CASE STUDY

Air source heat pumps: Rural Stirling Housing Association

1 Project overview

Introduction

In 2022, Rural Stirling Housing Association completed a project to decarbonise heating systems in some of their stock.

The majority of the 41 properties were located in Old Kirk Loan and Craigmore View and were built in the early 2000s. The aim was to upgrade the energy performance of these properties, to bring them in line with the requirements of the Energy Efficiency Standard for Social Housing 2020 (EESSH2). The housing association also sought to make energy more affordable for tenants and selected a combination of measures that would reduce tenants' reliance on the grid.

Project name: Old Kirk Loan and Craigmore View Heat Replacement Programme
Landlord: Rural Stirling Housing Association

Contractor: Everwarm
Project manager: Changeworks
Tenant engagement: Changeworks
Evaluator: Changeworks

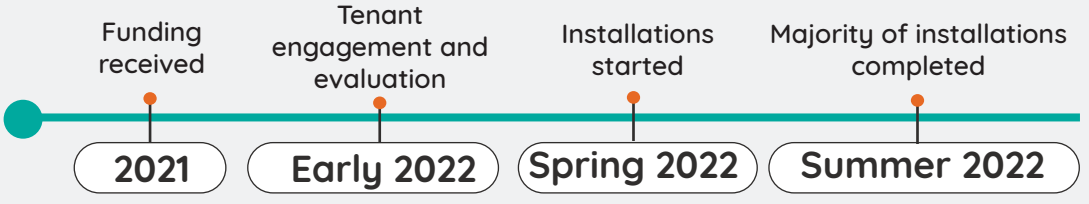
Overall cost: £874,899

Funding source: Social Housing Net Zero Heat Fund: £486,357
Rural Stirling Housing Association: £388,542

Heat technology: Air source heat pumps

Building archetype: 41 timber framed cottage flats and terraced properties
Year: Early 2000s
Tenure: Social housing

Project timeline:



Measures

The project replaced older storage heaters with air source heat pumps, while also installing solar PV and electric battery storage to generate and store electricity. The aim was to install measures in 45 properties; four of these installations did not proceed as a result of tenant refusal due to concerns about possible increase in running costs.

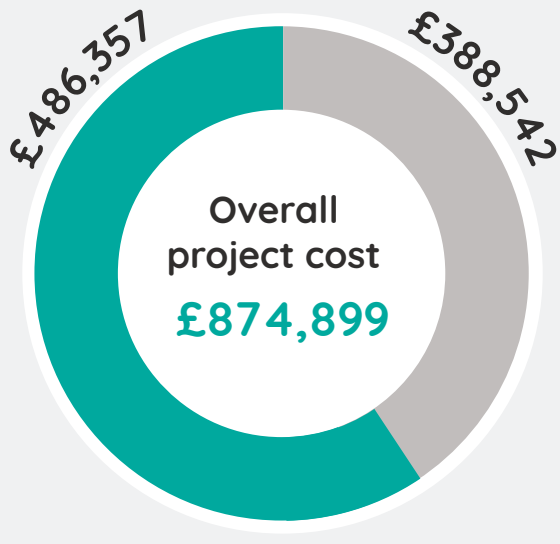
2 Project management

Contractor

The project was managed by the primary consultant, Changeworks, who assisted with the funding application, stakeholder engagement and impact assessment.

The installation contract was won by Everwarm who began installations in late March 2022 and the majority of the works were completed by the end of Summer 2022. Everwarm also supported customers to ensure that they were on the correct tariffs and organised the installation of new meters; this often involved three-way telephone calls with the energy supplier.

3 Costs



FUNDED BY

- The Social Housing Net Zero Heat Fund
- Rural Stirling Housing Association

The Social Housing Net Zero Heat Fund paid for £486,357 and the remaining project costs were then covered by Rural Stirling Housing Association.

The total cost of installation provided by Everwarm was £802,186. This was less than the original budget as the measures were not feasible in certain properties and some tenants refused installation. The installation cost per unit was approximately £20,000.

Work carried out by Changeworks totalled £72,713; half of which was covered by the Social Housing Net Zero Heat Fund and the remainder by the housing association.

