# Electric Vehicle developments

## Updates from AEMO and industry

28 July 2021 FRG Meeting

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# Background and Purpose

This presentation explores the uncertainty associated with Electric Vehicles (EVs) and work underway to resolve that uncertainty. AEMO seeks stakeholder input on the strategic impact to forecasting, where strategic impact is defined as uncertainty of likelihood multiplied by size of impact.

Engagement timeline:

| Timing | Details | Responsible |
|---|---|---|
| Feb 2021 | 2020 Forecast Improvement Plan (FIP) "Initiative 4 – emerging technologies" | AEMO |
| Feb – Apr 2021 | 2021 EV forecasts FRG discussion and Consultation | AEMO, CSIRO |
| Today | 2020 FIP progress update | AEMO |
| | EV developments | AEMO, Participants |
| Nov 2021 | 2021 Forecast Accuracy Report | AEMO |

Today's agenda:

1. Introduction (**Magnus H**)
2. EVs forecasting opportunities (**Joachim T**)
3. AEMO's work in the DEIP EV working group (**Harley M/Chris M**)
4. SmartCharge Queensland Research program (**Energex/Ergon**)
5. Electric Vehicles Smart Charging Trial (**Origin Energy**)

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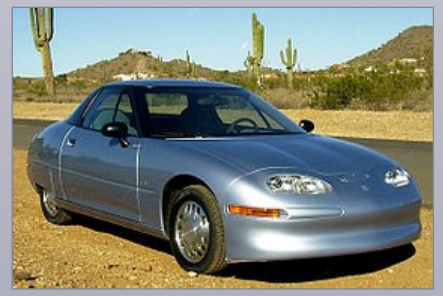
# The fourth wave of EVs

1880: Gustave Trouvé's tricycle, was the world's first electric car

1974: The Citycar was the most sold EV in the US till Tesla S



1996: GM produces EV1, its first purpose-designed EV

2017: Tesla starts production of its more affordable Tesla 3

1900: EVs makes up 28% of the cars on the road.

