

The background of the entire page is a photograph showing a pair of hands, one from the left and one from the right, cupping a bright, glowing white orb. The lighting is warm and soft, with a color palette dominated by oranges, reds, and yellows. The orb has a subtle texture and a bright highlight, giving it a three-dimensional appearance. The hands are positioned as if they are carefully holding or presenting the orb.

OUTCOMES EVALUATION REPORT FOR THE HOME ENERGY ACTION PROGRAM

**Prepared for NSW Department
of Planning and Environment**

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Clear Horizon

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Acronyms

Acronyms	Description
ABS	Australian Bureau of Statistics
AC	Air conditioning
AEMO	Australian Energy Market Operator
ARO	Appliance Replacement Offer stream
ATSI	Aboriginal and Torres Strait Islander
CALD	Culturally and Linguistically Diverse
CBA	Cost benefit analysis
CCF	NSW Climate Change Fund
CHP	Community Housing Provider
CO ₂ -e	Carbon dioxide equivalent
CSO	Community Service Organisation
DPE / Department	The NSW Government Department of Planning and Environment
DLF	Distribution Loss Factor
EEAP	NSW Energy Efficiency Action Plan
EHA	Energy Hardship Assist stream
GHG	Greenhouse Gas
HEA	Home Energy Action Program
HW	Hot water
KEQ	Key Evaluation Question
KPI	Key Performance Indicator
MLF	Marginal Loss Factor
PV	Photovoltaic
SES	Strategic Evaluation & Statistics team
SHU	Social Housing Upgrade stream
SHP	Social Housing Provider

HOME ENERGY ACTION PROGRAM OUTCOME EVALUATION

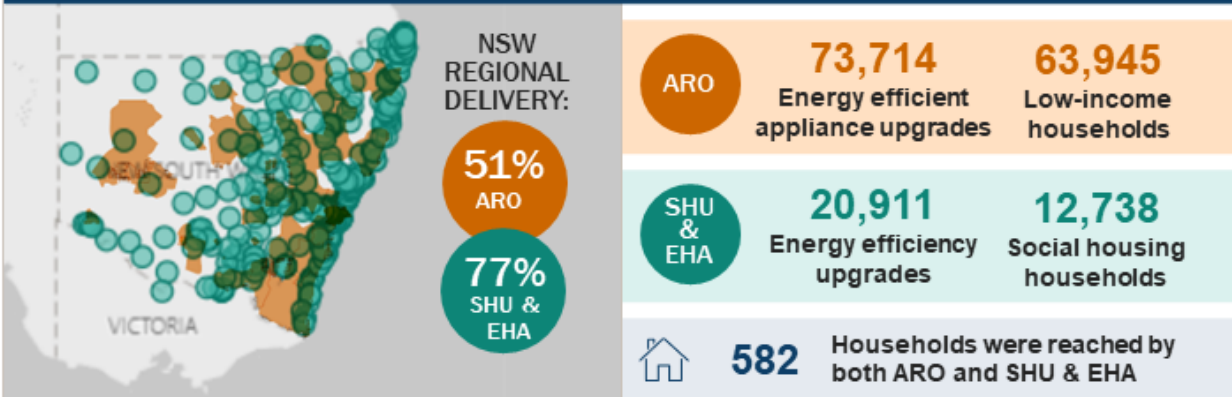
This evaluation focused on phase 2 of the program, that ran from 3 September 2017 to 26 June 2022. The program was made up of 3 streams:

The **Appliance Replacement Offer (ARO)** Stream partnered with an appliance retailer to provide discounted energy efficient appliances, namely televisions and refrigerators, to eligible concession card holders and identified exceptional cases.

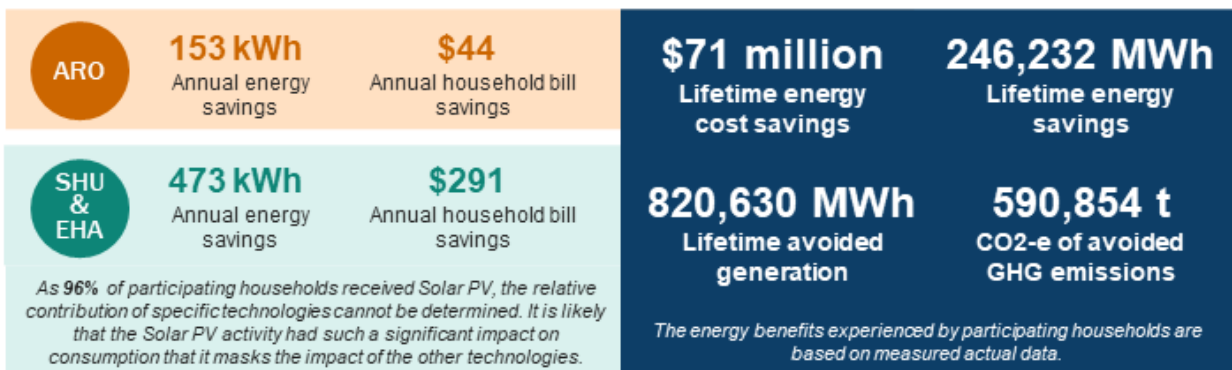
The **Social Housing Upgrade (SHU)** Stream partnered with SHPs to subsidise energy saving home upgrades, such as Solar PV, air conditioning, hot water systems, and draught proofing.

The **Energy Hardship Assist (EHA)** Stream partnered with energy retailers for their hardship customers.

THE PROGRAM IMPROVED ENERGY PERFORMANCE AND LIVEABILITY FOR 76,101 VULNERABLE HOUSEHOLDS IN NSW.



THE PROGRAM PROVIDED ANNUAL ENERGY AND BILL SAVINGS TO THE PARTICIPATING VULNERABLE HOUSEHOLDS.



PROGRAM PARTNERS OUTLINED A NUMBER OF KEY OUTCOMES THEY EXPERIENCED AS A RESULT OF THE PROGRAM.

- ✓ Improved ability to work collaboratively with government and better connections
 - ✓ Understand the communities where they work
 - ✓ Greater knowledge of energy efficiency interventions
 - ✓ Improved capacity to manage and deliver projects
 - ✓ Confidence to pursue future funding opportunities
 - ✓ Strengthened networks between SHPs and CSOs
- ARO** (Appliance Replacement Offer)
- SHU & EHA** (Social Housing Upgrade & Energy Hardship Assist)

EXECUTIVE SUMMARY

Introduction

The Home Energy Action (HEA) program (the program) delivered energy efficiency improvements to households vulnerable to energy stress by helping them access energy saving appliances and home upgrades. The Program was funded under the NSW Climate Change Fund (CCF) and delivered through two phases. The first phase, with a budget of \$26.8M, ran from March 2015 to June 2017, and the second phase ran from September 2017 to June 2022 with a budget of \$49.9M. Only the second phase is evaluated in this report.

The program sought to deliver on NSW Government objectives to reduce bill stress and improve the affordability and liveability of housing in NSW for low-income households that are under energy bill pressure and vulnerable to ongoing energy hardship. It also sought to contribute to the Government's energy savings targets and Commonwealth Governments emissions reduction targets.

The program intended to address the high upfront costs or split incentive barriers vulnerable households face in accessing energy efficient appliances and home upgrades. Removing these barriers would provide a reduction in energy stress for the targeted vulnerable households, who often pay a higher share of their income towards energy bills. Addressing energy bill pressure would mean that vulnerable households would be less likely to ration consumption of energy or forego other essentials below what is comfortable or healthy. This outcome would flow on to have beneficial impacts on health, safety, and reduced financial and housing stress.

The program also aimed to deliver government action on energy efficiency for vulnerable households through partnerships with social housing providers (SHPs), community service organisations (CSOs), and energy retailers. The program included three Streams, outlined in the following table.

Table 1. HEA program Streams and activity summary

Program Stream	Activity summary
Social Housing Upgrade (SHU)	Subsidies for energy efficiency upgrades to residential housing delivered in partnership with social and community housing providers.
Energy Hardship Assist (EHA)	Subsidies for energy efficiency upgrades in social and community housing with a focus on Local Aboriginal Land Council housing delivered in partnership with Energy Retailers for households in or at risk of energy hardship.
Appliance Replacement Offer (ARO)	Discounted replacement of energy efficient appliances to eligible concession card holders and identified exceptional cases, delivered through retail partnerships. Eligible concession holders included those in social housing, in private rental market or homeowners.

This outcomes evaluation examined the effectiveness and impact of key outcomes, measured long-term impacts (sustainability and durability) of the program, identified social benefits, spill-over benefits, and other unintended outcomes, and assessed the appropriateness of the design and equity of implementation against the intent to target vulnerable households.

This evaluation focused on phase 2 of the program, that ran from 3 September 2017 to 26 June 2022, and its design was informed by the HEA Program Evaluation Plan (v3 May 2022), program logic, and key evaluation questions. Data collection, analyses, and synthesis was undertaken to inform evidence-based findings that respond to each KEQ. The evaluation used a mixed methods approach to capture qualitative and quantitative evidence, utilising a range of data, including interviews, comparison of pre and post surveys, program documents and reports, participating household interview transcripts, and measured actual data for participating households provided by the Australian Energy Market Operator (AEMO).

The energy and bill savings findings reported in this evaluation are based on the *measured actual data* provided by AEMO for the purpose of this evaluation. This data was weather normalised using a regional analysis. A key limitation affecting the methodology was the high level of variability within this data set. For each technology, the analysis found measured savings to be lower than the *estimated savings* that were used by the program team in the design and ongoing reporting of the program. A comprehensive comparison of the measured and estimated data sets was beyond the scope of this evaluation.

Relatedly, during the program period (2017 – 2022), NSW experienced a number of natural disasters, including the 2019-2020 Black Summer Bushfires and multiple severe Storm and Flooding events, the impacts of the COVID-19 global pandemic, and the onset of cooler and wetter weather from the 2020-21 summer with a protracted La Nina period. These external challenges are likely to have influenced energy consumption behaviour, however, the extent of this influence was beyond the scope of this evaluation.

Key findings

The evaluation found the program provided multiple and linked benefits to vulnerable households. The program improved the affordability and liveability of housing in NSW for low-income households that are under energy bill pressure and vulnerable to ongoing energy hardship. Energy efficiency upgrades provided participating vulnerable households with energy bill savings and decreased associated bill related stress through reduced consumption of energy from the grid, as well as greater control over energy usage. Furthermore, improvements in thermal comfort, reductions in mould, improvements to health and health conditions, and improvements to social connectivity were all seen for participating households.

The energy benefits experienced by participating households are based on measured actual data. The whole program contributed to lifetime energy cost savings of up to \$71 million for participating households, lifetime energy savings of up to 246,232 MWh, lifetime avoided generation of 820,630 MWh, and lifetime savings of up to 590,854 t(CO₂-e) of avoided GHG emissions.

Equity was maintained as a guiding principle that informed the program's design and delivery. ARO successfully targeted low-income households through focusing on eligible concession card holders, and the SHU & EHA targeted vulnerable households through engaging social housing tenants via partnerships with SHPs and Energy Retailers. The program also prioritised reach to regional areas of NSW, being all the state except the metropolitan areas of Greater Sydney, Newcastle, and Wollongong¹. ARO achieved this through partnership with an appliance retailer that could deliver state-wide, and the SHU & EHA achieved this through strategically partnering with SHPs operating in regional areas.

Delivering the program through partnerships enabled the program to catalyse energy efficiency upgrades for partners, improve their understanding of energy efficiency upgrades, build their capacity and

¹ [Regional NSW Today](#)

confidence in project management, and further embed energy efficiency considerations in their day-to-day operations.

Outcomes

Upgrades delivered to vulnerable households.

The program improved energy performance and liveability for 76,101 vulnerable households in NSW. Through the ARO, 73,714 energy efficient appliances were upgraded for 63,945 low-income households, this included the replacement of 55,743 refrigerators and 17,971 televisions with more energy efficient models. Through the SHU & EHA Streams, the program delivered 20,911 energy efficiency upgrades for the benefit of 12,738 households in collaboration with 27 different SHPs. There were 582 households that were reached by both ARO and SHU & EHA.

The program vastly exceeded its initial target of 40% regional delivery, with 51% of those that participated in ARO being regionally located, and 77% of those engaged through SHU & EHA also being regionally located.

The delivery of upgrades through the SHU & EHA stream contributed to overcoming the cost barrier associated with the upgrades through partner co-contributions. Of the \$83 million was spent on these upgrades, roughly 63% of this represented the co-contribution of partners.

Energy outcomes

The program provided annual energy and bill savings to the participating vulnerable households. Through the ARO Stream, upgraded appliances contributed to average annual energy savings of 153 kWh and average annual household bill savings of \$44. The SHU & EHA contributed to average annual energy savings of 473 kWh and household bill savings of \$291. As 96% of participating households in the EHA & SHU streams received solar PV, the relative contribution of specific technologies cannot be determined. It is likely that the Solar PV activity had such a significant impact on consumption that it masks the impact of the other technologies.

Solar PV contributed to alleviating energy poverty for participating households. While households that received Solar PV reduced their consumption of energy sourced from the grid, their overall household energy consumption (grid plus PV) increased. This increase may be evidence that the installation of Solar PV enabled them to address previous energy poverty, such as rationing or forgoing energy use for heating and cooling. An investigation of energy use behaviour to this level was not within scope of this evaluation.

As a whole, the program was delivered to households across three NSW Regions / Climate Zones. Whilst average energy and bill savings for houses does vary across the regions and climate zones, the variability in the data prevents any meaningful comparisons of savings between regions being drawn.

