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FEATURE ARTICLE - HOUSEHOLD ENERGY EFFICIENT IMPROVEMENTS: INTENTIONS, ACTIONS AND BARRIERS

This feature article consists of the following subsections

Summary

This article draws on longitudinal data collected as part of the Household Energy Consumption Survey (HECS) in providing some initial insights regarding energy efficient improvements made by Australian households. It follows a subsample of HECS respondents for 12 months after their household interview, and examines their intentions and subsequent actions in making energy improvements to their dwelling. Overall, this analysis found that of the 21% who indicated an intention to make improvements, around half did so in the follow-up period. Interestingly, most improvements (around two-thirds) were not reported as a planned improvement at initial interview.

Key findings:

- Households in the ACT were more likely to both intend to and subsequently carry out a modification to their dwelling.
- More than half of those who intended to make an improvement, made the same type of improvement they intended.
- For those who did not make an improvement (whether intended or not), reasons such as cost and lack of need were common barriers identified for not doing so.
- Owner households who intended to make an improvement were more likely to indicate a future intention to make an improvement in the

12 months after the follow-up period.

Introduction

In an environment of rising energy costs, energy efficient improvements to dwellings, such as replacing appliances for improved energy efficient modes or installing solar panels or insulation, are increasingly being considered by Australian households.

This article explores the intentions and subsequent actions of a subgroup of Household Energy Consumption Survey (HECS) respondents in relation to such energy saving improvements. While a variety of influences contribute to decisions around energy efficient improvements, intention is theorised as a key influence to undertaking such actions (Endnote 1). Intentions have also been used to help understand energy efficient behaviours among Australian households in previous research. (Endnote 2).

During their first household interview, households indicated whether or not they planned to make energy efficient improvements over the next 12 months. The subsequent actions of households based on their stated intention to undertake energy efficient improvements provides some interesting insights regarding barriers to implementing such plans.

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Sample selection

Households interviewed for the HECS were asked about their energy efficiency intentions in the next 12 months. That is, whether they intended to replace any heaters, coolers or any major whitegoods to more energy efficient models in the next 12 months or whether they intended to make any energy efficient modifications to their dwelling, such as replacing hot water systems or installing insulation. Renter households were not asked whether they intended to modify their dwelling due to their limited choices in modifying the structure of their dwelling.

Households were also asked if they were willing to, on a three monthly basis over the following year to be contacted to answer a small number of follow-up questions on household energy use and behaviours. Participation was voluntary and could be undertaken via an online questionnaire or telephone interview, with the final round of questions asked between January and March 2013.

Households who agreed to participate provided the following information over the 12 months follow-up period:

- information about any energy efficient dwelling improvements made (such as installing window treatments and insulation, and installing solar hot water or electricity systems)

- any appliance upgrades for heaters/ coolers and whitegoods, for improved energy efficient models
- reasons why dwelling improvements or appliance upgrades were not made (if none were made) and
- future intentions to make energy efficient improvements.

While all HECS households selected throughout 2012 were asked to participate in the follow-up questions, only those households first interviewed between January and March 2012 are considered in this analysis. This allows a complete 12 month observation period for energy efficient behaviours to be examined and compared with their intentions (for the next 12 months) stated during their interview.

Of the 3,310 households interviewed between 1 January - 31 March 2012, 1,269 (38%) agreed to participate in follow-up questions. Of these households, 639 (19% of households first approached) participated in all rounds of follow-up questions, up to and including the January to March 2013 questions.

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Sample characteristics

Due to the voluntary nature of participation, households differed across various attributes when compared to households who did not participate (or only partially participated) in the follow-up.

The sample had higher representation by households across various characteristics. For example, there were higher representation among those who owned their own dwelling, lived in a separate house (rather than an apartment, flat or unit for instance), consisted of a couple only, lived in states other than New South Wales, Victoria or Queensland (and in particular lived in Climate Zones 7), when compared to the overall HECS population.