1920: EVs disappears as no longer competitive

1973: Oil Crisis prompts new interest in EVs

1990: California passes its Zero Emission Vehicle (ZEV) Mandate

2019: Norwegian EV market share first to reach 50%

2035: EU-wide ban of new ICEs

1880 1900 1920 1940 1960 1980 2000 2020 2040

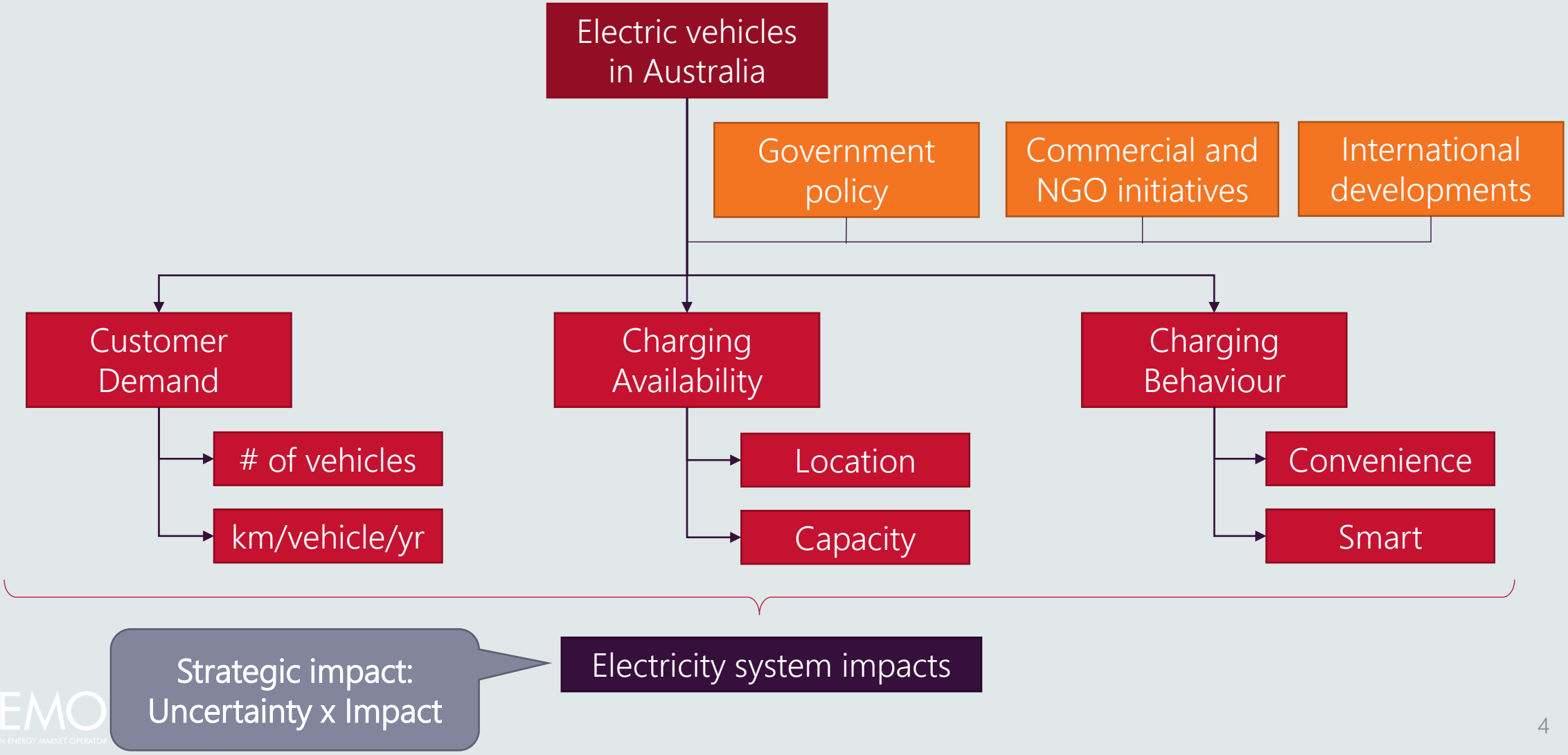
Performance/cost

Fuel security

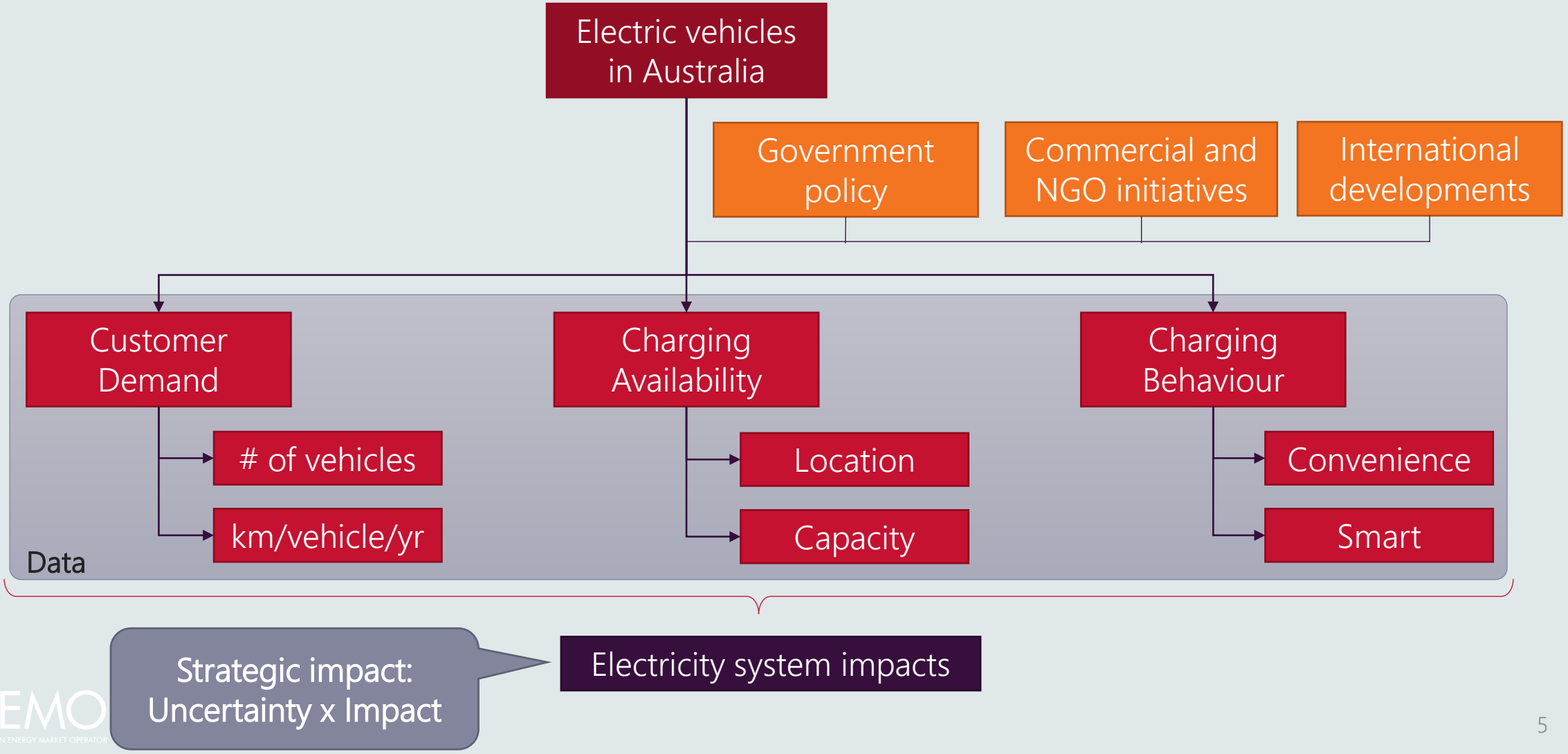
Environment

Performance/cost
Environment
Fuel security

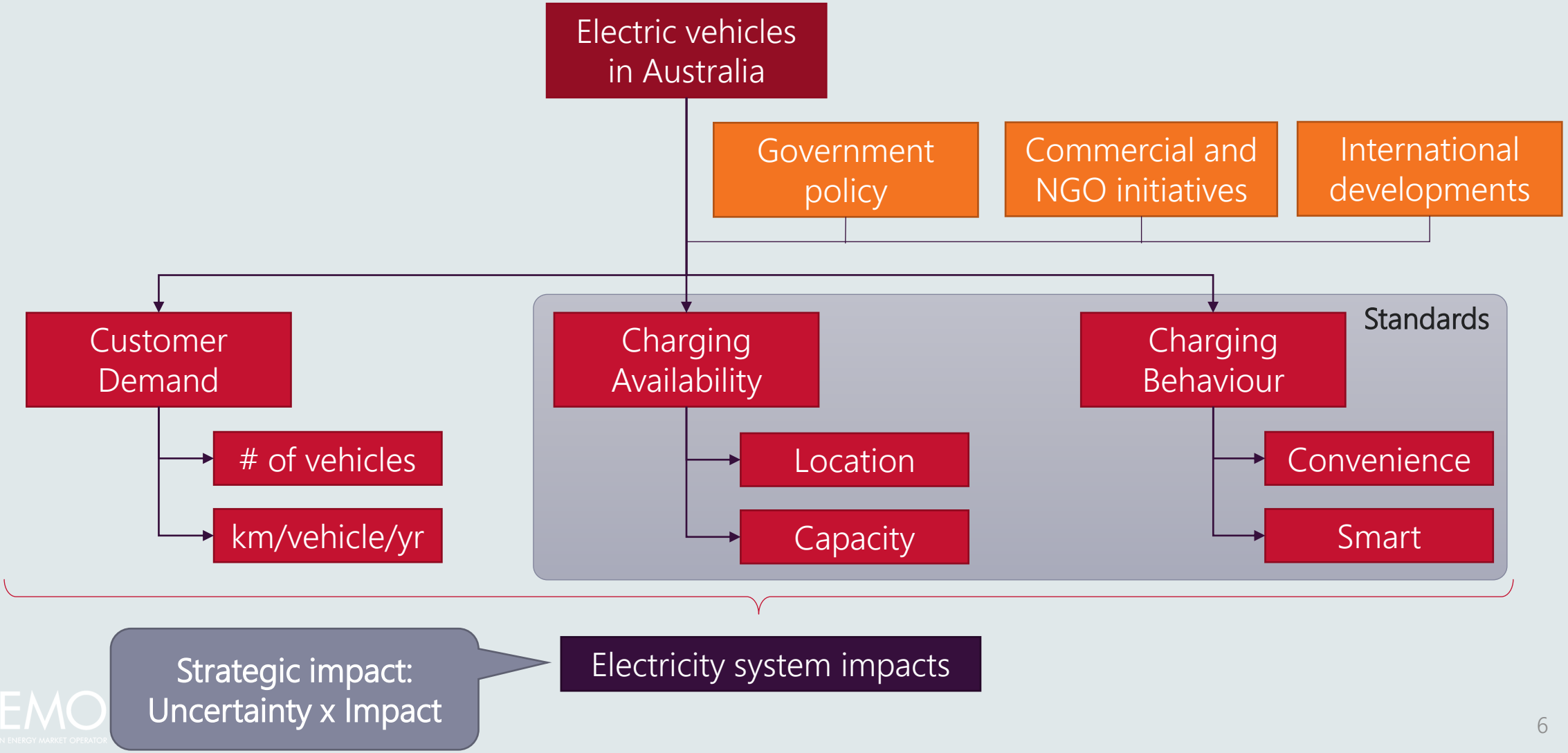
# EVs in Australia and their impact on the electricity system



