



Department
of Energy &
Climate Change

Evaluation of the Renewable Heat Premium Payment Scheme Phase Two

Main Report

January 2015

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Summary

This report summarises findings from an independent evaluation of Phase Two of the Renewable Heat Premium Payment Scheme (RHPP2), commissioned from ICF Consulting by the Department of Energy & Climate Change (DECC). The evaluation provides an independent assessment of the Scheme's delivery, which ran from April 2012 to March 2013, across the three mechanisms used to reach households.

The evaluation examines the extent to which the Scheme met its objectives and the lessons that can be learnt to inform further development of the Renewable Heat Incentive (RHI). The RHPP2 Scheme was extended in April 2013 until the launch of the domestic Renewable Heat Incentive (RHI) on 9 April 2014. The scope of the evaluation and this report was restricted to the second phase of the RHPP Scheme. A separate, small scale evaluation of Phase One was undertaken and can be found on the GOV.UK website: <https://www.gov.uk/government/publications/analysis-of-customer-data-from-phase-one-of-the-renewable-heat-premium-payments-rhpp-scheme>

Research methodology

The study employed a mixed method approach including:

- a census of installations undertaken with social tenants and owner occupiers in the private householder and communities scheme (scheme participants). Census responses ranged from 222 to 4,136 households depending on the population;
- interviews (a total of 168) with owner occupiers, tenants, social landlords, community group leads and installers of renewable heating technologies (scheme participants); and
- interviews (a total of 51) with owner-occupiers, Registered Social Landlords (social landlords) and community group leads who applied to, but did not install renewable heating technologies as part of the RHPP2 Scheme (non-participants).

The findings and conclusions in this report are drawn from the above quantitative and qualitative evidence.

A separate technical report provides details of the research methodology, sample and data analysis and can be found on the GOV.UK website <https://www.gov.uk/government/publications/evaluation-of-the-renewable-heat-premium-payment-scheme-phase-two>

Policy background

The Renewable Heat Premium Payment (RHPP) was a government scheme that provided a grant towards the capital cost of installing renewable heating technologies in domestic properties. The summary features of the Scheme are:

- The eligible technologies included air and ground source heat pumps, biomass boilers, and solar thermal panels;
- The Scheme was available to those living in Great Britain;
- For the householder element of the Scheme, any householder could apply for solar thermal, but only people living in areas off the national gas grid were eligible to apply for heat pumps and biomass boilers. The off-gas grid eligibility criterion did not apply for the social landlord and communities elements of the Scheme, although it was used as a criterion when rating applications for funding;
- The Scheme operated in three phases: Phase One (August 2011 – March 2012), Phase Two (April 2012 – March 2013) and RHPP2 Extension (April 2013 – March 2014);and
- The Scheme was funded by the Department of Energy & Climate Change (DECC) and was administered by the Energy Savings Trust.

The RHPP2 Scheme (April 2012- March 2013) was comprised of three elements:

- one-off grants, paid through vouchers issued to householders to help with the cost of installing renewable heating technologies, and redeemed upon certified completion;
- competitions for social landlords to bid for grants to cover some of the costs of installing renewable heat technologies in social housing; and
- a new Communities Scheme to install renewable heating technologies in private homes, facilitated by community groups.

The RHPP Phase Two Scheme was directed to:

- help support the renewable heat industry in the period before the domestic Renewable Heat Incentive could be introduced; and to
- learn about the performance and use of domestic renewable heat installations.

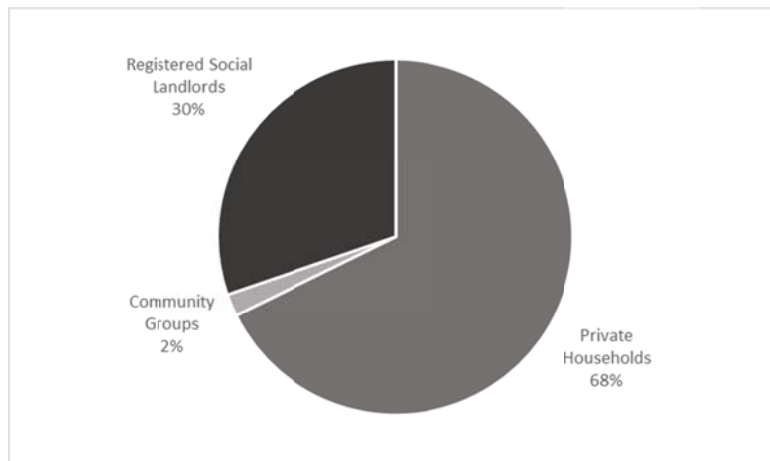
We consider the achievement of these two objectives below.

Supporting the renewable heat industry through the take-up of the RHPP (Phases One and Two)¹

The Scheme part funded over 15,500² installations

Across all phases of the Scheme (but excluding the RHPP2 Extension phase) and all customer groups, 15,634 installations received grant assistance under the RHPP Scheme. Of these, 70 per cent were installed by private households (including households in the Communities Scheme) and 30 per cent in social housing. Installations of heat pumps accounted for 59 per cent, solar thermal for 29 per cent and biomass boilers for 12 per cent of all renewable heat installations.

Installations of renewable heat technologies by customer group, funded by the Renewable Heat Premium Payment Scheme, Phases One and Two combined

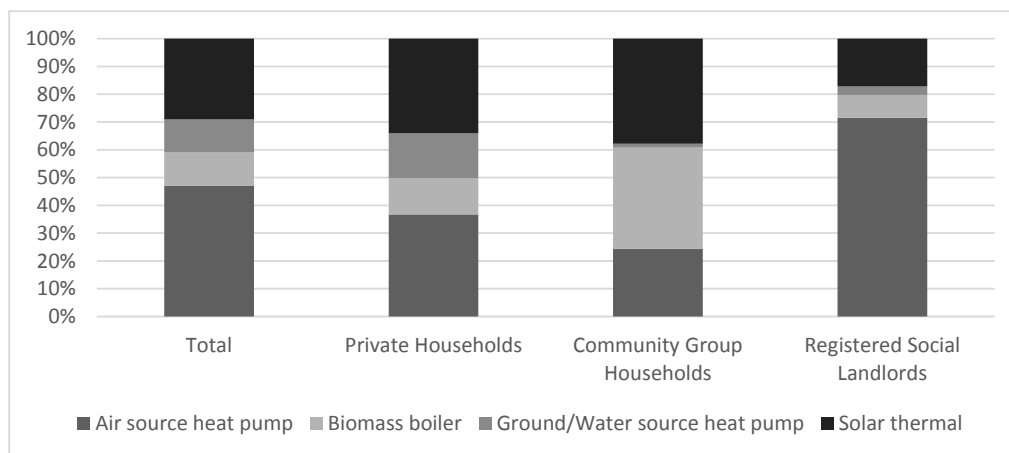


Source: DECC published data, August 2014. Excludes Phase Two Extension.

