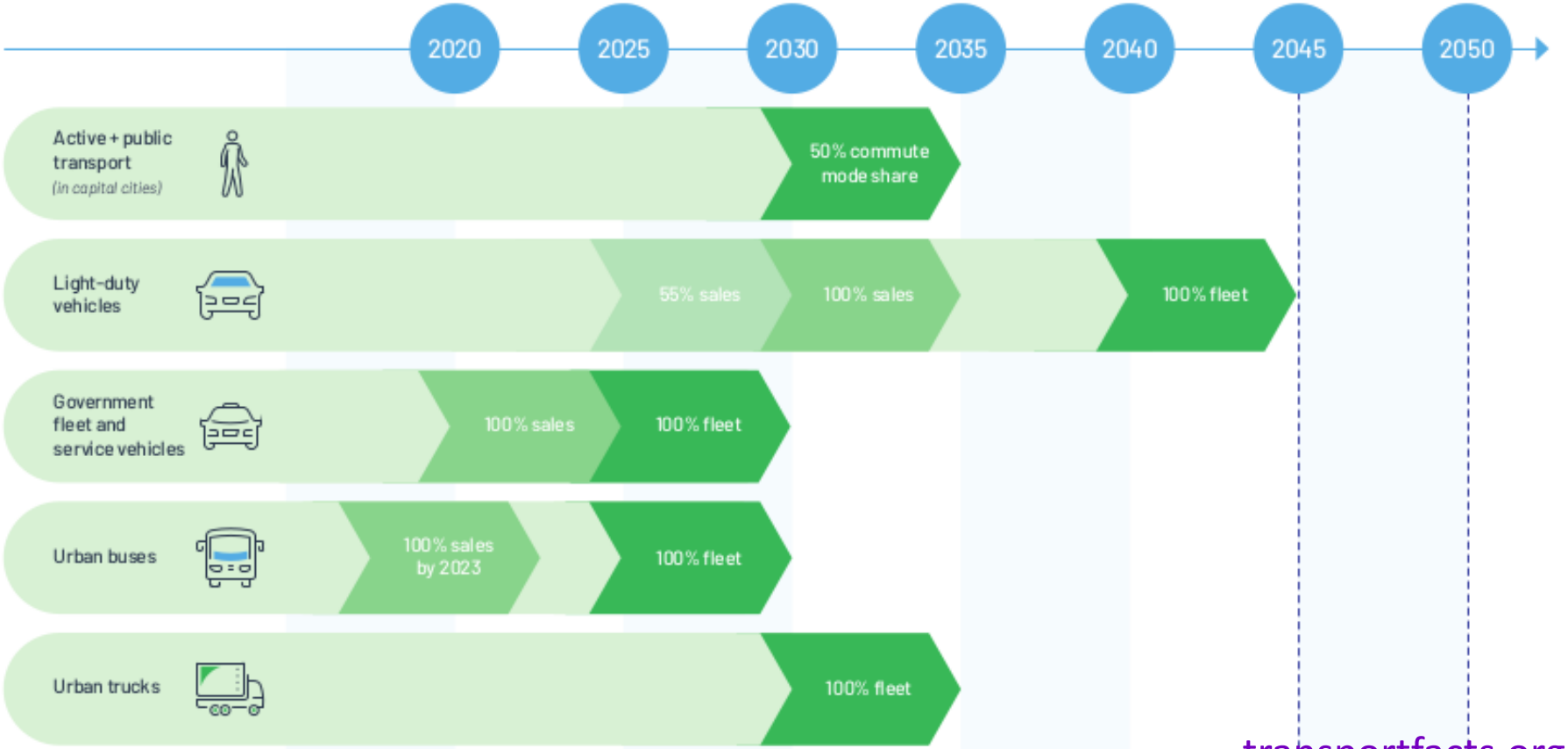


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# Higher ambition

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