Executive summary

The Home Energy Efficiency Upgrade Program (HEEUP) was a Low Income Energy Efficiency Program (LIEEP) trial funded by the Department of Industry, Innovation and Science, which assisted 793 households in greater Melbourne and regional Victoria to upgrade to more efficient hot water systems.

The objective of HEEUP was to assist low income households to overcome information, capital and trust barriers than might otherwise lead to less efficient hot water system purchases. Hot water was chosen because:

- it is one of the biggest energy users in the home accounting for around 20% of household energy use
- a new system has high up-front costs ranging from $1,000 to $5,500
- it is a complex purchase, with households having to calculate up-front costs and running costs, often with a great deal of uncertainty

As a result many households, particularly those on low incomes with capital constraints, choose a like-for-like replacement, which is often not the optimal upgrade for them or the environment.

This report outlines the delivery of HEEUP and the related research, which examined four distinct but interrelated aspects of the program: the actual energy savings from the different hot water systems; the level of incentive required to get low-income households to upgrade to a more efficient system; whether HEEUP changed purchasing decisions, and the key lessons from HEEUP for delivering similar types of programs.

The HEEUP research is important because there has been little study of programs designed to increase the uptake of more efficient hot water systems by low-income households.

HEEUP was funded by the Commonwealth Department of Industry, Innovation and Science (DIIS) and delivered by the Brotherhood of St Laurence, with a consortium that included Monash (University) Sustainability Institute (MSI), AGL, NSW Office of Environment and Heritage (NSW OEH), and the Alternative Technology Association (ATA).

HEEUP delivery outputs

Overall, 793 hot water systems were installed in HEEUP's main delivery period, which operated from April 2014 to January 2016. More than 600 of these systems were installed in 12 months from January 2015. Along with the hot water systems installed HEEUP undertook 1291 home visits to provide independent advice on hot water upgrades.

HEEUPs upgrades focused in two primary streams:

- low-income owner occupier households: where 71% (550) upgrades occurred
- community housing: where 22% (176) of the upgrades occurred with the benefits flowing to low income tenants.

A small number of emergency replacement upgrades (21, or 3%) and independent installations (46, or 6%) also occurred.

HEEUP participants were able to upgrade to:

- solar (with gas or electric boosters) (during all stages)
- heat pump (during selected stages)
- instant gas (during all stages) or
- gas storage (during selected stages).

Owner occupier participants in HEEUP received a home visit from a BSL staff member, who provided information on the best upgrade options, a subsidy and access to a no interest loan to help reduce the capital barrier. The subsidies were tiered with the highest cost systems (solar and heat pump) receiving the highest subsidy.

Of the 550 owner occupier participants who upgraded their system, 69% upgraded to one of the more efficient systems: a solar system (47%) or heat pump (22%).

Community housing upgrades were arranged and funded by the housing provider. Each housing provider received a flat rate $1,100 subsidy per upgrade. Tenants were approached to provide access to energy metering data; however, they were not required to contribute to the financing of the upgrade.

In the community housing stream, 28% of the 176 installations were either solar (5%) or heat pump (23%).

HEEUP research

The research components of HEEUP were undertaken by either Monash (University) Sustainability Institute (MSI) or the Brotherhood of St Laurence Research and Policy Centre (RPC). AGL played an important role facilitating access to data and assisting with data analysis.

The research questions were:

1 What change in household energy consumption (and energy expenditures) has occurred?
2 What is the optimal level of incentive?
3 Has HEEUP overcome the barriers to upgrades and generated 'additional' take up of efficient hot water systems?
4 What were the key lessons from the program in particular what enabled or impeded program goals?

1. What were the energy savings from the upgrades?

Monash University researchers assessed the changes in energy consumption in a sample of 339 households who installed hot water systems as part of HEEUP (see section 4, Byrne et al.). For all participants except those involving a fuel switch, they found:

- a statistically significant decrease in daily electricity consumption of 25% (2.09 kWh per day) and a statistically significant decrease in daily gas consumption of 7% (7.63 MJ per day)
- an annual reduction of 762 KWh ($213.46) for electricity consumption and 2,787 MJ ($55.64) for gas consumption.

They concluded that in overall terms the intervention was successful in producing energy savings.

The upgrade paths yielding significant decreases in daily electricity consumption were:

- electric storage to heat pump (29%)
- electric storage to gas instantaneous (42%)
- electric storage to gas solar (41%).

