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# An Online Tool for Future E-Mobility Scenarios and Their Potential Impact on Future NEM Demand

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APSRC 2023, RMIT, December 2023



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# Introduction

- Increasing uptake of DER:
  - stronger role for energy users
  - increasing interest and engagement
- Customers and those who advocate for them need to be better informed:
  - access to clearer, engaging, trustworthy and relevant information
- The Energy Trends Visualisation (ETV) project (funded by the Race for 2030 CRC) is trialling online and interactive tools to help energy stakeholders better understand the challenges and opportunities presented by the energy transition by making key trends visible.
- Within ETV project, UNSW has developed an online, interactive tool for exploring future e-mobility scenarios and their potential impact on future NEM demand

# The E-Mobility Tool

- Pilot phase
- Pitched at energy stakeholders:
  - customer advocates
  - highly-engaged customers (e.g., medium-large businesses with high energy costs)
- Developed in Python and has two sections:
  - Demand Forecast and the Impact of EV Charge Profiles on it
  - EV traces for a typical year



## Data Sources and Preparation

- A dataset of yearly EV traces developed by Katelyn Purnell in her PhD project [1]:
  - ✓ passenger vehicles (cars and motorcycles)
  - ✓ light commercial vehicles
  - ✓ bicycles
  - ✓ taxis/on-demand ride share vehicles
  - ✓ municipal buses
  - ✓ municipal ferries
  - ✓ articulated trucks
- The demand data was obtained from the 2022 ISP [2].
- The demand dataset included half-hourly data points, and the EV traces were hourly data points: The EV traces data was interpolated to become half-hourly.
- To implement state-based EV factors, we have mostly used the national vehicle numbers [1, 3, 4, 5], and pro-rated them by each state's population [3].

# Demand Forecast and Impact of EV Charge Profiles



Region: NSW × ▾

Charging Regime: ● End of Service

During Service

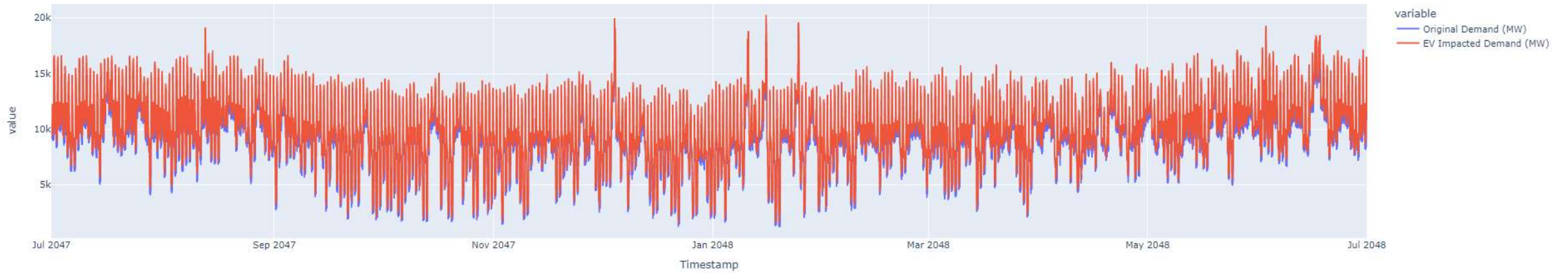
Sunshine

Non-peak

Time Span:



## Demand Forecast and Impact of EV Charge Profiles



Region: NSW × ▾

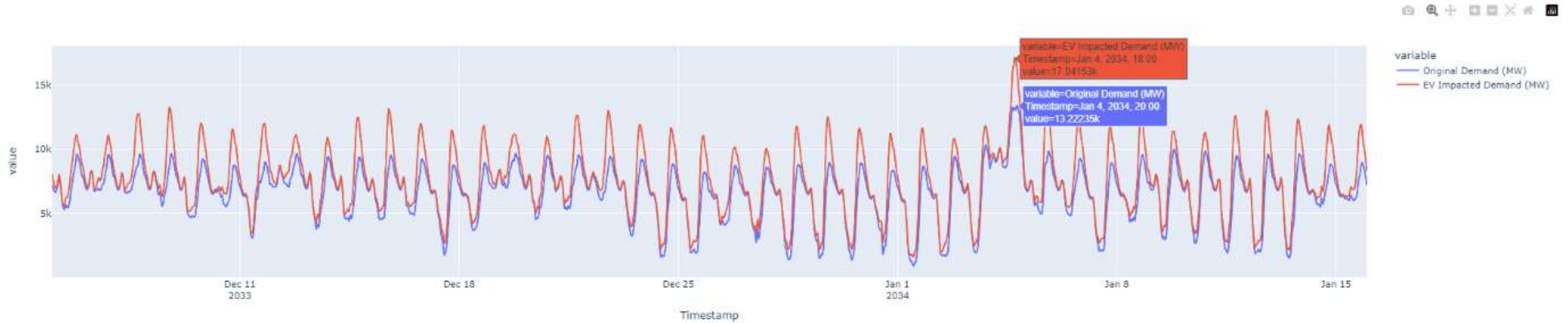
Charging Regime:  End of Service

- During Service
- Sunshine
- Non-peak

Time Span: 2023 204,2048 2051



# Demand Forecast and Impact of EV Charge Profiles



Region: NSW

Charging Regime:  End of Service

During Service

Sunshine

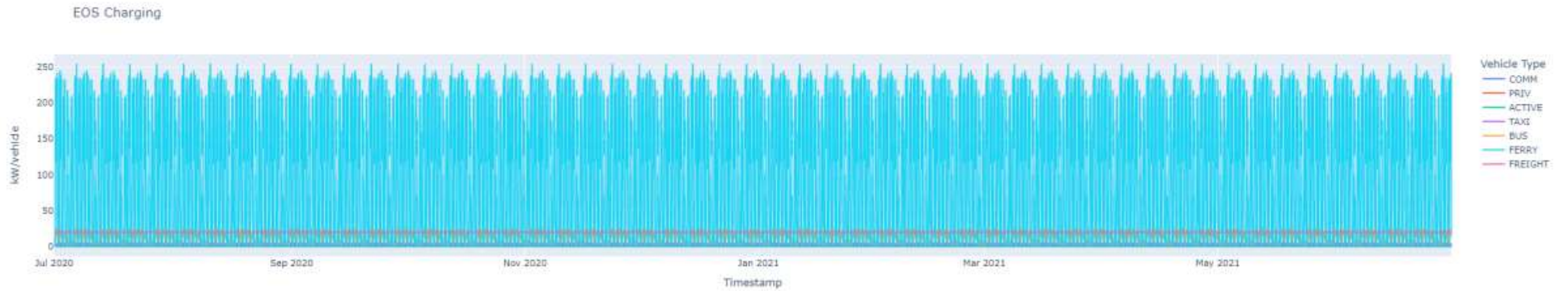
Non-peak

Time Span:





## EV Traces for a Typical Year



Trace Type:  Charge (kW/average vehicle)

Transport Energy Required (kW/average vehicle)

Average Connectivity to the Grid via Charging Infrastructure (% of the fleet)