More detailed comparisons of characteristics of the responding sample and complete HECS population are available in the 'Feature Article' datacube located in the 'Downloads' tab of this product.

As with other sample surveys, statistical techniques were applied to improve estimation and representativeness of the key output variables used for this article. A summary of the approach taken is presented in the Appendix 'Adjustment for non-response in longitudinal analysis'.

Although statistical techniques (weighting) appeared to improve population representativeness and estimation for the sample, caution should be shown when interpreting estimates as propensity to respond to the HECS longitudinal component was unlikely to be random. No formal study of non-response bias has been undertaken to estimate the degree to which behavioural outcomes would be different in the non-responding sample. To partially offset potential error, stricter tests for statistical significance (99% confidence) have been applied (unless

otherwise stated) when suggesting differences between groups in the following analysis.

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Intentions and actions to modify dwelling

One in every five households (21%) stated an intention during their first interview to make an energy efficient improvement to their dwelling in the next 12 months. Between April 2012 and March 2013, 31% of households made some form of energy efficient improvement to their dwelling. Characteristics of these households are further discussed below, and presented in table 2.

Table 1: Intentions and actions to modify dwelling (a)

	Actions during follow-up period (April 2012 to March 2013)		
	Made energy efficient improvements	Did not make energy efficient improvements	Total
Intentions, first interview (January - March 2012)	%	%	%
Intended to make improvements in the next 12 months	10	10	21
Did not intend to make improvements in the next 12 months	21	58	79
Total	31	69	100

(a) All differences between groups are significantly different (using a 99% confidence interval), except for between actions of households who intended to make improvements (10% each) and the total proportion of those households who intended to make improvements and who did not intend to but made them (21% each).

Ten percent of households made an energy efficient improvement to their dwelling after stating an intention to do so. ACT households were the only group (among the characteristics examined) more likely than others to have made an improvement during the longitudinal period after stating they intended to make an improvement. 24% of ACT households intended to make an improvement, of which three quarters (or 18%) did during the next 12 months.

A further ten percent of households intended to, but did not make an energy efficient improvement, with no particular types of households more likely to fall into this group.

One in five households (21%) indicated they had no intention of making an improvement, but nevertheless made an improvement during the follow-up period. Couple only households were the most likely to have made an improvement, despite not reporting an earlier intention. Three

quarters (75%) of couple only households did not intend to make improvements, however more than one third of these (28% of all couple only households) did so during the next 12 months.

Households who used electricity only were also more likely to make an improvement despite not intending to do so at first interview. Of the 81% of households who only used electricity in their dwelling and who did not report intending to make an improvement, almost one third (26% of all electricity only households) made an improvement.

The households most likely to act consistently with their intention not to make improvements were couple family households with dependent children and those living in either Climate Zones 2 (warm humid summer, mild winter) or 6 (mild temperate).

Table 2: Intentions and actions to make energy efficient improvements, selected household characteristics

	First interview (January - March 2012)			
	Intended to make improvements		Did not intend to make improvements	
	Follow-up period (April 2012 - March 2013)			
	Made improvements	Did not make improvements	Made improvements	Did not make improvements
	%	%	%	%
Household characteristics, First interview (January- March 2012)				
Tenure type				
Owner without a mortgage (including life tenure)	8	*7	25	59
Owner with a mortgage (including rent/ buy arrangements)	15	16	*18	51
Total owners	12	12	22	55
Renter	*7	**8	*19	66
Dwelling type				
Separate house	11	12	19	59
Other types of dwelling	*10	*4	*30	56 (b)
Energy source(s) used in dwelling				
Electricity only	*10	*10	26	55
Electricity and gas only	11	12	16	61
Electricity, gas and other sources of energy	**6	**6	**19	69
Electricity and other sources of energy only	*14	**5	38	42 (b)
State or territory of usual residence	11	*9	20	59
NSW	*9	*11	*21	59

