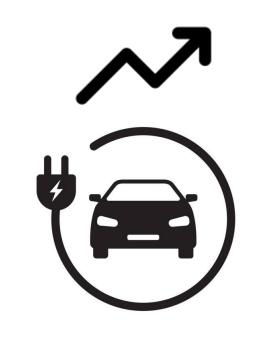


# Consumer preferences for electric vehicle charging management and response to time-of-use tariff discounts

**Melbourne Energy Institute** 

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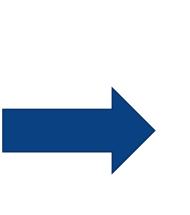
# 1. Introduction

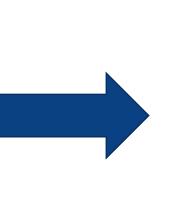


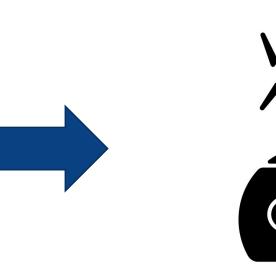
Increase in

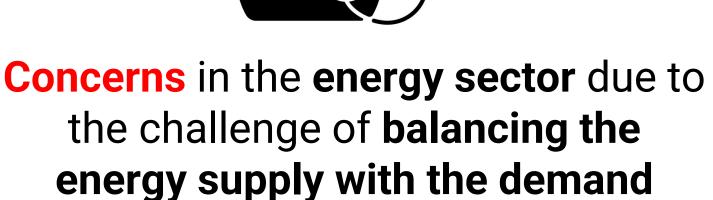
**Electric Vehicle** 

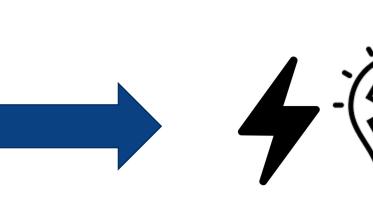
**(EV)** adoption

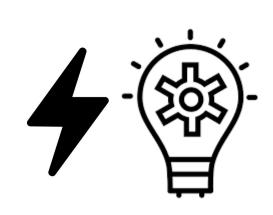












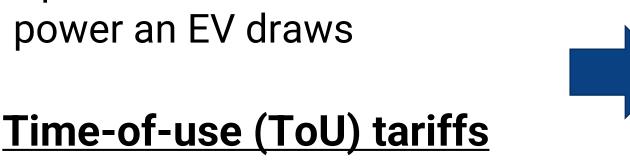
**Need** for **electricity** demand management strategies



### **Smart charging**

Optimise when and how much

charge their EV off-peak







How do consumers respond to these electricity demand strategies?

## 2. Aim

### **Investigate consumers'**

- preferences for **smart charging technology** and **control** (user-managed or supplier-managed)
- responses to progressive ToU tariff discounts in guiding change of EV charging time to late-night (11pm) and around midday (10am-2pm)

# 3. Methodology





**Online Survey** Collected between July - August 2021

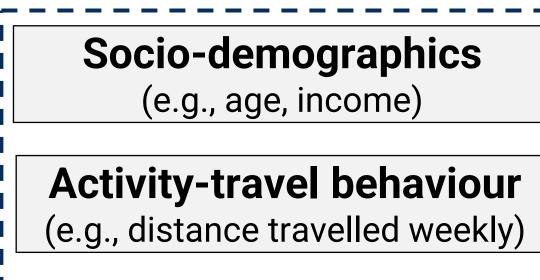
**Sample 994 drivers** living in **Australia** 

97 EV owners 897 ICEV owners





## **Explanatory Variables**



**EV-related variables** (e.g., EV ownership) **Dwelling features** 

**Attitudinal indicators** (e.g., pro-environmental)

(e.g., solar panel installation)

### Modelling

MODEL 1 Multinomial Probit Model

MODEL 2

Bivariate

Ordered Probit

Model

**Technology** and **Control** 

# **EV** Charging

# SMART CHARGING TECHNOLOGY AND CONTROL

- (a) Conventional charging Charging is monitored and controlled only by you. Your car is charged from the moment it is plugged in (or based on a simple timer).
- (b) <u>User-managed</u> smart charging Charging is optimised by an automatic system that is monitored and controlled only by you. Considering the desired level of charge and departure time, the system selects the cheapest time to charge the EV based on ToU tariffs.
- (c) Supplier-managed smart charging Charging is optimized by a centralized system that communicates and coordinates with the electricity supplier to determine the best schedule for charging, considering real-time electricity demand in your area.

# Change **EV** Charging

Time

# Late at night (11 pm)

Around midday (10 am - 2 pm)

### 4 scenarios

RESPONSES TO TIME-OF-USE TARIFF DISCOUNTS

- No discount
- 10% discount
- 20% discount
- 50% discount

### Choice

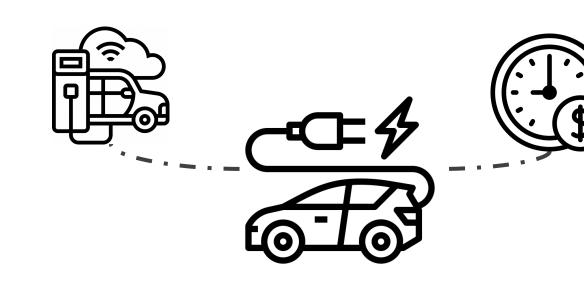
- Definitely not Probably not
- Probably yes
- Definitely yes

# 4. Results and Conclusions



R1. Consumers willing to change charging time are likely to have more flexible schedules, while time-constrained (e.g., full-time workers) individuals seek practical benefits of smart charging.

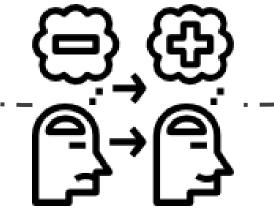
C1. Expanding electricity demand strategies beyond home charging could be beneficial for better attending to consumers' activity-travel needs.



R2. Current EV owners have a higher propensity than potential EV adopters to choose **supplier-managed smart** charging and change EV charging time to around midday in response to ToU tariffs.

C2. Findings are reassuring for the implementation of supplier-managed smart charging and ToU tariff trials targeting EV owners. However, results from such trials will probably overestimate consumer acceptance.





R3. Attitudinal indicators are key predictors of smart charging adoption, such as environmental attitudes and privacy concerns. Environmental attitudes also influence the responses to ToU tariff discounts.

C3. Attitudinal factors should be addressed in trials and programs, especially when consumers are still sceptical about smart charging technologies.





R4. ToU tariff discounts seem to be more efficient in motivating behavioural changes towards lateat-night EV charging compared to around midday.

C4. When promoting midday charging, strategies beyond tariff discounts are encouraged. Emphasising environmental benefits and acting upon consumers' activity-travel schedules will probably be crucial.