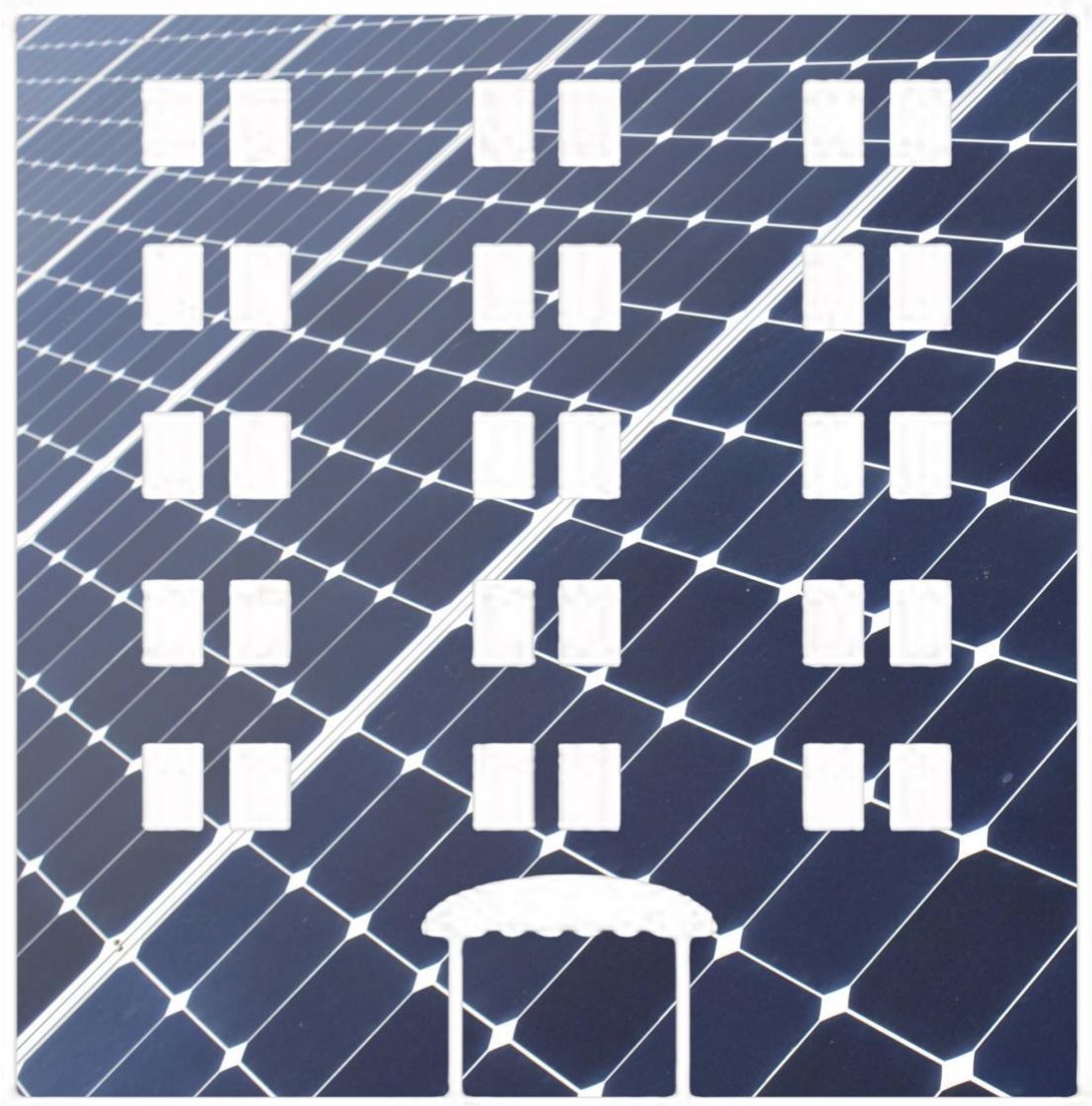
Photovoltaics on Apartment Buildings



Project Report

Executive Summary

Centre for Energy and Environmental Markets (CEEM)
UNSW Sydney

Energy Consumers Australia
ECA Research Project AP841

ENERGY CONSUMERS AUSTRALIA

Centre for Energy and Environmental Markets

UNSW SYDNEY

Executive Summary

The Opportunity

Australia has over 2 million solar households (22% of houses) but apartment dwellers are largely excluded from the benefits of clean, cheap solar generation.