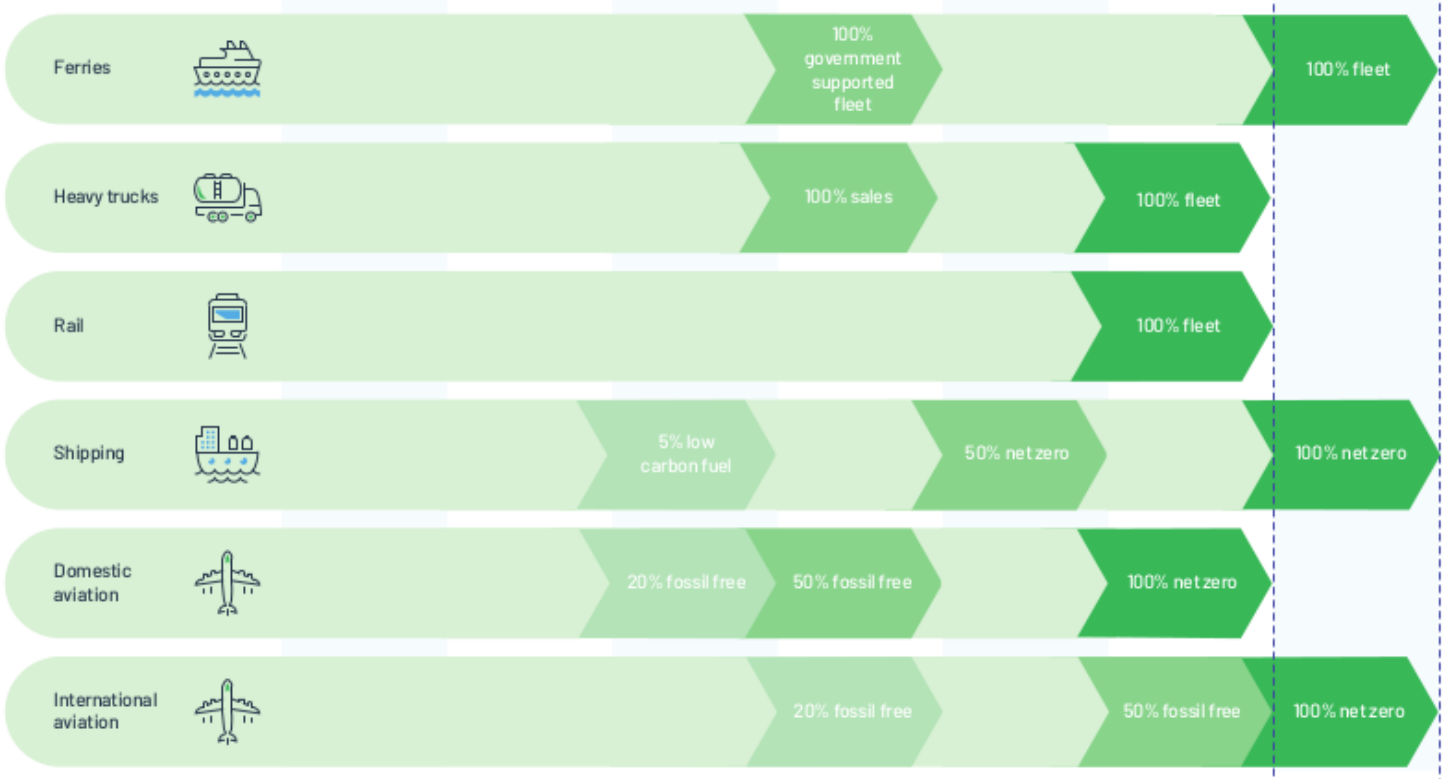


Net-zero* may require offsets, although mode-specific targets should be starting point, and strengthened over time.