# Data availability is critical to inform forecasting



# Standards are important in supporting uptake, and minimise electricity system costs



# EV forecasting opportunities

Joachim Tan, AEMO

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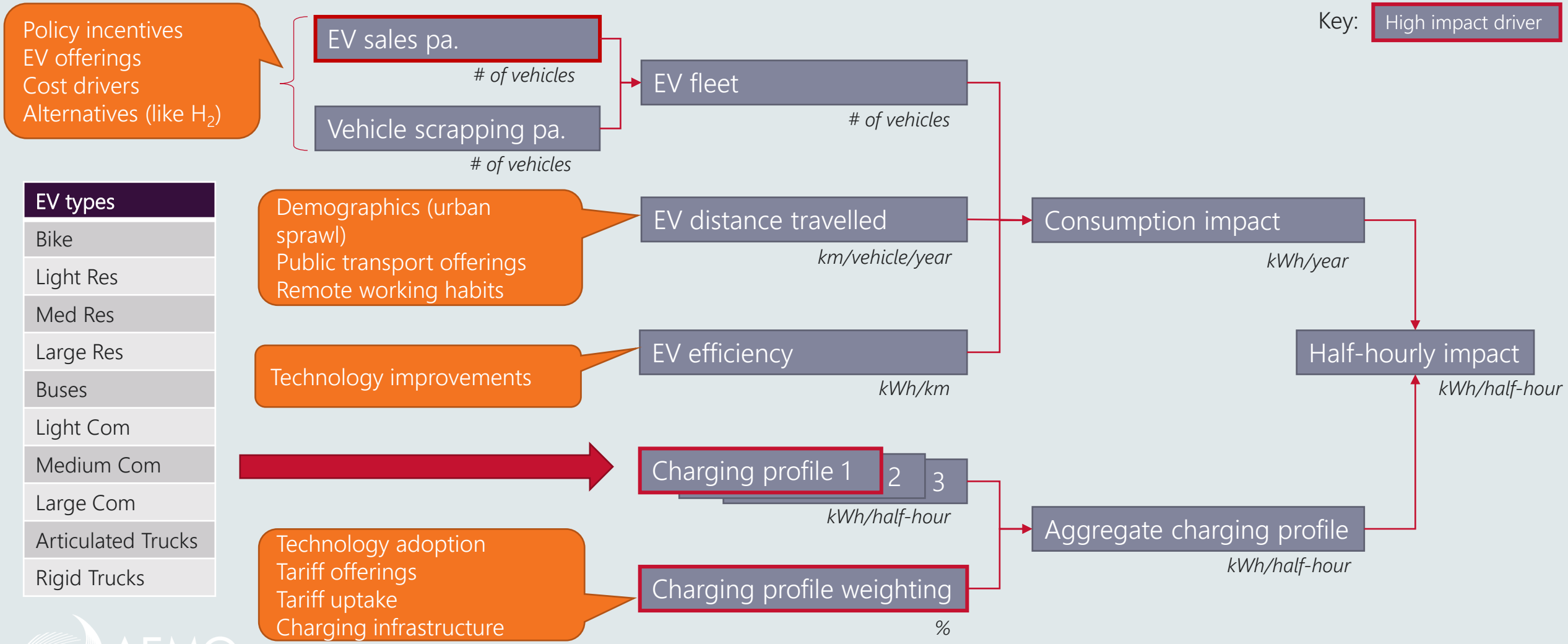
# Where are the EV forecast improvement opportunities?




| EV types |
|---|
| Bike |
| Light Res |
| Med Res |
| Large Res |
| Buses |
| Light Com |
| Medium Com |
| Large Com |
| Articulated Trucks |
| Rigid Trucks |