4 Project impact

Evaluation approach

Energy performance
Changeworks analysed the differences in modelled energy efficiency (i.e. Energy Performance Certificates (EPCs)) before and after the improvements. Properties were grouped to enable comparison between the different archetypes.

Property environmental evaluation
Changeworks placed environmental sensors in volunteered properties to monitor the effect of the installed measures. The monitors measured temperature and relative humidity and were installed in properties prior[1] to installation and left for one year following the measure installation. This data was then analysed to show the range in temperature, and ability to meet standard heating regimes and maintain healthy humidity levels.

Tenant satisfaction
Changeworks issued householder surveys both pre- and post-installation. However, the survey responses were very low, despite sending reminders and the offer of a prize draw. Due to the low sample size, there was insufficient data to robustly evidence the impact of the measures across the project.

Results

Energy performance rating
The average energy efficiency rating, Standard Assessment Procedure (SAP), prior to installation was 65, or band D. The lowest scoring property was an end-terrace house with a score of 39 (band E) and the highest was a ground floor flat at 74 (band C). After installation, the average energy efficiency rating increased by 20 SAP points, to 85, band B. This increase is 20 points higher than the national average (65).

Prior to the installation, 20 properties had an energy efficiency band of D, 17 properties were band C and four were band E. After installation, 39 of the properties improved to band B and two to band C.

1. Due to the need to swiftly install measures once suitable properties were identified because of project timescales; the sensors were only in the properties for a short time prior to installation.

Property environmental monitoring results

Figure 1 illustrates the proportion of days that the standard heating regime was met for each of the monitored rooms[2]. Across all properties the average temperature increased from 18.96°C to 19.07°C. The standard heating regime requires a higher temperature to be met in living rooms, which partly explains the lower proportion of days this was met in the living room compared to other rooms.

Figure 2 shows the proportion of days that the healthy relative humidity[3] was met. Post installation, this decreased from 67% to 57% of the time. The housing association explained that there has been an increase in reported condensation and damp. Further investigation is required into the cause, but possible reasons include tenant's opening windows less as a result of rising energy costs. A solution for this could be improving insulation to the properties.

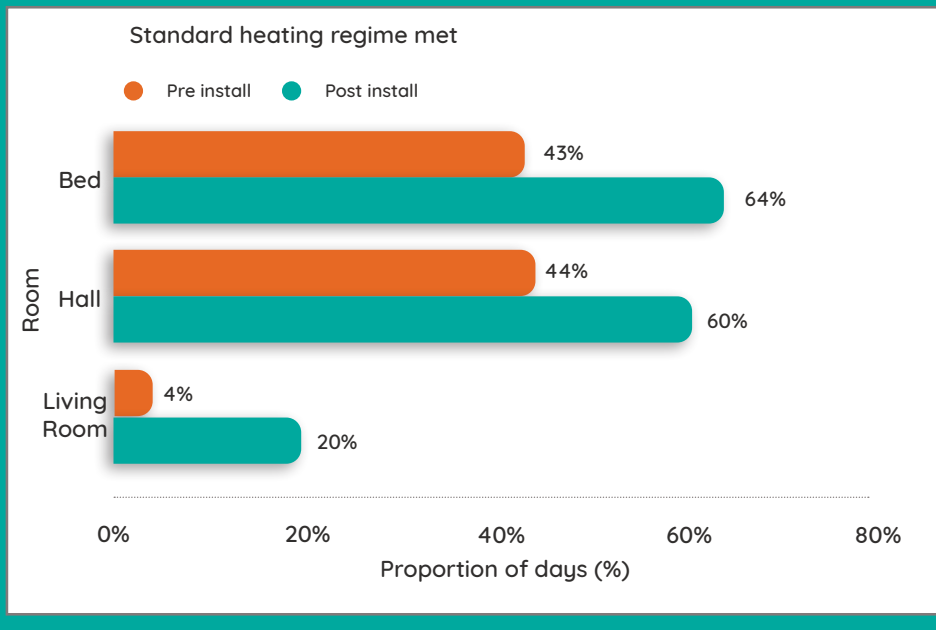


Figure 1: The proportion of days the standard heating regime was met in rooms pre- and post-installation.

