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# The emperor and the cowboys: The role of government policy and industry in the adoption of domestic solar microgeneration systems

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## HIGHLIGHTS

- A postal survey identified issues with solar microgeneration adoption policies.
- Consumers not receiving subsidies had lower overall satisfaction with installations.
- Government lacked stability in policy application and transparency in tariff pricing.
- Evidence indicated solar industry members are seen as potentially untrustworthy.
- Governments should improve regulation of industry and provide reliable information.

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## ABSTRACT

While domestic solar microgeneration installations have increased in popularity, there is potential for their adoption to slow as financial incentives are reduced or phased out. This study uses a postal survey of 362 solar adopters in Western Australia to identify areas of policy improvement for the adoption of domestic solar systems. Research included quantitative analysis of Likert-type statements and analysis of qualitative comments by survey respondents, including testing the validity of inferences in comments using publicly-available data. While the vast majority of respondents were satisfied with their systems, satisfaction rates were lower for consumers not receiving the premium feed-in tariff and where information on systems was not self-sourced. Consumers considered governments to be untrustworthy and information provided by industry was perceived as inconsistent and inaccessible. Consumers felt they did not receive a fair price for electricity exported to the network and feared that changes in utility prices could render their investment uneconomical. Concerns regarding members of industry may be allayed by certification schemes, but these remain voluntary and limited in effectiveness. These findings underscore the need for increased government activity in providing independent information to consumers and regulating the solar industry, including commitments to long term policies and certification schemes.



## 1. Introduction

Australia boasts one of the highest rates of small-scale renewable energy system adoption in the world, with as many as 2 million householders having 'solar rooftops' – with either solar water heaters (870,000) and/or solar microgeneration systems (1.25 million) installed (Clean Energy Regulator, 2014). A confluence of factors led to an increase in the adoption of domestic solar microgeneration systems in Australia, including increasing household electricity tariffs, reduced capital cost of systems, public acceptance of microgeneration and in particular the availability of various subsidies, with installation rates rising with increasingly generous incentive packages (Climate Change Authority, 2012). Furthermore, whilst installation costs of solar microgeneration systems are steady at approximately AU$2/watt (Morris, 2014), household electricity tariffs continue to rise, rendering solar microgeneration systems a sound financial investment for many Australian householders, even in the absence of financial incentives (AGL Energy, 2014).

Research into domestic microgeneration adoption has so far focussed on motivations and characteristics of adopters and barriers to household adoption (Balcombe et al., 2014; Faiers and Neame, 2006). Studies find that while installers are

*Abbreviations:* FiT, feed-in tariff; c/kWh, AU cents per kilowatt hour

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environmentally conscious, financial factors are instrumental in the decision to adopt solar microgeneration (Balcombe et al., 2013; Schelly, 2014b). The availability of generous feed-in tariffs (FiTs), the opportunity to reduce exposure to increasing domestic electricity tariffs and the ability to increase the value of homes act as primary motivating factors (Balcombe et al., 2014). On the other hand, a lack of transparent, reliable and independent information, transaction costs ('hassle factor') and distrust of the energy industry are seen as important barriers to installation (Eyre et al., 2010).

Research has also indicated the social context of adoption and lived experiences with technology will contribute to adoption profiles. Claudy and O'Driscoll (2008) analysed energy efficiency in domestic buildings and found that knowledge of economic benefits of energy efficiency investments alone would not necessarily incentivise technology adoption, but that policy developers should look 'beyond economics' to consider behavioural determinants, such as attitudes and social norms, that interact with consumer decision-making. As noted by Schelly (2014a), policy developers should be aware of the socially contextualised practices of people, because it is 'patterns of human engagement which ultimately shape policy success' (p. 544). For example, according to Rogers' (2003) theory on the diffusion of innovations, as a technology diffuses through space and time an increased portion of technology adopters will gain information on a technology from friends and family, as opposed to sourcing their own information. In addition, negative experiences with technology itself might impact on or prevent consideration of solar microgeneration installation (Claudy and O'Driscoll, 2008).

