

# Something new under the sun

## Solar PV on South Australian rentals

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*Rental properties are less likely to have solar PV installations than owner-occupied properties, resulting in higher electricity bills and greenhouse gas emissions. Government programs that coordinate and change the incentives faced by landlords, renters, property managers and solar installers can help address this imbalance.*

Discussion paper

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# Summary

Rooftop photovoltaic (PV) solar panels would save many households money, yet Australia's residential buildings only use about 6 Gigawatts (GW) of their 43–61 GW potential.<sup>1</sup> The problem is particularly acute for renters; while 29% of owner-occupied dwellings have rooftop solar only 4% of rental properties do.<sup>2</sup> Across all zoning types, South Australia has 17 GW of rooftop solar potential, of which it uses 1 GW.<sup>3</sup>

One explanation for the low uptake of solar on rentals is the “split incentive problem”, which occurs when the person responsible for a decision or an expenditure is not the person who benefits from the decision or expenditure. Most obviously, the landlord pays for and manages the solar installation but the tenant benefits from lower electricity bills – but there are also split incentives between landlord/tenant and property manager, current tenant and future tenant, the resident of each apartment in a block, and landlord/tenant and retailer.

Solutions to low uptake of solar on rentals should not be limited to addressing the split incentive problem. The magnitude of the split incentive problem is contested, and it is not clear how responsive landlords are to financial incentives.

A review of existing schemes shows that they use a variety of approaches, with some common elements appearing across schemes:

- A formal process for landlords to pass some of the cost of an installation on to tenants
- A trusted broker that recommends a particular installer and PV brand, and may monitor the PV system after installation
- Other financial incentives for landlords, including rebates, interest-free loans or both.

From this study, the Australia Institute has written three recommendations as well as a series of design principles for the South Australian Government to consider.

The authors thank Dr Bjorn Sturmberg, Joel Dignam and the City of Adelaide for their help with this paper.

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<sup>1</sup> Roberts et al. (2018) *Solar trends report for Solar Citizens*, <http://apvi.org.au/solar-trends-report-for-solar-citizens/>; for a higher estimate based on residential zones, see UTS, Australian PV Institute, & UNSW (2019) *How much rooftop solar can be installed in Australia?*, [https://www.cefc.com.au/media/402125/isf-rooftop-solar-potential-report-final\\_.pdf](https://www.cefc.com.au/media/402125/isf-rooftop-solar-potential-report-final_.pdf)

<sup>2</sup> Tilbury (2018) *The final frontiers of rooftop solar: opportunities for energy entrepreneurs*, p. 7, <http://energylab.org.au/news>

<sup>3</sup> UTS et al. (2019) *How much rooftop solar can be installed in Australia?*, p. 15

## Recommendations

To overcome the split incentive problem and encourage a greater uptake of solar for rental properties, the South Australian Government should:

- Adopt a scheme like Solar Victoria that marries a rebate, an interest-free loan and a formal structure for passing a modest rent increase on to the tenant.
- Consider remunerating solar installers for each installation on a rental property, to reflect the added time cost for installations that involve a tenant as well as the property owner and/or a “finder’s fee” for property managers who secure an arrangement between landlord and tenant.<sup>4</sup>
- Legislate a right for tenants to have their requests for reasonable energy efficiency and solar PV upgrades/installations met, provided the tenant is prepared to pay the cost of the upgrades, pro-rated, via a modest increase in rent.

Separate from these concrete policy proposals, governments should also consider the following design principles when trying to resolve any energy efficiency/solar PV split incentive problem.

- Assume scepticism: Landlords and tenants are not necessarily convinced by the figures that show that they “should” be better off with energy efficiency/solar PV upgrades.
- Incentivise property managers: Even if landlord and tenant incentives align, property managers do not necessarily have an incentive to facilitate energy efficiency/solar PV upgrades.
- Set minimum standards: Minimum standards can serve as a floor for what renters expect, their universal application means that they are not necessarily passed on in the form of higher rent and they create a market and reliable stream of custom for installers.
- Consider energy efficiency alongside or ahead of solar PV: Energy efficiency may be more cost-effective than solar PV installations.
- Targeted role for government: Government intervention is best used to set incentives, ensure installation quality and build confidence in the process.<sup>5</sup>
- Set eligibility wide: Limiting a program’s availability, e.g. to low-income households, is a virtuous idea but it slows down a scheme by forcing eligibility to be checked for every applicant.
- Work with a few fixed suppliers: These trusted suppliers can be relied upon for implementation.
- Dedicated body responsible: When a scheme is managed as part of other responsibilities, it makes it hard to promote the scheme.

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<sup>4</sup> In correspondence with Bjorn Sturmberg, August 2020.

<sup>5</sup> In correspondence with Bjorn Sturmberg, August 2020.

- Monitoring is essential: Monitoring the solar savings realised, and alerting bad systems to installers and/or the government, is essential to make the model acceptable to landlords and tenants.<sup>6</sup>
- If it takes too long, participants drop off: A faster scheme is more effective than a perfectly designed one.

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<sup>6</sup> In correspondence with Bjorn Sturmberg, August 2020.

# Introduction

For many households, rooftop photovoltaic (PV) solar panels would pay for themselves in lower electricity bills within four to six years, a fraction of the typical warranty life of about 25 years.<sup>7</sup> Despite this, only a small portion of residential buildings with solar potential have solar panels installed: as of 2018, about 6 Gigawatts (GW) of capacity out of a total potential of 43–61 GW in Australia.<sup>8</sup>

One of the most significant gaps in rooftop solar uptake is among renters. As of 2018, 29% of owner-occupied dwellings had rooftop solar installations, compared to 4% of rental dwellings.<sup>9</sup> With 32% of Australian households renting (30% in South Australia),<sup>10</sup> this represents a major missed opportunity for cleaner energy, cheaper electricity bills and more distributed generation.

The “split incentive problem” may explain this disparity.<sup>11</sup> Renters benefit from solar installations with lower electricity bills, but the landlord pays for the installation. Unless the incentives of renters and landlords can be aligned, rooftop solar is not installed even though it would be a net money saver.

Split incentives can be overcome by the two parties negotiating. However, the low uptake of rooftop solar on rental dwellings demonstrates that landlords and tenants are mostly failing to coordinate, or that incentives are otherwise skewed. By identifying why landlords are failing to adopt rooftop solar, government can improve the uptake of rooftop solar and therefore lower costs for tenants, raise property values for landlords and reduce emissions.

This report breaks down the impediments to rooftop solar on rental properties, and then presents case studies of solutions to the problem that have been implemented in Australia.

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<sup>7</sup> Note that different parts of a solar system may have different warranty lengths. Frost (2019) *How long should a solar power system last?*, <https://www.domain.com.au/news/how-long-should-a-solar-power-system-last-801076/>; Potter (2018) *Solar panel systems payback times - Australian cities*, <https://www.choice.com.au/home-improvement/energy-saving/solar/articles/solar-panel-payback-times>

<sup>8</sup> Roberts et al. (2018) *Solar trends report for Solar Citizens*; for a higher estimate based on residential zones, see UTS et al. (2019) *How much rooftop solar can be installed in Australia?*

<sup>9</sup> Tilbury (2018) *The final frontiers of rooftop solar: opportunities for energy entrepreneurs*, p. 7

<sup>10</sup> ABS (2019) *4130.0 - Housing occupancy and costs, 2017-18*, <https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4130.02017-18>

<sup>11</sup> Sturmberg & Cumming (2018) *Raising the roof: Solar for renters and apartment dwellers - Renew Magazine*, <https://renew.org.au/renew-magazine/solar-batteries/solar-for-renters-and-apartment-dwellers/>