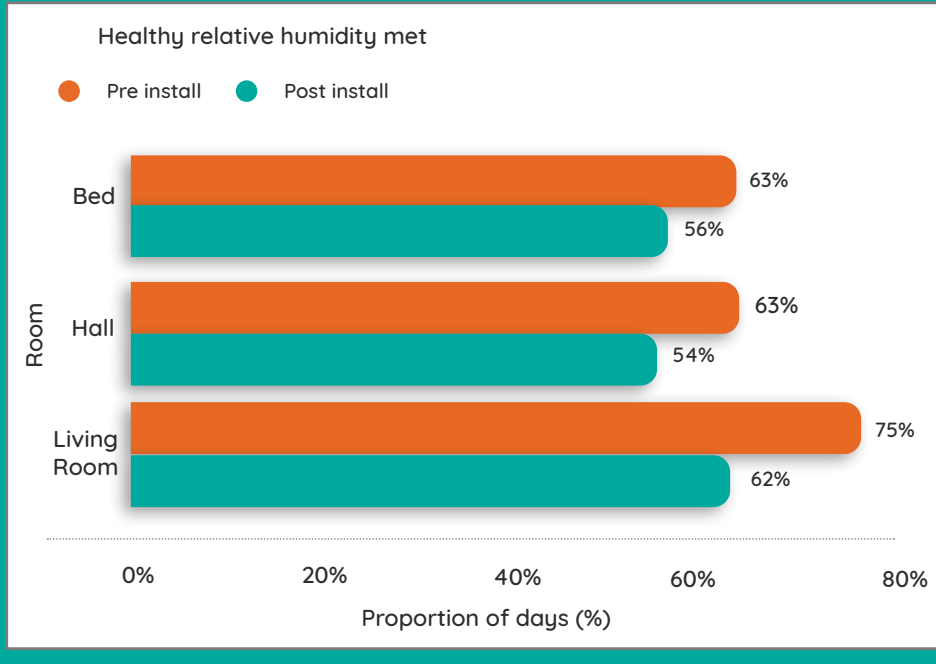


Figure 2: The proportion of days that healthy relative humidity levels were met in rooms pre- and post-installation.

2 To meet the standard heating regime, temperature must be at least 18°C in hallways and bedrooms, and 21°C in living rooms. This must be maintained for at least nine hours on weekdays and 16 hours on weekends.

3 Healthy levels of relative humidity are between 40-60% humidity.

5 Challenges and recommendations

Tenant understanding

Challenge:
Ensuring tenants are on-board with the project to enable installations and confidence in the systems. Some tenants will refuse installation if the benefits are not appropriately communicated to them.

Recommendation:
Engage in tenant liaison on site from the project inception. This engagement can help promote behavioural change by raising awareness about the measures and encouraging careful energy usage to maximise the benefits of the measures. Tenant consultation can also help minimise disruptions for tenants, while increasing the engagement with the project. This could have facilitated an increase in survey responses, to acquire more robust data on the impacts of the project.

Network operator delays

Challenge:
This project experienced some delays in receiving Distribution Network Operator (DNO) approval, which held up some of the installation work. This approval is often required for projects that involve modifications or new connections to the network.

Recommendation:
Engage with the DNO at an early stage in the project to reduce the risk of delays.

Maintenance

Challenge:
One of the concerns raised by Rural Stirling Housing Association was maintenance. In particular, they felt that if the system fails then it could be more expensive and time consuming to repair than a traditional storage heater. This is compounded by limited skills and capacity of the labour force, particularly in rural areas.

Solution:
To mitigate this in future projects, Rural Stirling Housing Association are exploring a cost benefit analysis of air source heat pumps against high heat retention storage heaters.

Recommendation:
Wider work is needed to upskill and expand the capacity of the supply chain to support maintenance of air source heat pumps.

6 Project contact

Rural Stirling Housing Association welcomes enquiries about site visits from other social landlords. Please email Craig Wood: **craig@rsha.org.uk**

This is part of a suite of case studies that can be found on the ClimateXChange social housing decarbonisation webpage, alongside a summary report, which gives an overview of the key learnings and recommendations.

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