Household wellbeing outcomes

Within the SHU & EHA, vulnerable households experienced a number of affordability, liveability and wellbeing improvements and benefits. Thermal comfort improvements were seen in increased comfort of participant living rooms and bedrooms, as well as decreased issues with draughts in homes. Emotional wellbeing improvements and benefits were experienced through a reduction in energy bill related stress, a greater sense of control over energy usage, and an improved ability to pay for energy usage. Health

benefits were seen, in terms of decreases of mould and mildew in homes, and improvements to health conditions. Participants also experienced improvements to their social wellbeing as a result of improvements to their homes, including greater connectivity with family and friends. Within the ARO, the most notable wellbeing outcomes were improvements to diets and social connectivity.

The contribution of the SHU & EHA streams to improvements of household energy efficiency knowledge is unclear. The team supported SHP partners through the provision of education materials on how to use energy efficient appliances and save money on energy bills. The team also directly built partners energy efficiency education capability through facilitating training on how to educate participating households. However, there was an increase between pre and post surveys in the number of participating households who indicated they either couldn't remember, or were unsure, if they received energy efficiency information materials. Noting this, participating households that did receive information reported an improvement in their knowledge of how to use energy efficient appliances and save money of their energy bills due to how easy the information was to understand and its usefulness for energy and bill saving behaviours.

SHP partners highlighted a range of challenges associated with providing vulnerable households with energy and bill savings information, including English literacy, tenants not being home, tenants not having a reliable contact number, and challenges associated with COVID-19 lockdowns and restrictions on movement.

Program Partner outcomes

Partnership was fundamental to the delivery model of the program, and extensive time and effort were given by the program team to develop the relationships with partners. Program partners across all streams noted that this resulted in the design of a program that was better aligned to their needs and improved delivery throughout the life of the program.

Program partners, including social housing providers, community service organisation and appliance and energy retailers, outlined a number of outcomes they experienced as a result of the program. For SHU & EHA partners, this included energy efficiency upgrades to social housing stock that wouldn't have occurred otherwise, greater knowledge of energy efficiency interventions, improved capacity to manage and deliver projects, confidence to pursue future funding opportunities, as well as strengthened networks between SHPs and CSOs. The ARO partner noted improved ability to work collaboratively with government and better connections with, and understanding of, the communities in which they work, as key outcomes.

Equity

Equity was a guiding principle of the program throughout design and delivery.

Equity in design

Equity was a guiding principle that informed and shaped the design process. Substantial time was given to incorporating equity into the program during its design phase. This involved extensive consultation processes with prospective partners, as well as thorough research undertaken by the team. This preliminary work enabled the program to consider how to target vulnerable households and operate in a manner that was accessible to vulnerable households. The program design ensured only vulnerable households accessed the program, with a focus on low-income households for the ARO stream and social housing tenants for the SHU/EHA stream.

Equity in delivery

Equity was further fostered and prioritised during delivery by the ongoing flexibility and autonomy afforded to the team, their ability to work adaptively with partners, and an ongoing emphasis on learning, improvement, and adaptation. The subsidies on energy efficient upgrades were provided through the program in partnerships with social housing providers, community service organisations, energy retailers, and an appliance retailer across metropolitan and regional NSW.

The autonomy and flexibility afforded to the program team enabled them to adapt and persist with delivery despite delays and challenges. For the ARO, the team was able to carefully consider flexibility in eligibility requirements and empower CSOs to make decisions about inclusion in the program. This close collaboration with CSOs not only enhanced the visibility of the program, but also worked to ensure access for those that needed it.

For the SHU & EHA the adaptive approach meant the program actively negotiated which SHPs they partnered with and prioritised. This meant they could extend access to vulnerable communities, as well as pursue considerable investment in capacity building for smaller SHPs so their tenants could benefit from the program. A key challenge that the SHP partners encountered was the requirement that smart meters be installed for every Solar PV system. A lack of clarity on whether smart meters were installed, who was responsible for undertaking the installation, as well as confusion as to who was permitted or responsible for turning the Solar PV systems on once the smart meters had been installed, resulted in delays for some vulnerable households in receiving the benefits provided by Solar PV.

Recommendations

The following recommendations have been synthesised from the findings surfaced through the evaluation, and cover program MERI, design, and delivery. The recommendations for future programs focus on building on the success achieved through the program period.

- Continue to **utilise and strengthen program measurement, evaluation, reporting, and improvement (MERI) systems and processes**, with a focus on using the data and insights to inform decision making for future programs, including comprehensive planning for data collection, storage, use and quality control.
- Continue to invest time and resources in collaboration and research to **ensure future program design draws on the most up to date information and evidence about energy efficiency and household liveability upgrades** and is grounded in the experiences and needs of target beneficiaries.
- Continue to **deliver future programs through partnerships and balance the opportunities** for the achievement of greater reach through high-capacity partners, with opportunities to build capacity of lower-capacity partners.
In addition, greater investment in, and prioritisation of, individuals within partner organisations that have existing relationships and consistent interactions with vulnerable households is encouraged. This will enhance the visibility of programs and improve energy efficiency and bill savings education efforts.
- Continue to **uphold a customer-centric and adaptable approach to program delivery** to ensure that programs are sufficiently responsive to the needs of target beneficiaries, and responsive to contextual influences such as the COVID pandemic, bushfires and floods experienced during the previous program period.

1 INTRODUCTION

1.1 Program Background

The Home Energy Action (HEA) program (the program) delivered energy efficiency improvements to households vulnerable to energy stress by helping them access energy saving appliances and home upgrades. The Program was funded under the NSW Climate Change Fund (CCF) and delivered through two phases. The first phase ran from March 2015 to June 2017 with a budget of \$26.8M and, and the second phase ran from September 2017 to June 2022 with a budget of \$49.9M. The program was delivered by the former Sustainability Programs Branch, now the Climate Change and Sustainability Division, within the Office of Energy and Climate Change.

The program sought to deliver on NSW Government objectives to reduce bill stress and improve the affordability and liveability of housing in NSW for low-income households that are under energy bill pressure and vulnerable to ongoing energy hardship. It also sought to contribute to the Government's energy savings targets and Commonwealth Governments emissions reduction targets.

As outlined in the program logic (Appendix A), the program aimed to contribute to these outcomes by providing vulnerable households with access to a range of household energy saving upgrades. The program consisted of three Streams, outlined in Table 2, that were designed to provide options and opportunities for vulnerable households that would encourage and enable the acquisition or implementation of more energy efficient technologies. The program also worked to improve energy literacy and consumption behaviour to support households in their ability to maximise their energy and bill savings.

Table 2. HEA program Streams and activity summary

Program Stream	Activity summary
Social Housing Upgrade (SHU)	Subsidies for energy efficiency upgrades to residential housing delivered in partnership with social and community housing providers.
Energy Hardship Assist (EHA)	Subsidies for energy efficiency upgrades in social and community housing with a focus on Local Aboriginal Land Council housing delivered in partnership with Energy Retailers for households in or at risk of energy hardship.
Appliance Replacement Offer (ARO)	Discounted replacement of energy efficient appliances to eligible concession card holders and identified exceptional cases, delivered through retail partnerships. Eligible concession holders included those in social housing, in private rental market or homeowners.

The department partnered with Social Housing Providers (SHPs), Community Service Organisations (CSOs), appliance retailers, and energy retailers to deliver the program to vulnerable households. The program reached 76,101 vulnerable households in NSW. The ARO stream reached 63,945 households, the SHU & EHA Streams reached 12,738 households. 582 households were reached by both the ARO and SHU & EHA Streams.

1.2 About the evaluation

Purpose

The purpose of the evaluation was: to assess the **effectiveness** and **impact** of the program’s second phase (2017-2022); to assess the program’s social benefits and unintended outcomes; and to assesses the **appropriateness of the program design** and the **equity of implementation** against the intent to target vulnerable households. The evaluation presents **learnings** and recommendations to inform future plans, policies, and the delivery of relevant programs.

Approach and Methodology

The evaluation was delivered in line with the HEA Program Evaluation Plan (v3 May 2022), Project IV Outcomes Evaluation. The evaluation responds to the key evaluation questions (KEQs) outlined in the evaluation plan, using the structure presented in Table 2.

Table 3. Evaluation report structure and key evaluation questions (O = Outcomes)

Outcomes
<i>Upgrades delivered to vulnerable households</i>
O2.1 To what extent has the program targeted and assisted households vulnerable to energy stress?
O2.2 To what extent has the program reached vulnerable households in regional areas?
<i>Energy outcomes</i>
O1.1 To what extent has the program contributed to achieving energy saving and avoiding generation of GHG emissions?
O1.2 To what extent has the program contributed to energy and bill savings for households?
O1.3 To what extent has the installation of various technologies contributed to energy and bill savings for households?
O1.4 To what extent has the program resulted in energy and bill savings across various regions / climate zones?
<i>Household wellbeing outcomes</i>
O1.5 To what extent has the program contributed to thermal comfort and well-being co-benefits to participants?
O1.7 To what extent has the program enabled partners to provide vulnerable households with knowledge of how to use energy efficiently
<i>Program partner outcomes</i>
O4.1 To what extent has the program accelerated the upgrade or otherwise improved social housing stock in terms of energy performance and liveability?
O4.2 To what extent has the program assisted housing provider partners to embed energy efficiency / renewable energy considerations in operations and maintenance?

O1.6 What have been the broader social benefits – both intended and unintended - of the program?

Equity

O2.1 To what extent has the program targeted and assisted households vulnerable to energy stress?

O2.3 To what extent is access to the program equitable to households vulnerable to energy stress?

The evaluation design was informed by the program logic and key evaluation questions. Data collection, analyses, and synthesis was undertaken to inform evidence-based findings that respond to each KEQ. The evaluation used a mixed methods approach to capture qualitative and quantitative evidence. The evaluation drew on the existing available data collected through the ongoing delivery and evaluation of the HEA program, and additional data collected through interviews with program staff and program partners. The evaluation was contracted to undertake an analysis of measured actual energy data of energy and bill savings for participating households. This was provided by the Australian Electricity Market Operator (AEMO) and was weather normalised using a regional analysis (see Attachment B for further explanation). Table 4 presents the data used in the evaluation.

Table 4. Data summary

Data source	# of data points
Existing program data	
SHU/EHA and ARO datasets	2 datasets (1 for SHU & EHA, 1 for ARO), that included application data, type of upgrade, AEMO analysis, demographic information, Program KPI reporting, and energy savings, energy bill savings
PowerBI datasets	2 datasets (1 for SHU & EHA, 1 for ARO), that included application data, type of upgrade, AEMO analysis, demographic information, Program KPI reporting, and energy savings
DPE led participating household social research	NVIVO dataset of transcripts for phone interviews with 30 participating households
Matched pre and post <i>Multiple Benefits Survey</i> data	164 matched participating household respondents (From sample of: Pre n=240; Post n=426)
Previous Program Evaluations	4 documents
SHP training evaluation	1 document
Project closure reports	7 reports from Program Partners
Data collected for the evaluation	
Program Partners interviews	10 semi-structured interviews (4 social housing providers, 3 Funding partners, 2 Community Service Organisations, 1 Technical Specialist)

Data source	# of data points
Program Staff interviews	8 semi-structured interviews
DPE analysis description	1 document outlining method of analysis to determine degree of household overlap between ARO and SHU/EHA Streams

The quality of existing program data and data collected for this evaluation was confirmed through ongoing communication with the Strategic Evaluation & Statistics (DES) team throughout the evaluation to ensure that the right data was provided and appropriately deidentified where necessary. Details of the quality assurance processes for the energy and bill savings analysis is detailed in Attachment B. Quantitative data was analysed using descriptive statistics and qualitative data was analysed using thematic analysis to surface key themes. Where relevant, quotes have been integrated into the report to illustrate key points using participant codes that communicate the type of stakeholder (e.g., **PS#** represents program staff, **SHP#** a social housing provider, **FP#** a funding partner, **CSO#** a community service organisation, **TS#** a technical specialist, and **I#** a participating household of the DPE social research).

The results of data analysis were then synthesised against the KEQs to develop evaluative findings. The findings that emerged through the synthesis process were found to gather more coherently against the structure presented in Table 3. A sense-making workshop was held with key program and Department staff to collaboratively review and validate the evidence, test the key findings, and inform the development of recommendations. Following this, a recommendations workshop was also held with key program and Department staff to identify the key areas for recommendations and elicit any contextual insights to ensure that the recommendations crafted by the evaluation team were both accurate and relevant for future programs.

Energy Savings

Energy Savings: Energy savings are calculated as a difference between household consumption pre-upgrade and post-upgrade, this figure is also referred as ‘energy savings from reduction in consumption’ notably from the electricity grid.

Avoided Generation: Avoided generation is the avoided cost and effort in producing an additional kWh or MWh of electricity. This is the sum of energy efficiency savings from the program, avoided electricity generation due to renewable solar exports, and avoided line losses due to energy savings and new solar generation. Note that in cases where there is no solar PV, avoided generation is the sum of energy savings due to the program and corresponding savings from avoided line losses.

Avoided Line Losses: Avoided line losses are calculated using NSW’s Marginal Loss Factor (MLF) and Distribution Loss Factor (DLF).

Cost Savings

Cost savings from reduced energy consumption as a result of the program is calculated using NSW’s average electricity price of 28.66 cents per kWh sourced from Canstar Blue². As such, cost savings are provided in nominal April 2023 Australian dollars.

² [Canstar Blue – Average Electricity Prices in Australia per kWh](#)

Cost benefits from solar export rebates for households that received solar PV upgrades is calculated using IPART's average benchmark all-day feed-in-tariff³ for NSW in 2022 - 2023. The average rebate rate calculated is 8.3 cents per kWh, this is derived by averaging the all-day feed-in-tariff range of 6.2 to 10.4 cents per kWh.