VIC	*8	11	*21	59
QLD	*13	*8	*23	57
SA*	*12	*10	*22	56
WA	*9	16	*20	55
TAS	**20	*20	**30	*30 (b)
NT	18	*6 (a)	**24	*53 (b)
ACT				
Climate Zone				
High humid summer, warm winter (Zone 1)	**12	**20	**35	**33 (b)
Warm humid summer, mild winter (Zone 2)	*8	*11	*15	66
Hot dry summer, warm or cool winter (Zones 3 and 4)	*18	*12	*31	*39 (b)
Warm temperate (Zone 5)	9	9	22	60
Mild temperate (Zone 6)	*9	*10	20	61
Average gross household income per week ($)	2,160	2,268	1,925	1,851 (b)
Average equivalised disposable household income per week	1001	*1,058	957	920 (b)
Average number of employed persons per household	1.5	1.2	1.2	1.3
Sample size (n)	84	91	135	329
Weighted estimate of households ('000)	905.6	903.1	1836.6	6925.0

* estimate has a relative standard error of 25% to 50 percent and should be used with caution.
** estimate has a relative standard error greater than 50% and is considered too unreliable for general use.
(a) A significant difference (using a 99% confidence interval) exists between actions during the longitudinal period for those who intended to make energy efficient improvements
(b) No significant difference (using a 99% confidence interval) exists between actions during the longitudinal period for those who did not intend to make energy efficient improvements. All other comparisons for this group are significantly different.

Types of modifications made

A summary of the types of modifications made during the longitudinal period by the intention stated beforehand is presented in table 3**.** For households who made improvements during the longitudinal period, there were no significant differences between the types of modification made by households based on their intention to modify.

Table 3: Types of modification made by households who made energy efficient improvements, by intention.

	Intended to make improvements	Did not intend to make improvements
	%	%
Type of modifications made during follow-up period (April 2012 - March 2013)		

Owner households (a)		
Replaced heater, cooler or major whitegood	38	31
Installed solar electricity or hot water system	*21	*16
Installed insulation	**7	**4
Installed ceiling fans	*12	**3
Installed window treatments	36	22
Installed hot water system	**2	**5
Installed other energy efficient improvements	*9	*9
Intention and improvement made were the same	59	na
–Solar electricity or hot water system	56	na
–Window treatments	72	na
–Insulation, ceiling fans, hot water systems or other improvements	59	na
Renter households		
Replaced heater, cooler or major whitegoods	*16	*14

* estimate has a relative standard error of 25% to 50 percent and should be used with caution.
** estimate has a relative standard error greater than 50% and is considered too unreliable for general use.
(a) Includes households with a life tenure or rent/ buy tenure arrangement.
na not applicable

Of owner households who intended to make an improvement, 59% made the same type of improvement as they had initially intended.

Owner households who intended to make improvements were more likely to (using a 95% confidence interval) to replace a heater, cooler or major whitegoods than renter households (38% of owners compared to 16% of renters). However the same comparison for those who did not intend to make improvements (31% of owners and 14% of renters) was not significantly different.

Barriers to making improvements

Households who did not make an improvement were asked to select the main reason why they had not done so. These reasons have been further grouped to improve estimation.

- Tenure - which includes those who couldn't make improvements as they were renters
- Lack of need - where improvements had been previously made or the household considered their energy consumption low enough already
- Motivational - which includes households who indicated either inconvenience, lack of knowledge, saving energy as not a priority, or who had not thought about reducing energy consumption as reasons why they had not made an improvement.

- Financial - where up-front costs for making improvements were too high.
- Other - any other reason why improvements were not made.

A household could report more than one type of main reason across the longitudinal period, and therefore may be included in more than one category.

There were no main reason why improvements were not made which differed significantly between groups based on intention to make improvements. Estimates are presented in table 4.