The significant electricity reductions were associated with annual financial saving equivalent to $244.14 (electric storage to heat pump), $303.89 (electric storage to gas instantaneous), and $295.65 (electric storage to gas solar). Increased gas consumption associated with upgrading from electric storage to gas instantaneous and to gas solar, was not statistically significant for either of these pathways.

The upgrade paths yielding significant decreases in daily gas consumption were:

- gas storage to gas instantaneous (15%) and
- gas storage to gas solar (13%).

These effects correspond to annual financial savings of $114.45 and $101.96 respectively.

2. What was the optimal subsidy level to encourage households to purchase a more efficient system?

Analysis of program data and a discrete choice experiment were undertaken to identify the optimal subsidy to encourage households to purchase a more efficient system.

Program delivery experience

Analysis of program data revealed:

- Conversion rates from a home visit to an installation were higher when the subsidy was higher and the out-of-pocket expense lower.
- Higher subsidies and the inclusion of heat pumps coincided with more energy efficient systems being installed.

- Upgrades to solar and heat pump systems could be achieved in 65% of participating households with the following subsidy mix:
    - $2,300 to $2,900 for upgrades to solar (with a householder contribution around $2,000)
    - $2,000 to $2,300 for upgrades to heat pumps (with a householder contribution between $1,600 and $1,800)

Discrete Choice Experiment

Ward and Brent (see Chapter 5) conducted a discrete choice experiment, which explored householders' preferences for hot water service upgrades.

Running costs had a larger impact on people's choices than upfront costs

For a generic hot water upgrade (when no technology is explicitly stated in the experiment), an extra dollar in annual running costs has around 7.6 times the impact of an extra dollar of upfront cost on people's choices. When the respondents were aware of the types of upgrade, annual running cost had even more influence on their preference.

3. Did HEEUP change purchasing decisions?

Participants' purchasing intentions and decisions were analysed to understand whether HEEUP shifted their purchasing behaviour.

HEEUP shifted hot water system upgrades to a planned decision

Without HEEUP, (73%) of participants would not have replaced their hot water system until it broke down. The program brought forward these households' upgrade decisions and made them a planned upgrade rather than an emergency decision. In doing so HEEUP was able to prevent ad-hoc decision making when there is limited opportunity for households to weigh up the relative costs and benefits of different hot water systems.

Participants upgraded to a more efficient system than they would have without HEEUP

HEEUP was also successful in shifting participants' upgrade choices to more efficient hot water systems. Only 19% said they would have upgraded to solar and 7% to heat pump without HEEUP. With HEEUP, participants opted for more efficient systems, with 47% purchasing solar and 27% purchasing heat pumps.

HEEUP also helped participants to achieve their ideal upgrade choice

Participants' final upgrades were more in line with their ideal upgrade than they would have been without HEEUP.

HEEUP case studies – Changing purchasing decisions

The research case studies illustrated ways the program assisted households' to make upgrades possible, brought forward upgrade decisions, shifted households towards more efficient upgrades and may influence future purchasing decisions.

4. What lessons were learnt from HEEUP service delivery?

Lessons about the service were identified from research case studies and the HEEUP reflective practice process.

Case studies

The eleven research case studies highlight factors influencing householders' decisions about upgrading their hot water services. They illustrate how HEEUP assisted some participants to overcome:

- capital barriers, through a combination of either rebates, loans or full funding
- information barriers, mostly through a combination of EEO and installer advice
- the tenancy barrier, through working with community housing providers.

Case study households reported achieving energy savings, bill savings, greener energy use and peace of mind. On the other hand, HEEUP did not overcome information asymmetry and trust barriers in at least one case study household.

Reflective practice process

The HEEUP staff's reflective practice process identified lessons from HEEUP including:

Low income home owners will upgrade to a more efficient hot water system when they are provided an **incentive** or **subsidy,** a **low interest loan** to cover the out of pocket expenses and **information** on upgrade options

Community housing providers are keen to participate and provide economies of scale.

Support should be provided to households on a graduated basis. Specifically:

- the **subsidy level should be higher for more expensive and efficient systems**: solar and heat pump
- provision should be made to **provide a higher level of financial support for those in energy hardship** or fuel poverty who cannot afford to co-contribute
- Independent, in-home advice, is very valuable for those who need it. However, many households have already decided on the upgrade they want and don't need detailed advice. In-home advice should therefore only be provided to households who need it. Other households should be provided with information and advice over the phone or via online channels.