Emissions Reduction

Emissions reduction figures are calculated based on expected avoided electricity generation as a result of the program. The avoided volume of emissions uses carbon dioxide equivalent intensity of NSW's electricity generation in 2021⁴ and is measured in tonnes of carbon dioxide equivalent per MWh i.e., t(CO₂-e)/MWh. NSW's 2021 average carbon intensity of electricity generation = 0.72 t(CO₂-e)/MWh.

Regional NSW

The program prioritised reach to regional areas, this is understood to be all of the state of NSW except the metropolitan areas of Greater Sydney, Newcastle, and Wollongong⁵.

Vulnerable households

Vulnerable households are understood as households that are 'vulnerable to energy stress'. As outlined in the Mid-term Process Evaluation (2020), vulnerable to energy stress is defined as those people or households that may:

- Struggle to pay their electricity or other energy bills due to income to energy cost disparity,
- Pay their energy bill and be unable to pay for other essential household items,
- Be unable to pay their bill and experience disconnection,
- Live in thermal discomfort because they reduce heating and cooling in summer and winter months to avoid high bills, and
- Go into debt with payday lenders to avoid defaulting on payments

1.3 Limitations

Every effort was made to deliver a rigorous evaluation within the available budget. However, the following limitations are noted:

- The degree of overlap between ARO and SHU/EHA datasets, in terms of the households that participated in both Streams, was calculated by the SES team with multiple limitations identified. (detailed in Doc 19).
- There was a high degree of variability within the ARO and SHU/EHA datasets provided by AEMO that limited the ability to draw robust conclusions from many of the analysis undertaken. In addition, for the SHU/EHA datasets the dominance of Solar PV installs, and correspondingly small number of other energy efficiency upgrades delivered in isolation, has meant that seeking averages for these other activities and then comparison between them is not feasible.
- A comprehensive comparison of the methods and assumptions used for analysis the *measured actual data* undertaken for this evaluation and the *estimated savings data* used throughout the design and delivery of the program by the program team, is beyond the scope of this evaluation.

³ [IPART – Solar feed-in tariff benchmarks 2022-23](#)

⁴ [Carbon Dioxide Equivalent Intensity Index \(CDEII\) - AEMO](#)

⁵ [Regional NSW Today](#)

- Energy and bill savings data for the SHU and EHA streams that was provided for analysis has been paired together. Given both streams both targeted social housing tenants, these have been analysed together.
- The evaluation drew on interview data collected from participating households that was conducted by the Department. This social research was intended to surface the social and broader wellbeing benefits experienced by participating households. This research was not designed by the Clear Horizon team, and further engagement with participating households was out of scope for this evaluation.
- The evaluation drew on survey data collected from participating households that was conducted by the Department. The Multiple Benefits Survey was a pre and post survey provided to households before and after participating in the SHU & EHA Streams. Variations in the framing of questions between the pre and post surveys (described in Appendix B) limit the conclusions that can be drawn. In addition, the provided survey data was not linked to specific participants and so neither the energy or bills savings, or the specific energy efficiency upgrades they received, is unknown.
- The evaluation drew on a sample of program partner project closure reports (seven), which was a subset of the total number (27) of project closure reports.
- Limitations in previous evaluations are stated in the respective reports.
- A list of Program staff and Program partners were provided to the evaluation team for interviews. The convenience sample used for this evaluation was based on those that responded and were able to participate. While evaluation achieved an adequate diversity of types of program partners, it does not represent the views of all program partners.

1.4 Report structure

This Findings section of the report is structured against the two evaluation headlines of Outcomes and Equity, introduced in Table 3, with a section Heading and summary of key findings presented in coloured boxes, as illustrated below. The Recommendations section follows the Findings.

Section Heading

Finding Summary

2 FINDINGS

The findings of the evaluation are presented beneath the overarching themes of Outcomes and Equity. The Outcomes section is separated against Energy Outcomes, Household Wellbeing Outcomes, and Program Partner Outcomes. The Equity section is separated against the Reach of the Program, Equity in Design, and Equity in Delivery. The relevant KEQs are listed beneath each section heading.

2.1 Outcomes

The program provided multiple and linked benefits to vulnerable households. Energy efficiency upgrades provided vulnerable households with savings in energy usage (i.e., reduction in consumption from the grid) and savings in their energy bills. These savings resulted in a reduction in energy bill related stress, as well as improvements in control over energy usage and an improved ability to pay energy bills for participating households. Furthermore, improvements in thermal comfort, reductions in mould, improvements to health and health conditions, and improvements to social connectivity were all seen for participating households.

2.1.1 Upgrades Delivered to vulnerable households

The section of the report provides findings related to the extent that the program targeted and assisted households vulnerable to energy stress (KEQ O2.1), and the programs reach to regional areas (KEQ O2.2).

The program improved energy performance and liveability for 76,101 vulnerable households in NSW. Through the ARO, 73,714 energy efficient appliances were upgraded for 63,945 low-income households, this included the replacement of 55,743 refrigerators and 17,971 televisions with more energy efficient models. Through the SHU & EHA Streams, the program delivered 20,911 energy efficiency upgrades for the benefit of 12,738 households in collaboration with 27 different SHPs. There were 582 households that were reached by both ARO and SHU & EHA.

The program vastly exceeded its initial target of 40% regional delivery, with 51% of those that participated in ARO being regionally located, and 77% of those engaged through SHU & EHA also being regionally located.

The program targeted and reached vulnerable households, with ARO focusing exclusively on low-income households by requiring a concession card to participate, and the SHU & EHA Streams partnering with social housing providers, whose tenants were all renters and low-income earners. The SHU & EHA Streams also targeted and reached Aboriginal and Torres Strait Islanders (ATSI) through partnerships with the Aboriginal Housing Office, Local Aboriginal Land Councils, or Aboriginal Housing Corporations.

The program reached a total of 76,101 vulnerable households in NSW with 63,945 households participating in the ARO stream, 12,738 households participating in the SHU & EHA Streams, and 582 households participating in both Streams. Due to limitations with the data, the number of ATSI and CALD households cannot be ascertained.

The equity of the program is demonstrated by comparing the proportion of participating households with different characteristics⁶ of vulnerability to the state-wide averages. This method was used in the mid-term evaluation to provide an indication of the different kinds of vulnerable households who benefited from the program. Table 5 illustrates the reach and equity of the program Streams based on the proportion of activities provided by each stream against characteristics of vulnerability including households in regional areas, renters, single parent households, and households from CALD backgrounds or who identify as ATSI. The available data from both Streams showed that the proportion of participating households with these characteristics is higher than that of NSW.

Table 5. Reach and equity based on program activities.

Question area	ARO	SHU & EHA	NSW population (ABS census 2021)
# of households	63,945	12,738	NA
% of households in regional areas	51%	77%	35%
% of households renting	43%	100%	33%
% of households comprised of a single parent with children at home	19%	NA	16%
% of activities CALD	20%	NA	5.7%
% of activities ATSI	5%	NA	3.4%

2.1.2 Energy Outcomes

The following section provides the findings related to the energy savings and avoided greenhouse gas (GHG) emissions (O1.1), the energy and bill savings for households (O1.2), and insights into how the energy and bills savings were achieved through various technologies (O1.3) and across various climate zones (O1.4).

The program contributed to lifetime energy cost savings of **\$71 million** for participating households as a result of lifetime energy savings of up to **246,232 MWh**. The program also provided lifetime avoided generation of **820,630 MWh** of energy and lifetime savings of up to **590,854 t(CO₂-e)** of avoided GHG emissions.

The program contributed to energy and bill savings for participating households in the constitutive Streams. The EHA & SHU Streams contributed to average annual household energy savings of **473 kWh** and associated annual bill savings of **\$291**. The ARO Stream contributed to average annual household energy savings of **153 kWh** and associated annual energy bill savings of **\$44**.

The broader societal benefits achieved through the program are understood as the total energy savings from the grid, the avoided generation of energy, and reduction in GHG emissions over the lifetime of the

⁶ Australian Council of Social Services, Brotherhood of St Lawrence & Australian National University, *Energy Stressed in Australia*, October 2018

installed technologies. These findings are based on the average savings found for households that participated in the program.

Average annual savings results for the EHA & SHU Streams were based on measured actual data for 6,246 addresses. For the ARO Stream, the matched AEMO data provided results for 37,300 addresses. The respective annual energy and bill savings per household for each Stream are shown in Table 6. The increased average bill savings for those with solar PV is because of the solar Feed in Tariff⁷ income that these addresses have included in their bills.

Table 6. Annual average measured actual savings per household for each program Stream

Question area	EHA and SHU	ARO
Annual average energy savings per household (kWh per year)	473	153
Annual average bill savings per household (per year)	\$135	\$44
Annual average bill savings per household (plus average feed in Tariff of \$156 per year for the 96% of households with PV). (Per year)	\$291	NA

These results were then extrapolated for the total households that participated in the program. For the EHA & SHU stream this was 12,738 households. A 25-year⁸ lifetime calculation was then made, see Table 7. For the ARO stream the results are also extrapolated to provide an estimated result for all 63,945 addresses that accessed the ARO program. A 10-year lifetime calculation⁹, for the televisions and refrigerators, was then made. Lifetime calculations refer to the expected use life of the upgrades and appliances. Results are also shown below in Table 7.

Table 7. Lifetime savings per program Stream.

Question area	EHA / SHU lifetime savings (25 years)	ARO lifetime savings (10 years)
Energy savings	150,692 MWh	98,294 MWh
Avoided energy generation (Includes Line Losses of 7.25%)	718,164 MWh	105,420 MWh
Avoided GHG emissions (Includes Line Losses of 7.25%)	517,078 t (CO ₂ -e)	75,902 t (CO ₂ -e)
Bills savings	\$43 million	\$28 million

⁷ Based on [IPART - Solar feed in tariff benchmarks 2022-23](#)

⁸ This was the same number of years used in the 2018 HEA program interim report.

⁹ Based on [Choice lifetime estimates](#)

Contribution of technologies

The relative contribution of different technologies cannot be determined due to limitations with the data sets. Almost all (96%) of participating households for the SHU & EHA Streams received solar PV, and it is likely that the PV activity had such a significant impact on consumption that it masks the impact of other technologies.

Solar PV contributed to alleviating household energy poverty. While households that received PV reduced their consumption of energy sourced from the grid, their overall household energy consumption (grid *plus* PV), significantly increased.

Solar PV also contributed to exporting **22,145,777 kWh per year** of emissions free energy into the NSW grid, therefore resulting in a reduction of **14,611 t(CO₂-e) emissions per year** from the NSW grid.

The four different energy efficiency upgrades for this analysis included: solar PV, hot water systems, air conditioning, and draught proofing. The number of upgrades and various combinations in which they were delivered, as well as the measured impact on energy consumption, is shown in Table 8 below.

Table 8. Sample of Measured results from the various technology options.

Activity	Number of upgrades	Average Actual energy savings from reduced consumption (kWh per year)	Average bill savings from reduced consumption (not incl. PV exports) (\$ per year)
Households without PV			
Hot water (HW)	163	1,096	\$314
Draught proofing (DP)	73	(+235)	\$(+67)
Air conditioning (AC)	17	206	\$59
DP, HW	4	487	\$142
Households with Solar PV			
PV	2,891	558	\$160
PV, DP	1,389	500	\$143
AC, DP, PV	1,396	260	\$74
PV, AC	298	327	\$93
PV, HW	15	1,103	\$316
Program total	6,245	Average = 473 kWh	Average = \$135

Table 6 shows that of the 6,246 addresses that had suitable data, 5,989 of these addresses included PV, amounting to 96% of the overall number. The difference in the sample sizes between households without

PV and households with PV is too large to make meaningful comparisons. There is also insufficient data for addresses that had only one of the three other upgrade activities to make meaningful comparisons.

Additionally, analysis of the data revealed that the data set had very large variability, which further cautions comparison between technologies and prevents conclusions about contributions from specific technologies. For example, the 1,369 households that had air conditioning, draught proofing, and Solar PV had an average annual energy saving of 260 kWh – but – the 298 households that *only* had air conditioning and Solar PV had a higher average annual energy saving of 327kWh. Similarly, the 2,981 households that only had Solar PV installed had a greater reduction in energy consumption than the 1,389 households that had Solar PV and Draught proofing, 558 kWh and 500 kWh respectively. This example illustrates the significance of the variability, i.e., energy consumption of participating households, and its impact on being able to determine robust comparisons between energy efficiency technologies.

Comparison between Measured and Estimated savings

The datasets for this evaluation also included an estimated savings for activities undertaken through the program. For the SHU & EHA activities, estimated annual kWh savings were provided. This is compared with the measured actual savings from the AEMO data set below in Table 9Table 10. No data was available on varying combinations of activities for the estimated data.

Table 9. Comparison of MEASURED and ESTIMATED savings for SHU & EHA

Activity	MEASURED ACTUAL Average energy savings (kWh per year)	ESTIMATED Average energy savings (kWh per year)
Solar PV	558	3,428 For 3.1 kW Average (i.e., counting all including exports)
HW	1,096	2,400 => 5,500 (Range of system sizes 52 to 325 Litre)
DP	(+235)	NA (No numbers in the spreadsheet)
AC	206	208 => 850 (Range 2.5 to 6 kW System)

For the ARO activities, estimated annual kWh and bill savings were provided. This is compared with the measured actual savings from the AEMO data set below in Table 10.

