

Improving Energy Affordability for Australian Low-Income Renter Households

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Introduction

Australian household energy affordability is a major political and public concern after a sustained period of significant electricity and gas price increases. Solar photovoltaic (PV) energy provides a key means for greater household control over the cost of electricity bills. Australia has led the world with household adoption of solar PV.

The common business model to encourage household solar system adoption is structured around individual ownership requiring an upfront cost from the dwelling owner. This model advantages owner-occupiers with adequate financial resources and suitable rooftop capacity. The upfront cost excludes low-income households, and renters are further disadvantaged without rooftop property rights. This unequal access to solar PV, as low-income households experience the most deleterious impact from substantive energy price increases, raises important energy justice principles and practices.

This article sets out the current Australian 'energy landscape' for households and the affordability issues facing low-income households, presents findings from a recent research project to progress new options for low-income households to have greater control over the cost of their electricity bills, and proposes future research directions to improve energy affordability—through access to solar PV—for low-income renters.

The current 'energy landscape' for Australian households

As in other advanced economies, electricity plays a significant social and economic role in Australia—for the standard of living of all Australians and as an intermediate input for all industries. The increase in total Australian electricity consumption, particularly since 1960, reflects growth in both energy intensive industries and household use. Nearly 100% of Australian households use mains electricity as a source of energy and 50% use mains gas.

Energy consumption is a significant contributor to carbon emissions due to the high reliance on fossil fuels (about 83%) to generate Australia's electricity despite the growth in renewable energy sources which accounted for 15% of electricity generation in 2016 (Energy Council of Australia 2016). Wind and solar photovoltaic (PV) now account for 50% of renewable energy resources to produce electricity.

Since 2006, Australian household electricity prices have rapidly escalated, primarily driven by regulated transmission and distribution prices (AEMC 2017; Chester 2015). The cumulative effect of these price

increases has been most deleterious for low-income households (Chester 2013, 2014). As the impact of significant year-on-year price increases became more extensive, particularly for business, energy affordability has become a major political concern (ACCC 2018; Australian Government 2017).

Concurrent with rapidly rising energy bills and the growth of household energy impoverishment, Australia has been leading the world in household adoption of solar energy with more than 20% of homes estimated to have installations (Australia PV Institute 2016). The rapid residential uptake of solar PV has been encouraged through the availability of Australian State government feed-in-tariffs and other incentives such as rebates.

Although many households are now 'prosumers', being both producers and consumers of electricity, barely 2% of installed solar PV capacity is independent of the centralised electricity grid. This means that—without significant additional capacity—most prosumer households will be impacted by future electricity price increases.

All Australian electricity retailers have developed business models for the uptake of small-scale solar PV connected to the centralised networks. These models are based around installation ownership by an individual, third party or community. The most common model is individual ownership requiring an upfront capital cost from the dwelling owner and rooftop capacity which are prohibitive for low-income households and those who are renters.

The situation for low-income households

Around 1.8 million (21%) of all Australian households fall within the lowest income quintile, are highly dependent on income from government pensions and allowances, and more than one third are renters (with nearly 22% in the private rental market) (ABS 2017b). The number of renting households has grown as home buying costs have escalated. The number of low-income households dependent on private rental housing has also grown as the availability of public and community housing has not matched demand.

Australian low-income households have higher proportions with 5 or more persons, multiple families, and no dwelling access to the internet. Poor households also spend higher proportions of income and expenditure on energy, and thus energy costs have

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a disproportionate impact on households (Chester and Morris 2012).

These characteristics mean that the poorest households experience greater disadvantage from electricity price increases and indicate the scale of household exclusion from the opportunity to reduce energy bills using solar PV. Low-income household characteristics also indicate the contracting, billing and technology access issues to be addressed if 'energy justice' is accessible for all households.

The feasibility of low-income households accessing solar PV will also depend *inter alia* on the willingness of these households to shift from their current energy supply arrangements. Russell-Bennett et.al (2017: 6) found that motivation by Australian low-income households to adopt energy efficiency was driven by "awareness, low perceived cost, incentives and rebates, comfort and health/wellness/stress [and] the top five barriers were high perceived costs, knowledge gaps, lack of trust, split incentives and low literacy/cultural barriers".

Other studies of household motivators and barriers to adopting solar and other microgeneration technologies have found:

- a higher willingness if adoption achieves household independence of (UK, Irish, German and Swedish) energy suppliers and protection against future energy costs (Balcombe et. al 2014; Claudy et. al 2011; Karakaya et. al 2015; Palm et.al 2011);
- concerns about costs, reliability, maintenance, lack of regulation, administrative difficulty and installation logistics (Palm 2018; Palm et. al 2011; Wolske et. al 2017);
- motivations differed for different microtechnologies and for older and younger (New Zealand) households (Baskaran et. al 2013);
- community solar ventures were more likely to be joined by those motivated by environmental concerns or peer effects (Bauwens 2016; Noll et. al 2014);
- lack of time, interest, ability or scepticism were reasons why (UK) rural households would not participate in community ventures (Rogers et. al 2008);
- financial incentives attracted younger Italian households whereas the environment was of greater concern to Austrian households (Braitto et.al 2017);
- younger age, higher income, ownership and independent roof were positively correlated with uptake in Malta (Briguglio et. al 2017);
- concerns that technology may be surpassed, reliability and life of technology were barriers for Taiwanese households (Shih and Chou 2011);
- availability or not of feed-in tariffs influenced satisfaction with adoption by Western Australian households (Simpson and Clifton 2015);
- information through social networks was impor-

tant for Queensland households (Sommerfeld et. al 2017); and

- ways for (Canadian, Danish and UK) energy co-operatives to overcome the barriers of perceived usefulness and experience with renewable energy (Viardot 2013).