# Solar opportunities in South Australia

A study conducted by the University of Technology Sydney (UTS), the Australian PV Institute and the University of New South Wales (UNSW) for the Clean Energy Finance Corporation (CEFC) in 2019 calculated that South Australia has 17 GW of potential rooftop PV capacity, of which it uses only 1 GW.<sup>12</sup> Across Australia, over half of the rooftop PV capacity is in residential zones.<sup>13</sup>

The study finds that there is “high potential for rooftop solar” around Adelaide, and medium-scale potential further north and inland. Local government authorities (LGAs) with a GW or more of potential rooftop PV are Onkaparinga, Port Adelaide Enfield, Cambelltown, Salisbury and Playford.<sup>14</sup>

**Table 1: LGA PV capacity**

LGA	PV capacity (MW)	Annual energy output (GWh)
<b>Onkaparinga</b>	1,310	1,838
<b>Salisbury</b>	1,151	1,600
<b>Port Adelaide Enfield</b>	1,147	1,588
<b>Playford</b>	1,085	1,511
<b>Charles Sturt</b>	920	1,286
<b>Tea Tree Gully</b>	674	929
<b>Marion</b>	585	827
<b>Mitcham</b>	493	690
<b>West Torrens</b>	486	682
<b>Adelaide Hills</b>	443	609

Source: UTS, Australian PV Institute, & UNSW (2019) *How much rooftop solar can be installed in Australia?*, pp. 23–24, [https://www.cefc.com.au/media/402125/isf-rooftop-solar-potential-report-final\\_.pdf](https://www.cefc.com.au/media/402125/isf-rooftop-solar-potential-report-final_.pdf)

<sup>12</sup> UTS et al. (2019) *How much rooftop solar can be installed in Australia?*, p. 15

<sup>13</sup> 96.0 GW of 179.4 GW. Note that not all residences are in residential zones, and not all buildings in residential zones are residences. UTS et al. (2019) *How much rooftop solar can be installed in Australia?*, p. 14

<sup>14</sup> UTS et al. (2019) *How much rooftop solar can be installed in Australia?*, pp. 23–24

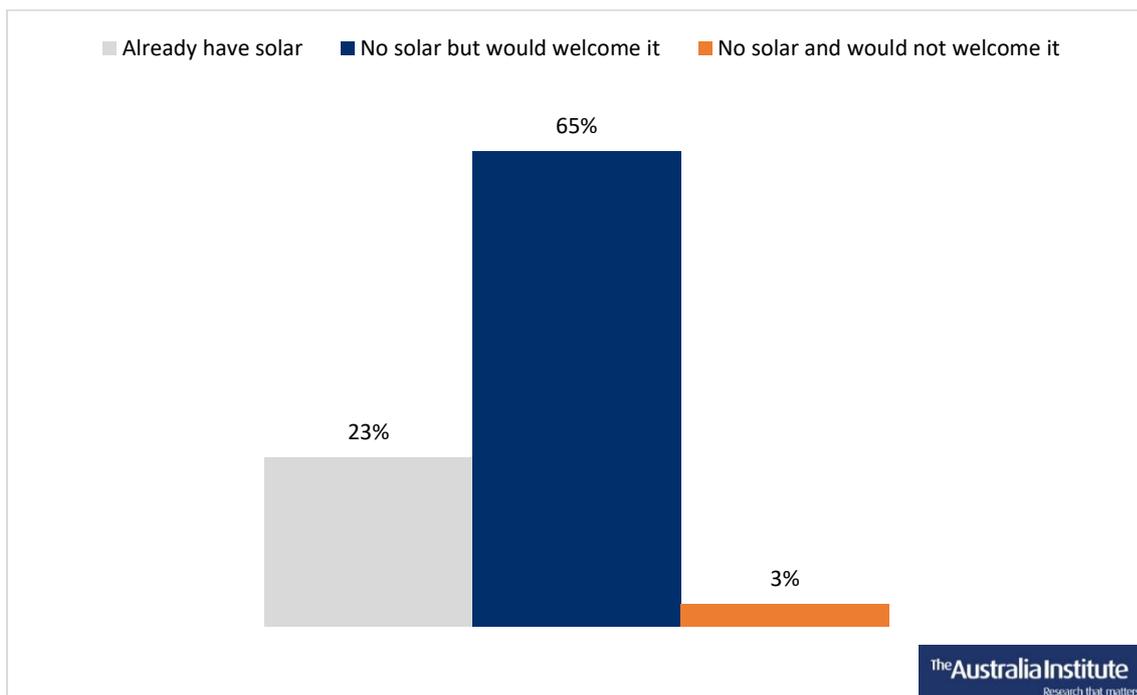
# Public opinion: renters and landlords

The Australia Institute surveyed a sample of 510 South Australians about their living situation, whether they have solar installed on their property and whether they would contribute to the cost of installing a solar system.

Results show that the majority of rental properties do not have solar systems installed, despite a strong desire from renters for solar to be installed on their homes.

- Two in three renters (65%) do not have solar on their homes but would welcome their landlord installing it.
  - One in four renters (23%) already have solar on their homes.<sup>15</sup>
  - Just 3% of renters do not have solar on their homes and would not welcome their landlord installing it.

**Figure 1: Renters and solar in South Australia**

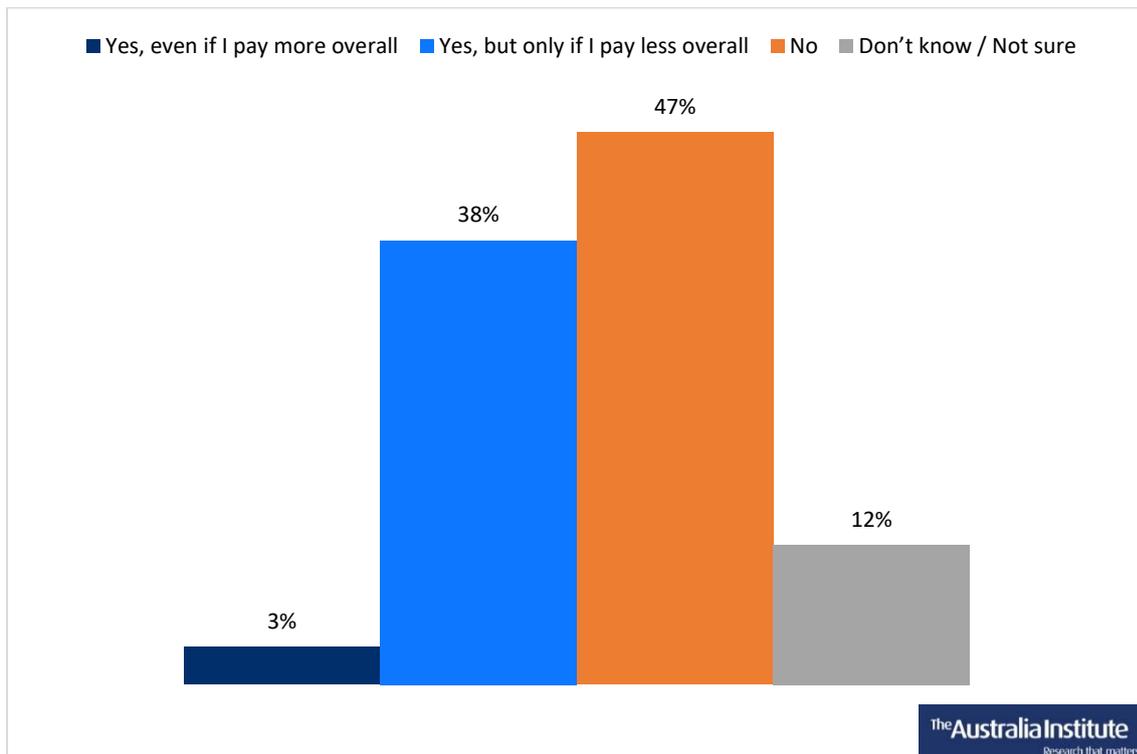


<sup>15</sup> It is worth noting that 23% of renters with solar is considerably higher than the 4% of rental properties with solar reported in Tilbury in 2018. There will have been an increase in solar installations since 2018; it is also possible that respondents with solar hot water installations counted those in their response. For the 4% figure, see Tilbury (2018) *The final frontiers of rooftop solar: opportunities for energy entrepreneurs*, p. 7

Renters were then asked if they would be willing to contribute to the cost of installing a solar system on their rented homes.