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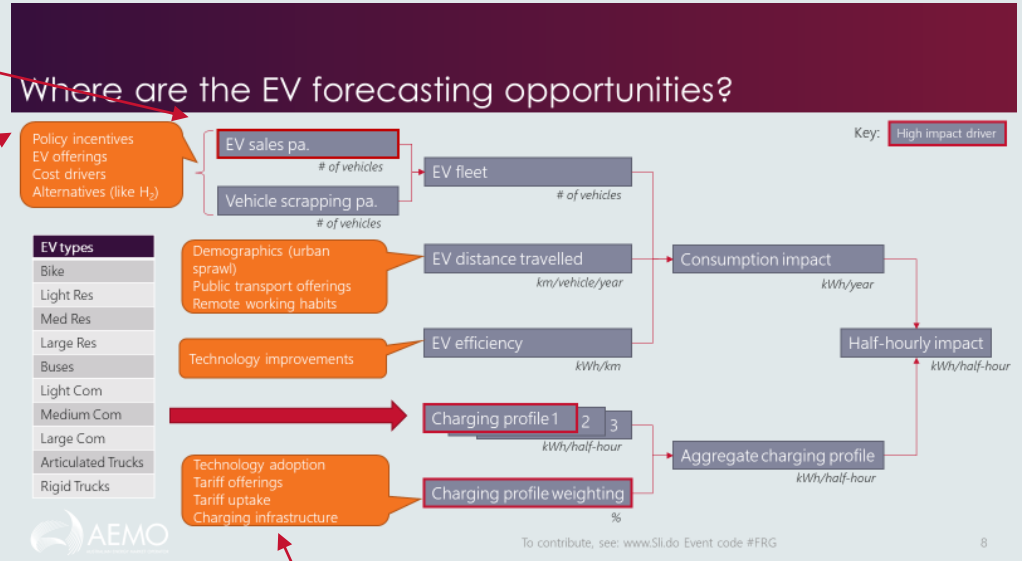
# EV sales are increasingly forecastable, with supportive policy and charging infrastructure developments supporting growth

EV uptake:

- ABS vehicle census shows strong EV growth in 2020: https://www.abs.gov.au/media-centre/media-releases/australian-vehicle-fleet-hits-20-million
- Significant growth in uptake expected in 2021. Tesla pushes EV market share to 2%: https://thedriven.io/2021/06/07/tesla-army-arrives-in-australia-in-what-will-be-record-shattering-quarter/

EV policy:

- The NSW Electric Vehicle strategy (https://www.environment.nsw.gov.au/topics/climate-change/net-zero-plan/electric-vehicle-strategy) and Victoria's Zero Emissions Vehicle Roadmap (https://www.energy.vic.gov.au/renewable-energy/zero-emissions-vehicles) are both reflected within the 2021 IASR.
- QLD are considering policies to boost EV uptake: https://thedriven.io/2021/07/21/queensland-rules-out-ev-road-tax-but-everything-else-on-table-to-boost-ev-uptake/
- NT waives registration charges for new EVs from July 2022 for 5 years: https://dipl.nt.gov.au/strategies/electric-vehicle
- EU policy target – Only zero emission vehicles to be sold from 2035: https://ec.europa.eu/commission/presscorner/detail/en/IP_21_3541




EV charging infrastructure:

- QLD EV Highway expansion: https://www.qld.gov.au/transport/projects/electricvehicles/super-highway
- Chargefox network to quadruple in size by 2025: https://www.chargefox.com/chargefox-network-to-quadruple-in-size-by-2025/