¹ Figures presented exclude the RHPP2 extension scheme as the data was not available at the time of producing this report. The final full RHPP data (covering the RHPP1, RHPP2 and RHPP2 extension schemes) can be found here: <https://www.gov.uk/government/statistics/rhi-and-rhpp-deployment-data-november-2014>. A special feature on the RHPP can also be found in the December 2014 edition of Energy Trends <https://www.gov.uk/government/statistics/energy-trends-december-2014>

² Available at: <https://www.gov.uk/government/statistics/rhi-and-rhpp-deployment-data-august-2014>

Installations of renewable heat technologies by customer group and renewable heat technology, funded by the Renewable Heat Premium Payment Scheme, Phases 1 and 2 combined



Source: DECC published data, August 2014. Excludes Phase Two Extension.

The RHPP Scheme sat within a wider market including other retrofit renewable heat installations, new build and small non-domestic installations. It was designed to target a section of this market: off gas grid retrofit. The RHPP Scheme (across all phases) required installations to be registered with the Micro-generation Certification Scheme (MCS), a scheme which certifies microgeneration technologies and installation companies. Looking at the number of RHPP installations as a proportion of the total MCS registered installations provides an indication of the penetration of the scheme in the market. During Phases One and Two of the RHPP Scheme 49 per cent of registered installations with MCS were installed under the RHPP Scheme. The proportion was highest for biomass boilers (78 per cent) and lowest for solar thermal (40 per cent).

Installation in Phase Two accounted for 60 per cent of all installations in the two phases

Phase Two was implemented between April 2012 and March 2013. In this period, some 9,500 installations (60 per cent of total installations in the two phases) were undertaken. The share of different technologies taken-up was broadly similar to Phase One.

However, for 78 per cent of renewable heating technologies installed as part of the private householder scheme, users reported that it was likely or very likely that they would have done so in the absence of the RHPP2 Scheme. Eighty-seven per cent of private households had heard about the RHI and it is possible that some may have proceeded with their installation in anticipation of the RHI. The number of installations that would have gone ahead without the RHPP Scheme was reported to

be lower for the Communities Scheme, with only 43 per cent of installations deemed likely.

In Phase Two, engagement with social landlords and community groups facilitated take-up in new markets and areas

The RHPP2 Scheme has supported the market for renewable heat technologies by encouraging the participation of households that would not have otherwise benefited from the Scheme, especially through the Registered Social Landlords competition, but also to a lesser degree the Communities Scheme.

Social landlords used the Scheme to develop and test both the suitability of the technologies and their own capacities to implement installation programmes.

There is no quantitative data on the extent to which the installations funded by the Registered Social Landlord competition would have been likely to have been made in the absence of the Scheme. But interviews with a sample of social landlords that participated in the RHPP2 Scheme highlighted the benefits of the Scheme:

Some social landlords interviewed stated that the grants available through the Scheme provided an incentive to consider technologies alternative to those conventionally used, and to identify ways in which investment in renewable heat technologies could involve the integration of these considerations into their building investment and maintenance programmes and budget planning cycles: *'[Installation of renewable heat technologies was a] useful complement to our own investment programmes in insulation.'* (Participating RSL 8); *'We were planning to upgrade our off-gas portfolio anyway...so this scheme appealed'* (Participating Registered Social Landlord 15).

Some social landlords indicated in interviews that participation in the RHPP2 Scheme resulted in their organisation acquiring greater knowledge and understanding of renewable heating technologies, and it enabled the testing and piloting of the use of renewable technologies: *'The rationale for participation in this project was to install a range of renewable techs, singly and in combination, so we can do some meaningful comparisons between technologies....We wanted some decent data to inform future investment in this area.'* (Participating RSL 29); *'We learnt about the practical realities of installing [the technology] through this scheme – so that is a useful outcome in itself'* (Participating Registered Social Landlord 14).

Social landlords that participated in Phase One of the Scheme explained in interviews that their previous experience of the application and installation process helped them submit applications to install more renewable heat installations: *'We had the experience of RHPP1 and the programme for replacing heating in ... off-grid homes so we were always going to go for any other sources of grant funding.'* (Participating Registered Social Landlord 28); *'Communication [with tenants] was easier this time [for RHPP2], after having the experience of RHPP1... [For RHPP1]*

we didn't know what the experience and the running costs would be like. We did some careful monitoring [of RHPP1 installations] so we were able [for RHPP2] to give better information to customers on running costs... We had better uptake [because of] fewer tenant refusals' (Participating Registered Social Landlord 17).

Most social landlords interviewed who had achieved installations stated that these had a positive impact on the majority of their tenants, in terms of satisfaction with the performance of the renewable heating technology and perceived lower energy costs, justifying investment in renewable heating technologies: '[Participating in the Scheme] shows that we are a caring landlord addressing fuel poverty by giving [tenants] the choice of what to have installed' (Participating Registered Social Landlord 24). "A satisfied tenant in a properly heated home leads to lower maintenance costs for us from associated problems such as damp and condensation... that is an additional benefit for us" (Participating Registered Social Landlord 6).

During interviews, social landlord, in particular smaller ones, identified management constraints which limited their take-up and number of installations achieved. These issues include the need for:

- housing stock assessments (numbers of units, condition of heating systems, insulation levels);
- recognition of potential planning issues;
- technology and supplier information;
- the operation of a procurement process to select an installer;
- tenant engagement processes before, during and after an installation;
- management of installation projects using government schemes, including the use of reserve lists of projects/ buildings; and
- flexibility in housing capital and revenue expenditure plans to take better advantage of government schemes.

Community groups engaged communities and promoted take-up, but struggled to achieve targeted levels of installation.