- One in two renters (47%) were not willing to contribute to the cost of installing a solar system on their home.
  - Two in five (38%) were willing to contribute to the cost, but only if it reduced their energy bills by at least as much as they contributed to the solar system.
  - Only 3% of renters were willing to contribute to the cost even if it meant they were paying more overall.

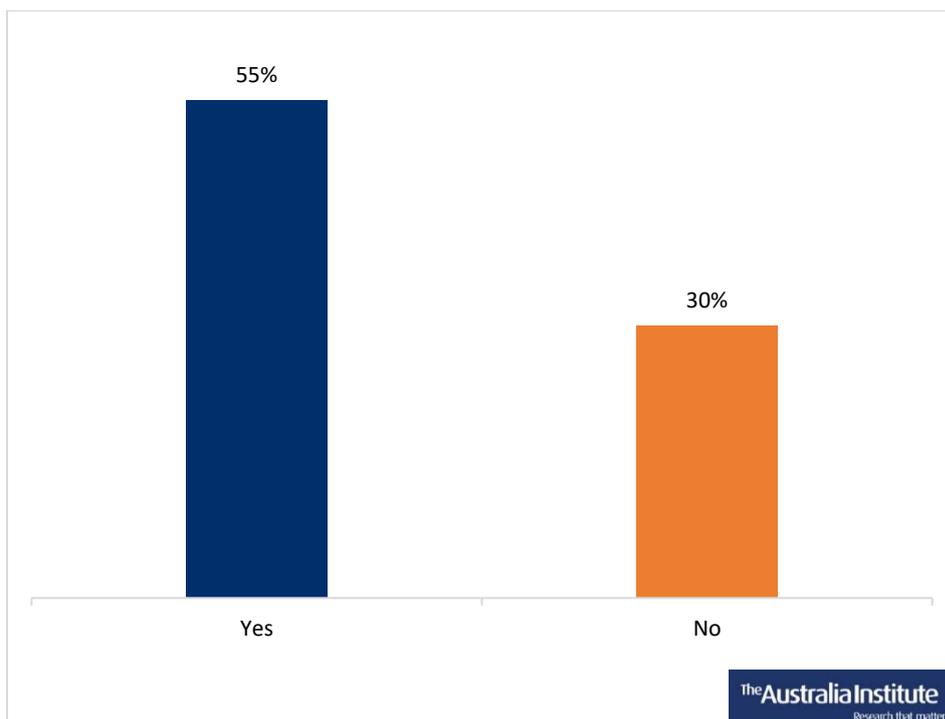
**Figure 2: Renters contributing to the cost of installing solar**



Respondents who own investment properties without solar panels were asked whether they would install solar panels in their property if the cost of installing that system were shared between themselves and their tenants.

- A majority of residential property investors (55%) would install solar on their investment properties if the costs were shared.
  - Three in ten investors (30%) were not willing to install solar when the costs were shared.

**Figure 3: Investors willing to install solar, if costs shared with tenants**



These results show there is significant potential to overcome the split incentive problem, with a willingness from some tenants (41%) and landlords (55%) to co-invest in the installation of a solar system.

In the vast majority of cases where a renter is willing to contribute to the cost of installing a solar system on their home, a demonstrable decrease in electricity bills greater than the amount they have contributed to the installation is required.

# Split incentive problems

A split incentive problem exists when a transaction is of net benefit, but the benefit goes to one person and the cost to another. Landlord–tenant relationships frequently involve split incentives, for example with energy efficiency, home improvements and quality of furnishings.

The classic rooftop solar split incentive is the *landlord–tenant split incentive* already described in the introduction. The landlord must approve the rooftop solar system, pay for it, and take responsibility for its upkeep. The tenants consume the electricity generated for free and save money on their electricity bill for any surplus sold back into the grid.

There are at least four other types of split incentives that also affect rooftop solar uptake.

In multi-tenant, multi-owner buildings like most apartment blocks, the *multi-tenant, multi-owner split incentive* also applies. Owners, including owner-occupants, and renters have varied incentives based on their personal situation and the properties of their particular apartment.<sup>16</sup> The costs and challenges of coordination are also greater the more people there are to coordinate.

Tenants also face *temporal split incentives* because they are not guaranteed to be living in their current residence for very long. They will be reluctant to pay a large amount upfront for rooftop solar because their cost may be for a future tenant's benefit.<sup>17</sup>

There is a *split incentive between utility companies and their customers*. Retailers may be expected to promote and/or implement rooftop solar programs, but by doing so they reduce demand for their product.<sup>18</sup>

Finally, landlords often contract the managing of a property to a real estate agent. A property manager's incentives may not align with either the landlord's or the tenant's, even if the landlord and tenant's incentives align.

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<sup>16</sup> Economidou & Bertoldi (2015) *Practices to overcome split incentives in the EU building stock*, pp. 1344–1345, [https://www.eceee.org/library/conference\\_proceedings/eceee\\_Summer\\_Studies/2015/6-policies-and-programmes-towards-a-zero-energy-building-stock/practices-to-overcome-split-incentives-in-the-eu-building-stock/](https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2015/6-policies-and-programmes-towards-a-zero-energy-building-stock/practices-to-overcome-split-incentives-in-the-eu-building-stock/)

<sup>17</sup> Bird & Hernández (2012) *Policy options for the split incentive: Increasing energy efficiency for low-income renters*, p. 5, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4819331/>; Economidou & Bertoldi (2015) *Practices to overcome split incentives in the EU building stock*, pp. 1344–1345

<sup>18</sup> Identified for energy efficiency, but the same split incentive could apply to rooftop solar depending on implementation. Bird & Hernández (2012) *Policy options for the split incentive: Increasing energy efficiency for low-income renters*, p. 5

**Table 2: Benefits and risks/costs of rooftop solar, stakeholders**

	Benefits	Risks/Costs
<b>Landlords</b>	Improves house value House more attractive to renters/Renter satisfaction Helps the environment	Installation Maintenance Transaction costs – engaging with tenants Tenants may leave before costs repaid Opportunity cost – best use of time / best form of property improvement?
<b>Tenants</b>	Lower electricity bills Helps the environment	Benefits could be less than advertised Transaction costs – engaging with landlords May move homes before benefits realised Opportunity cost – best use of time / best form of property improvement? Landlord may react poorly to suggestion
<b>Property manager</b>	Landlord satisfaction Tenant satisfaction	Transaction costs – engaging with landlords and tenants Landlord may react poorly to suggestion
<b>Energy utility</b>	Customer satisfaction May be paid for service	Loss of income from electricity bills Network costs

## Trust, knowledge and time<sup>19</sup>

Academic and founder of SunTenants Bjorn Sturmborg identifies three major challenges for solar PV on rentals:

- **Trust:** There is limited trust and goodwill between landlords, tenants and property managers.
- **Knowledge gap:** Solar energy is not well understood, and unless a system is monitored it is very difficult to determine how much value it has actually created. It also cannot be observed working, unlike other big energy purchases like heating or cooling. The energy savings in any given quarter are modest, and not readily apparent from the electricity bill.
- **Time:** Solar installations are already a low-margin business, and installations on rentals inevitably require more discussion and are more complex than installations on owner-occupied properties. Property management is also low-margin, and the business model depends on property managers managing a large number of properties.

Between these three challenges, no single party to the process – installer, landlord, tenant and property managers – has an incentive to champion the installation of solar PV on any given property.

<sup>19</sup> In correspondence with Bjorn Sturmborg, August 2020.