# Key charging profiles for home/work reflect different user behaviours

User behaviour

Plug in when price is low

User behaviour

Plug in when PV is generating

| EV types |
|---|
| Bike |
| Light Res |
| Med Res |
| Large Res |
| Buses |
| Light Com |
| Medium Com |
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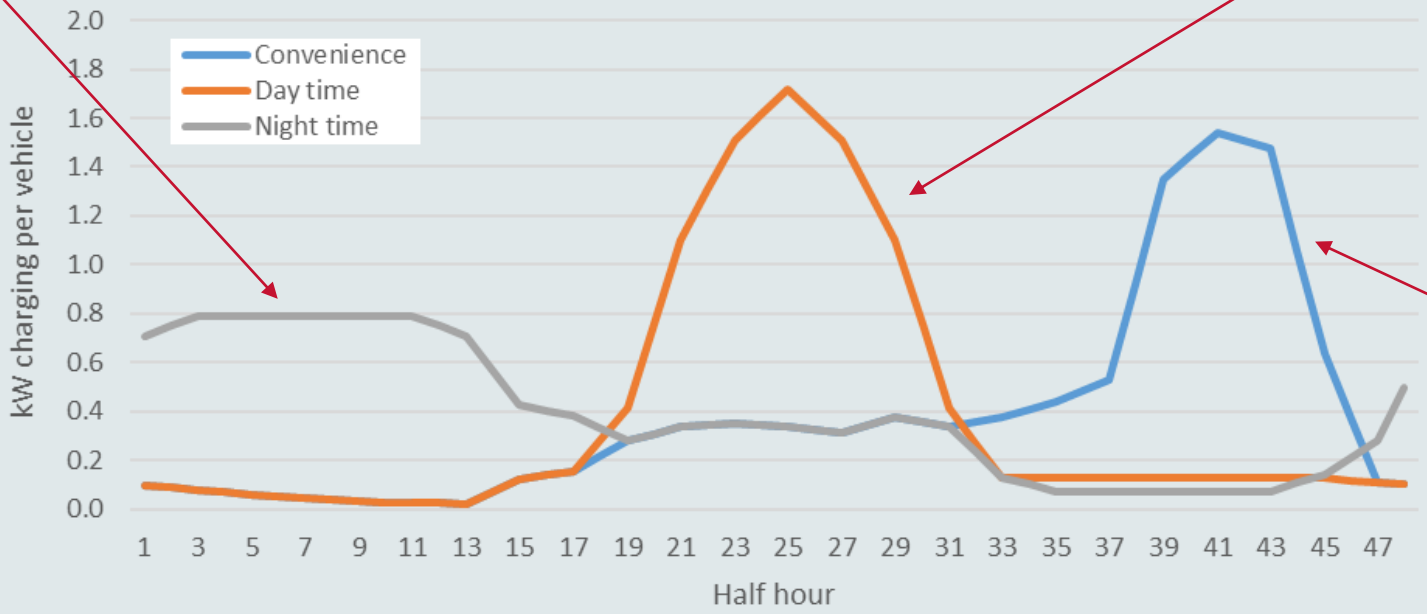
| Articulated Trucks |
| Rigid Trucks |

Charging profiles* (kW per vehicle) by time of day




User behaviour

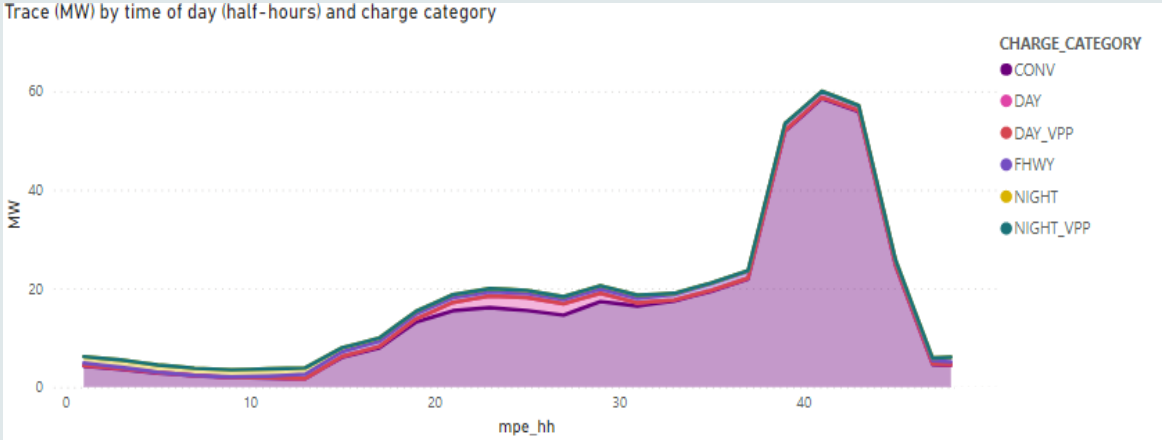
Plug in when parking (convenience)

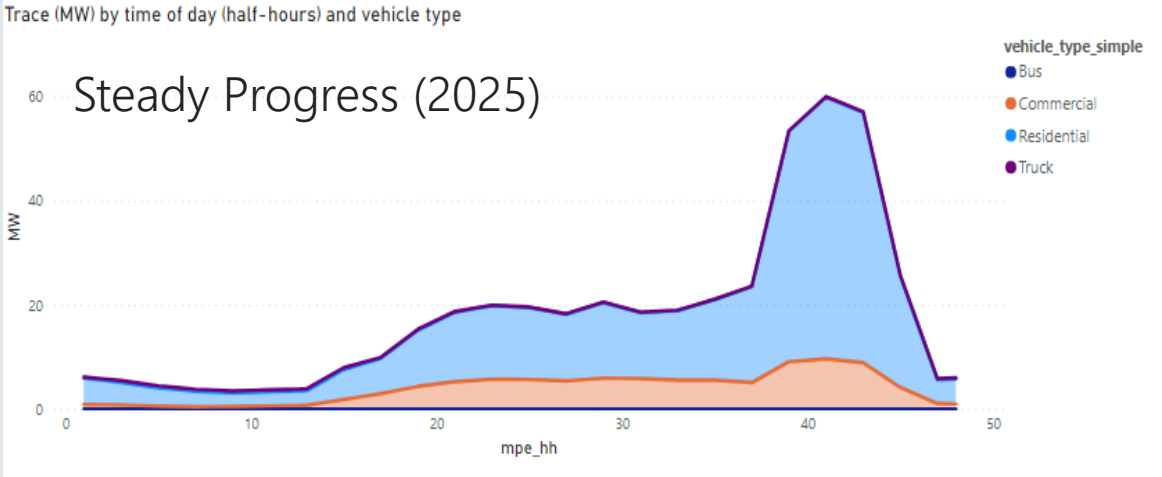
** The above three are current key home/work charging profiles, with other charging profiles shown next slide*