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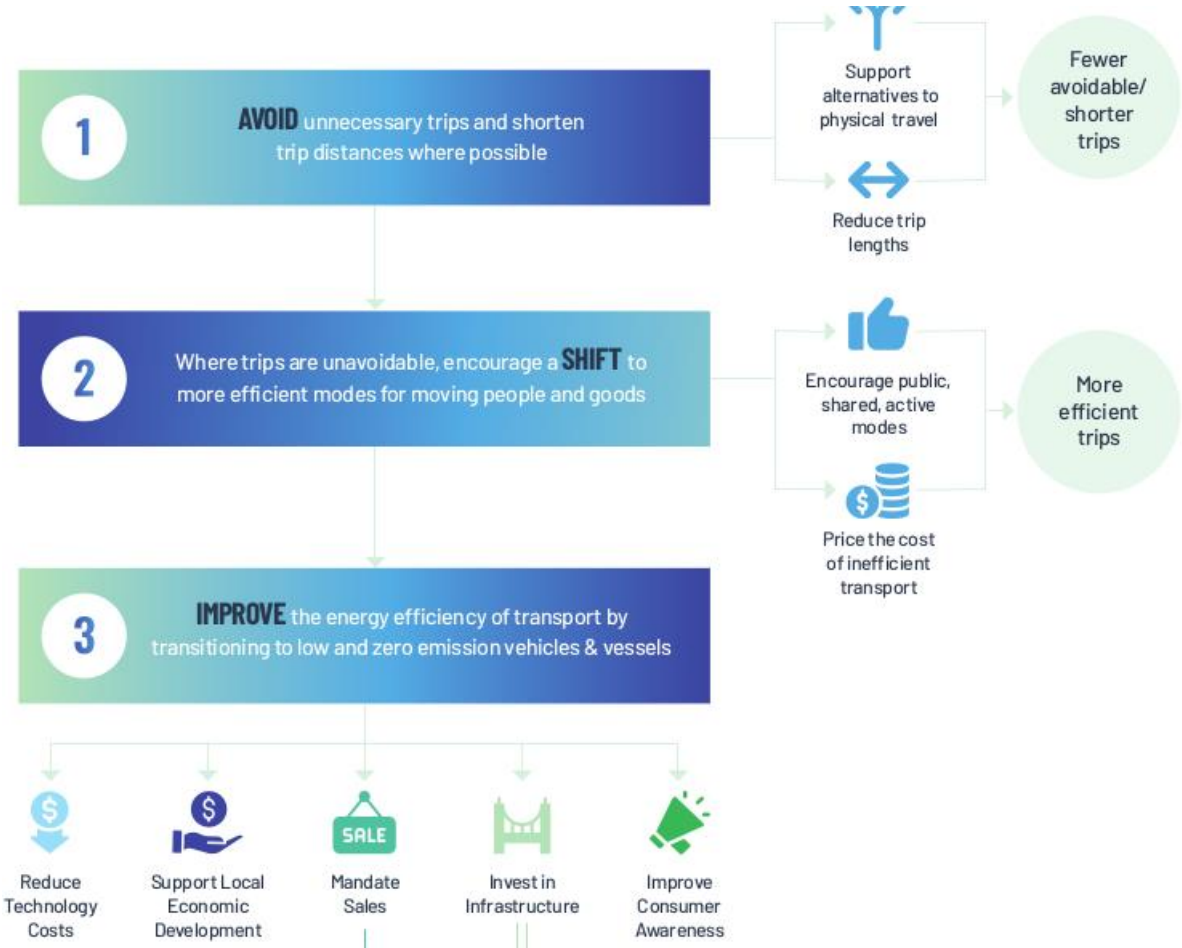
# Avoid – Shift – Improve

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# Role for all levels of Government

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## Local government checklist

Local government action is critical to addressing transport emissions in our cities and local regions.

- Set net zero and interim decarbonisation targets for each transport segment
- Encourage remote work
- Introduce anti-idling initiatives
- Invest in active transport networks
- Support electric micro-mobility
- Support car-sharing
- Parking reform
- Introduce low emissions zones (LEZs)
- Support road pricing reform
- Improve public transport networks
- Improve investment decision making
- Set an airport 2030 decarbonisation target
- Introduce a low-carbon ports initiative
- Provide zero emission fleet support
- Reform building policy
- Fund urban charging
- Electrify taxis and ride-share fleets
- Trial and support zero emission ferries
- Reduce avoidable travel
- Introduce zero emission heavy vehicle fleet support
- Fund a national charging network
- Consider virtual international conferences
- Consider freight choices

## State / territory government checklist

State and territory governments can work together to move past the current patch-work approach and strive to help Australian households and businesses to make the most of the transport transition and ensure Australia stays connected.