# Alternative problems

This paper identifies the split incentive problem as a potential barrier to the uptake of rooftop solar on rental properties, particularly the mismatched financial incentives between landlord and tenant. Given this, it is worth considering how significant the split incentive problem may be in Australia and how responsive landlords are to financial incentives.

## Will landlords respond to financial incentives?

There is some evidence that energy efficiency has become cheap enough that there is already a financial incentive for landlords to install energy efficiency measures on their property regardless of tenant contribution. That is because energy efficiency measures may improve the value of a property by more than they cost to install.

Obviously, a landlord is not interested in the hypothetical value of their property, but this dynamic means that they may want to install energy efficiency measures in anticipation of selling the property, retaining their current tenant longer than they otherwise would or raising the rent next time the property becomes vacant, even if they recover none of the cost from the current tenant.

Academics Franz Fuerst and Georgia Warren-Myers looked at the effect of EER star ratings (Energy Efficiency Ratings) and other energy efficiency installations like solar PV and insulation on the price houses sold for, the rent paid and the time on market for properties in the Australian Capital Territory. They found that “the price paid for energy efficiency rises as the star rating increase” when it comes to house sales. The study did not find a significant premium for solar PV and thermal systems, although properties with solar PV systems sell faster. Energy efficient rental properties attract higher premiums on rent, although the relationship is not linear (the most efficient properties do not necessarily attract the highest premiums).<sup>20</sup>

Academics Chunbo Ma, Maksym Polyakov and Ram Pandit find a 2.3–3.2% per cent property price premium associated with PV systems installed on homes in Perth, although it is worth noting that some properties would have benefited from Western Australia’s generous feed-in tariff, which closed to new entrants after about a year.<sup>21</sup>

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<sup>20</sup> Fuerst & Warren-Myers (2018) *Does voluntary disclosure create a green lemon problem? Energy-efficiency ratings and house prices*, <https://www.repository.cam.ac.uk/handle/1810/280417>

<sup>21</sup> Ma, Polyakov, & Pandit (2016) *Capitalisation of residential solar photovoltaic systems in Western Australia*, <https://onlinelibrary.wiley.com/doi/abs/10.1111/1467-8489.12126>

Non-academic studies have found a premium for solar PV installations. US real estate website Zillow finds that in the United States homes with solar panels sell for 4.1% more.<sup>22</sup> Origin Energy reports that 57% of homeowners say that they would pay up to \$10,000 more for a home equipped with solar and 55% of renters say that they would pay up to \$10 more per week rent for a property with solar.<sup>23</sup>

These mixed but generally positive results for energy efficiency suggest that landlords would benefit financially from installing energy efficiency measures, and potentially from solar PV itself. That they usually do not suggests that some landlords are not responding to financial incentives. A program that narrowly tries to overcome the split incentive problem is liable to fail if it ignores the fact that many landlords are not particularly responsive to financial incentives.

## Split incentive problems in energy efficiency

Some of the academic literature finds that the split incentive problem is not observed in Australia with regards to energy efficiency and energy consumption. These studies were commissioned in 2010 and 2012 by the Australian Housing and Urban Research Institute (AHURI). The studies used energy costs as a proxy for energy consumption and efficiency. They found that owner-occupiers spent more on energy than renters, even when accounting for variables like household income, household size and dwelling type.<sup>24</sup>

The report authors are candid that energy efficiency is difficult to observe, for several reasons: the lack of a satisfactory measure of per unit energy prices that households must pay, the unobserved choice of space and water heating and cooling systems and the different ages of properties owner-occupied versus rented.<sup>25</sup>

A 2019 study by Better Renting, a community organisation focused on renters' rights, took a different approach to measuring energy efficiency. Their study looked at rental and sales listings in the Australian Capital Territory, finding that 43% of rental properties had the minimum EER of 0 compared to 5% of properties listed for sale.<sup>26</sup>

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<sup>22</sup> Mikhitarian (2019) *Homes with solar panels sell for 4.1% more*, <https://www.zillow.com/research/solar-panels-house-sell-more-23798/>

<sup>23</sup> Thornton (2020) *Does solar boost property value?*, <https://www.originenergy.com.au/blog/does-solar-boost-property-value/>

<sup>24</sup> Gabriel, Watson, Ong, Wood, & Wulff (2010) *The environmental sustainability of Australia's private rental housing stock*, p. 3, <https://www.ahuri.edu.au/research/final-reports/159>; Wood, Ong, & McMurray (2012) *Housing tenure, energy consumption and the split-incentive issue in Australia*, [https://espace.curtin.edu.au/bitstream/handle/20.500.11937/36317/189586\\_189586.pdf](https://espace.curtin.edu.au/bitstream/handle/20.500.11937/36317/189586_189586.pdf)

<sup>25</sup> Gabriel et al. (2010) *The environmental sustainability of Australia's private rental housing stock*, pp. 29–31; Wood et al. (2012) *Housing tenure, energy consumption and the split-incentive issue in Australia*, pp. 11–12

<sup>26</sup> Better Renting (2019) *Baby it's Cold Inside: Energy Efficiency Ratings in the ACT*, [https://www.betterrenting.org.au/baby\\_its\\_cold\\_inside\\_energy\\_efficiency\\_act](https://www.betterrenting.org.au/baby_its_cold_inside_energy_efficiency_act)

The AHURI studies did not look specifically at solar PV installations. As described above, there is an observed disparity between solar installations on rental properties and on owner-occupied dwellings, with the split incentive problem a logical explanation for the disparity. In fact, the 2010 AHURI study found that landlords did raise the split incentive issue, “particularly in relation to large cost items such as solar panels and hot water systems”.<sup>27</sup>

It is also worth noting the age of the studies, with the older AHURI study ten years old at the time of writing this report. In that time, the price of residential solar has fallen by four-fifths and Australian electricity prices have risen by about two-thirds.<sup>28</sup> These changing costs are likely to affect the incentives for landlords, owner-occupiers and renters.

Nonetheless, these studies make an interesting case that Australia’s generous tax incentives for real estate speculation and lack of rent regulation contribute to more investment in rental stock than in other countries where a split incentive problem in energy efficiency has been found.<sup>29</sup> A broad strategy to address the underprovision of solar PV on rentals is likely to be more successful than one limited to addressing split incentive problems.

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<sup>27</sup> Gabriel et al. (2010) *The environmental sustainability of Australia’s private rental housing stock*, pp. 91–92

<sup>28</sup> Note that ABS comparison is 2010–2020, while IRENA comparison is 2010–2019 as 2020 results are not yet available: ABS (2020) *6401.0 - Consumer Price Index, Australia, June 2020*, <https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/6401.0Main+Features1June%202020?OpenDocument> ; IRENA (2020) *Renewable power generation costs in 2019*, p. 68, <https://www.irena.org/publications/2020/Jun/Renewable-Power-Costs-in-2019>

<sup>29</sup> Gabriel et al. (2010) *The environmental sustainability of Australia’s private rental housing stock*, pp. 29–31

# How to create social change

One frame of looking at energy efficiency is the three approaches to social change: “Tell Me” (education), “Make Me” (legal requirements) and “Help Me” (assistance).<sup>30</sup>

Some landlords may have misapprehensions about solar PV pricing and payoff that, if corrected by more information and education, would lead to them installing solar PV on their rental properties on their own dime. The AHURI report into private rental housing describes these landlords as such:

These investors are the hardest to reach in terms of the delivery of information. When consulted, they emphasised that they were receptive to information campaigns, including receiving brochures about minor measures they could undertake. These could potentially be delivered with council rates notices.<sup>31</sup>

Other landlords are recalcitrant, and will require legal changes that might, for example, require disclosures of energy efficiency and energy costs in rental listings, empower tenants to request reasonable energy efficiency improvements or set minimum standards for rental properties. Some landlords will be eager to participate, but need help to install solar PV, either with coordination or funding.