...but how will technology impact these charging behaviours?

# Forecast scenarios reveal the impact of alternative charging profile weightings on the grid

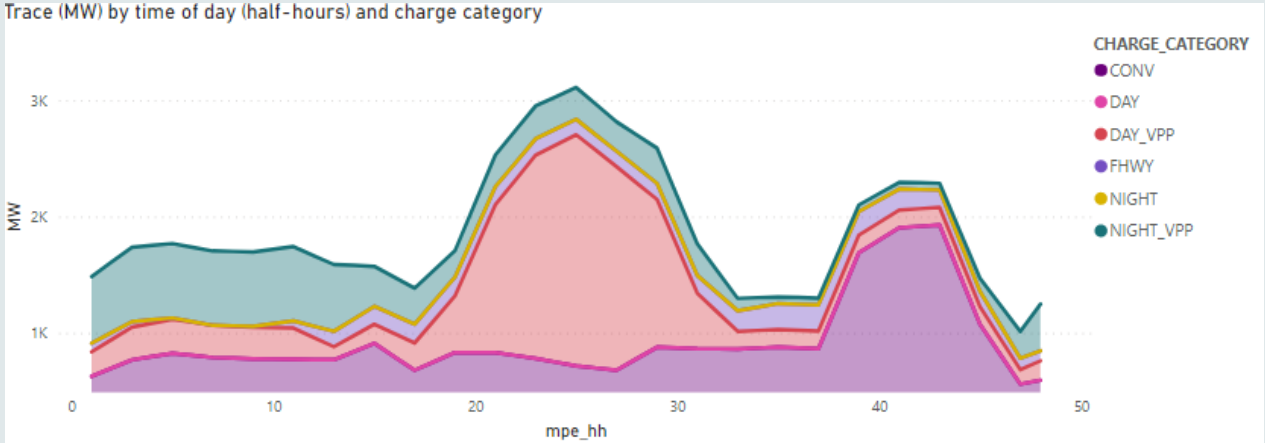
## Steady Progress (2025)