- Set net zero and interim decarbonisation targets for each transport segment
- Encourage remote work
- Introduce anti-idling initiatives
- Support Mobility-as-a-Service (MaaS)
- Invest in active transport networks
- Support electric micro-mobility
- Parking reform
- Introduce low emissions zones (LEZs)
- Support road pricing reform
- Improve public transport networks
- Improve investment decision making
- Introduce a zero emission vehicle sales mandate
- Provide zero emission fleet support
- Reform building policy
- Introduce emissions stickers
- Fund urban charging
- Enhance grid utilisation and renewable energy uptake
- Develop an EV database
- Initiate an EV charging infrastructure register
- Support charging infrastructure planning
- Electrify taxis and ride-share fleets
- Trial and support zero emission ferries
- Reduce avoidable travel
- Introduce a zero emission heavy vehicle sales mandate
- Introduce a zero emission heavy vehicle fleet support
- Introduce zero emission heavy vehicle curfew exemptions
- Fund a national charging network
- Support electric and hydrogen aviation trials
- Consider virtual international conferences
- Support traffic management
- Consider freight choices
- Fund strategic green hydrogen clusters
- Set strategic direction for Sustainable Aviation Fuels
- Set an airport 2030 decarbonisation target
- Introduce a low-carbon ports initiative
- Enhance Australia's critical minerals strategies
- Incentivise local component production & vehicle manufacturing
- Incentivise local component recycling
- Invest in local skills development
- Support new technology pilot projects

## Federal government checklist

The Australian federal government has an essential role to play to ensure the nation captures the significant economic opportunities that decarbonised transport can offer and ensure we remain competitive with our global peers.

- Set net zero and interim decarbonisation targets for each transport segment
- Encourage remote work
- Introduce anti-idling initiatives
- Invest in active transport networks
- Support electric micro-mobility
- Introduce low emissions zones (LEZs)
- Road pricing reform
- Improve public transport networks
- Improve investment decision making
- Introduce a zero emission vehicle sales mandate
- Provide zero emission fleet support
- Introduce a zero emission vehicle incentive scheme
- Introduce a zero emission vehicle company tax benefit
- Reform building policy
- Provide consumer support
- Enhance grid utilisation and renewable energy uptake
- Develop an EV database
- Initiate an EV charging infrastructure register
- Support charging infrastructure planning
- Transition to World Harmonised Light Vehicle Testing Procedure (WLTP)
- Introduce a zero emission heavy vehicle sales mandate
- Introduce a zero emission heavy vehicle fleet support
- Introduce zero emission heavy vehicle company tax benefits
- Introduce zero emission heavy vehicle design rule exemptions
- Fund a national charging network
- Support zero emission aviation trials
- Support new technology pilot projects
- Consider virtual international conferences
- Support traffic management
- Introduce carbon pricing
- Consider freight choices
- Fund strategic green hydrogen clusters
- Set strategic direction for Sustainable Aviation Fuels
- Include international aviation and shipping in national targets
- Set an airport 2030 decarbonisation target
- Introduce a low-carbon ports initiative
- International transport R&D
- Develop net zero plans for shipping and aviation

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# Charging vehicles

# Storage potential

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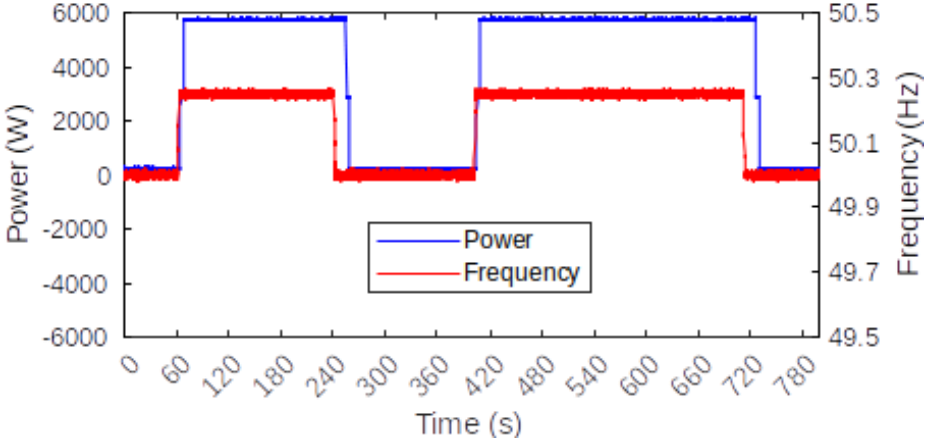
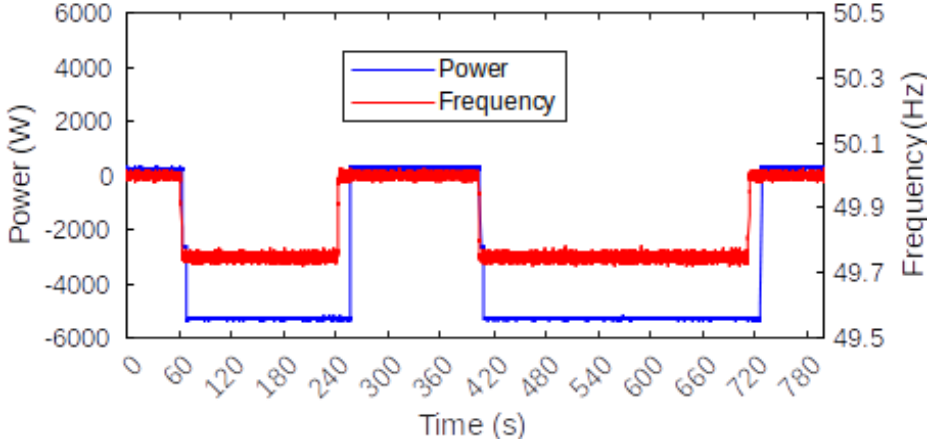
x 10,000