Table 10. Comparison of MEASURED and ESTIMATED savings for ARO

Activity	MEASURED ACTUAL Average energy savings (kWh per year)	ESTIMATED Average energy savings (kWh per year)	MEASURED ACTUAL Bill savings per year in \$AUD	ESTIMATED Bill savings per year in \$AUD
Television	153	527	44	122
Fridge		738		170

A thorough comparison of the methods and assumptions underpinning the analysis of the *Measured Actual* and *Estimated* savings is beyond the scope of this evaluation. In each instance, the estimated savings are considerably higher than that found in the measured actual savings. It is again worth noting that the measured actual data is drawn from a cohort of vulnerable households over a period in which significant external challenges, such as natural disasters and a global pandemic, were likely to have a significant impact on their energy consumption behaviours.

Contribution of Solar PV

Households that had Solar PV installed not only showed a reduction in energy consumption from the NSW grid but also a contribution of emissions free energy to the NSW grid via Solar PV exports, as well as a reduction in energy poverty.

Based on suitable data, the average Solar PV export per participating household is **1,811 kWh per year**. Extrapolating this to the 96% of the households that participated in the SHU and EHA Streams results in a total of **22,145,777 kWh** of Solar PV exports per year. The estimated volume of energy exported results in a total reduction of **14,611 t(CO₂-e) emissions per year** from the NSW grid.

Whilst participating households that had Solar PV installed experienced a reduction in energy consumption of energy sourced from the grid, their overall household energy consumption (grid plus PV) is seen to have increased. The findings show an average increase of **2,394 kWh per year** in overall energy consumption, likely enabling households to increase their use of energy for things such as heating and cooling. The absence of linked data prevents certainty or quantification of this. The detail of this estimation is based on the average Solar PV system installed for the Streams being 3.1kW and Feed in Tariff of 8.3c/kWh. The detail of the estimation is outlined in Table 11 and illustrated in Figure 1.

Table 11. Change in average energy consumption for a single household with Solar PV system.

Detail for average single household	kWh per year
Before installation of Solar PV system	
Average NSW grid power consumed before PV	7,135
After installation of Solar PV system	
Average power generated by 3.1 kW PV system installed	4,671
<i>Average Solar PV power consumed at address</i>	2,860

Detail for average single household	kWh per year
<i>Average export of Solar PV power to NSW grid</i>	1,811
Average NSW grid power consumed after PV	6,669
Average reduction in energy consumed from NSW grid	466
Average energy consumed 'After' (grid + PV)	9,529
Average increase in overall (grid + PV) energy consumption	2,394

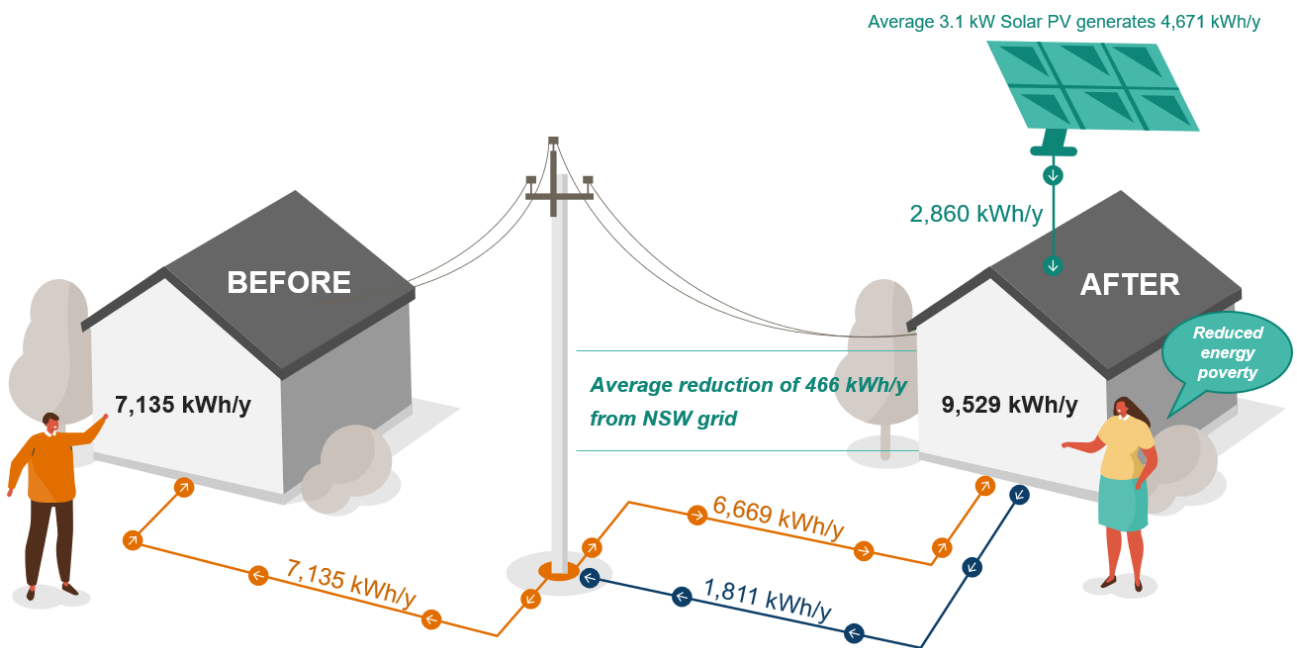


Figure 1. Schematic diagram of Solar PV self consumption.

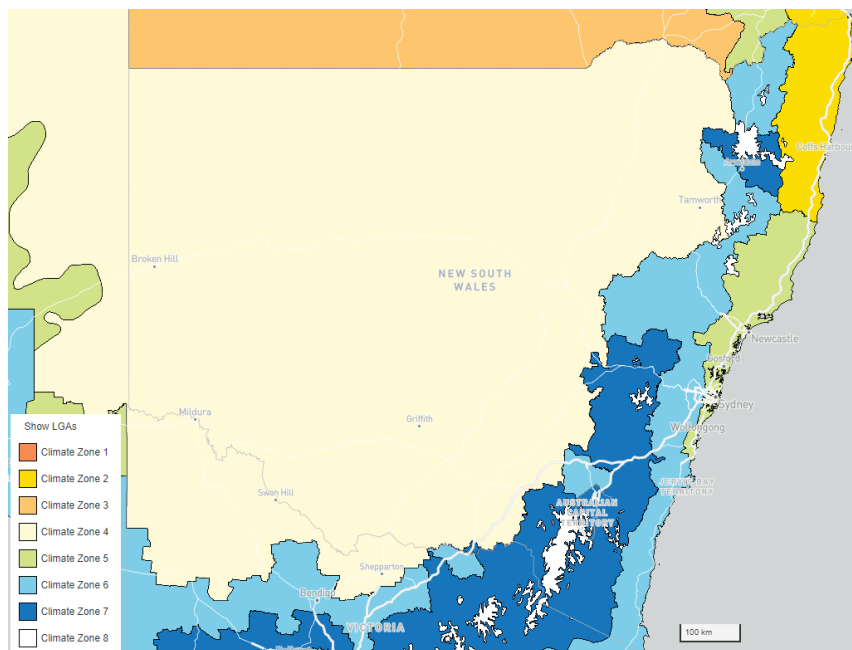


Figure 2. Climate Zones of NSW (ref: <https://www.abcb.gov.au/resources/climate-zone-map>).

Savings across climate zones

The program was delivered throughout NSW to households across the three Climate Zones. Variability in the data prevents any meaningful comparisons of savings between regions being drawn.

Household energy and bill savings were analysed across the three relevant regions / climate zones of NSW, see Figure 2, for the 96% of matched addresses that included PV activity (n=5,989).

Whilst the total bill savings do vary across the three regions, as seen in Table 12, the variability of the data prevent any meaningful comparisons being drawn.

Table 12. Average Energy and bill savings by region & climate zone.

Region & Climate Zone/s	No. of households (n = 5989)	Average reductions (kWh per year)	Average bill saving per household (\$ per year)	Average PV Export	Feed in Tariff Credit	Total average bill saving
Interior NSW Zone 4 <i>Hot dry summer, cool winter</i>	3,531 (59%)	458	\$131	2,035 kWh	\$168	\$300
North NSW Zone 2, 5 <i>Warm humid summer, mild winter</i> <i>5: Warm temperature</i>	1,163 (19%)	384	\$110	1,607 kWh	\$133	\$243
South NSW Zones 6, 7 <i>6: Mild temperate</i> <i>7: Cool temperate</i>	1,295 (22%)	560	\$160	1,814 kWh	\$150	\$311

There are a number of possible interpretations of the data, however robust conclusions cannot be drawn due to limitations with the available data. The lower average Solar PV exports for the North NSW (Zone 2 & 5) region might suggest that the average Solar PV systems in that region were smaller than in the other two regions. The lower average Solar PV exports for the North NSW (Zone 4) region might suggest that the average solar PV systems in that region were smaller than in the other two regions, and or that Zone 4 ('Hot dry summer') had greater use of air conditioning (during the solar hours of the day) than the other regions.

2.1.3 Household wellbeing outcomes

The following section presents the findings related to outcomes for vulnerable households, including the program's contribution to wellbeing benefits (KEQ O1.7) and changes to energy efficiency knowledge (KEQ O1.7). Households that participated in the Multiple Benefits Survey were involved in the SHU & EHA Streams. The following findings relate to these streams unless specifically stated otherwise.

Thermal comfort

Participants experienced an improvement in the thermal comfort of their homes, with 65% of survey respondents indicating an improvement in the thermal comfort of their living rooms and 46% experiencing a decrease in issues with draughts in their homes. The degree to which specific technologies contributed to these outcomes could not be ascertained as survey data was not linked to program participant data.

Survey respondents were asked to reflect on the thermal comfort of their living rooms and bedrooms through the Multiple Benefits Survey (n=164). By the end of the program 65% of respondents indicated an improvement in the thermal comfort of their living rooms and 59% indicated an improvement in the comfort of their bedrooms (see Table 13). Overall, by the end of the program 54% of respondents indicated that they now either **rarely** or **never** feel uncomfortable in their living rooms, and 42% indicated they either **rarely** or **never** feel uncomfortable in their bedrooms.

Table 13. Comparison of before and after Multiple Benefit Survey responses to the questions 'do you find the temperature of your living room uncomfortable?' and 'Do you find the temperature of your bedroom uncomfortable?'. Survey response options were: Never, Rarely, Sometimes, Often, Always.

Changes to thermal comfort	Living room	Bedroom
<i>More comfortable</i>	65%	59%
<i>No change</i>	19%	21%
<i>Less comfortable</i>	16%	20%

Of those that experienced an improvement to the comfort of their living and bedrooms, 15% indicated an improvement from **often** feeling uncomfortable to **never** feeling uncomfortable in both their living rooms and bedrooms. Half of those who experienced a decrease in thermal comfort throughout the program indicated that their comfort levels were already low at start of the program, with 48% and 52% of respondents indicating a shift from **often** feeling uncomfortable to **always** feeling uncomfortable in their living rooms and bedrooms, respectively. Of those who experienced no change to their thermal comfort, 51% either **often** or **always** feel uncomfortable in their living rooms, and 60% either **often** or **always** feel uncomfortable in their bedrooms.

Issues with draughts in homes is another dimension of thermal comfort. Draughts result where there are gaps in a home, such as in the flooring or around windows and doors. These gaps reduce the energy efficiency of a home and the feeling of airflows has an impact on thermal comfort. In terms of changes over the life of the program (comparing pre and post survey responses), 46% experienced a decrease in issues with draughts in their homes, with 32% experiencing no change, and 22% experiencing an increase in issues with draughts (see Figure 3). As noted in the limitations, the specific energy efficiency upgrade/s received by survey respondents was not available, therefore, it is unclear as to which survey respondents did or did not receive draught proofing upgrades to their homes. By the end of the program (post survey) 50% noted that they either **never** or only **rarely** feel draughts. Significant improvements were seen for those who previously **always** had issues with draughts, with 15% of respondents shifting from **always** having issues to **never** having issues, and 16% went from **always** to **rarely** having issues. Notably, 44% of those who did not have any changes were **always** experiencing issues with draughts. Regarding the 22% of respondents who noted more issues with draughts, 17% of these indicated they went from **often** having issues to **always** having issues¹⁰.

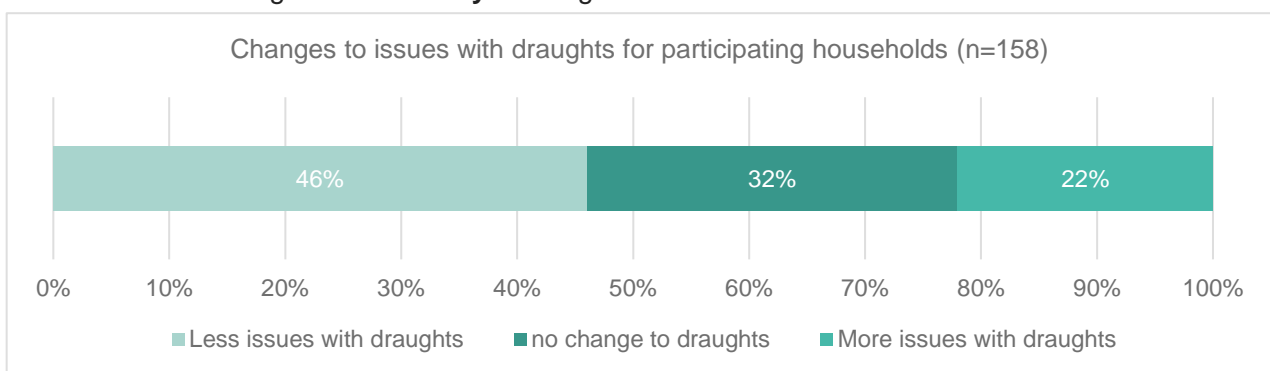


Figure 3. Comparison of before and after Multiple Benefit Survey responses to the question – ‘How often do you have an issue with draughts in your home?’. Survey response options were: Never, Rarely, Sometimes, Often, Always.