Community groups consisted of existing groups, broadly focused upon community action to promote renewable energy in order to reduce the environmental impact of fossil fuels and reduce the energy bills of low income households. Most had experience of similar, previous schemes. Even where the group had no experience of promoting renewable heat technology, all had experience of promoting environmental sustainability at the community level: '*Participation in the*

Communities Scheme] was a desire to somehow kick-start renewable heat in this area, and make a bit of noise about it' (Town-based group, Community Group 1).

All of the Community Group Leads³ welcomed the funding and support provided to develop their projects. In developing and delivering projects, they reported difficulties in securing sufficient households from target areas. Every household was not required to be in these areas, but a greater number would result in a higher grant score and higher voucher values. Face-to-face contact was reported as being effective in engaging local households. It enabled the community group members to talk about the Scheme and the technologies as a trusted source of advice and to answer householders' questions. As well as house-to-house door-knocking, events to promote the Scheme that included local installers demonstrating technologies, were also important to a community-based approach. *"It's a big thing around here about local businesses. People prefer to work with people from down the road."* (Village-area group, CG7).

The majority of Leads identified the timing of the Communities Scheme as providing a challenging framework for engaging households and achieving installations. Households were required to make decisions about installations before and after Christmas and this was a barrier to securing financial commitments amongst the middle to low income households targeted: *'To take people from ground zero to having an installation in place that would entail considerable disruption in terms of what that installation would do to their house, and ask them for an upfront payment, all by the end of March, that was asking way, way too much'* (Rural villages group, Community Group 18).

The key barrier to converting expressions of interest into installations reported by Community Group Leads was the cost of installing renewable heat technology that remained after the voucher value had been discounted. Almost all of the community groups expected the vouchers to provide a higher value discount than what was awarded: *'Initially we thought that the voucher would cover 50 per cent of the cost – in the end it was more like 30 per cent'* (Large mixed urban and rural area, No Installations Community Group 2).

Community groups that were more successful in reaching planned targets had a number of shared features:

- effective partnership working with installers: established from the earliest stages of the Scheme and sustained throughout;
- networking with other community groups: to learn from each other and to promote the Scheme through networks and, for those covering large areas, to work with those more local to specific communities;

³ Community Group Lead was the person in each of the community groups responsible for the delivery of the local project under the Communities Scheme

- having a well-developed infrastructure and paid staff: full-time staff working with volunteers and with experience of delivering community projects; and
- having a well-developed project plan: with realistic targets and experienced staff able to react quickly to work with installers and other groups.

Learning about the demand, performance and supply of domestic renewable heating systems

Customer awareness and interest in renewable heat technologies was high.

Interviews with private households showed that many were already researching and investigating the possibility of investing in renewable heat technologies, and engaging with installers and manufacturers to establish the range and feasibility of using different renewable heat technologies, prior to the Scheme, encouraged in part by the promise of the Renewable Heat Incentive (RHI). More than half of the interviewees reported that they had been informed about the Scheme through their installer. This was at the time of visiting an installer's showroom or having a visit for an assessment or quote: *'They came out and did an assessment. That was when we heard about the grant'* (biomass boiler).

Installers had also promoted the RHI as an incentive for participants: *'The main guy who sold us the system said, by the way, the installation qualifies you for renewable heat premium payments. I was like, oh wow what does that mean? He said you get a voucher, first of all you get about £800 back and then over about seven years you get extra money'* (ASHP).

The planned introduction of the RHI and the scope for future cost savings was an incentive considered to be important, although at the time of application there was some uncertainty over if and when the RHI would begin. The RHI was well known to households (87 per cent of those installing under the Private Householder Scheme had heard of the RHI) and was identified as a factor in the decision to install a renewable heat technology by almost half of the sample overall.

Consumers were motivated by the scope to reduce reliance on fossil fuels and cost savings

Across all customer groups and technologies, the most frequently indicated reason given for installations was the need to reduce dependence on fossil fuels (77 per cent of all installations). This was especially important for community scheme households and for installations of ground source heat pumps and biomass boilers. The rising price of fossil fuels was also a very important motivation, and the most important for private households (78 per cent of installations) and installations of biomass boilers (83 per cent of installations).

The desire to save money was the second most frequently indicated motivation for all three customer groups (70 per cent of all installations). This was the main motivation for social tenants, (74 per cent of installations), who identified this as a key motivation to agreeing to the installation. This was only a slightly weaker motivation for private households (69 per cent of installations) and community group households (68 per cent of installations). It was relatively more important for installations of solar thermal (75 per cent of installations).

Installations in social tenant properties were more likely than other customer groups to have taken place because they were thought to be more efficient than the previous heating system (55 per cent of installations). This was followed by practical reasons such as constant temperature (50 per cent), easier to use (48 per cent), and a reliable supply (47 per cent).

Consumer satisfaction with installed renewable heat technologies was high

Satisfaction levels with installations, across all technologies, for all three customer groups, was high at 88 per cent. Overall satisfaction levels with installations was 92 per cent, reported in the private household census⁴. Similar satisfaction levels with installations (92 per cent) were reported in the census of households in the Communities Scheme⁵. There was no significant association found between the overall level of satisfaction reported by private householders and Communities Scheme householders and the technology installed.

The census of social tenants indicated that 74 per cent of users of renewable heat installations were generally positive about their installation⁶. The overall satisfaction levels among tenants were the highest among users of biomass boilers and ground source heat pumps. *“It works brilliantly. It keeps the house warm at the right temperature.”* (Tenant 5); *“I can actually run a shower off the hot tap now, whereas before it was like a little trickle, and it would take all week to fill up the bath... It’s so nice to have a warm house”* (Tenant 10).

It is too early to establish the extent of cost savings and changes in the use of heating and hot water systems

While it is evident that across all three customer groups, 74 per cent of installations were hoping to achieve cost savings in the long-term, census data from users of renewable heating technologies highlighted that there is currently no reliable data available to measure cost savings. Generally, there is increased use of the new

⁴ Source: Follow-up (FU) surveys (Wave 1 (FUW1) and Wave 2 (FUW2)). This compares with 89% reported in the immediate post-installation survey. Follow up survey results were used as they give a measure of satisfaction once the technology has been used for a heating season.

⁵ Source: on-line census of all householders who applied for and redeemed an RHPP voucher through a Communities Competition project.

⁶ Source: postal and online census of all tenants where social landlords have installed RHT

heating systems reported by all customer groups, with almost half of all installations reported to be used for longer periods in comparison to the previous heating system. What is not clear from the data is why this is and whether this is occurring because users find their system more or less cost effective to run for longer periods and/or because it is simpler to operate.