## Incentives to coordinate

Ideally, landlords and tenants could resolve the split incentive problem by coordinating between themselves. Some reasons why they do not are:

- Tenants try to keep their interactions with landlords to a minimum
- Landlords are reluctant to bother their tenants
- Landlords do not believe that solar installations increase the value of their property
- Tenants are sceptical or outright distrustful that they will receive the full benefits reported
- Landlords and/or tenants are not aware of the savings available
- Landlords or tenants have higher priorities than saving money/higher rent
- Landlords are ignorant of the energy costs of the properties they own.

Government and charity programs, and commercial enterprises, can overcome these coordination problems, information asymmetries and transaction costs with information

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<sup>30</sup> GEER Australia (2017) *Driving change*, p. 25, <http://energyconsumersaustralia.com.au/publications/driving-change-caused-low-income-consumers-change-behaviour>

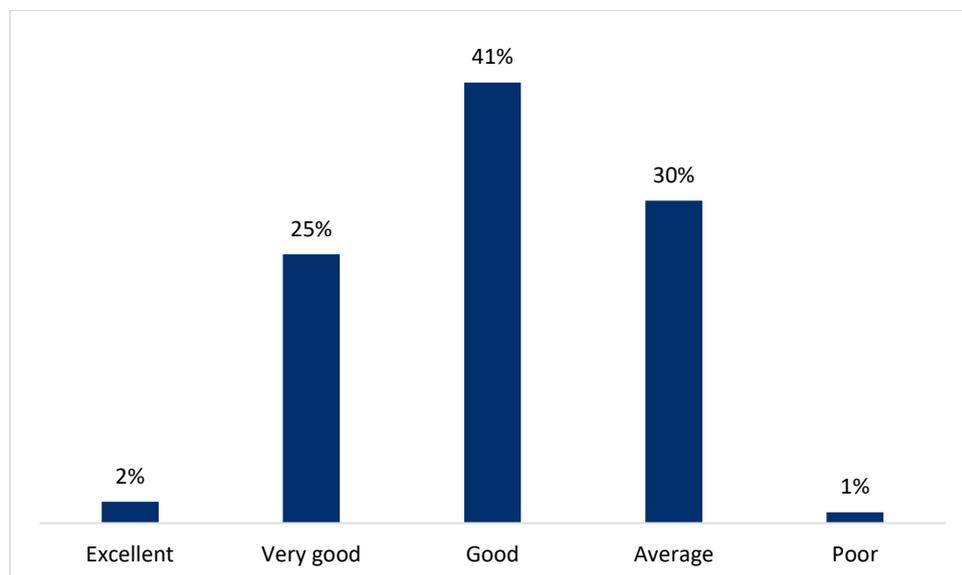
<sup>31</sup> Gabriel et al. (2010) *The environmental sustainability of Australia's private rental housing stock*, p. 5

campaigns and centralised administration of the projects, by absorbing the risk of defective or unsatisfactory schemes and by acting as an intermediary between landlord and tenant.

Improvements in renters' rights can also encourage landlords to cooperate. Requiring landlords to agree to reasonable solar PV and energy efficiency requests from tenants (for example, where the tenant contributes to the cost) would encourage coordination between tenant and landlord to overcome the split incentive problem.

Education could also help. Landlords are ignorant about the energy efficiency of their properties. A UK survey of landlords found that two in three (68%) thought that their properties were above average, and only one respondent thought his or her property or properties were below average. See Figure 4 for details and source.

**Figure 4: Energy efficiency of your tenanted properties**



Source: Hope & Booth (2014) *Attitudes and behaviours of private sector landlords towards the energy efficiency of tenanted homes*, pp. 17–18,  
[https://www.researchgate.net/publication/267048043\\_Attitudes\\_and\\_behaviours\\_of\\_private\\_sector\\_landlords\\_towards\\_the\\_energy\\_efficiency\\_of\\_tenanted\\_homes](https://www.researchgate.net/publication/267048043_Attitudes_and_behaviours_of_private_sector_landlords_towards_the_energy_efficiency_of_tenanted_homes)

## Incentives to act unilaterally

In rental properties where the landlord pays for the tenant's electricity use, there is no landlord–tenant split incentive to install rooftop solar. A landlord who buys rooftop solar pays less in electricity bills.

Similarly, as soon as a landlord's incentive to install solar exceeds its cost, there is no longer a split incentive problem. The tenants may also benefit (free ride) but the landlord no longer needs to coordinate with them. The landlord will be prepared to install and pay for the system, even if the tenants are not prepared to contribute to the cost.

In these cases, there is no reason why the landlord will not also increase the rent if they are able to. For example, giving a landlord a free solar PV array will solve the split incentive problem, but they may still raise the rent to reflect the higher value of the property. The incentive has led to a windfall for the (typically better off) landlord rather than the (typically worse off) renter.

## Requirements to act

New Zealand requires rental properties to have adequate ceiling and under-floor insulation and an approved form of heating in every living space. This was accompanied by a program to install insulation and heating in eligible buildings. The program cost NZ \$340 million and had a net benefit of NZ \$951 million.<sup>32</sup>

In the United Kingdom, landlords are legally required to ensure their properties meet minimum energy efficiency requirements.<sup>33</sup>

In November 2020, the Victorian Government announced that it would introduce minimum standards for insulation, draught sealing and hot water systems in rental properties.<sup>34</sup>

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<sup>32</sup> AHURI (2018) *When it comes to rental property standards, what can Australia learn from New Zealand?*, <https://www.ahuri.edu.au/research/ahuri-briefs/when-it-comes-to-rental-property-standards-what-can-australia-learn-from-new-zealand>

<sup>33</sup> Hope & Booth (2014) *Attitudes and behaviours of private sector landlords towards the energy efficiency of tenanted homes*, [https://www.researchgate.net/publication/267048043\\_Attitudes\\_and\\_behaviours\\_of\\_private\\_sector\\_landlords\\_towards\\_the\\_energy\\_efficiency\\_of\\_tenanted\\_homes](https://www.researchgate.net/publication/267048043_Attitudes_and_behaviours_of_private_sector_landlords_towards_the_energy_efficiency_of_tenanted_homes)

<sup>34</sup> Andrews (2020) *Too many rentals are like ovens in summer and fridges in winter. And too many tenants are shelling out a fortune on bills because their heater is older than they are. That's why we're bringing in minimum standards for insulation, draught sealing and hot water systems.* <https://t.co/VFSFhQj9Bq>, <https://twitter.com/DanielAndrewsMP/status/1328474746741161984>

# Australian case studies

What follows are case studies of Australian policies and business enterprises to encourage solar PV or energy efficiency uptake (or both). Some specifically target solar PV on rentals while others are general solar PV schemes that nonetheless address the split incentive problem.

## GOVERNMENT PROGRAMS

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### Building Upgrade Finance/Environmental Upgrade Agreements (NSW, Victoria, South Australia)

Building Upgrade Finance/Environmental Upgrade Agreements (BUF/EUA) are an initiative of the NSW, Victorian and South Australian state governments that allow building upgrades to be financed with loans with competitive interest rates repaid through council rates, including a contribution from tenants in some circumstances.

The loans are not for the most part available for residential dwellings.<sup>35</sup> The exception is Victoria, which in April 2020 legislated to allow for the program to be used by homeowners<sup>36</sup> (though to the authors' knowledge, no homeowner EUAs are yet in place).