x 5

# Grid-worthy vehicles

# Good progress



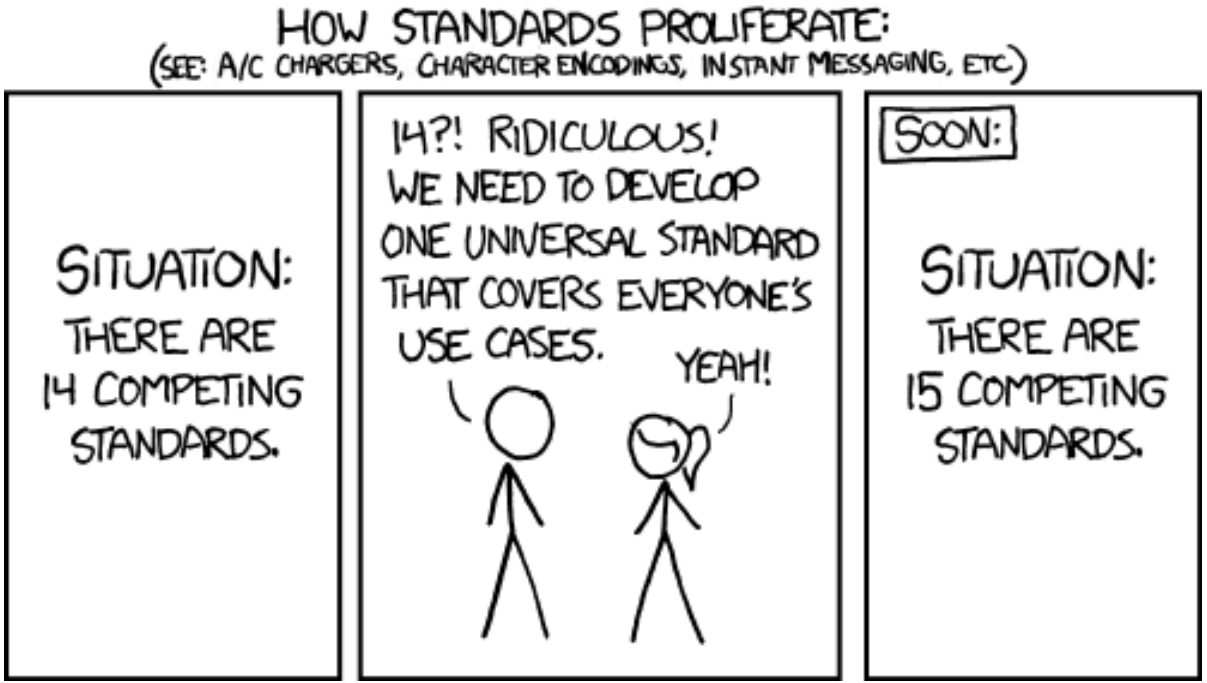




FCAS response of EV connected to bi-directional charger in DERlab at ANU.

Md M. Haque, et al., "Assessment of FCAS Capabilities of a V2G Capable EV Charger", 2022.

# Vehicle-worthy grid

# Many moving parts




xkcd.com/927/

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- **Transport**

  Turn around rising emissions

- **FACTS**

  Avoid – Shift – Improve

  Role for all levels of gov + industry

- **Vehicle-grid integration**

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  Grid to be ‘vehicle-worthy’

# Thanks

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