Two-thirds of installers interviewed were positive about the impact of the RHPP2 Scheme in generating demand for renewable heating technologies

Two-thirds of installers interviewed were positive about the role played by the RHPP2 Scheme in generating and sustaining demand amongst owner occupiers (i.e. private households and households in the Communities Scheme) and social landlords, and that it had been good at maintaining the supply chain, if not building it up. Installers noted how the RHPP2 Scheme had helped to act as a 'stop gap' to the domestic RHI and that it 'maintained the continuity' in demand until the domestic RHI was launched.

Installers supplying the growing social landlord market appeared to have benefited more from the Scheme than installers who concentrated exclusively on the domestic household sector in terms of increasing revenues and the size of their business to meet demand. The effect of the grant to social landlords was recognised by several firms, for example, one installer noted that the RHPP2 Scheme had 'raised the profile of renewable heating technologies within social housing providers and made people commit to doing a bit more.' Another installer suggested the grant had been essential in driving purchases of heat pumps from social landlords (but not from private householders).

Lessons learned from RHPP2 Scheme administration and delivery for future policy measures designed to support the domestic take-up of renewable heat technologies

Social landlords and community groups played important roles in securing take-up

Installations in social housing offered opportunities for the growth of renewable heat technologies markets: Analysis of the published take-up data⁷ indicates that the social housing market represents a significant share of the total renewable heat technology market. This was acknowledged by some installers interviewed who reported developing services targeted at and specialised in the social housing market. Interviews with a sample of social landlords shows the RHPP2 Scheme attracted participation from social landlords that were experienced in the installation of renewable heat technologies as well as those looking to learn from and test the use of renewable heat technologies and related planning processes. Social

⁷ Available at: <https://www.gov.uk/government/statistics/rhi-and-rhpp-deployment-data-august-2014>

landlords were motivated to install renewable heat technologies by expected improvements in tenant welfare (comfort and lower heating bills) as well as financial returns for their organisation. Projects in social housing provide scope for testing and demonstrating the benefits of renewable heat technologies that smaller households and private tenants might benefit from, and for increasing awareness of these benefits amongst (non-participant) housing providers: *“If the possibility comes up again we will be much better placed to take advantage of it as we have learned a lot from the process. We now also have better information on running costs which we can use to inform [potential] customers”* (Participating Registered Social Landlord 17), *“[Participating in RHPP] has prompted other Registered Social Landlords to come and have a look at what we have done. It has helped educate other housing providers [about the technologies]”* (Participating Registered Social Landlord 11).

The RHPP2 Scheme has demonstrated the facilitation role that community groups can play to support delivery: Despite the reported challenges noted above, many of the Community Group Leads described their project as a success. This was related to their learning from the project and the advantages they could identify rather than the number of installations achieved. *‘For us, as an organisation we are a lot more knowledgeable about the practical problems around renewable tech and the practical problems that people in the communities where we worked face. We also learned about the importance of using community leaders to build trust and raise interest’* (Large rural area group, Community Group 16). They highlighted that the Scheme had promoted much greater awareness of renewable heat technologies across their communities: *‘The Scheme has drawn attention to alternative technologies and there is a growing interest and awareness in these’* (Village-area group, Community Group 15). Receiving support from a community group was an important factor for those who had installed renewable heating technologies as part of the Communities Scheme. Over half (55 per cent) of all installations were unlikely to have been made in the absence of the voucher.

Targeting different types of households was possible

The three mechanisms achieved installations across a wide range of households, in terms of household income, age, and property type based on household descriptions provided by respondents to the three respective censuses. Take-up under the private household voucher scheme, compared to those that had installed under the Communities Scheme, tended to be made by older, more affluent households living in large, detached houses and for whom the incentive provided was less influential. The social landlord competition made a major difference in the household profile benefiting from the Scheme, with households (social tenants) on lower incomes and in smaller properties compared to households using the other two schemes.

The novelty of renewable heat technologies did not limit the take-up by groups unfamiliar with the technology: The census data for private householders,

households in the Communities Scheme and social tenants, together with interview data indicates there were no major concerns about the installation and use of a renewable heating system. Users of the renewable heating technologies felt well informed based on their own research and, in the case of social tenants, felt well informed and briefed on the use of the renewable heat technology. The willingness of those with installations to recommend their use (81 per cent of installations) was high across all customer groups.

The incentives provided by the Scheme varied between customer groups and influenced take-up: The availability of a one-off grant payment was more important to households in the Communities Scheme (55 per cent of installations in the communities scheme would have been unlikely to take place in the absence of the scheme) than to those who redeemed a voucher via the private householder scheme (19 per cent were unlikely to have taken place without the scheme). It has not been possible to establish how much this was due entirely to the difference in voucher value, although it is obviously an important factor. Another possible factor might have been the different value placed by householders on the incentive provided by the planned renewable heat incentive (RHI). However, awareness and anticipation of the use of the RHI was very high among both groups of households (87 per cent installing under the private household scheme had heard of the RHI and 78 per cent installing under the Communities Scheme were planning to apply for the RHI) playing an important role in supporting take-up.

Discounts were negotiated as part of the Communities Scheme but the volume of installations achieved didn't always allow them to be realised: An objective of the Communities Scheme was for community groups to look to secure discount agreements with installers, based on bulk purchase. While many of the groups reported securing a discount, interviews revealed that few were realised due to insufficient sales volumes being achieved. For example, one Community Group Lead reported negotiating a 5 per cent discount for sales of five to nine units and a 10 per cent discount for 10 or more sales; only two renewable heating technologies were finally installed. Nonetheless, such examples indicate the potential for bulk purchase schemes to negotiate discounts to help reduce up-front costs.

Working with community groups helped promote renewable heating Community groups provided an additional mechanism for promoting renewable heat technologies and the installation of technologies, especially in off-grid areas located in more rural areas. Most groups reported that they had been able to work well with local installers, who were keen to work with them to build a local market and increase clients for their business: *'The installer wasn't there to sell he was there to guide people...so moving away from the whole commercialism of energy'* (Village-area group, Community Group 10). Most of the Community Group Leads interviewed felt that the Scheme design would have benefited from further community group involvement. They saw greater, earlier involvement of community groups as key to effective design, particularly in understanding rural issues.