Major recommendations

Recommendation 1: New program to address barriers to energy efficiency and energy savings in low-income households

HEEUP showed that:

- *with information, a subsidy and the option of a no interest loan, low-income home owners will switch to a more efficient hot water system;*
- *households have varying levels of need;*
- *high-needs households require greater support.*

The HEEUP This approach can be applied to other major energy efficiency upgrades.

Recommendation:

Introduce a program to assist low-income Australians improve the energy efficiency of their homes and so lower their energy bills. The program should:

1. Provide three critical enablers:
    - targeted information from trusted sources on energy efficiency upgrades and residential solar photovoltaics (solar pv)
    - subsidies for efficient hot water (solar, heat pump and instant gas), residential solar pv, and selected other upgrades (including insulation and highly efficient appliances such as refrigerators)
    - access to low-cost loans.
2. Provide graduated levels of support according to household need:
    - base level: all households should have access to relevant information on energy upgrades and this should be tailored for segments of the low-income population including pensioners and CALD communities
    - intermediate level: access a subsidy to reduce the up-front cost of an upgrade, a no interest loan to help manage the out-of-pocket expense, and the option of in-depth, independent decision support
    - high level: increased subsidies with minimal or no co-payments, where clear hardship can be established. This may be needed for households with high energy consumption relative to income, or in energy billing hardship, or with specific health or disabilities that may place them in energy hardship, or who are low income and have specific energy efficiency needs, such as a highly inefficient hot water system

Recommendation 2: Accelerate action in community housing

Community housing providers and tenants wanted energy efficiency upgrades and considerable scope exists to engage them further. Information and brokerage may be needed to do this.

Recommendation:

Introduce an incentive scheme to accelerate the uptake of energy efficiency upgrades in community housing. Funding could focus on the marginal additional cost of installing more efficient fixtures as part of regular maintenance.

Consideration should be given to identifying a broker to assist community housing providers plan a transition to efficiency upgrades of existing housing.

Other recommendations

Recommendation 3: Subsidise solar and heat pump to keep householder contributions low.

Upgrades to solar and heat pump systems were achieved in 65% of participating households with the following subsidy mix:

- *$2,300 to $2,900 for upgrades to solar (with a householder contribution around $2,000)*
- *$2,000 to $2,300 for upgrades to heat pumps (with a householder contribution between $1,600 and $1,800)*

Recommendation:

Provide subsidies of up to $2,900 to keep householder contributions for solar hot water below $2,000 and for heat pump below $1,800.

Recommendation 4: Widen the options available for improving energy productivity

Many HEEUP participants reported they were interested in upgrades other than hot water: rooftop solar photovoltaics (solar PV) was identified as a particular interest.

Recommendation:

Future policy and programs should facilitate householders' access to the most appropriate solutions for reducing their costs and improve energy efficiency including:

- energy efficiency upgrades in existing dwellings
- rooftop solar.

Recommendation 4: Facilitate low cost financing

Low cost financing through NILS was an important enabler for some HEEUP participants. Concessional loans are particularly suitable for low-income home owners when used in conjunction with a subsidy.

Recommendation:

Future programs or policy should fund concessional loans that enable low-income households to improve the efficiency of their homes. Consideration should be given to existing schemes such as the No Interest Loans Scheme (NILS) and council concessional loans (such as Darebin Solar Savers).

Recommendation 6: Quantify the multiple benefits of energy efficiency upgrades

HEEUP found participants had a range of motivations for improving energy efficiency. The program also contributed to a series of non-energy benefits including greenhouse gas emissions reductions, improved amenity, improvements and wellbeing and reduced stress; however, these were not quantified.

Further research should be funded to quantify the multiple benefits of residential energy efficiency upgrades and develop valid and reliable assessment tools. Specific attention should be given to the benefits for health, wellbeing, and reduced stress.

Recommendation 7: Partner with not for profits

The BSL was trusted by HEEUP participants because it is a known, not-for-profit community services provider. This had two benefits described by participants: a demonstrated capacity in engaging with low-income households and communities and a commitment to the best interests of the householder, unlike for-profit service providers.

Recommendation

Opportunities for not-for-profit organisations to provide energy efficiency services to low-income and vulnerable households should be developed. This will expand the reach of energy efficiency programs and address trust barriers.

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