BUF/EUAs address the landlord–tenant split incentive because, as a “statutory charge”, the cost of repayments can be passed on to tenants. In Victoria, tenants must consent; in NSW and South Australia, charges can be passed through without consent provided the tenant is no worse off.<sup>37</sup>

BUF/EUAs address the temporal split incentive because they are attached to the property, and remain with it when sold.<sup>38</sup> Councils collect the loan repayments and pass them on to the lender, but are not liable in the case of a default.<sup>39</sup> However, it is worth noting that the existing BUF process can be cumbersome and complicated for councils; billing and IT

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<sup>35</sup> Building Upgrade Finance (n.d.) *Overview*, <https://buildingupgradefinance.net.au/about/>

<sup>36</sup> Victorian Government (2020) *Environmental Upgrade Finance*, <https://www.energy.vic.gov.au/energy-efficiency/environmental-upgrade-agreements>

<sup>37</sup> Blundell (n.d.) *Environmental Upgrade Agreements: Your guide to Australia's finance innovation for building retrofits*, p. 26, [https://sustainableaustraliafund.com.au/wp-content/uploads/2014/03/TFE\\_eBOOK\\_FINAL1.pdf](https://sustainableaustraliafund.com.au/wp-content/uploads/2014/03/TFE_eBOOK_FINAL1.pdf); Building Upgrade Finance (n.d.) *South Australia*, <https://buildingupgradefinance.net.au/south-australia/>

<sup>38</sup> Victorian Government (2020) *Environmental Upgrade Finance*; note in South Australia the BUF/EUA only remains with the property if the new owner agrees to take on the loan.

<sup>39</sup> Victorian Government (2020) *Environmental Upgrade Finance*

improvements might be needed before councils would sign up for the small-value, high-volume transactions that a residential BUF scheme would involve.

With funding support from the SA Government until August 2022, the City of Adelaide employs a Building Upgrade Finance central facilitator to assist the implementation and operation of Building Upgrade Finance across South Australia.<sup>40</sup>

## Solar Victoria/Solar Homes (Victoria)

The Solar Victoria state government program (also known as Solar Homes) provides eligible owner-occupiers and landlords with a rebate (up to \$1,850) and interest-free loan (also up to \$1,850) to install solar panels.<sup>41</sup> The program will run for 10 years from 2018, with a target of installing solar on 650,000 homes.<sup>42</sup>

Landlords can negotiate for their tenants to pay up to half of the monthly repayments of the interest-free loan (maximum \$19.27 per month), if their tenants consent. The renter payments last for the four-year life of the loan or until the renter vacates the property.<sup>43</sup>

As of September 2020, Solar Victoria reports 110,000 Solar Homes applications approved, with 95,000 solar panel systems, 900 solar hot water systems and 1,000 solar battery systems installed since August 2018, with \$198 million paid in rebates so far.<sup>44</sup> It is not known what portion of these installations were on rental properties.

The solar battery rebate is currently over-subscribed; new slots are made available from time to time but they are very quickly filled.<sup>45</sup> Unlike the solar panel rebate, the solar battery rebate is only available to owner-occupiers.<sup>46</sup>

In the November 2020 Victorian Budget, the State Government announced an additional 42,000 rebates for households to install solar panels over the next two years and 15,000 rebates for small businesses. It also expanded eligibility for the battery rebate to all of

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<sup>40</sup> City of Adelaide (2020) *Building upgrade finance*, <https://www.cityofadelaide.com.au/about-council/grants-sponsorship-incentives/building-upgrade-finance/>

<sup>41</sup> Solar Victoria (n.d.) *Solar rebates for rental properties*, <http://www.solar.vic.gov.au/solar-rental-properties>

<sup>42</sup> Andrews & D'Ambrosio (2020) *Cutting power bills with solar panels for 650,000 homes*, <http://www.solar.vic.gov.au/cutting-power-bills-solar-panels-650000-homes>

<sup>43</sup> Solar Victoria (n.d.) *Information for landlords*, <http://www.solar.vic.gov.au/information-landlords>

<sup>44</sup> Solar Victoria (2020) *Solar Homes program reporting (September)*, <http://www.solar.vic.gov.au/solar-homes-program-reporting>

<sup>45</sup> See for example Solar Victoria (2020) *Facebook post, 4/11/2020*, <https://www.facebook.com/SolarVictoriaAU/photos/a.358782121548703/819247365502174>

<sup>46</sup> Solar Victoria (2020) *Solar battery rebate*, <http://www.solar.vic.gov.au/solar-battery-rebate>

Victoria (it was previously limited to suburbs that were identified as high growth and with high PV penetration).<sup>47</sup>

## Solar Savers (Victoria)<sup>48</sup>

Solar Savers is an initiative of eight Victorian local councils that complements the Solar Victoria program.

Solar Savers is a bulk buying scheme, where purchasers benefit from the work done by the local councils in accrediting a particular installer (eko energy), auditing 5% of properties, running a competitive tender for the provider and confirming that solar PV makes economic sense for each participant.

Pensioners are potentially eligible for loans with competitive interest rates from Bank Australia.

The previous version of the scheme was a rates-based solar repayment scheme for pensioners.<sup>49</sup>

## Solar Saver Rates and Bulk Buy (Darebin City Council)<sup>50</sup>

Darebin City Council (in Victoria) offers property owners two options for installing up to 10 kW of solar PV on their properties:

- Solar Saver Rates “stream”, in which the council pays the costs of installation and the property owner repays over the course of 10 years (interest free), and

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<sup>47</sup> Solar Victoria (2020) *Solar battery rebate*; Vorrath (2020) *Victoria fast-tracks rooftop solar and battery rollout, part of \$800m energy savings package*, <https://reneweconomy.com.au/victoria-fast-tracks-rooftop-solar-and-battery-rollout-part-of-800m-energy-savings-package-87407/>

<sup>48</sup> Bank Australia (2019) *The Victorian initiative making solar power accessible*, <http://www.bankaustralia.com.au/>; Eastern Alliance for Greenhouse Action and Northern Alliance for Greenhouse Action (n.d.) *Solar Savers*, <https://solarsavers.org.au/>

<sup>49</sup> Solar Savers (2019) *Solar Savers Victoria (archived)*, <https://web.archive.org/web/20190120033324/https://solarsavers.org.au/>

<sup>50</sup> City of Darebin (2020) *Darebin Solar Saver (Rates stream) Frequently Asked Questions (FAQ)*, <http://www.darebin.vic.gov.au/-/media/cityofdarebin/Files/Darebin-Living/CaringfortheEnvironment/EnergyandClimate/SolarPrograms/FAQ-SolarSaverRatesstream-3Aug2020.ashx?la=en>; (2020) *Darebin Solar Saver (Bulk Buy stream) Frequently Asked Questions (FAQ)*, <http://www.darebin.vic.gov.au/-/media/cityofdarebin/Files/Darebin-Living/CaringfortheEnvironment/EnergyandClimate/SolarPrograms/FAQ-SolarSaverBulkBuystream-3Aug2020.ashx?la=en>; (n.d.) *Energy and climate*, <http://www.darebin.vic.gov.au/en/Darebin-Living/Caring-for-the-environment/EnergyClimate>; Energy Matters (n.d.) *Darebin Council leads the way with Solar Saver scheme*, <https://www.energymatters.com.auhttps://www.energymatters.com.au/darebin-council-solar-saver-scheme/>

- Solar Saver Bulk Buy “stream”, in which the property owner pays upfront (or arranges their own finance).

So far, about 1,400 households have participated in the scheme. The plan is to double solar output in the local government area from 18 MW to 36 MW, with 4,000 households participating. The expected cost is \$20 million over four years.

The Rates stream has at times been open to all, but it is currently limited to low-income households and the 2020 program is closed to new applicants.

The advantage of Bulk Buy over the property owner making their own arrangements is that the council has negotiated with a chosen provider (currently EnviroGroup) a particular price and quality assurance for the solar PV which may be better than what the property owner could get on their own. The council is seen as an honest broker, unlike energy retailers or solar contractors. The council estimates that the saving is 10–15%.<sup>51</sup>

The different schemes have certain other financial details, for example Rates is GST-free (because the council does not pay GST) and Bulk Buy may have a shorter wait time and can include a battery installation or other variations. The Rates stream wait time is between three and nine months after receiving a quote; longer after the first expression of interest. The Solar Victoria rebate is available under Rates and Bulk Buy; the Solar Victoria loan may be available under Bulk Buy.

