



Solar Apartments

Opportunities for distributed photovoltaics in multi-unit residential buildings Mike Roberts SPREE

Never Stand Still

Faculty of Engineering

School of Photovoltaic and Renewable Energy Engineering

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Energy Consumers Australia

Image: The Observatory, Port Macquarie – courtesy Chris Denny



Presentation

Motivation

Opportunity and Barriers

Technical Arrangements

Research Questions

Methodology:



Opportunity Assessment Load Characterisation Data Collection Network Modelling Distributing Risks and Benefits Regulatory Issues Publications





Motivation (in numbers)

2°C 1.7 26-28% million 40-55% households 66-75% Zero

1. United Nations Framework Convention on Climate Change (UN FCCC), Adoption of the Paris Agreement. 2015.

- 2. Campbell, R., Meeting our Paris Commitment. 2017, The Australia Institute.
- 3. IEA, World Energy Outlook 2016 Executive Summary. 2016, International Energy Authority.



Solar Apartments The Opportunity



An opportunity for a co-ordinated response to a collective problem: A Clean Energy Community?

ABS. Census of population and housing. 2016. (Australian Bureau of Statistics)





Barriers to Deployment



Roberts MB, Bruce A, MacGill I. Opportunities and Barriers for Photovoltaics on Multi-Unit Residential Buildings: Reviewing the Australian Experience. (Under review).





Shared PV to meet Common Property loads



Over 60% of apartments are in buildings under 4 storeys



Solar Apartments **Technical Arrangements**





Solar Apartments Research Questions

- 1. What is the opportunity for solar photovoltaics (PV) on Australian apartment buildings?
- 2. What is the value for households, electricity distribution networks, society and the environment?
- 3. How can different technical and financial arrangements ensure equitable distribution of costs, risks and benefits?
- 4. What regulatory changes are needed to make this happen?





Solar Apartments Opportunity Assessment

- GIS analysis of insolation and shading using 3D building models and Lidar data (APVI methodology)
- Building employment survey data (Local government)
- Visual assessment of aerial imagery



Building Characterisation \rightarrow Usable Roof Area \rightarrow Generation Capacity

Roberts, M., Copper et al, Assessment of Rooftop PV Potential for Australian Apartment Buildings (forthcoming)



Solar Apartments Load Characterisation





Solar Apartments Apartment Loads



Charts taken from Roberts, M., Haghdadi, N., et al., *Characterisation of Australian apartment energy loads.* Forthcoming.



Apartment Loads

Solar Apartments



Charts taken from Roberts, M., Haghdadi, N., et al., *Characterisation of Australian apartment energy loads.* Forthcoming.



Solar Apartments Data Collection





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Data Collection



Ongoing collection of interval data from retailers & network service providers

Direct Load Metering

- 5 buildings
- 60 apartment loads
- Common property loads
- Whole building loads
- 5s 30s interval data
- From May2017 ongoing





Solar Apartments Modelling

GENERATION





Solar Apartments Sharing Risks & Benefits





Solar Apartments Publications

Roberts, M. B., A. Bruce and I. MacGill (2015). *PV in Australian Apartment Buildings – Opportunities and Barriers*. <u>Asia Pacific Solar Research</u> <u>Conference</u>. Brisbane.

Roberts, M. B., G. Huxham, A. Bruce and I. MacGill (2016). *Using PV to help meet Common Property Energy Demand in Residential Apartment Buildings.* <u>Australian Summer Study in Energy Productivity</u>. Sydney.

Roberts, M. B., A. Bruce and I. MacGill. *Opportunities and Barriers for Photovoltaics on Multi-Unit Residential Buildings: Reviewing the Australian Experience.* (Under review).

Roberts, M. B., N. Haghdadi, A. Bruce and I. MacGill *Characterisation of Australian apartment energy loads.* (Forthcoming)

Roberts, M. B., A. Bruce and I. MacGill. *Collective Prosumerism: Assessing the opportunity for Embedded Networks, Distributed Solar and Storage in Australian Apartment Buildings.* (Forthcoming)

Roberts, M. B., J. Copper, A. Bruce and I. MacGill Assessment of Rooftop PV Potential for Australian Apartment (Forthcoming)



Solar Apartments Regulatory Submissions

Embedded Network Regulation Electricity Metering Regulation Electricity Retail Law A focus on individual customer access to the retail market creates an impediment to co-ordinated solutions.

An opportunity for a co-ordinated response to a collective problem: Apartment buildings as Clean Energy Communities

Roberts MB, Passey R, Submission to the Victorian Government in response to the draft position paper on their review of the General Exemption Order Roberts MB, Passey R, Bruce A, MacGill I. Submission to AEMC review of regulatory arrangements for embedded networks. 2017. (APVI, CEEM)

Forthcoming Solar Apartments Report for Energy Consumers Australia Solar opportunity modelling for Australian Photovoltaic Institute / Climate Media Centre / Solar Citizens



Thank you!



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Questions?