Charging Scenario:  End of Service

During Service

Sunshine

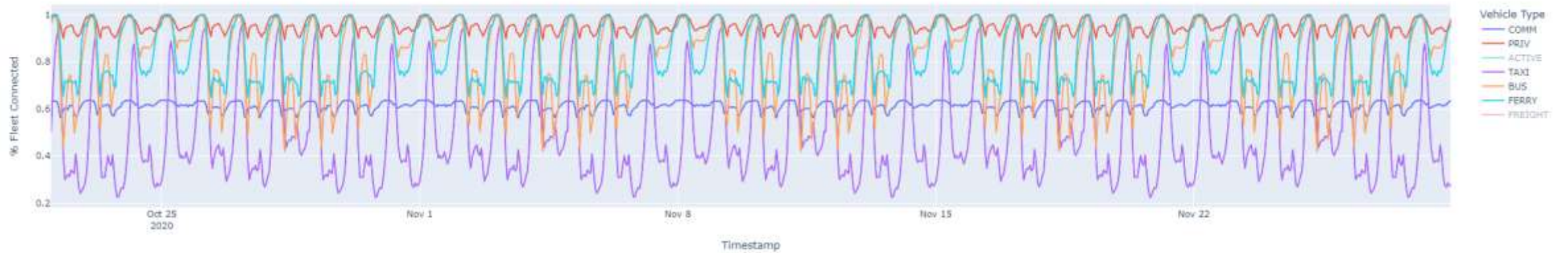
Non-peak





## EV Traces for a Typical Year

SUN Connectivity

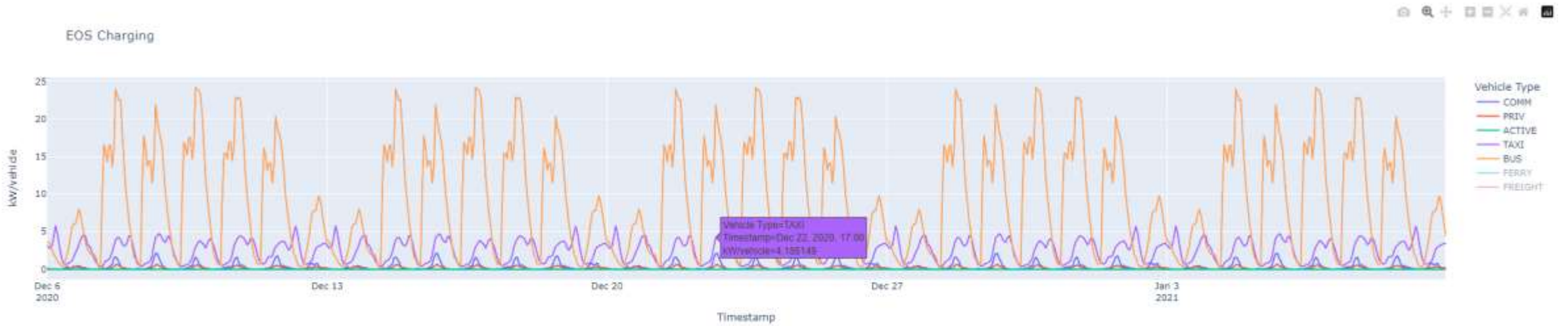


- Trace Type:
- Charge (kW/average vehicle)
  - Transport Energy Required (kW/average vehicle)
  - Average Connectivity to the Grid via Charging Infrastructure (% of the fleet)

- Charging Scenario:
- End of Service
  - During Service
  - Sunshine
  - Non-peak



## EV Traces for a Typical Year



Trace Type:  Charge (kW/average vehicle)

Transport Energy Required (kW/average vehicle)

Average Connectivity to the Grid via Charging Infrastructure (% of the fleet)

Charging Scenario:  End of Service

During Service

Sunshine

Non-peak



## Conclusion and Future Works

- A trial version of an online, interactive tool that visualises the EV traces, future NEM demand and the potential impact of EVs on demand.
- We will monitor how these visualisations get picked up and used by stakeholders including consumer representatives and media.
- We invite feedback from interested stakeholders and based on this feedback:
  - make improvements to usability of the tool;
  - add functionality such as:
    - solar and wind traces;
    - the ability to compare them against the demand traces;
    - both with and without the impact of EVs.

## Acknowledgements

The work was supported by Race for 2030 Cooperative Research Centre and the Australian Centre for Advanced Photovoltaics (ACAP).

## References

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- [3] Australian Bureau of Statistics, 2023, 'National, State and Territory Population March 2023', <https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/mar-2023#states-and-territories>.
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- [5] Transport NSW, 2023, 'Public Transport Trips - All Modes', <https://www.transport.nsw.gov.au/data-and-research/data-and-insights/public-transport-trips-all-modes>.

Thank you 😊