A past round focused on housing cooperatives, which are self-funded and rent to those with low incomes.<sup>52</sup>

The program is open to owner-occupiers and landlords provided that the tenants consent. Victorian law limits the extent and frequency of rent increases.

## Solar for Rentals Trial (Queensland)

The Queensland Government is offering 1,000 rebates of up to \$3,500 for landlords to install solar PV on their rental properties. The systems come with a monitor.<sup>53</sup>

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<sup>51</sup> Energy Matters (n.d.) *Darebin Council leads the way with Solar Saver scheme*

<sup>52</sup> Slezak (2017) *Renewables roadshow: how the “nonna effect” got Darebin’s pensioners signing up to solar*, <https://www.theguardian.com/environment/2017/mar/22/renewables-roadshow-how-the-nonna-effect-changed-darebins-approach-to-solar>

<sup>53</sup> Queensland Government (n.d.) *About the trial | Solar for rentals trial*, <https://www.qld.gov.au/community/cost-of-living-support/concessions/energy-concessions/solar-for-rentals-trial/about-the-trial>

The program's website includes a calculator for tenants to calculate whether they are likely to be ahead for any given rent increase following a solar PV system installation. There is also a calculator for landlords.<sup>54</sup>

## Solar Savers Adelaide (City of Adelaide)<sup>55</sup>

Solar Savers Adelaide was a scheme from the City of Adelaide to install solar PV systems on owner-occupied and rental dwellings. The council paid the up-front cost of the system and installation, and recovered costs through an increase in quarterly rates (a "separate rates" mechanism). A modest interest rate was also charged over the 10-year duration of the finance.

With 279 expressions of interest, only 58 properties were eligible as participation was limited to rental properties charging market rates and to low-income owner-occupiers. Ultimately, 40 properties were both eligible and prepared to take part (15 owner-occupied and 25 rental).

A single solar installation company, Cool or Cosy, was chosen for the installations. Cool or Cosy owns Tindo Solar, the SA-based manufacturer of the panels installed by the scheme. Altogether, 86 kW of solar PV was installed.

Correspondence with representatives from City of Adelaide results in these observations:

- The scheme was successful.
- The long delay between expressions of interest and installation (almost two years) meant that many dropped out of the scheme before installation.
- Landlords did not necessarily perceive that the solar PV systems made their properties more attractive.
- The more restricted the scheme (e.g. with eligibility limited to lower-income households), the more difficult it is to administer.
- Projects were more successful if they worked directly with the landlord, not through a property manager.

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<sup>54</sup> Queensland Government (2019) *Solar for rentals calculator*, <https://www.dnrme.qld.gov.au/qld/community/cost-of-living-support/concessions/energy-concessions/solar-for-rentals-calculator>

<sup>55</sup> City of Adelaide (2017) *Solar Savers Adelaide*, [https://yoursay.cityofadelaide.com.au/solarsavers#:~:text=3%20years%20ago-,Solar%20Savers%20Adelaide%20is%20a%20Program%20of%20the%20City%20of,in%20the%20City%20of%20Adelaide.](https://yoursay.cityofadelaide.com.au/solarsavers#:~:text=3%20years%20ago-,Solar%20Savers%20Adelaide%20is%20a%20Program%20of%20the%20City%20of,in%20the%20City%20of%20Adelaide.;); (2019) *Solar Savers Adelaide (archived)*, <https://web.archive.org/web/20190331215432/https://www.cityofadelaide.com.au/your-council/funding/solar-savers-adelaide/>; Murtagh (n.d.) *Solar Savers Adelaide program puts a spring in the step of residents*, <https://living.cityofadelaide.com.au/solar-savers-adelaide-program-puts-a-spring-in-the-step-of-residents/>

- A dedicated body might be able to implement the program more efficiently and produce more convincing materials/target those materials better to get greater interest.

The Solar Savers Adelaide Program Summary, available on request from the City of Adelaide, provides detailed, practical information on how to implement a separate rates solar PV scheme including considerations like heritage listing, meter upgrades and how to encourage uptake.

## Green leases (Commonwealth)

“Green lease” policies formalise a process for landlords and tenants to come to an agreement that aligns their incentives on a building’s environmental impact. Commonwealth and state and territory governments are committed to pursuing green leases for their tenancies, and their resources are available for other landlords and tenants to use.<sup>56</sup>

A green lease involves five elements:

1. Target environmental performance standards
2. Metering and data reporting requirements
3. Environmental management plan
4. Building management committee
5. Remedial action / dispute resolution regime.<sup>57</sup>

These elements ensure that parties to a green lease agree on their performance standards, have the right to access data as to whether all parties are meeting their agreed responsibilities, and have a mechanism for redress if one party fails to meet their responsibilities.

## COMMERCIAL OPERATIONS

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### Landlord arbitrage

A number of schemes work by enabling the landlord to sell electricity directly to their tenants, at a discount on the grid rate.

<sup>56</sup> energy.gov.au (n.d.) *Green Leases*, <https://www.energy.gov.au/government-priorities/energy-productivity-and-energy-efficiency/green-leases>; HVAC HESS (2013) *HVAC factsheet - Overcoming split incentives*, <https://www.energy.gov.au/publications/hvac-factsheet-overcoming-split-incentives>

<sup>57</sup> energy.gov.au (2012) *Tenant’s guide to Green Leases*, <https://www.energy.gov.au/government-priorities/energy-productivity-and-energy-efficiency/green-leases>

The Gigawatt Project is a commercial scheme that allows landlords to arbitrage the difference between the lower cost of rooftop solar and the higher cost of grid electricity. Tenants also receive some compensation for every kilowatt-hour of solar PV *not* used as well (i.e. they receive a portion of the feed-in tariff). The tenant pays two bills each month, although the total paid for electricity will be lower thanks to the Gigawatt Project.<sup>58</sup>

Powershop's SunYield scheme operates on a similar premise, for new homes built by investment builders.<sup>59</sup>

Matter's Digital Solar was a commercial scheme that also worked on the landlord arbitrage model. Landlords paid a subscription to access Matter's Digital Solar monitoring system, and tenants bought electricity off the landlord's solar PV system at a discount to the grid price. The monitoring system also allowed tenants to adjust their electricity consumption patterns.<sup>60</sup> The project went into administration in 2018.<sup>61</sup>

Bjorn Sturmberg identifies three challenges with the model of direct electricity sales to tenants:

1. The addition of the tenant as a party makes the process more expensive, complicated and at risk of devolving into mistrust
2. The second bill makes the total cost seem greater, even if the sum of the cost of the two bills is smaller than the cost of the single bill would have been
3. The additional administrative cost of billing consumes a significant share of the savings from the solar.<sup>62</sup>

## Brokering a rent increase

SunTenants was a commercial operation that effectively served as a broker between landlord and tenant by convincing both that installing solar PV in exchange for a modest rent increase would be a mutually beneficial decision. The landlord paid SunTenants for a monitoring system, and SunTenants could re-calculate the tenants' rent increase if it looked like tenants would cease receiving a net benefit from the solar PV system.

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<sup>58</sup> Brakels (2018) *The Gigawatt Project reviewed: solar for rented roofs*, <https://www.solarquotes.com.au/blog/gigawatt-project-review/>

<sup>59</sup> Vorrath (2018) *Rental solar scheme targets 15,000 Queensland investment homes*, <https://onestepoffthegrid.com.au/rental-solar-scheme-targets-15000-queensland-investment-homes/>

<sup>60</sup> Matter (n.d.) *Sunlight is the new super*, <http://go.matter.solar/going-solar/>; Turner (2016) *Digital Solar opens up solar power to Australian renters*, <https://www.smh.com.au/technology/digital-solar-opens-up-solar-power-to-australian-renters-20160304-gnajxz.html>

<sup>61</sup> Vorrath (2018) *Rooftop solar start-up Matter Technology in administration*, <https://reneweconomy.com.au/rooftop-solar-start-up-matter-technology-in-administration-66508/>

<sup>62</sup> In correspondence with Bjorn Sturmberg, August 2020.