The role of installers was important in facilitating market take-up: As noted above, the RHPP2 Scheme has helped to test the demand for renewable heat technologies across a number of market ‘niches’ (for example, different building types in different regions and with different ownership structures – private versus social). This opportunity to ‘road test’ the viability of new technologies in different settings and to see what works well has provided an important demonstration effect. One installer for example had helped to improve renewable heating installations where systems were not performing as designed, building a reputation for themselves in the process for troubleshooting. As reported in earlier sections, installers have played a role in supporting social landlords, community groups and households by providing information and advice.

1 The Renewable Heat Premium Payment Scheme

1.1 An overview of the Renewable Heat Premium Payment Scheme

1.1.1 The main features of the RHPP Scheme

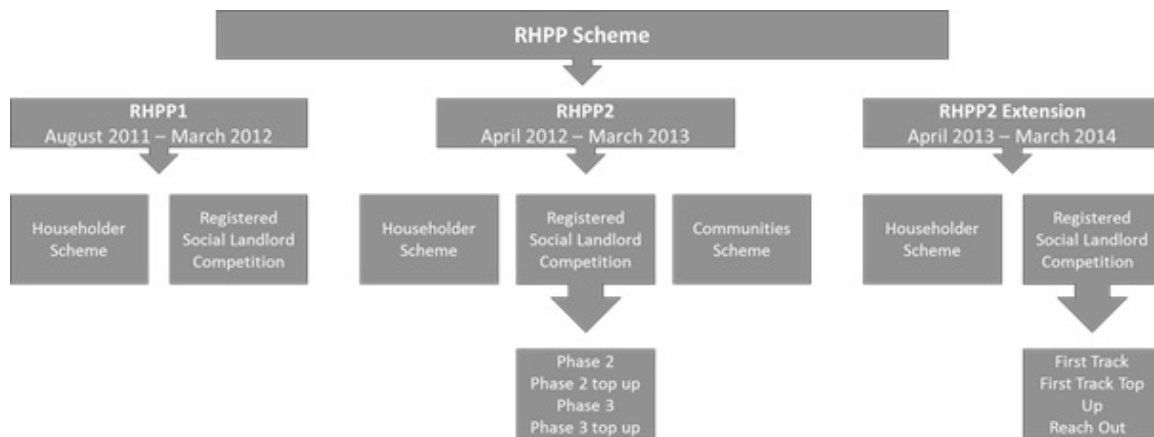
The main features of all three phases of the Renewable Heat Premium Payment (RHPP) Scheme were:

- The RHPP Scheme was a government scheme that provided a grant towards the capital cost of installing renewable heating technologies in domestic properties;
- The eligible technologies included air and ground source heat pumps, biomass boilers, and solar thermal panels;
- Grants were available to private households, community groups and the social landlord sector;
- The Scheme operated from August 2011 to March 2014, ahead of the launch of the domestic Renewable Heat Incentive (RHI) on 9th April 2014;
- The Scheme was available to those living in Great Britain;
- For the householder element of the Scheme, any householder could apply for solar thermal, but only people living in areas off the national gas grid were eligible to apply for heat pumps and biomass boilers. The off-gas grid eligibility criterion did not apply for the social landlord and communities elements of the Scheme, although it was used as a criterion when rating applications for funding.;
- The Scheme was funded by the Department of Energy & Climate Change (DECC) and was administered by the Energy Savings Trust; and
- Figure 1 provides an overview of the three phases of the RHPP Scheme. Annex 1 provides the customer journey for each of these schemes. The scope of this evaluation and report is restricted to the second phase of the RHPP Scheme. A separate, small scale evaluation of Phase One was undertaken and can be found [here](#)⁸.

⁸ Available at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265585/Analysis_of_customer_data_from_phase_one_of_the_renewable_heat_premium_payments_RHPP_schemeFINAL.pdf

Figure 1: Overview of RHPP Scheme



1.1.2 RHPP Phase Two Scheme objectives

The primary objective of the RHPP2 Scheme was to encourage the uptake of, and capture information from, a significant number of domestic renewable heat installations: with information to be collected across different customer types (private households, social landlords and tenants, community groups and related demographics) and types of housing (e.g. terraced houses, detached houses).

The Scheme was expected to contribute towards:

- maintaining the supply chain;
- learning about the supply, demand, performance and use of domestic renewable heating systems; and driving improvements in technical system performance, future uptake and delivery.

The second phase of the RHPP Scheme comprised three elements:

- one-off grants, paid through vouchers issued to householders to help with the cost of installing renewable heating technologies, and redeemed upon certified completion;
- competitions for Registered Social Landlords (social landlords) to bid for grants to cover some of the costs of installing renewable heat technologies in social housing; and
- a Communities Scheme to install renewable heating technologies in private homes, facilitated by community groups.

1.2 Research objectives of the RHPP2 evaluation

The overall aims of the RHPP2 evaluation were to gain a better understanding of:

- the value and effectiveness of different mechanisms and incentives to influence consumers to take up renewable heating technology;
- the impact of the RHPP2 Scheme on the installer market;
- the renewable heating technologies themselves and how people use them; and
- whether the RHPP2 Scheme met its objectives.

The specific research objectives for the RHPP2 Scheme were to:

- provide an overview of the take-up of renewable heat installations across different consumer groups, types of individuals and building stock;
- explore how and why consumers are engaging, or not engaging, with the Scheme;
- examine the role of RHPP in driving improvements in the performance of renewable heating systems;
- develop an understanding of how installers are engaging with the Scheme and assess the impact on their business and the wider market;
- assess the scheme delivery and administration; and
- explore the effectiveness of engaging private householders, social landlords and communities to deliver renewable heating technologies.

1.3 Summary of the take-up of the RHPP Scheme (Phase One and Two combined)

1.3.1 Over 15,500 renewable heating technologies were installed in Phases One and Two of the RHPP Scheme

A total of 15,634 renewable heating technologies were installed in Phases 1 and 2 of the RHPP Scheme. Forty per cent of these renewable heating technologies were installed during Phase One and 60 per cent in Phase Two, (Table 1). Phase Two extension is not included in this analysis as the data were not available at the time of producing this report. Final RHPP statistics for Phases One, Two and Two extension can be found [here](#)⁹

Table 1 Installations by customer group, Phase One (August 2011-March 2012) and Phase Two (April 2012-March 2013)

Phase	Private Households	Registered Social Landlords	Communities Scheme	Total Number	% of Total
Phase One	5,230	961	-	6,191	40%
Phase Two	5,315	3,763*	365	9,443	60%
Total Number	10,545	4,724	365	15,634	100%
% of Total	68%	30%	2%	100%	

Source: Energy Saving Trust: Scheme monitoring data, August 2014. It excludes installations in the Phase Two extension.