- There are 1.4 million apartments in Australia, housing 10% of the population nationally but two thirds of residents in some urban LGAs, while one in three of all new dwellings are apartments.
- There is potential for an estimated 2.9-4.0 GW of solar PV on the roofs of Australian apartment buildings, equivalent to approximately half the existing installed residential capacity. On average 1-2 storey buildings have capacity for 3.7kW per apartment, 3 storey have 2.0kW/apartment and higher buildings average 16kW/apartment. Over 60% of apartments are in 1,2 or 3 storey buildings.
- On average, apartments use 79% of the electricity per occupant of detached and semi-detached houses. Apartment loads show greater temporal variability, and more diverse peak times than houses, resulting in greater benefits from aggregating diverse loads.
- Apartment building common property loads are highly building specific. Daily demand varies from 2 to 15 kWh/day/apartment, while load profiles often have higher daytime load and are flatter than household loads.

The Challenges

Despite a range of potential benefits over stand-alone housing, including potential economies of scale, aggregation of diverse household loads, and established governance arrangements for shared ownership, there are multiple challenges to deployment of solar PV on apartment buildings.

- Many apartment buildings have physical constraints on solar installation, including rooftop obstructions, competition for roof space, overshadowing, outdated wiring installations and structural issues, as well as access requirements that can significantly increase installation costs.
- Split incentives, high turnover of residents and owners, poor communication and other organisational issues can present barriers to co-ordinated action.
- Apartments are excluded from many solar incentive schemes and strata bodies may have difficulty in accessing finance for investment in solar.
- Strata Laws can present barriers to sustainability upgrades while electricity market regulation can make it difficult for electricity consumers to co-ordinate their energy supply arrangements.
- Lack of objective information for residents and shortage of solar installers with strata experience make decision making difficult.

Implementation Arrangements

Optimum arrangements for installing solar PV depends on the specific characteristics of buildings, households, electricity loads and financial arrangements; there is no “one size fits all” solution.

- For buildings with significant common property (CP), PV systems installed by the strata body to meet CP loads are less administratively and organisationally

complex than other arrangements and have payback periods comparable to those for residential houses. For buildings with relatively small roof areas (e.g. high-rise), this is often the optimum arrangement.

- PV installations for individual apartments face governance challenges and low self-consumption but can be simpler to implement than shared systems and can be financially optimal, particularly for smaller buildings.
- Embedded networks have not always been beneficial for customers, and retrofitting to some buildings can be expensive, but if they are owned and operated in the interests of residents and owners, they can result in significant cost savings.
- A shared PV system applied to aggregated building load can significantly increase PV self-consumption and building self-sufficiency compared to individual systems. PV added to an embedded network can reduce costs for consumers.
- Shared PV purchased behind-the-meter through a solar PPA can also provide significant benefits, while avoiding the regulatory challenges and upfront costs of an embedded network.
- Shared battery storage can further increase PV self-consumption and reduce demand charges but is unlikely to be financially beneficially without a substantial decrease in capital costs.
- Off-site solar avoids many of the challenges and may be the best opportunity for some residents to access solar generation, but financial benefits are restricted by high network costs.

Policy Recommendations

Regulatory reforms in areas of Strata, Electricity and taxation Law, as well as targeted financial incentives, could help apartment owners to access the benefits of solar energy.

- Changes to Strata decision-making processes and specific exemptions for sustainable infrastructure.
- Allowing strata bodies to use common property as collateral for loans.
- Inclusion of apartment tenants in strata decision making.
- Reversal of tax incentives for property investment.
- Targeted government incentives for PV feasibility studies and installation in apartment buildings
- Allowable retail and embedded network exemptions for EN operators owned by or constituted to benefit residential electricity consumers.
- Restrictions on developers' ability to enter into long-term energy supply contracts.
- Removal of unnecessary metering criteria and simplification of meter transfer arrangements.
- Introduction of cost-reflective pricing for use of local distribution networks.

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The full report is available from:
http://ceem.unsw.edu.au/sites/default/files/documents/Solar_Apartments_Final_Report_2019_4_3.pdf

A full list of the publications associated with research and analysis covered, at least in part, by this report can be found in Appendix A to the full report.

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Disclaimer

The authors have used all due care and skill to ensure the material is accurate. However, CEEM, UNSW Sydney, ECA and the authors do not accept any responsibility for any losses that may arise by anyone relying upon its contents. In particular, the financial costs and benefits of PV installation are highly dependent on building and household characteristics as well as on financial arrangements with retailers and other stakeholders.