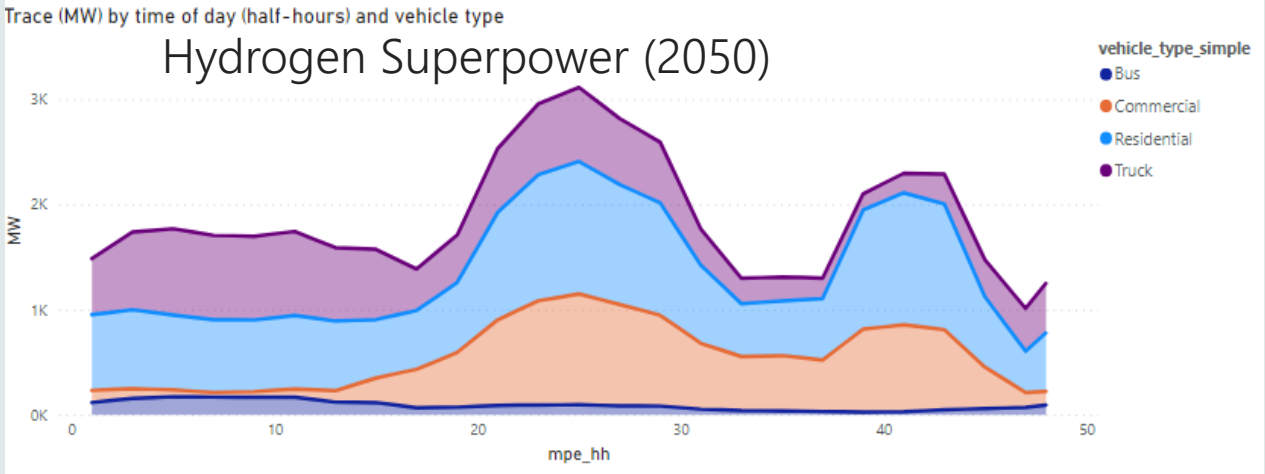


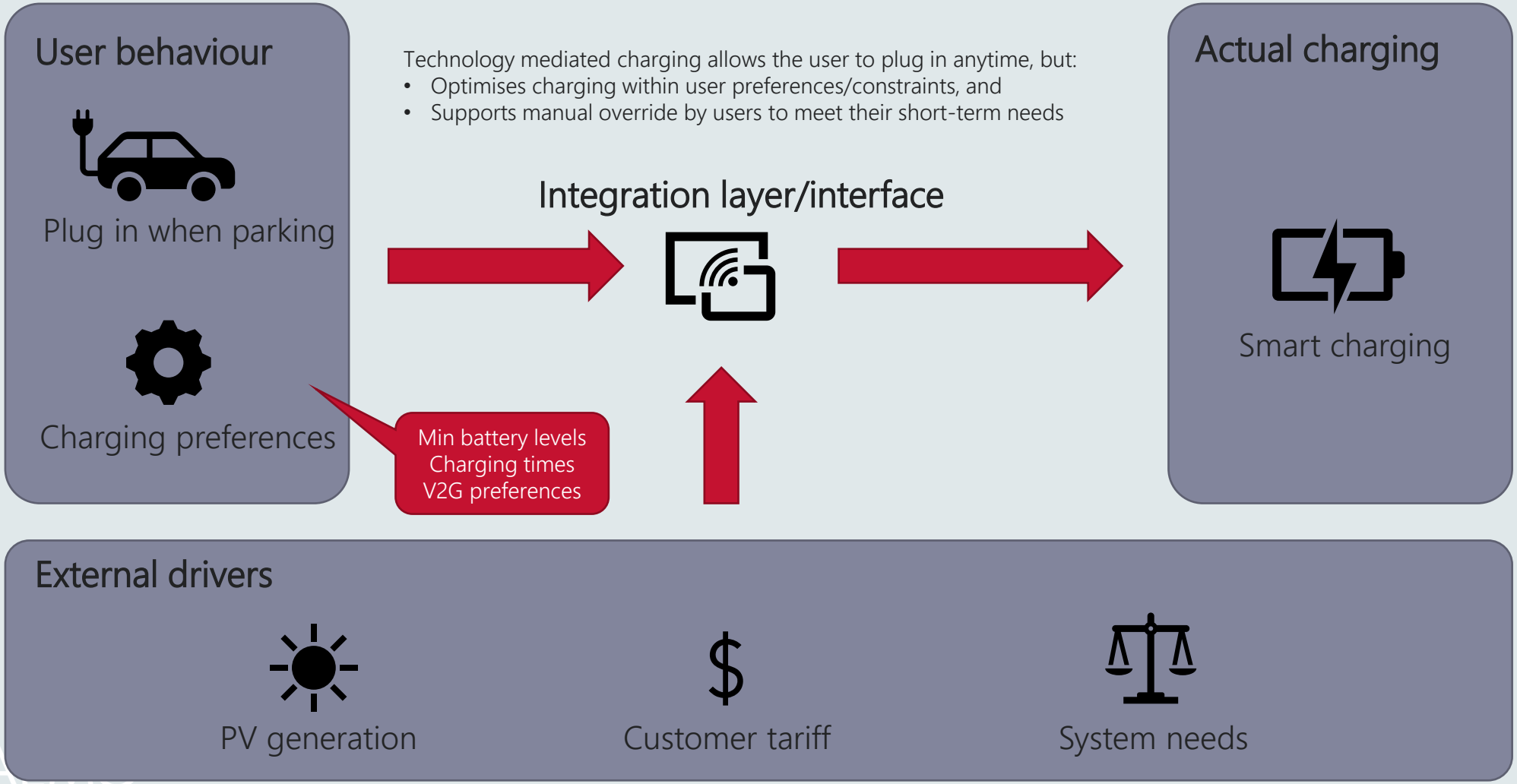

## Steady Progress (2025)

## Hydrogen Superpower (2050)




## Hydrogen Superpower (2050)

*In addition to the current key home/work charging profiles, Fast/Highway Charging (FHWY), DAY_VPP / NIGHT_VPP (coordinated charging) must be considered in the long term grid impacts.*

# AEMO will refine models and profiles of smart/coordinated charging as it evolves