Reduced energy stress

Participants experienced an improvement in their emotional wellbeing, with 66% of survey respondents indicating reduction in energy bill related stress, 56% indicating a greater sense of control over their energy usage, and 75% indicating an improved ability to pay for their energy usage. As stated previously, the relative contribution of specific technologies to these outcomes could not be ascertained.

Based on changes between the pre and post matched Multiple Benefits Survey, two-thirds of households surveyed reported a reduction in stress related to their energy bills, a contribution to an improvement in their wellbeing. Findings from the matched surveys indicate that 66% of respondents experienced a reduction in their levels of stress related to payment of energy bills after the program compared to before the program (see Figure 4). Of the remaining respondents, 27% indicated no change to their stress levels, and only 7% indicated an increase in feelings of bill related stress.

¹⁰ This data highlights the challenges associated with using self-reported scales of this nature in before and after surveys, as interpretation of the question is highly context dependant and does not seek to ascertain the respondent’s perception of the specific contribution of the intervention on the outcome.

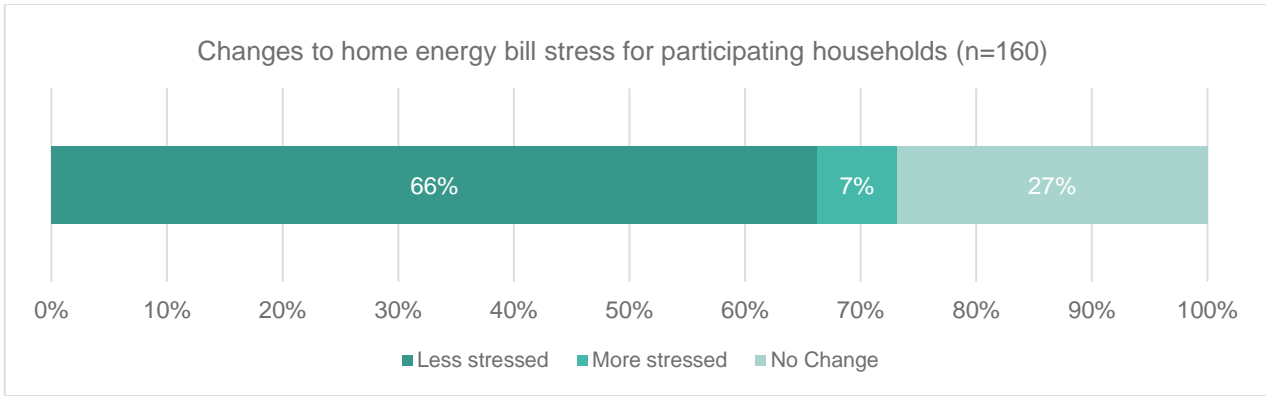


Figure 4. Comparison of before and after Multiple Benefit Survey responses to the question - “How often do you feel stressed about paying your home energy bills?”. Survey response options were: Never, Rarely, Sometimes, Often, Always.

A deeper look at the degree of change before and after the program shows that 40% of respondents experienced an improvement from being always stressed to never, rarely, or only sometimes stressed. Additionally, 57% of respondents who experienced no change, **always** feel stressed about their home energy bills, and 45% of those who experienced an increase in stress noted a shift from **often** to **always** feeling stressed.

The program also contributed to improvements in feelings of control of energy use with a comparison of survey responses from before and after the program showing that 56% of participating households felt more in control, 19% experienced no change, 13% felt less in control, and 11% remained uncertain (see Figure 5). Increased control over energy use is a desirable outcome for households subject to energy poverty, as it means that they have greater agency and choice over energy use rather than being required to forgo or ration energy use due to associated costs. Overall, by the end of the program 65% of respondents indicated that they felt either in **high** or **very high** control of their energy use. The qualitative interviews with participants also illustrated improvements to bill stress and feelings of control, with 50% (n=15) of the interviewees expressed that they now ‘*feel in control of energy use*’ (18).

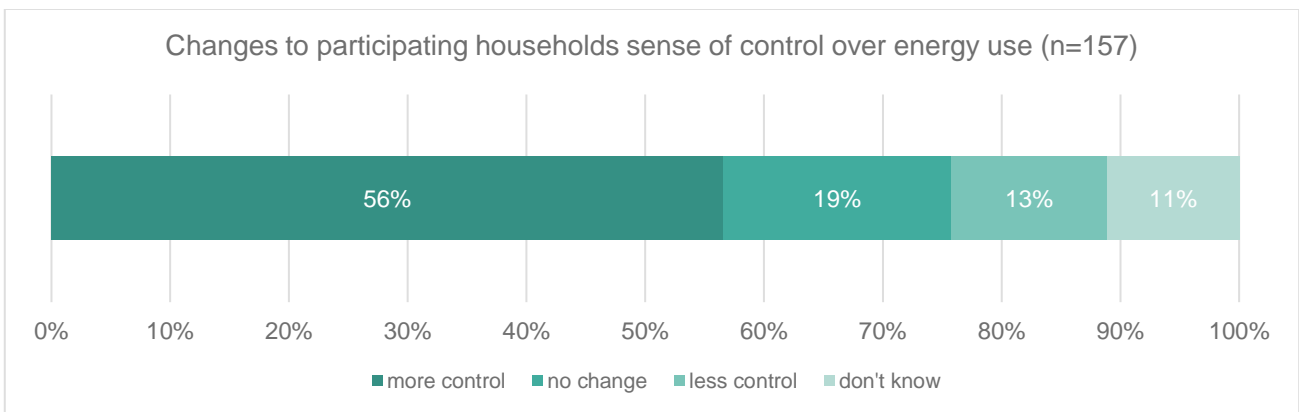


Figure 5. Comparison of before and after Multiple Benefit Survey responses to the question - “How much control do you think you have over the energy use of your home?”. Survey response options were: Very High Control, High Control, I don’t know, Low Control, Very Low Control, No Control.

Looking deeper into how people’s sense of control changed throughout the program, 32% of those that experienced an improvement in their sense of control shifted from feeling either **no** or **low control** to **very high control** and 63% of those who didn’t experience any change were already feeling either **high** or **very high control** over their energy use.

In addition to feelings of energy related stress being reduced and sense of control over energy use improving, 75% of survey respondents experienced an improvement in their ability to pay for household energy, with 17% experiencing no change and 7% experiencing a decline (see Figure 6). Of those that experienced an improvement, 43% experienced a change from initially finding their ability to pay for household energy either **very difficult** or **difficult**, to **easy**. Of those that experience no change in their ability to pay for household energy, 48% already noted it as being **easy**.

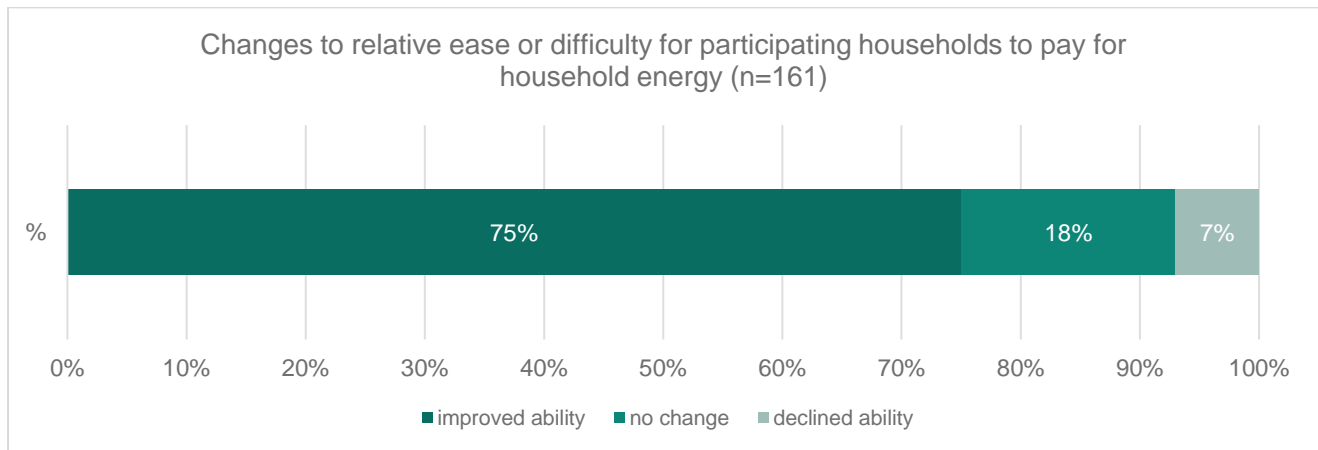


Figure 6. Comparison of before and after Multiple Benefit Survey responses to the question - “How easy or difficult has it been to pay for your household energy?” Survey response options were: Very Easy, Easy, Neither Difficult or Easy, Difficult, Very Difficult.

Improvements in energy bill related stress, control over energy usage, and ability to pay for household energy were pointed to by one program partner as being especially significant given recent increases in prices of electricity (SHP07). This same program partner also described instances where tenants expressed a sense of feeling valued through the program,

“Some young people fed back that they were pleasantly surprised that someone was interested in improving their lives to that degree. (SHP07).”

A sense of satisfaction or pride with their upgrades, whether that being ‘*very happy with solar panels*’ (118) or ‘*so grateful when she got a fridge – couldn’t stop looking at it*’ (12) also emerged from participants through interviews.

Health benefits

Participants reported improvements to their health, with 31% of survey respondents indicating decreases of mould and mildew in homes, and spill-over benefits of improved diets associated with new fridges and improvements to health conditions highlighted during participant interviews.

The program contributed to changes to household health conditions and wellbeing, demonstrated through changes to the amount of visible mould in respondents homes and other health benefits described. In terms of changes over the life of the program, 31% observed an improvement regarding the decrease in the visibility of mould or mildew in their homes, 53% didn’t notice any change, and 16% saw an increase in the visibility of mould and mildew (see Figure 7). It was anticipated that energy efficiency upgrades that reduced moisture in a home would have a beneficial effect on mould and mildew.

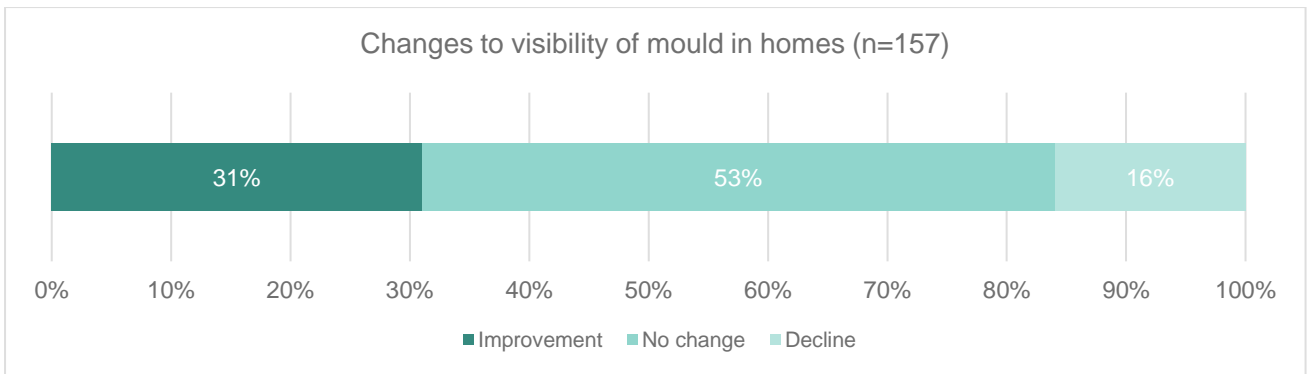


Figure 7. Comparison of before and after Multiple Benefit Survey responses to the question - “To what extent have you noticed mould or mildew in your home?”. Survey response options were: No visible mould/mildew, Specks of mould/mildew, Moderate mould/mildew patches, Extensive discoloured patches due to mould/mildew.

Looking in more detail at the degree of change that occurred, 43% of those that experienced an improvement observed a small change from **specks of mould** to **no visible mould**, and 16% saw an improvement from **moderate mould and mildew** to **no visible mould or mildew**. The majority, 67%, of those who observed no change indicated that they already had **no visible mould or mildew**. Of those who saw an increase in mould, 32% noticed a slight increase from **no visible mould** to **specks of mould or mildew**, and 28% saw a small increase from **specks to moderate mould or mildew patches**.

Health conditions such as bad knees, asthma, and heart conditions were identified as being positively impacted through heating and cooling improvements (I3, I9, I30). These spill-over benefits to participants’ health were known to the program team, having emerged during the mid-term evaluation of the program in 2018.

Health Benefits for ARO

The qualitative interviews with program participants surfaced some of the types of health benefits experienced for those that participated in the ARO. New fridges were reported to have impacts on the health of diets (I1, I2, I4, I9). One interviewee (I4) described how their previous fridge was old and too small for her needs, as a result it was difficult to manage fresh food and there was significant food wastage – with the new fridge they now have a diet that consists of more fresh vegetables, and they experience far less food wastage.

Social wellbeing

Participants also experienced improvements to their social wellbeing as a result of improvements to their homes, including greater connectivity with family and friends.

Another significant benefit that emerged through interviews with participants was that the improved comfort and decreased sense of energy stress, related to heating and cooling of homes, has meant that people are more likely to invite friends or family into their homes (I1, I6, I13, I17, I20, I22, I25, I27).