The objective of this research is therefore to document policy-related issues with the installation of domestic solar microgeneration systems, as identified by household adopters in Western Australia, with a view towards providing recommendations for improved policy delivery. Sections 3 (results) and 4 (discussion) use quantitative data from postal survey responses to assess adopters' satisfaction with their domestic microgeneration system, with a focus on interactions between satisfaction, availability of incentives and sources of information prior to deciding to install a system. Section 5 draws on qualitative comments in survey responses to identify sources of consumer dissatisfaction, with the majority of comments highlighting issues around government policy and delivery in relation to domestic solar microgeneration (Section 5.1), or industry performance (Section 5.2). An overview of comments relating to general renewable energy and associated policies is included in Section 5.3. Content analysis is used to verify findings from the survey analysis, with conclusions in each subsection identifying potential areas of policy intervention that could enhance consumer satisfaction.

## 2. Methodology

Six geographic areas were selected to represent a range of adoption experiences in the state of Western Australia, including four metropolitan postcode areas and two regional communities. All study sites were in Western Australia to ensure the same policies were applied in each area. The four metropolitan areas were required to have a minimum of 200 systems installed, minimum of 1000 free-standing dwellings (appropriate for solar installation) and maximum of 25% rental rate in the 2011 census (Australian Bureau of Statistics, 2013). Using the Australian Bureau of Statistics index of socio-economic welfare, the metropolitan communities were chosen to include two higher and two lower socioeconomic status communities, each with one higher and one lower installation rate (Clean Energy Regulator, 2014). Individual households in each postcode area were randomly selected for the postal survey using publicly-available aerial photography (Landgate, 2014), with the most recent solar systems installed in January 2013.

The survey comprised a series of Likert-type questions to assess householders' attitudes regarding domestic solar energy (Bernard, 2006), factors motivating installation, the importance of incentives, sources of information, satisfaction with systems and perceptions of regulation. Demographic information, details on the installation/incentives accessed and an open text section were also included.

In order to maximise response rates to the postal survey, a three-stage process was undertaken (Dillman et al., 2009). This comprised the initial survey being sent with a cover letter and reply paid letter followed by a reminder postcard and then another copy of the survey, cover note and reply paid envelope. The importance of follow-up surveys for maximising response rates has been recognised in similar studies (Baskaran et al., 2013). An iPad Mini was provided as an incentive prize to increase the response rate. Surveys were sent to 959 households between August and December 2013. The survey methodology complied with The University of Western Australia ethical procedures.

A total of 362 fully completed surveys were returned. This response rate of 38% is consistent with a similar study in New Zealand (Baskaran et al., 2013). Location-specific response rates varied from 27% to 55%, with a lower number of mail-outs but higher response rate for regional communities. SPSS Version 22.0 (IBM Corporation, 2013) was used to undertake non-parametric analysis of the quantitative survey data (Field, 2013). 121 survey respondents provided qualitative feedback. 146 individual comments were analysed, given some respondents provided feedback on more than one topic. These comments were coded according to whether they were positive (supportive), negative (critical) or neutral regarding experiences with solar installation and government support for renewable energy. Inter-rater reliability between co-authors for coding of direction of support was moderate (Landis and Koch, 1977), with a Cohen's $K$ of 0.478 (95% CI, 0.333–0.624, $p < 0.0001$). All comments were then grouped into themes decided on by the authors after consideration of the full suite of responses. Again, the inter-rater reliability was moderate, with a Cohen's $K$ of 0.411 (95% CI, 0.318–0.504, $p < 0.0001$). Given only moderate agreement between co-authors was reached, co-authors collaborated to clarify theme descriptions and allocate all remaining comments to a theme.

Themes were used as a starting point for the content analysis (Mayring, 2004) of publicly-available data. Data from between 2010 and 2013, the period during which 81% of survey respondents ($n=325$) installed their microgeneration system, was considered and included state and federal regulator data, federal government reports, government and industry media releases and news articles released. The websites of major solar microgeneration retailers were also reviewed. Triangulation of survey comments with multiple independent sources was conducted to determine whether respondent inferences could be considered accurate (Heras-Saizarbitoria et al., 2011).

## 3. Results 1 – quantitative survey results examining satisfaction with domestic solar energy

Results from the survey indicated that consumers are generally satisfied with the installation of their system. A total of 88% ($n=360$) of respondents confirmed that 'if [they] purchased a new home [they] would install a solar system'. Furthermore, 83% ($n=334$) of respondents indicated that '[their] solar system is living up to [their] expectations', and 76% ($n=332$) of respondents found that 'changes to [their] bills after installing [their] system