Note: *This includes installations across the four social landlord competitions.

⁹ <https://www.gov.uk/government/statistics/rhi-and-rhpp-deployment-data-november-2014>. A special feature on the RHPP can also be found in the December 2014 edition of Energy Trends <https://www.gov.uk/government/statistics/energy-trends-december-2014>

Over the two phases, two-thirds of all renewable heating technologies installed were done so as part of the private householder voucher scheme. The remaining installations were supported through the social landlord competitions and the Communities Scheme. The most popular renewable heating technology installed across the three customer types was an air source heat pump, accounting for almost 50 per cent of renewable heat installations (Table 2).

Table 2 Number of Installations by customer group and renewable heat technology type, Phase One (August 2011-March 2012) and Phase Two (April 2012-March 2013) combined

Renewable Heat Technology	Private Households	Registered Social Landlords	Community Groups	Total Number	% of Total
Air Source Heat Pump	3,871	3,379	89	7,339	47%
Ground/Water Source Heat Pump	1,704	146	5	1,855	12%
<i>All Heat Pumps</i>	<i>5,575</i>	<i>3,525</i>	<i>94</i>	9,194	59%
Biomass Boiler	1,381	389	133	1,903	12%
Solar Thermal	3,589	810	138	4,537	29%
Total Number	10,545	4,724	365	15,634	100%
% of Total	68%	30%	2%	100%	

Source: Energy Saving Trust: Scheme monitoring data, August 2014.

Note: Upon closure of the RHPP2 Scheme and at the time of fieldwork, a total of 364 installations had been funded as part of the Communities Scheme. However, one late payment for a biomass boiler was made in 2014 after the fieldwork period had ended, equalling 365 installations. In subsequent sections, the previous total of 364 installations is used in later tables.

The RHPP Scheme sat within a wider market including other retrofit renewable heat installations, new build and small non-domestic installations. It was designed to target a section of this market, the off gas grid retrofit market. The RHPP Scheme (across all phases) required installations to be registered with the Micro-generation Certification Scheme (MCS).

During phases 1 and 2 of the RHPP Scheme, 49 per cent of registered installations with the MCS were installed under the RHPP Scheme. The proportion was highest for biomass boilers (Table 3).

Table 3 The RHPP Scheme Phase One and Phase Two (August 2011-March 2013), position in the wider MCS registered market

Renewable Heat Technology	MCS Registered systems (Aug-11 to Mar-13)	RHPP installations (Aug-11 to Mar-13)	RHPP as % of MCS registered installations
Air Source Heat Pumps	14,193	7,339	52%
Biomass Boilers	2,449	1,903	78%
Ground Source Heat Pumps	3,771	1,855	49%
Solar Thermal	11,287	4,537	40%
Total	31,700	15,634	49%

Source: MCS Database.

The MCS registration figures also include installations on the gas grid, some developer new build installations and small non-domestic installations which were outside the scope of the RHPP Scheme. There are installations outside of the MCS framework, particularly for solar thermal.

1.4 Take-up of Phase Two, the main focus of the evaluation

The number of installations in Phase Two (excluding the Phase Two extension) was 9,443, which represents approximately 60 per cent of the total installed under the Scheme (Table 4). The share of installations by technology was similar in Phase Two in comparison to Phase One. Half of the installations were air source heat pumps, and 30 per cent were solar thermal. Private households accounted for 56 per cent of installations and installations for social tenants accounted for 40 per cent. Installations by households funded through the Communities Scheme accounted for four per cent.

Table 4 Number of Installations by customer group and renewable heat technology type, Phase Two (April 2012- March 2013)

Renewable Heat Technology	Private Households	Registered Social Landlords	Community Groups	Total Number	% of Total
Air Source Heat Pump	2,034	2,630	89	4,753	50%
Ground/Water Source Heat Pump	704	37	5	746	8%
<i>All Heat Pumps</i>	2,738	2,667	94	5,499	58%
Biomass Boiler	648	356	133	1,137	12%
Solar Thermal	1,929	740	138	2,807	30%
Total Number	5,315	3,763	365	9,443	100%
% of Total	56%	40%	4%	100%	

Source: Energy Saving Trust: Scheme monitoring data, August 2014. Excludes the Phase Two extension.

The detail of Phase Two is summarised below (Table 5), which indicates that the largest share of the scheme budget was allocated to and taken up by social landlords. In total £12.2 million was spent over the 18 months of the Scheme, of which £7.4 million was spent on installations for social tenants and £3.9 million for private households.

Table 5 Total RHPP2 budget, vouchers applied, issued, values, and installations by customer group

Customer group	Scheme budget (£)	Number of applications	Number of vouchers issued / installations planned	Number of funded installations	Value of grant disbursed (£m)
Private households (includes private tenants and private landlords who were excluded from the research)	7m	7,504	7,239 (6,957 excluding rejected vouchers)	5,315 (1,538 vouchers not redeemed)	3.9m
Registered Social Landlords	11.2m		5,718	3,763	7.4m
Community groups	3.1m	480	472	364	0.9m
Total	21.3m	7,984	13,147	9,442	12.2m

Source: EST: Scheme monitoring data. This excludes one biomass installation for a CG household. **Note** these figures are based on preliminary deployment data. The final numbers are now available here <https://www.gov.uk/government/statistics/rhi-and-rhpp-deployment-data-november-2014> The number of unredeemed private householder vouchers in this table differs from the final RHPP2 figures.

Further analysis of the Scheme (Table 6) indicates that:

- Between two thirds and three quarters of applications were successful and received grant funding.
- Private investment in installations amounted to £78m (the total costs of installation £90m¹⁰ less the value of grant received of £12m). Grants on average cover 14 per cent of installation costs, but represented only half of this (7 per cent) for private households.
- However, it is worthwhile noting that the differences in costs across the schemes are likely to be driven by the profile of the installation type, renewable heating technology and system size.

¹⁰ Installation costs include the cost of the technology and the costs of installation, including VAT. It excludes the cost of fuels.