Social wellbeing benefits for ARO

In terms of improvements to quality of life and social wellbeing a program partner reflected on the quality-of-life improvements resulting from having a functional television and refrigerator, as well as highlighting the improvements to social wellbeing and access to information that a television provides.

“I think some people quite ignorantly suggest that a television isn’t an essential item, and I would argue differently. I would like for any person to acknowledge how they would feel if they did not have access to what’s going on in the world if they didn’t have a window... a lot of these people find themselves in financial vulnerability ..., making [an energy efficient television] available to people improves their quality of life...I think most people would take for granted having a good working television and fridge in Australia today” (FP03).

Energy efficiency knowledge

The program provided education materials and training to SHP partners to equip them to educate program participants on how to use energy efficient appliances and save money on energy bills. The evidence was however inconclusive as to the degree to which participants received or remembered receiving information about how to reduce their energy use and bills.

Based on the perceived usefulness and sense of how easy the information was to understand, 60% of those who did receive information indicated it was either extremely or very useful and 79% indicated that it was either easy or very easy to understand. As such, the information contributed to building the knowledge of participants on how to use energy efficient appliances and save money of their energy bills.

Program partners highlighted a range of challenges associated with providing vulnerable households with useful information including English literacy, tenants not being home, tenants not having a reliable contact number and challenges associated with COVID.

The program team facilitated energy literacy training through webinars to assist social housing providers in their efforts to support and educate tenants on how to maximise energy and bill savings¹¹. In addition, the webinars also focused on how the upgrades could be best used to maximise energy bill savings for households, and guidance to SHPs on how to determine which energy efficiency home upgrades are most likely to reduce energy bills and use. Training was delivered on 4 occasions between February 2021 and May 2022 via online webinars. There was a total of 52 attendees across all webinars, representing 13 social housing providers and 5 community service organisations. A feedback survey was completed by 36 of the 52 attendees, with 92% indicating that they improved their knowledge on how to help residents in energy stress, and 86% indicating they would recommend the webinar to others.

Collaboration on materials between the program team and partners was also highly valued by the program partners.

“I don't think we understood that we really needed to take it back to basics and not just [focus on] how solar works and how that impacts your energy, but [provide] general energy savings tips. We suggested that to the department. They were absolutely on board. They helped us review [our] brochure and the material that we provided [and] they provided input” (FP01).

Program partners indicated that education materials and information were provided to participating households via letters, emails, and in some instances were followed up by phone calls (SHP01, SHP02, SHP05, SHP06 and all seven project closure reports). There was consistent feedback from program

¹¹ <https://www.energy.nsw.gov.au/households/ways-get-started/advice-housing-providers>

partners that they perceived the information to be valuable, and that the simplicity of the materials likely improved its efficacy (FP02, SHP02, SHP03, SHP07). One of the partners explained how,

“The department did share some brochures with us that had a bit of a cheat sheet to pass on to our tenants. [...] [with information about] small things that the tenants can do themselves without needing to upgrade anything really. A lot of them were pretty pleased to get some information like that and they were written in a way where it was really easy to read, so it was quite good” (SHP03).

The evidence from households who participated in the Multiple Benefits Survey is however ambiguous as to the degree to which respondents received, or remembered receiving, information about how to reduce their energy use and bills. Overall, only 35% of respondents for the post-installations survey indicated that they had received information about reducing either their energy use or energy bills by the end of the program. For the remaining respondents, 41% shared that they hadn't received information, and 21% were either unsure or couldn't remember. During the pre-installation survey 43% of respondents indicated that they had received information, with 48% saying they hadn't and 9% uncertain. What can be seen from the matched survey responses is that whilst there was a 19% increase in the number of respondents indicating they received information by the end of the program, there was an 18% increase in the number of respondents who were unsure as to whether they had received information and a 16% increase in the number of respondents who indicated that they didn't receive any information by the end of the program.

The usefulness, and ease with which the information could be understood, also provide important insights. Of those that indicated they had received information by the end of the program (n=57), 60% shared that they found the information either **extremely** or **very useful**, 30% found it either moderately or slightly useful, only 4% found the information not at all useful, and 7% were unsure. Again, for those that indicated they had received information by the end of the program, 79% expressed that it was either **very easy** or **easy** to understand, 16% indicated it was neither difficult nor easy, and only 5% shared that they found it either difficult or very difficult to understand.

SHP partners highlighted some of the broader challenges associated with engaging vulnerable households and the barriers this presented to education efforts. English literacy, tenants not being home, and tenants not having a reliable contact number were all identified (SHP02). In addition to these challenges, one partner further explained how,

“When we're communicating with these [households], some of them may be a little bit defensive about receiving it or offended around receiving it. It's a bit like, 'what do you want from me now?’” (SHP07).

Another partner outlined how they shared responsibility for educating tenants between themselves and the contractors undertaking the installs to enhance the likelihood of engagement with tenants (SHP02). To overcome some of the barriers associated with the provision of educational materials one partner outlined the importance of that being paired with someone known to community members, who is consistently available,

“The fact that the Project Manager [...] has been able to build a relationship with the community to provide education, and I think that's always a positive to be able to get down to the grass root. It's not just providing the hardware, but education needs to go hand in hand with the hardware that you provide as well. It's really valuable to have people on the ground that community member can

talk to and ask questions and have that long term discussion throughout the project and questioning to support that” (FP02).

Reflecting on education efforts two partners shared that it was hard to determine whether the education materials would be used or not (TS02, SHP02).

In addition to these challenges, COVID restrictions on movement were another barrier that inhibited engagement with vulnerable households. One partner shared that they had intended to conduct a ‘community day’, with support from the program team, in which they’d be available to assist people with energy bills and educate them around the use of energy efficiency measures, but that this didn’t proceed due to restrictions on movement (FP01).

Program partners indicated their intentions to educate tenants after the program through onsite meetings, sharing content on relevant groups in social media platforms, and resending of materials such as letters and brochures (SHP01, SHP02, SHP05, FP01, and 7 program partner reports).

2.1.4 Program Partner Outcomes

This section of the report outlines findings related to the extent to which the program accelerated and/or improved the energy performance and liveability of social housing stock in NSW (sub-KEQ O4.1), the extent to which energy efficiency and renewable energy considerations have been embedded into operations and maintenance for program partners (sub-KEQ O4.2), as well as the broader social benefits and unintended outcomes of the program (sub-KEQ O1.6).

Legacy for social housing providers

The program was vital to improving energy performance and liveability of social housing stock. Through the SHU & EHA Streams, the program delivered 20,911 energy efficiency upgrades in collaboration with 27 different social housing providers for the benefit of 12,738 households.

Approximately \$83 million was spent on these upgrades through the life of the program, with roughly \$31 million of that amount being provided by the Department and the remaining \$52 million representing the contribution of partners leveraged by the program.

All of the social housing providers interviewed for this evaluation indicated that the program was vital to the improved energy performance and liveability of their housing stock. Table 14 details the type and number of energy efficiency upgrades delivered through the SHU & EHA Streams. \$83 million was spent on these upgrades through the life of the program, with \$31 million of that amount being provided by the Department and the remaining \$52 representing the contribution of partners leveraged by the program (calculated from the SHU and EHA dataset).

Table 14. Type & number of energy efficiency upgrades delivered through SHU & EHA

Type of technology	# of upgrades delivered
Solar PV	11,526
Draught Proofing	4,795

Type of technology	# of upgrades delivered
AC	2,583
Lighting	902
5-6 Star NATHERS Upgrade	449
Hot Water Service	338
Ceiling Insulation	190
Ceiling Fans	105
Window / door shading	17
Lighting E1	6
Total	20,911

For larger social housing providers, the funding provided through the program catalysed internal investment that may not have occurred if the program didn't exist (SHP01, SHP02, SHP03).

“The reality is, I don't think we would have done near as many properties if we didn't have that funding from HEA. It's as simple as that. I don't know, at a guess, but we'd still... might only be half or two-thirds of the way through it. [...] The objective was to do solar in all the properties... We're pretty much done.” (SHP02).

One of the larger housing providers shared that the program and associated upgrades have prompted greater value for sustainability considerations in all of their planned maintenance and upgrades (SHP03). Paired with this was a particular focus on appropriate interventions for older housing stock.

The program was also found to encourage additional smaller interventions. Two housing providers shared how upgrades such as LED lighting, ceiling fans, insulation, and door seals were all highlighted as valuable complimentary interventions to the current work done (SHP02, SHP07).

The experience of the program was also cited as valuable for housing providers undertaking new builds. As noted in the 2018 Process Evaluation, energy efficiency considerations are required for new builds in NSW – however – two of the larger housing providers noted that they are now better positioned to pursue builds that exceed current standards, work well for tenants, and are able to be effectively delivered (SHP01, SHP03).

The internal reputation of teams that were delivering the energy efficiency upgrade projects was also bolstered through the program, better positioning these teams for future work.

“I think what we've got now in the [team responsible for energy efficiency] is a proven track record of being able to spend money on stuff that enhances the reputation of New South Wales government, obviously is aiming towards reducing carbon emissions, environmental impact. I think the departments money has been a fantastic catalyst for benefit in net terms, but also in improving the reputation of [the social housing provider] and the [team responsible for energy efficiency]. I don't think we can be more thankful for its benefit in that” (SHP01).

Capacity of program partners

Program partners, including social housing providers, community service organisation and energy retailers, noted different dimensions of capacity building that they experienced as a result of partnering with the program. These dimensions include greater knowledge of energy efficiency interventions, confidence to pursue future funding opportunities, improved ability to work collaboratively with government, better connections with and understanding of the communities in which they work, as well as strengthened networks between and amongst social housing providers and community service organisations.

One of the significant social outcomes to emerge from the program was the improved capacity within, and strengthened networks amongst, the program partners. The program team were aware that capacity building would be a key part of their work, both with regard to knowledge of energy efficiency interventions and skills pertaining to project management (PS01, PS03, PS06). One of the technical specialists who advised social housing providers on potential upgrades highlighted the significant work done to educate housing providers on the benefits, costs, and lifespans associated with different interventions (TS02).

These capacity building outcomes will likely have additional benefits as some program partners have greater knowledge about integrating energy efficiency into their ongoing activities. This was evident for one of the smaller housing providers.

“it’s about saying, okay, if we’re going to upgrade heat pumps, should we look at those more expensive energy efficient ones? Because we installed a couple of those. They were expensive. They were double the price, right. But they’re energy efficient. Should we be looking at those? Should we be looking at that as part of our plan maintenance, and increasing the budget for that? [Related to that], are our clients using more resources to cool their home where we haven’t done enough to seal their windows? (SHP07).

One of the community service organisations that partnered with the appliance upgrade stream have since altered their policy concerning the provision of fridges.

“We used to buy the nasty second-hand ones because we don’t have a huge amount of funding and that was all we could afford... they weren’t energy efficient; they didn’t last long. [Now] we are able to get them a brand-new fridge with a warranty so they had at least two years. A lot of people were grateful that they had a brand-new fridge... It did put less stress on them because they didn’t have to worry about it breaking down. If it did break down in that two-year period, it was under warranty... From that, our organisation [now] have a policy where we buy brand new fridges” (CSO02).

One of the smaller housing providers noted they now have the knowledge, competencies, and confidence to pursue other funding opportunities. Reflecting on future opportunities, the program partner shared,

“we’d be able to deliver it in a much better way, and understand the costings, the timeframes, and always a way of looking at funding opportunities if they’re available. [Now we’re thinking] what other funding possibilities are out there for us? And I think that’s what’s given – participating in this project has given us an understanding of – you know what, it can be endless if we put our effort in and we, you know – and we’re ready. And we have the right people on board. [...]

had we not gone through that process, I'm pretty sure we'd be going, "That's for a big CHP with 5,000 properties, not us where we've got 180" (SHP07)

Other capacity building outcomes relate to the ability of partners to work with government on future initiatives and the use of systems that were developed and proved as effective through the program, with one partner explaining:

"We recently were fortunate enough to win some business with NSW Department of Planning and Environment on a [similar appliance replacement initiative]. And we actually increased the centralisation of the way we operated with that program on the back of our learnings from the ARO" (FP03)

Further to internal capacity being built for program partners, their understanding of, and relationships with, the communities within which they operated were also reported to have strengthened through the program.

"Our connection with the community and understanding community needs has helped probably us and government. But from an [Energy Retailer] perspective, really helped us understand what those communities go through on a day-to-day basis and why energy is really difficult for them to understand. That's been a really insightful and exciting outcome for [the Energy Retailer]" (FP01).

The ecosystem change that occurred through strengthening networks between partners and the degree to which knowledge sharing between partners increased was less expected by the program team (PS03). The significance of this was evident in the recommendation from one of the smaller housing providers that connections with others who have been through similar processes would be an invaluable component of any future design process (SHP07). The program team were diligent to support this network and provide avenues for connection and reflection on lessons learned through the program. These have been captured and structured in an online toolkit that is available for social housing providers seeking to undertake energy efficiency upgrades¹².

2.2 Equity

Equity was a guiding principle of the program. The subsidies on energy efficient upgrades were provided through the program in partnerships with social housing providers, community service organisations, energy retailers, and an appliance retailer. By operating in partnerships and providing a proportion of the costs associated with energy efficiency upgrades, the program was able to extend its funding to a larger number of vulnerable households.

Substantial time was given to incorporating equity into the program during its design phase. This involved extensive consultation processes with prospective partners, as well as thorough research undertaken by the team. This preliminary work enabled the program to consider how to target vulnerable households and operate in a manner that was accessible to vulnerable households.