Table 4: Households who did not make energy efficient improvements during follow-up period, main reasons why energy efficient improvements were not made to dwelling by intention

	Intended to make improvements	Did not intend to make improvements
	%	%
Main reason why improvements were not made during follow-up period (April 2012 - March 2013) (a)		
Tenure	**25	32
Lack of need	45	53
Motivation	*25	19
Financial	47	41
Other reason	*11	16
No response	6	11

* estimate has a relative standard error of 25% to 50 percent and should be used with caution.
** estimate has a relative standard error greater than 50% and is considered too unreliable for general use.
(a) Households may report more than one type of main reason across the longitudinal period and therefore appear in more than one category.

For households who intended to make improvements, there was no single clear main reason why improvements were not made during the longitudinal period, though both lack of need and up-front costs were common reasons (45% and 47%, respectively).

Similarly households who did not intend to make improvements commonly reported lack of need (53%) and financial reasons (41%) as a main reason why improvements were not made.

Around one third of households (33% of intending and 38% of not intending) provided the same reason consistently during each follow up

period. For those who did not intend to make improvements, tenure was significantly more likely to be reported as a barrier than other reasons. Financial and lack of need were also significantly higher than other reasons (with a 95% confidence interval).

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Future intentions

Intentions to make energy efficient improvements in the next 12 months following the final follow-up interview are presented in table 5. These intentions are those collected from households during the last follow-up interview (between January and March 2013).

Overall, 41% of owner households and 6% of renters who initially intended to make improvements, stated they still intended to do so after the follow-up period. For owners, this was more than twice the proportion of households who initially did not intend to make improvements who indicated a future intention (17%) but a similar rate for renters (6% and 4% respectively).

Table 5: Future intentions to make energy efficient improvements

	First interview (January - March 2012)					
	Intended to make improvements			Did not intend to make improvements		
	Follow-up period (April 2012 - March 2013)					
	Made improvements	Did not make improvements	Total	Made improvements	Did not make improvements	Total
	%	%	%	%	%	%
Future intentions to make improvements between April 2013 - March 2014						
Tenure type						
Owner (a)						
Owner intends to make improvements	44	38	41	*19	16	17
Owner does not intend to make improvements	53	62	58	76	81	80
Total (b)	100	100	100	100	100	100
Renter						
Intends to make improvements	**12	-	6	19	-	4
Does not intend to make improvements	*79	100	89	67	100	93
Total (b)	100	100	100	100	100	100

* estimate has a relative standard error of 25% to 50 percent and should be used with caution.
** estimate has a relative standard error greater than 50% and is considered too unreliable for general use.
(a) Includes households with life tenure and rent-buy arrangements.

(b) Includes households who did not respond to the question on future intentions to make energy efficient improvements in the last follow-up interview.

For owner households who intended to and made improvements during the follow-up period, there was no clear intention for making future improvements. Around half of this group (53%) indicated they did not intend to make any future improvements (between April 2013 and March 2014). For renter households however, most (79%) who intended to make improvements, and did so during the follow-up period, indicated they did not intend on future improvements.

Owner households who initially intended to, but did not make improvements, were slightly more likely to say they did not intend to make future improvements. 62% indicated they did not intend to make future improvements, which was significantly higher (using a 95% confidence interval) than the proportion of these owners who intended to make improvements (38%).

Most owner households who did not initially intend to make improvements also indicated that they did not intend to make future improvements after the follow-up period. This was the case regardless of whether any actual improvements were made during the follow-up period, with 76% of those who made improvements and 81% of those who did not make improvements saying they did not intend to make future improvements.

No renter household who did not make an improvement during the follow-up period stated a future intention to make improvements. However, of those renters who made an improvement during the follow up period similar proportions (12% who intended to and 19% who did not intend to) stated a future intention to make improvements.

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Endnotes

1. Azjen, I., 1991, 'The theory of planned behaviour', Organizational Behaviour and Human Decision Processes, 50 (2), pp. 179-211.
2. Fielding, K, et al. 2010, Environmental sustainability: Understanding the attitudes and behaviour of Australian households, AHURI Final Report No. 152. Melbourne: Australian Housing and Urban Research Institute.

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