Installation costs estimated from the data provided in the post installation survey (private households, base = 4,319, 170 DKs 4 per cent excluded, estimated on 4,149 installations); census of those with installations (Communities Scheme households, base = 234, 20 DKs 6 per cent excluded, estimated on 214 installations). For Registered Social Landlords, the average RSL installation cost is calculated by taking the total installation costs for all Registered Social Landlords (from the RHPP Scheme data) and dividing by the total number of installations.

Table 6 Take-up of the Scheme by customer group

Customer group	Conversion of applications to installations (%)	Total cost of installations (£)	Average cost per installation (£)	Voucher / grant value disbursed as % of installation cost (%)	Voucher / grant disbursed as % of budget
Private households (vouchers)	71%	58.1m	10,923	7%	56%
Registered Social Landlords (grant)	66%*	29.2m	7,753	25%	66%
Community groups (vouchers)	76%	3.1m	8,495	29%	29%
Total	72%	90.3m**	9,566	14%	57%

Source: EST: Scheme monitoring data; costs of installation from primary research.

*Installations as % of vouchers issued.

**This is a mid-point estimate – the range is +/- 9%; i.e. from £82.4m to £98.3m – see Footnote for sources.

The rest of the report will explore these take-up issues further.

1.5 Previous heating system

The installation of renewable heat technologies replaced a wide range of previous heating systems (Table 7). Private household installations including those in the Communities Scheme, replaced oil central heating in the majority of cases. Social landlords replaced electric fixed room heaters in the majority of cases.

Table 7 Previous heating systems replaced by RHPP funded renewable heat technologies (excluding solar thermal, which is not a replacement technology), by customer group

Previous Heating System	Private Householders	Communities Scheme Households	Registered Social Landlords
Central heating – Gas (mains)	5%	*	1%
Central heating – Oil	47%	68%	11%
Central heating – LPG / other bottle gas	8%	11%	2%
Central heating – Solid fuel	4%	9%	11%
Fixed room heaters – Electric	10%	6%	58%
Fixed room heaters – Oil	*	-	1%
Fixed room heaters – Solid fuel	3%	*	3%
Portable heaters – Electric	1%	-	2%
Portable heaters – Bottled gas	*	-	1%
Don't know / Not applicable	16%	-	5%
Other	5%	3%	4%
Total	100%	100%	100%

Source: All post installation responses, except solar thermal (Base = 2,839); Communities Scheme households all responses, except solar thermal (Base = 148); tenants that selected 'heating only' 'heating and hot water' and 'don't know' in Q20 (Base = 1,144).

Notes: “*” = number of responses in the cell are below three.

“-” = zero.

1.6 Number of applications and installations by private householders to the RHPP Scheme (Phase Two only)

The size of the household and installation populations for the three customer groups that formed the basis of the research activity are summarised below.

1.6.1 Private households voucher scheme

The research with private households (not included in the Communities Scheme) was based on research with owner occupiers, excluding private tenants. There were 6,409 household applications for vouchers to help fund 7,104 installations, with multiple installations planned for a number of households (Table 8). Of these applications for installations, 5,170 were accepted (Table 9).

Table 8 Number of owner occupier applications for vouchers under RHPP2, by technology

Applications for installations by renewable technology:	No.	%
<i>Air source heat pump</i>	2,637	37%
<i>Biomass boiler</i>	884	12%
<i>Ground/water source heat pump</i>	1,014	14%
<i>Solar thermal</i>	2,569	36%
Total number of applications for installations	7,104	100%

Source: DECC: Application and grant dataset.

Number of owner occupier households applying for vouchers allowing for multiple applications, 6,409.

Table 9 Number of owner occupier installations under RHPP2 by technology

Installations by renewable heat technology:	No.	%	Installations as % of accepted applications
<i>Air source heat pump</i>	1,928	37%	73%
<i>Biomass boiler</i>	637	12%	72%
<i>Ground/water source heat pump</i>	694	13%	68%
<i>Solar thermal</i>	1,911	37%	74%
Total number of installations	5,170	100%	73%

Source: DECC: Application and grant dataset.

Number of owner occupier households with installation allowing for multiple installations, 4,898; 5.3% of households have two or more installations.

1.6.2 Number of applications made and vouchers issued, redeemed and claimed by households in the Communities Scheme

There was a two stage application process for the Scheme (see Section 4 for more detail). There were 45 Stage One applications; and 40 projects submitted Stage Two applications, with one unsuccessful Stage Two application.

Vouchers were awarded to 39 community projects, delivered by 36 community groups. One group had four projects. Eight projects achieved no installations. Only one fifth of all vouchers were redeemed.

Of the 1,712 installation vouchers allocated to community groups:

- 364 were redeemed by 341 households across 28 community groups (21 per cent of those awarded);
- 91 expired (5 per cent);
- 16 were withdrawn after offer due to lack of eligibility (1 per cent);
- 5 were rejected (installation not eligible); and

- 1,232 were unassigned – they were not issued by the community group to a household for redemption (72 per cent).

Schemes were delivered across England, Scotland and Wales.

Table 10 Number of vouchers issued in the Communities Scheme under RHPP2, by technology

Applications for installations by renewable technology:	No.	%
<i>Air source heat pump</i>	117	24%
<i>Biomass boiler</i>	167	35%
<i>Ground/water source heat pump</i>	6	1%
<i>Solar thermal</i>	190	40%
Total number of applications for installations	480	100%

Source: DECC: Application and grant dataset.

Table 11 Installations under RHPP2 by technology, Communities Scheme households

Installations by renewable heat technology:	No.	%	Installations as % of applications
<i>Air source heat pump</i>	89	24%	20%
<i>Biomass boiler</i>	132	36%	31%
<i>Ground/water source heat pump</i>	5	1%	10%
<i>Solar thermal</i>	138	38%	22%
Total number of installations	364	100%	24%
<i>Proportion of households with more than one installation per address</i>	6.7%		

Source: DECC: Application and grant dataset.

Number of households with an installation allowing for multiple installations, 341; 6.7% of households have two or more installations.

1.6.3 Number of installations made in social tenant properties as part of the social landlord competitions in RHPP2

Through the RHPP social landlord competition (phases 2, 2 top-up, 3 and 3 top-up), grants were awarded for a total of 3,763 installations of renewable heat technologies which were installed in 3,598 unique households. As shown in Table 12 below, air source heat pumps account for the majority of installations.