Equity continued to guide the program through delivery. The program team were afforded autonomy and flexibility that enabled them to adapt. This allowed the team to persist with delivery despite delays and challenges, as well as reconsider their eligibility criteria or which partners they prioritised to enhance the equity and accessibility of the program.

¹² <https://www.energy.nsw.gov.au/households/ways-get-started/advice-housing-providers>

2.2.1 Equity in Design

The following section of the report outlines findings regarding the extent to which the program was able to target and assist households vulnerable to energy stress (KEQ O2.1), and the extent to which the program was accessible to households vulnerable to energy stress (KEQ O2.3).

The ability of the program to target vulnerable households and operate in a manner that was accessible to vulnerable households was established and enabled by developing a deep understanding of the target cohort through collaboration with potential partners, research done by the team during the design phase, and drawing on the existing expertise and experience of the program team.

Partnership was fundamental to the delivery model of the program, and considerable time and effort were given by the program to develop the relationships with partners. Program partners noted that this resulted in a program that was better aligned to their needs and that delivery was improved.

Value and time were given to develop an understanding of the cohort and the challenges they face – both initially and throughout the program. Understanding was developed through drawing on existing research, visiting areas the program intended to reach, and setting up systems to retain learning throughout the program – such as the teams information and resources folder, or ‘virtual library’, of reports and research papers arranged by categories (PS01, PS05). In addition, having team members with existing knowledge of, and experience with, vulnerable households was indicated as being enormously helpful for the program’s design and ability to reach vulnerable households (PS04, PS05).

The time given to consult potential partners during the design of the program, and prior to working with partners once engaged, had been highlighted as significant in Phase 1 of the program through the 2018 Program Evaluation, as well as in Phase 2 of the program through the 2020 mid-term process evaluation. During this outcome evaluation, it was also pointed to by program partners as being instrumental for the program’s ability to engage and assist vulnerable households (CS02, FP03, SHP07). The level of involvement early on was identified as something that one partner had never experienced before in a government led program (FP03). One program partner recounted how their feedback during consultation was actively integrated into the programs design,

“When I talked [with the department] about refugees and domestic violence, and that not everybody’s on Centrelink that could benefit from this scheme, they had put in a process to accommodate those people as well” (CSO02).

The choice to specifically engage and partner with social housing providers in the SHU & EHA Streams was made as tenants are both renters and low-income earners (PS02). Similarly, the eligibility requirement of having a concession card, as well as discretionary processes for those that didn’t have concession cards, enabled the ARO stream to also reach those vulnerable to energy stress.

In addition to enabling the program to achieve equity, the collaborative nature of the program team and the ‘customer-centric’ approach they took to each partnership were identified by program partners as factors that resulted in projects that were aligned with their needs, capacity, and priorities (CS02, FP01, CHP01, SHP03, SHP07). This sentiment is illustrated by a program partner who shared,

“What I found really terrific was not just the original consultation, this program was sincerely run like a partnership. [...] And I really enjoyed the collaboration. When the program ended, it actually felt like people in my team were resigning” (FP03)

2.2.2 Equity in Delivery

This section of the report also provides findings on the extent to which the program was accessible to households vulnerable to energy stress (KEQ O2.3).

The work done during design was complemented by the ongoing flexibility and autonomy afforded to the team, their ability to work adaptively with partners, and an ongoing emphasis on learning, improvement, and adaptation. Flexibility was enabled by the shared passion amongst team members, the internal governance arrangements, and the contracting arrangements used with partners.

Relationships with partners

The shared value and passion amongst the team for helping vulnerable households was recognised by program staff as a crucial for the flexible and adaptable approach that enabled the program to enhance its reach and achievement of equity. Shared values were recognised as being important to the coalescence of the team, their ability to engage with partners, and commitment to undertaking high quality work for the benefit of the cohort they intended to reach (PS01, PS02, PS05, PS07). The intention to work for the benefit of vulnerable households was coupled with a culture of goodwill (FP02, FP03, TS02).

“There was a lot of goodwill between the parties that worked together, so that was great, and we all wanted to have a positive outcome for the project” (FP02)

The manner in which the team worked with the program partners proved critical to projects being delivered and improvements to social housing stock occurring. The flexibility and understanding of the team were important not just for the smaller housing providers that had less capacity for delivering the projects, but also in enabling the program to navigate various external challenges such as COVID, lockdowns, and floods. As one community housing provider explains:

“You’ve got some lack of understanding about the technical aspects of it. You’ve got COVID. We had the floods. So just when we’re about to roll this thing out, all of a sudden, ...we’re talking to the funding body, saying, “Listen, we’re not going to roll this out” – the project was expected to be finalised by the end of February, and we knew we weren’t going to meet that. And we were talking about that in December. [...] If we weren’t dealing with a funding body that was understanding of how we were operating, the conditions we were under, I probably would have just said to our CEO, “I’m pulling the pin here. This is all just too hard” (SHP07).

Adaptive management was a key part of the program’s delivery model and enabler of its overall success. It has been a longstanding characteristic of both phases of the program, with its significance being identified in the 2018 Program Evaluation.

- The impact adaptive management had on improving program partnerships, achieving desired results, and enhancing the likelihood that vulnerable households would experience benefits was highlighted by two of the program staff as their most significant lesson from the program (PS03, PS05).

- Underpinning and enabling adaptive management was regular communication that was aligned with the needs and wants of partners (FP03, SHP07), as well as reliable and efficient internal systems and processes (PS02).

Flexibility and autonomy

The program staff highlighted that the flexibility of the delivery model and degree of autonomy afforded to the team, in terms of who they engaged and how, the use of the eligibility requirements, and the program's governance; were significant factors that enabled it to successfully target vulnerable households, reach those living in regional areas, and enhance the accessibility of the program (PS01, PS03).

With regard to ARO, the team had cautious flexibility in eligibility requirements to minimise the likelihood that those that really needed the program would be blocked from it (PS01, PS02). This meant, for example, the program could *“go out to those bushfire affected communities and if somebody was short on cash and needed a replacement fridge or a TV, they could get those through the program as well without necessarily having the old one to replace”* (PS05). While this may have not contributed to energy outcomes it did contribute to wellbeing outcomes for the relevant households (noting that households without before and after energy consumption data are not included in analysis of energy outcomes). This flexibility was paired with the collaborative nature of the program. Program staff worked with and trained partners in community service organisations to make decisions concerning those who may not have fulfilled the eligibility criteria, such as refugees or victims of domestic violence, to increase the accessibility of the program to those that needed it (CS02, PS01, PS05). Program staff confirmed that adjustments to eligibility criteria were monitored closely to ensure appropriate inclusion (PS01, PS05). Ultimately, empowering partners to make these decisions enhanced the accessibility of the program to vulnerable households.

The program's internal governance was also identified as being critical to its ability to reach vulnerable households. Budget flexibility within and across Streams allowed the team to navigate barriers and redirect spending when necessary so the program could continue to achieve impact (PS02, PS07). Having the cost-benefit-analysis (CBA) tool approved by Treasury at the start of the program provided the team with a high degree of autonomy, which in turn enabled the team to efficiently progress or adapt the spending as needed, particularly within SHU (PS03).

In terms of the team's position and relationship within the broader department, the internal DPE Policy team was identified as being pivotal for enabling other flexibility of the program team due to their existing experience of also having worked with the targeted cohort (PS07).

With regard to governance arrangements with partners, flexibility in contracts and agreements meant the program was able to align with their needs, continue to reach vulnerable households despite barriers such as COVID or natural hazards, and adapt the program to expand its reach to vulnerable households (PS01, PS02, PS06, PS07).

Challenges

A number of challenges were encountered throughout the program as it sought to achieve equity in its delivery. SHP partners had to consider trade-offs between which different energy efficiency technologies to pursue, as well as choices around which houses to prioritise for upgrades. In pursuit of equity, the program team were also conscious of which partnerships to pursue and prioritise. The capacity and ability to operate at scale were clear benefits of larger partners in both streams. Within the SHU, the value proposition of larger actors changed, and the team refocused on smaller housing providers.

A key challenge that the SHP partners encountered centred on the installation of smart meters for every Solar PV system. Confusion around who was responsible for this, and whether it occurred, resulted in delays for vulnerable households in receiving the benefits provided by Solar PV.

Staff turnover and disappointment for vulnerable households who didn't receive upgrades were additional challenges that emerged as the team sought to achieve equity in their delivery.

Tensions and trade-offs, with regard to decisions about the types of interventions to pursue and which households to prioritise, emerged for program partners during design and scoping phases for the program and individual projects in their pursuit of equity. In reflecting on the design process, in which decisions were made about which houses to target and which interventions to proceed with, one of the social housing providers shared,

"I had this little bit of indecision going on in my mind about are we making the right decision for these funds. Let's face it, it's probably not going to come up again in a hurry. Are we reaching enough young people? [...] And that was always niggling in my mind. Wouldn't it be good to have solar in our buildings? Big question – why? Because we'd reach more young people, because if we've got 12 units in that one building, we may have 20 separate tenancies because we've got two young people in any one property" (SHP07).

Another housing provider also reflected on the difficulty of decisions concerning how to prioritise the delivery of upgrades. Whilst outlining their pre-existing priority to target regional areas, working from the "Isotherm 33 line" – those areas with an average temperature 33 degrees and above in January – they reflected on the potential equity implications of this approach to delivery, sharing, "*why is someone in Broken Hill getting air con, and we're not getting it, in Penrith? – for argument's sake. That was our challenge. We had to have a prioritised approach*" (SHP02).

Size and capacity of program partners

The scale afforded to larger program partners assisted the extent to which they could reach a broader range and number of vulnerable households, including those in regional areas. With reference to the ARO, the team did encounter an instance of a small, regional appliance retailer complaining that the choice to partner with a large appliance retailer came at a cost to retailers like themselves. Noting this, the transparent procurement process and value proposition of the larger retailer, in terms of their regional reach and capacity to deliver at scale, were identified by the team as credible grounds to pursue partnership with them (PS01). One of the program partners, who represented the large appliance supplier, noted that,

"We were able to ensure that it didn't matter where somebody was located, we were able to provide them with the appliances. And whilst that might not sound like a big deal in New South Wales, there are actually some regional and remote locations that I know other suppliers in our field do not deliver to, and our commitment to get product to every eligible applicant, I think was a terrific outcome because it meant genuine access for all" (FP03).

This same partner also highlighted their existing and well-established network with community service organisations that enabled them to promote the program and build broader awareness about it for those that needed to access it.

The SHU and EHA Streams were both designed to overcome the split incentive barrier, inherent in rent-based tenure arrangements, that exists for social housing providers looking to make energy efficiency

improvements to their housing stock. Social housing providers need to commit investment from their limited budgets for energy efficiency upgrades, whilst the benefits of these upgrades are experienced solely by the tenants. The social housing providers do not recover a return on their investment. This barrier is more pronounced for smaller (tier 2 & 3) social housing providers whose resources are more limited. A further complication is that many smaller housing providers manage the tenancy and housing asset but do not themselves own the housing asset, it's owned by a larger (tier 1) social housing provider or government housing provider (SHP07).

The subsidy for energy efficiency upgrades provided by the program was available to all social housing providers to assist in overcoming this split incentive barrier. The Energy Hardship Assist, which was piloted in the first phase of the program and adopted as part of the program during its second phase, sought to address the obstacle that the co-funding requirement, whereby program partners were required to cover a proportion of the costs associated with energy efficiency upgrades, continued to present for the involvement of tier 2 & 3 social housing providers.

The 2020 mid-term process evaluation recommended that the program continue to place greater emphasis on smaller tier 2 & 3 social housing providers to enhance the equity of the program and its regional reach. The team were already shifting their focus in this direction, as they spent considerable effort reaching out to tier 2 & 3 housing providers, adapting documents sets to enhance their accessibility, and working with these providers to develop their project management and energy efficiency skills and competencies (PS03, PS06). In conjunction with this effort was an acknowledgement within the team that tier 1 social housing providers also had extensive reach into regional areas and provided access for specific cohorts (PS03). Similar to the ARO stream, the reach and capacity of larger actors enhanced the ability of the program to target and benefit vulnerable households. By the end of the program 46% of the SHU/EHA funding was provided to the Land and Housing Corporation, and 31% was provided to the Aboriginal Housing Office.

The team actively considered how the value proposition of larger social housing providers changed throughout the life of the program as the number of interventions increased, and the resulting consequence for smaller housing providers became more apparent. As one of the program team reflected on their efforts to,

“...get away from the high capacity social housing providers and move to the lower capacity ones, and I do think a bit more work could have been done at the beginning about understanding the value proposition for the high capacity social housing providers, guys like [tier 1 social housing provider], who I actually think made a profit out of getting a grant from us because they already had funding. [By] their second project, the cost benefit to them was substantial and that [meant] we didn't need to be involved in that project – we did end up asking them some hard questions and they had to back down” (PS02).

This sentiment was echoed by one of the larger social housing providers who appreciated the shift to place greater emphasis on smaller housing providers, noting however that they believed this was too little too late, and should have been something explored and decisively budgeted for at the start of the program (SHP02). Both this social housing provider and another, in reflecting upon their experience of the administrative burden associated with the Energy Hardship Assist stream, indicated that there would have been greater efficiency if they had been required to include a specified proportion of tier 2 & 3 housing assets – which they own but a community housing provider manages – within the upgrades the program funded them to deliver (SHP01, SHP02).

Relatedly, the program team worked to improve the program's focus on upgrading old housing stock following an instance where program funding was channelled into new builds. This unfolded due to a budget commitment for Solar PV being larger than the number of suitable homes, and the funding was then refocused to either heat pumps in old housing stock or Solar PV in their new-builds program (SHP03). This was a point of frustration that the program team had to navigate but couldn't avoid (PS02). The team adapted to this and placed greater emphasis on upgrading old housing stock moving forward.

