



Australian  
National  
University



Battery Storage and  
Grid Integration  
Program

*An initiative of The Australian National University*

# Flexible Seasonal Operation of a Community Battery to Align with Community Expectations

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# Challenge: Aligning industry and community expectations around battery operation

- Federal govt. has funded installation of over 400 batteries
- Both battery operators and community stakeholders wish to maximise their benefit
- Trials to inform how different operating scenarios fulfil different stakeholder requirements

# Community and Operator Expectations

<b>Community</b>	<b>Networks</b>
Cost reduction Emissions Reduction Self-sufficiency Autonomy Independence	Grid Stability Grid Reliability Integration of DER Innovation

# Methodology

- In-house battery optimisation algorithm and power flow analysis algorithm
  - Multi-objective optimisation
- Network of 55 households with 100% solar penetration
- 200kWh battery located in middle of feeder
- Canberra NextGen data
- Assume 3 discrete operating modes: Solar Soak, Cost Minimisation, Balanced

# Evaluation Metrics

- Voltage
- SSS – Solar Self Sufficiency

$$SSS = 1 - \frac{\text{community imports}}{\text{community load}}$$

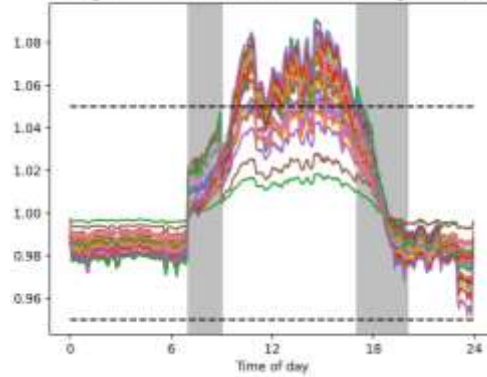
- SSC – Solar Self Consumption

$$SSC = 1 - \frac{\text{community exports}}{\text{community solar generation}}$$

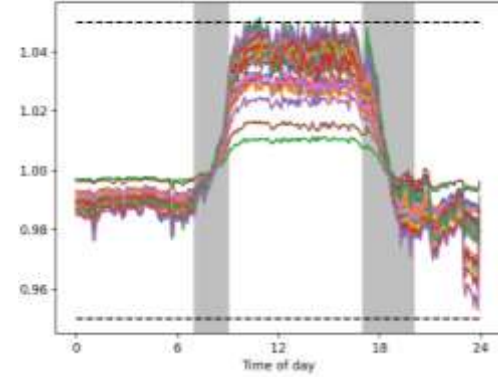
- Financial

Summer

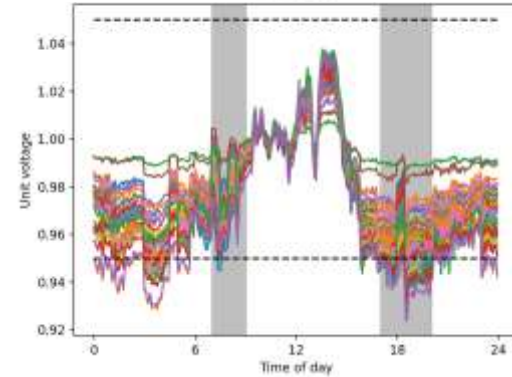
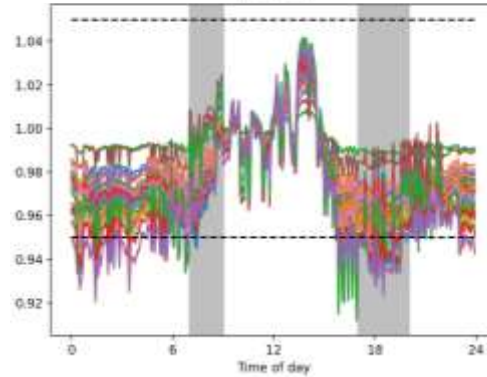
Cost minimisation/ Arbitrage



Solar Soaking



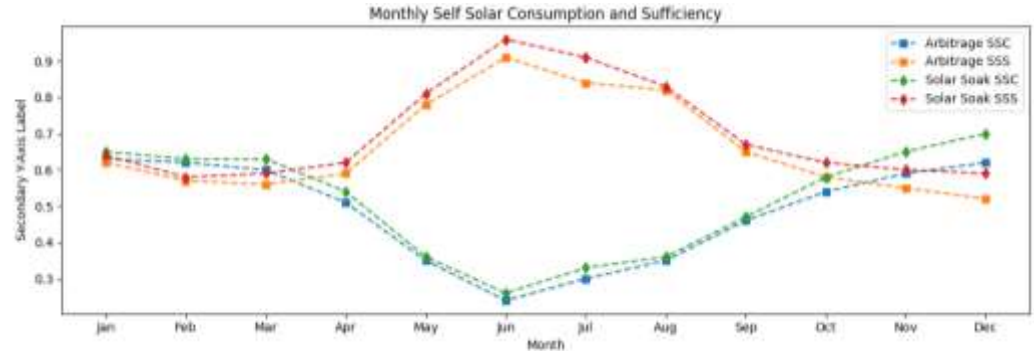
Winter



# Seasonal Operation

Algorithm	w1	w2	w3
Arbitrage Only	0	1	1
Solar Soak Only	100	1	0
Balanced	1	1	1

Algorithm	SSC	SSS
Arbitrage Only	0.61	0.44
Solar Soak Only	0.7	0.55
Balanced	0.45	0.62
Hybrid	0.67	0.50



# Proposal: Introduce strong seasonality

- Align battery operation with solar characteristics

Yarra Energy Foundation Battery in North Fitzroy, Victoria with mural entitled 'Set the controls to harness the sun' by artist Hayden Dewar.





# Conclusion and Future Work

- Conclusion
  - Adapting battery operating algorithms to align with seasonal characteristics could be a good way to trade-off between contrasting expectations
    - Need tariff that greater rewards solar soaking in summer
  - Improvements include voltage management benefits, community solar utilisation, and financial
- Future Work
  - Repeating with larger network, and over a longer time frame
  - Including Inverters, V2G, HB

THANK YOU  
Questions?