SunTenants is now owned by Solar Analytics, but seems to operate under the same principal. A detailed review in 2018 from SolarQuotes blog outlines how the service could be useful where tenant and landlord otherwise do not coordinate.<sup>63</sup>

## ANALYSIS OF CASE STUDIES

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A review of the case studies – government and commercial – shows that overcoming distrust and overcoming apathy are the two major contributions that a solar scheme can make.

Government schemes that have a nominated installer and/or manufacturer allow the government to stand in as an “honest broker” who guarantees the quality of the installed product. In some cases, this is supported with random spot checks, assurances or other methods of increasing consumer confidence. Commercial brokers may install monitoring equipment so that renters can check for themselves that they are getting a good deal, with payment plans that may be structured to guarantee renters are better off.

A government scheme can also address a renter’s distrust of their landlord, for example by pegging the renter’s commitment at a level that guarantees that they will be better off.

A financial incentive is the most obvious means of overcoming apathy, but it should be backed by dedicated promotion and advertisement.

A quick, administratively simple scheme helps ensure that initial interest translates into actual participation; forms of means-testing may be morally worthy but they delay the process and makes it more likely that participants drop out.

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<sup>63</sup> Brakels (2018) *SunTenants: A simple way to get solar power on rented roofs?*, <https://www.solarquotes.com.au/blog/suntenants-review/>; Solar Analytics (n.d.) *Solar benefits calculator*, <https://www.suntenants.com>

# Conclusion

There are considerably fewer solar PV installations on rental properties than owner-occupied dwellings in Australia, and misaligned incentives for installers, landlords, tenants, property managers and utility companies are likely to be at least partially responsible.

South Australia can learn from successful and well-designed government and commercial programs from around Australia. The City of Adelaide's groundbreaking Solar Savers Adelaide scheme provides a wealth of insight and experience that the State Government can draw upon. The Solar Victoria scheme is another key program that the Government should investigate further, particularly its use in conjunction with the council-driven Solar Saver schemes.

A full list of recommendations appears in the Summary.

# Appendix

## Polling Method

The Australia Institute conducted a survey of 510 South Australians between 23 and 27 July 2020, online through Dynata, post-weighted to reflect social demographics by age and gender in South Australia.

Voting crosstabs show voting intentions for the lower house. Those who were undecided were asked which way they were leaning; these leanings are included in voting intention crosstabs, but results are also shown separately for undecideds. “Coalition” includes separate responses for Liberal and National. “Other” includes Centre Alliance, One Nation, Jacqui Lambie Network and Independent/Other.

## Detailed results

All questions asked in this series are shown below.

### *Are you renting the home in which you live currently?*

	<i>Total</i>	<i>Male</i>	<i>Female</i>	<i>Coalition</i>	<i>Labor</i>	<i>Greens</i>	<i>Other</i>
<b>Yes</b>	30%	28%	33%	23%	32%	30%	43%
<b>No</b>	69%	71%	67%	77%	66%	68%	56%
<b>Don't know / Not sure</b>	1%	1%	1%	0%	2%	2%	1%

### *Are there solar panels installed on your home?*

(Only asked of renters)

	<i>Total</i>	<i>Male</i>	<i>Female</i>	<i>Coalition</i>	<i>Labor</i>	<i>Greens</i>	<i>Other</i>
<b>Yes</b>	23%	21%	25%	27%	22%	22%	20%
<b>No</b>	77%	79%	75%	73%	78%	78%	80%
<b>Don't know / Not sure</b>	0%	0%	0%	0%	0%	0%	0%

**Would you welcome your landlord installing solar panels on the roof of your home?**

(Only asked of renters without solar panels installed on their home)

	<b>Total</b>	<b>Male</b>	<b>Female</b>	<b>Coalition</b>	<b>Labor</b>	<b>Greens</b>	<b>Other</b>
<b>Yes</b>	85%	82%	88%	84%	88%	93%	80%
<b>No</b>	4%	2%	5%	0%	5%	0%	8%
<b>Don't know / Not sure</b>	11%	16%	7%	16%	7%	7%	12%

**Would you contribute to the cost of installing a solar panel system on your rental property if it saw your energy bills reduced?**

(Only asked of renters without solar panels installed on their home)

	<b>Total</b>	<b>Male</b>	<b>Female</b>
<b>Yes, even if I ended up paying somewhat more overall</b>	3%	1%	5%
<b>Yes, but only if it reduced my energy bills by at least as much as I contributed to the solar system</b>	38%	47%	30%
<b>No</b>	47%	46%	48%
<b>Don't know / Not sure</b>	12%	6%	17%

	<b>Total</b>	<b>Coalition</b>	<b>Labor</b>	<b>Greens</b>	<b>Other</b>
<b>Yes, even if I ended up paying somewhat more overall</b>	3%	0%	5%	9%	3%
<b>Yes, but only if it reduced my energy bills by at least as much as I contributed to the solar system</b>	38%	36%	45%	43%	29%
<b>No</b>	47%	61%	40%	31%	47%
<b>Don't know / Not sure</b>	12%	3%	10%	16%	22%

**Do you own an investment property that is currently being rented out to residential tenants?**

	<b>Total</b>	<b>Male</b>	<b>Female</b>	<b>Coalition</b>	<b>Labor</b>	<b>Greens</b>	<b>Other</b>
<b>Yes, more than one</b>	6%	9%	4%	11%	2%	3%	4%
<b>Yes, one</b>	9%	12%	7%	10%	10%	5%	10%
<b>No</b>	83%	79%	88%	79%	88%	90%	82%
<b>Don't know / Not sure</b>	1%	0%	2%	0%	0%	2%	4%

***Are there solar panels installed on your investment properties?***

(Only asked of investment property owners with more than one investment property)

	<b>Total</b>	<b>Male</b>	<b>Female</b>
<b>Yes, on all my investment properties</b>	17%	7%	38%
<b>Yes, on at least one investment property</b>	45%	56%	20%
<b>No, not on any of my investment properties</b>	34%	30%	42%
<b>Don't know / Not sure</b>	5%	7%	0%

	<b>Total</b>	<b>Coalition</b>	<b>Labor</b>	<b>Greens</b>	<b>Other</b>
<b>Yes, on all my investment properties</b>	17%	16%	0%	100%	0%
<b>Yes, on at least one investment property</b>	45%	48%	17%	0%	64%
<b>No, not on any of my investment properties</b>	34%	36%	32%	0%	36%
<b>Don't know / Not sure</b>	5%	0%	51%	0%	0%

***Are there solar panels installed on your investment property?***

(Only asked of investment property owners with one investment property)

	<b>Total</b>	<b>Male</b>	<b>Female</b>	<b>Coalition</b>	<b>Labor</b>	<b>Greens</b>	<b>Other</b>
<b>Yes</b>	15%	12%	20%	11%	32%	0%	0%
<b>No</b>	83%	88%	74%	89%	61%	100%	100%
<b>Don't know / Not sure</b>	2%	0%	6%	0%	7%	0%	0%

***Would you install solar panels on your investment property if the cost of installing that system were shared between yourself and your tenants?***

(Only asked of investment property owners)

	<b>Total</b>	<b>Male</b>	<b>Female</b>	<b>Coalition</b>	<b>Labor</b>	<b>Greens</b>	<b>Other</b>
<b>Yes</b>	55%	67%	27%	60%	24%	79%	68%
<b>No</b>	30%	23%	45%	26%	65%	0%	10%
<b>Don't know / Not sure</b>	15%	10%	28%	14%	11%	21%	22%