Recent research findings

Existing research focuses on current models for solar PV adoption and does not address the barriers posed for low-income households without the financial capacity or who are renters rooftop property access rights. As a first step towards the development of new consumer options to increase the accessibility of low-income households so that they may have greater control over the cost of their electricity bills, we conducted a small research project in the first half of 2018.

This project examined:

- the advantages and disadvantages of existing solar PV models for Australian home-owning and renting (public or private) low-income households;
- the issues which influence a low-income household's decision-making about the adoption of solar energy to meet its energy needs;
- the primary information sources which low-income households use to make a decision about switching to solar; and
- the legislative and regulatory barriers to the adoption of distributed energy solutions like solar PV.

Focus groups were held in the Fairfield Local Government Area (LGA) of Sydney, Australia's largest capital city, to understand the issues influencing a lower income household's decision-making about using solar energy to meet their energy needs.¹ Income and demographic data by LGA from the 2016 Census was mapped against the data on solar energy installations in each LGA. A review was conducted of the different types of offers from electricity companies, and small-scale projects provided by some local councils, commercial and not-for-profit organisations to encourage households to install a solar energy system. The legal and commercial issues—for different household types— arising from the different models were analysed.

The project's key findings were:

- Older lower income households consider that they are managing their electricity bills, and more so since their children are no longer living with them;
- There is a high level of understanding about the common marketing offer for household solar installation with high upfront costs for the dwelling owner and suitable rooftop space;
- Older lower income households generally consider that they will not live long enough for

- a 'return' on the initial high cost to install a solar energy system;
- There is concern about deciding which are the best solar products and installations, from whom to seek expert advice, and a lack of trust in marketing information;
 - Family, friends and neighbours are sources of advice although many households consider that government should help them manage the risk by providing clear information when complex technical decisions are needed about installing or using a solar energy system;
 - Older lower income households perceive little difference between the electricity companies and thus consider they have little control over prices paid and no need to switch companies;
 - Decisions about the ways to manage household energy use and responsibility for bill paying differ between household types;
 - LGAs with high proportions of lower income households have the highest capacity for solar due to the high number of dwellings with rooftop capacity although many are rental housing;
 - Internet access from home is much less in those LGAs with high proportions of lower income households;
 - The majority of offers for household solar installations are structured around the dwelling owner having the financial resources to pay upfront for the system and installation costs;
 - There is some provision of household solar energy through community and third-party ownership schemes although these involve a very small number of households;
 - Different household types (e.g., renter, with young children, multiple family, older) need different options to the current common upfront cost scheme to install a solar system which is met by the dwelling owner; and
 - Alternative schemes for household adoption of solar energy will need to address several issues such as: roofing suitability; responsibility for operation and maintenance; access to consumer data; buyout options; equipment warranty periods; property access issues; consumer protections; and control of the system.

These results suggest that: the accessibility to solar PV by low-income households needs to be reframed from being a problem to be solved by the individual household if energy justice is to apply to all—not some—households; a 'shotgun' approach to uniform incentives or business models will exacerbate not ameliorate energy injustice; policymakers should not ignore the role and influence of peers and social norms on energy consumption decisions by households and particularly older lower income households; different household types do not fit the existing business and economic models that assume

consumer and prosumer behaviour will change with price and incentives; local government could play a very significant role in improving the energy justice for low-income households; and, the motivations, barriers and success factors for solar PV adoption are highly influenced by the household's income level.

The project results also provide new insights into: the different forms of energy injustice that arise from existing solar PV business models and incentive schemes; older person household attitudes to solar energy which is highly relevant as Australia is experiencing a strong demographic shift to an aging population; and, the role of family, friends and neighbours as a trusted source of advice about adopting solar PV.

Future research

The option for renters to access solar energy has received least attention by policymakers, businesses or researchers and often is referred to as 'too hard a nut to crack'. This is primarily because of the range of parties involved (e.g., dwelling owner, real estate agent, housing authority) in addition to the consumer-electricity supplier relationship, and thus the complexity of issues to resolve. The current situation for Australian low-income households, the growth in renting households, and our research findings, demonstrate the need for a national research project that focuses upon low-income renter households.²

Future research could develop new consumer-focused options—for widespread application to private, public and community rental housing—that overcome barriers to low-income household solar energy use and are supported by electricity retailers, real estate agents, landlords, tenants' unions, public and community housing authorities, affordable housing developers and local councils. This would be assisted by delineation of the different stakeholder issues to be addressed if new consumer options (business models) for low-income households are to be feasible. Such issues may include, for example, lease duration, metering options, responsibility for operation and maintenance, access to consumer data, buyout options, equipment warranty periods, property access, and control of the system. Data could also be collected about the energy needs of low-income renters, their household practices, key energy decision-making issues, and willingness to use solar. Such data could be used to create 'energy profiles' for different low-income renter types and used to inform the design of a set of consumer options (by rental type and household type) to access solar energy which meet the consumer's needs and the legal, commercial and other needs of the multiple stakeholders involved in rental housing.

Solar energy provides a key means for greater household control over the cost of electricity bills. Yet low-income renter households will remain excluded from this step towards energy justice unless there is development and widespread application of new

consumer options that are not dependent on upfront capital costs and roof ownership. Future research is needed to advance energy justice for low-income renters.

Footnotes

¹ Across the 33 Sydney LGAs, Fairfield has the highest proportions of households with: an annual income of less than \$65,000, multiple families, 5 or more persons and no dwelling access to the internet. In 2016, Australian average weekly earnings were \$62,000 p.a. and the minimum wage was \$36,000 p.a.

² Low-income household characteristics vary across the Australian States (e.g., multiple family, separate dwelling, languages spoken, energy use mix), and there are different State government policy settings supporting solar. A national project can address the implications arising for these differences.

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