Issues with the installation of smart meters

One of the significant negative unintended outcomes that emerged through interviews with program partners, involved various challenges associated with the installation of smart meters. This relates to NSW legislation that stipulates that smart meters are required for every new Solar PV system. One of the social housing providers explained:

"We have our cases where Solar's been sitting there on the roof for six months, and the tenant's not getting the benefit of the solar" (SHP02).

It was highlighted that this is an ongoing issue. The challenge was further complicated by a lack of clarity regarding who was responsible for installing the smart meters, and once installed, who was responsible for turning the Solar PV Systems on (FP01, SHP02). Difficulties in contacting tenants due to them either not being home or not having a reliable contact number, also made it difficult to proceed with the installation of smart meters (SHP02). Evidently, this additional work was identified as a significant and unexpected administrative burden for partners. This challenge has also resulted in additional costs to complete the installs, and in some cases further costs associated with upgrading electrical boards and fuses (SHP01, SHP02, SHP07).

Dealing with disappointment

There were also instances where participants were left disappointed as a result of the program engaging them during scoping or planning stages but not following through with delivery of any upgrades (PS01, PS02, PS04, PS06). Within the SHU & EHA Streams partners realised they were unable to proceed with energy efficiency upgrades upon discovering the site wasn't suitable, for example, due to the position or structural integrity of the roof for Solar PV (SHP07, FP01). Another cause of disappointment was choices by program partners to pursue different types of energy efficiency upgrades in different locations after having scoped the potential for upgrades with prospective households (SHP07).

Managing staff turnover

Similar to the 2020 mid-term process evaluation, majority of partners reflected that the governance of the program and the relationships with the program team were positive. However, a number of partners highlighted challenges they experienced when working with the program.

Staff turnover – both within the program team and the partner team – resulted in a loss of knowledge, changes to manner and frequency over communication, and changes to expectations for funding and reporting (FP01, FP02, SHP01, SHP02, SHP03, PS06). Further to this, there was feedback that partners experienced a lack of clarity, in terms of how funding was to be provided, reporting requirements, expectations around evaluation of the program, and roles and responsibilities of partners (FP02, SHP01, SHP02).

3 RECOMMENDATIONS

The following recommendations have been synthesised from the findings surfaced through the evaluation, and cover program MERI, design, and delivery. The recommendations focus on building on the success achieved through the program period, for the purpose of informing future programs.

1. Continue to **utilise and strengthen program measurement, evaluation, reporting, and improvement (MERI) systems and processes**, with a focus on using the data and insights to inform decision making, including comprehensive planning for data collection, storage, use and quality control.

The program had the foundational elements of a robust measurement, evaluation, reporting, and improvement (MERI) system that included an evaluation plan, program logic, and dynamic dashboard reporting. The program collected a range of quantitative and qualitative data aligned to intended outcomes.

However, these data varied in quality and usefulness for the purposes of this evaluation. Data quality, usefulness, and management could be improved through undertaking a more systematic and strategic approach to MERI across the program to ensure the data necessary to understand the contribution of the program to both affordability and liveability outcomes, the equity of program reach, and the effectiveness of the partnerships, is supported by a comprehensive plan for its collection, storage, and use (including integrating multiple data sources to inform specific judgements).

While the evaluation was able to demonstrate the multiple benefits associated with the energy efficiency upgrades, the evidence available to support assessments of the program's contribution to liveability, wellbeing, and health outcomes was limited. By ensuring these intended outcomes are clearly articulated and integrated into the MERI system, the effectiveness of the program in influencing these outcomes can be better understood and evidenced, and the impacts of future programs can be expanded beyond a narrower focus on reduced energy demand and lower GHG emissions.

In addition, specific data collection tools could also be improved, including:

- The pre and post household benefit survey could be redesigned to be more aware of the complexities of household behaviour and directly linked to the elements of the program they participated in and associated energy use profiles. For example, instead of utilising a pre- and post-survey method, consider using just a post- survey that asks the household about how participating in specific elements of the program has contributed to the specific intended outcomes of the program, and link this information to the measured household energy data.
- An Impact Log could be established and integrated into regular program management processes to systematically capture instances of impact that emerge throughout program delivery (both intended and unintended). An Impact Log ensures that data is managed in a central place, the quality of the inputted data is consistent, and it is regularly reviewed and updated through integrating it within regular (i.e., monthly, or quarterly) meetings. This data would also be highly valuable for mid-term and end of program evaluations, as it not only provides a source of evidence but also aids in reducing risk associated with overreliance on interviews with program staff and program partners.

Integration of the MERI system into internal program processes will ensure the effectiveness of program partnerships are systematically reviewed and responsive to challenges that may arise.

2. Continue to invest time and resources in collaboration and research to **ensure the program design draws on the most up to date information and evidence about energy efficiency and household liveability upgrades** and is grounded in the experiences and needs of target beneficiaries.

The needs of vulnerable households and the challenges in engaging them are diverse and complex. The program benefitted from having time available to consult with prospective partners who work directly with vulnerable households, as well as time spent building the teams understanding and knowledge of their needs in relation to energy efficiency and liveability improvements, and engagement methods. The provision of similar time is encouraged for future programs to ensure they establish relationships with partners that operate effectively during program delivery and design programs that are fit-for-purpose.

In addition, each of the energy efficiency and liveability upgrades made available through the program should be supported by a strong, evidence-based rationale, which should also be tested through program MERI. For example, the evaluation demonstrated that Solar PV provided the most significant improvements to household energy use and associated bill stress and wellbeing outcomes far beyond the other upgrades.

3. Continue to **deliver programs through partnerships and balance the opportunities** for the achievement of greater reach through high-capacity partners, with opportunities to build capacity of lower-capacity partners.

In addition, greater investment in, and prioritisation of, individuals within partner organisations that have existing relationships and consistent interactions with vulnerable households is encouraged. This will enhance the visibility of programs and improve energy efficiency and bill savings education efforts.

The reach and accessibility of the program to vulnerable households through all program streams was largely enabled through the program's partnership delivery approach.

The ability of high-capacity partners to deliver at scale was known during the design of the program, and has proven to enable the program to reach a large number of vulnerable households. With regard to social housing providers, more thorough consideration of capacity and access, or ability to access, other public funding is encouraged. This understanding would enhance the strategic clarity and direction of short-term, grants-based programs and their choices of who to prioritise for partnerships.

Relatedly, the stakeholder-centred and hands-on approach modelled by the team with lower capacity social housing providers not only enabled projects to proceed and be delivery despite considerable external challenges, but also provided the partners with invaluable experience and skills that will enable them to pursue future funding opportunities.

Additional investment in, and prioritisation of, individuals within partner organisation that have existing relationships and direct engagement with participating households is also encouraged. The collaboration ARO had with CSOs and the key project manager within one of the SHU & EHA projects was shown to improve the visibility, accessibility, and reach of the program to those that needed it. In addition, it was also found that efforts to educate vulnerable households on how to improve energy and energy bill savings was strengthened through individuals that were known and available to vulnerable households.

4. Continue to **uphold a customer-centric and adaptable approach to program delivery** to ensure that programs are sufficiently responsive to the needs of target beneficiaries, and responsive to contextual influences such as the COVID pandemic, bushfires and floods experienced during the previous program period.

The program's customer-centred approach and associated flexibility was critical to its success. By ensuring future programs continue to be responsive to the different and changing needs of targeted beneficiaries and of delivery partners, they will continue to be in a strong position to overcome challenges and deliver intended outcomes.

APPENDIX A: HEA PROGRAM LOGIC

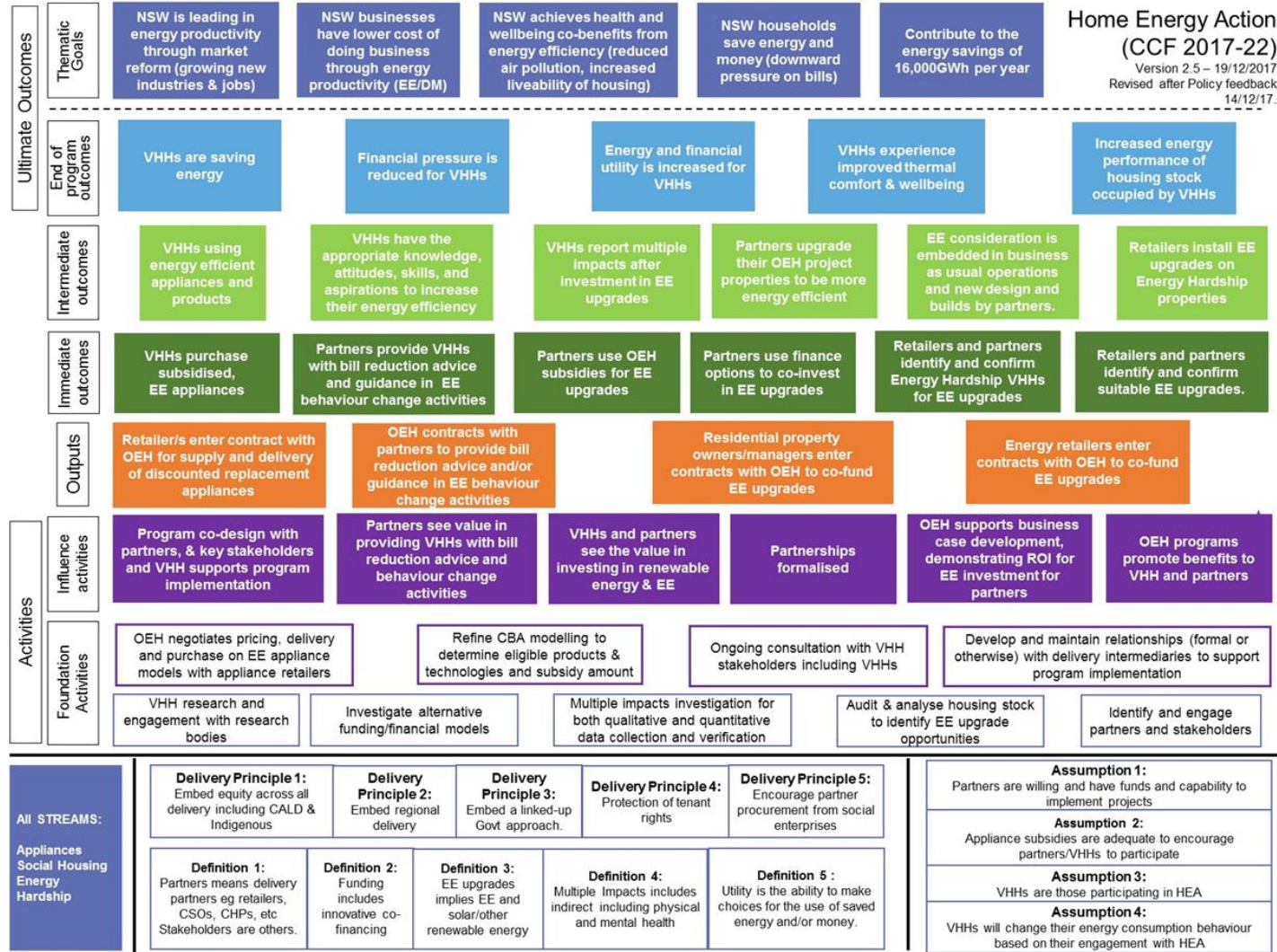


Figure 1: Program Logic (Note: Assumption 3 should read “VHHs are willing to participate in HEA”)

APPENDIX B: PREPARATION FOR COMPARING PRE AND POST SURVEYS

The matched pre and post Multiple Benefits Survey included 164 responses. The following questions varied between pre and post installation surveys:

Pre installation question	Post installation question	Clear Horizon response
Over the past year, how easy or difficult has it been for you to pay for electricity, gas, or other fuel to use in your home?	Over the past 3 months how easy or difficult has it been for you to pay for electricity, gas, or other fuel to use in your home?	<p>Survey completion date indicates respondents had just experienced summer, therefore any energy efficiency upgrades had been tested by more extreme weather conditions.</p> <p>The post installation question allows for a period of time in which respondents would have received a bill for energy use, therefore their ability to self-assess changes is valid.</p>
<p>Do you find the temperature of your living room uncomfortable in:</p> <ul style="list-style-type: none"> - Summer (Dec - Feb) <p>Do you find the temperature of your living room uncomfortable in:</p> <ul style="list-style-type: none"> - Winter (June - Aug) <p>Do you find the temperature of your living room uncomfortable in:</p> <ul style="list-style-type: none"> - Spring (Sept – Nov) / Autumn (March - May) 	Do you find the temperature of your living room uncomfortable?	<p>Responses to the three periods for the pre installation survey questions were averaged to align with the post installation survey question.</p> <p>As noted above, the completion date of the survey indicates respondents had just experienced summer, therefore any energy efficiency upgrades had been tested by more extreme weather conditions.</p>
<p>Do you find the temperature of your bedroom uncomfortable in:</p> <ul style="list-style-type: none"> - Summer (Dec - Feb) <p>Do you find the temperature of your bedroom uncomfortable in:</p> <ul style="list-style-type: none"> - Winter (June - Aug) <p>Do you find the temperature of your bedroom uncomfortable in:</p> <ul style="list-style-type: none"> - Spring (Sept – Nov) / Autumn (March - May) 	Do you find the temperature of your bedroom uncomfortable?	<p>Responses to the three periods for the pre installation survey questions were averaged to align with the post installation survey question.</p> <p>As noted above, the completion date of the survey indicates respondents had just experienced summer, therefore any energy efficiency upgrades had been tested by more extreme weather conditions.</p>