OVERCOMING THE SPLIT INCENTIVE PROBLEM FOR LOW-INCOME RENTAL HOUSEHOLDS AND SOLAR PHOTO VOLTAIC TECHNOLOGY

Tim Nelson, Griffith University, t.nelson@griffith.edu.au
Tracey Dodd, University of Adelaide, tracey.dodd@adelaide.edu.au
Rosanna Vazey, AGL Energy, rvazey@agl.com.au
Aleks Smits, AGL Energy, asmits@agl.com.au

Overview

Australia has one of the highest uptake rates of distributed solar Photo Voltaic (PV) in the world with around one in four detached houses having installed the technology. However, the vast majority of solar PV is installed on owner-occupied dwellings because improvements are most readily made by changes to property that generally require approval and considerable capital outlay from the owner, rather than fittings or small-scale investments by the tenant.

Numerous studies have shown that split incentives cause lower uptake of energy efficiency improvements in the rental sector (see Schleich and Gruber, 2008 and Gillingham et al., 2009 among others). But there are few studies that discuss the barriers and potential solutions for installing distributed generation in low-income and rental housing.

There are two key barriers to the adoption of solar PV by low-income households: the split incentive whereby the landlord incurs the capital cost of installation while the tenant receives lower electricity bills; and the relatively short tenures of rental agreements that create disincentives for tenants from purchasing panels themselves. In markets with restructured electricity retailing (as is the case in Australia's National Electricity Market), there is the further complication of 'customer churn' between retailers. In this article, we contrast the economics of solar PV for 'hardship' customers, used as a proxy for low-income rental customers, with the economics for 'average' customers.

Methods

Our hypothesis is that the economic return from deploying embedded solar PV for low-income rental households is higher than that of an 'average' customer. To determine this we obtained two sets of consumption data from AGL Energy Ltd, one of Australia's largest electricity retailers:

- Half-hourly load profiles of 1,000 customers on AGL Energy's hardship program, Staying Connected, for the 2017 calendar year. Hardship program customers were used as a proxy for low-income tenant consumption, consistent with the findings of Nelson et al (2018).

- Half-hourly load profiles of 1,000 'average' AGL Energy customers.

These consumption data sets were then used to model the economic impacts of installing a 3 kW solar PV system using a innovative business model designed to overcome the split incentive problem (see below). The half-hourly annual output profile for solar PV was derived from Clean Energy Regulator data.

We found that low-income households had higher electricity consumption on average, meaning the economic returns for deployment of the technology were superior for low-income rental households. We then sought to explore how a new approach to the business model may overcome the split incentive problem. Specifically, we modelled the impact of paying an upfront 'leasing' stipend to the owner of the property with a view to renting the roofspace. In this business model, the renter benefits from accessing low-cost solar energy behind the meter with any excess sold back to the grid. Neither the principal or the tenant would own the solar system but both would benefit from additional rental income (for the roofspace) and lower electricity bills respectively.

Results

Our preliminary results are presented below.

Scenario	(1) $1000 payment to landlord No subsidy	(2) No payment to landlord No subsidy	(3) $1000 payment to landlord Subsidy included
Internal rate of return (IRR)	7%	11%	14%
Net present value (NPV)	$634.03	$1,586.41	$2,119.75
Simple payback period (years)	8.8	7.1	6.1

The payback period for a new business installing and operating solar PV was found to be 6.1 years if subsidies for the solar system are assumed to be available (as they currently are). Assuming no subsidies and an upfront payment to the property owner of $1,000, the payback period is still relatively low at 8.8 years.

Conclusions

Our results show that solar PV could significantly reduce tenant-occupied household electricity bills and associated greenhouse gas emissions due to relative high average levels of energy consumption for low-income households. Our policy recommendation relates to a new organisational and financial structure for overcoming the split-incentive problem to ensure low-income tenant-occupied households are able to deploy solar PV to maximise societal welfare. If deployed at scale, the cost of capital could be significantly lowered, thereby maximising societal welfare from installing lower-cost distributed generation to households that currently face split incentive barriers to uptake.

References

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