Table 12 Installations under RHPP2 by technology, RSL Scheme, Phases: 2, 2 top-up, 3 and 3 top-up

Installations by renewable heat technology:	No.	%
<i>Air source heat pump</i>	2,630	70%
<i>Biomass boiler</i>	356	9%
<i>Ground/water source heat pump</i>	37	1%
<i>Solar thermal</i>	740	20%
Total number of installations	3,763	100%
<i>Proportion of households with more than one installation per address</i>	4.7%	

Source: Energy Saving Trust database, August 2014.

Number of social tenant households with an installation allowing for multiple installations, 3,598; 4.7% of households have two or more installations.

1.7 Structure of the report

The report continues in the following sections:

- Section 2 – provides an overview of the methodology used as the basis of the evaluation;
- Section 3 – provides a picture of the attitudes towards and perception of the renewable heat technologies of customers (households, landlords and tenants);
- Section 4 – examines the effectiveness of the Scheme in engaging with community groups;
- Section 5 – examines the effectiveness of the Scheme in engaging with social landlords; and
- Section 6 – provides an overview of the role in, and impacts on renewable heat technology installers of the Scheme.

A glossary is provided at the end of this report.

Further information is provided in supporting annexes. Details of the research tasks are summarised in the companion Technical Report.

2 Methodology

2.1 Introduction

The overall aims of the Phase Two Renewable Heat Premium Payment (RHPP2) Scheme evaluation were to gain a better understanding of:

- the value and effectiveness of different mechanisms and incentives employed to influence consumers to take up renewable heating technology;
- the impact of the RHPP2 Scheme on the installer market;
- the renewable heating technologies themselves and how people used them; and
- whether the RHPP2 Scheme met its objectives.

The specific research objectives for the RHPP2 Scheme were to:

- provide an overview of the take-up of renewable heat installations across different consumer groups, types of individuals and building stock;
- explore how and why consumers are engaging, or not engaging, with the Scheme;
- examine the role of RHPP in driving improvements in the performance of renewable heating systems;
- develop an understanding of how installers are engaging with the Scheme and assess the impact on their business and the wider market;
- assess the Scheme delivery and administration; and
- explore the effectiveness of engaging private householders, Registered Social Landlords (social landlords) and communities to deliver renewable heating technologies.

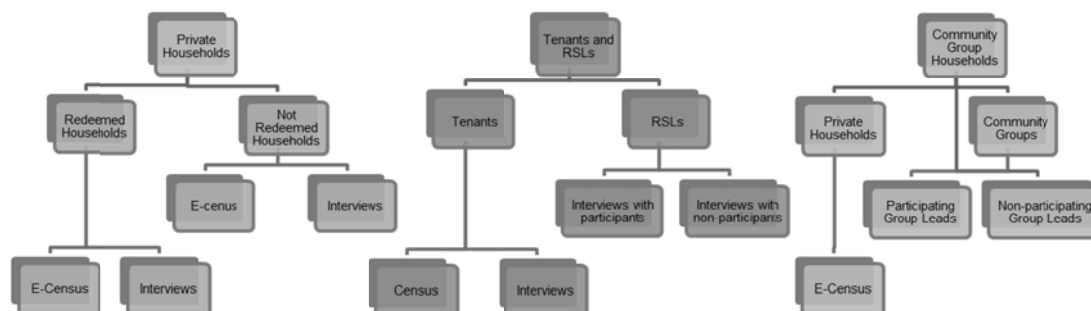
2.2 The research strands

In order to meet these objectives, the research was organised into four strands:

- Three different customer groups (individual private households; households in the Communities Scheme; social landlords and their tenants) that had applied to the Scheme and either chosen to use the Scheme or not; and
- Interviews with installers and certification bodies responsible for renewable heat installation standards as a complementary strand.

A schematic representation of the customer groups and the research undertaken is provided in Figure 2. Research methods are further summarised below and in Table 13, while the accompanying Technical Report provides additional detail into the research methods and analysis employed for each of the strands. All methods were designed and implemented in compliance with the Social Research Association principles.

Figure 2 Schematic representation of the customer group research



2.3 Research methods

2.3.1 Quantitative research

The quantitative research comprised:

- Private households
 - Post-installation e-census and later follow-up e-census with all households (owner occupiers) that had redeemed a voucher (administered by the Energy Saving Trust and data provided to the evaluation team for cleaning and analysis);
 - E-census of all households (owner occupiers) that had not redeemed a voucher by the original end of the Scheme (March 2013); and
 - E-census of all households that had redeemed a voucher through the Communities Scheme.
- Social tenants
 - Census of all tenants that had received an installation from those social landlords that agreed to participate in the study; and
 - Reporting the analysis.

For sections of the report that discuss characteristics of those who responded, for example age group or housing type, we refer to: household respondents where results are based on the households returning one or more post-installation questionnaires. Where a household completed more than one questionnaire (for different technologies installed) one of the two questionnaires was selected for analysis of the data at the household level. Most of the data reported is at the installation level.

For the e-census of households that did not redeem a voucher, three 'groups' were developed for the collection and analysis of data. The first question of the census filtered respondents into three groups, with each group answering a tailored set of questions. The three groups include:

- **Group 1:** Households that did not redeem any vouchers;
- **Group 2:** Households that redeemed the voucher, but after the deadline; and
- **Group 3:** Households that received multiple vouchers, but did not redeem them all.

All survey results were subject to statistical analysis to establish non-sampling errors (biases) examining coverage, measurement and unit and item non-response errors. Although each survey was administered as a census, response rates strongly varied across the four censuses (between ca. 35 per cent and 84 per cent). The data was examined for non-response bias and an assessment for the need and feasibility of post-stratification weighting. The conclusion was that whilst differences in response rates could be detected under a number of population variables, a post-stratification weighting of the dataset was not possible because of the lack of information on population characteristics that have the largest influence on response or non-response rates.

To see whether responses to individual questions are markedly influenced by key population variables, the cross-tabulations were supplemented with measures of association (Cramer's V for categorical data or Kendall's Tau-B for ordinal data). More detail on these measures, what they mean and why they were chosen, is provided in the Technical Report.

2.3.2 Qualitative research

The qualitative research comprised semi-structured telephone and face-to-face interviews with purposively selected samples:

- Private households
 - telephone interviews with 50 households that redeemed vouchers and completed post installation and follow-up questionnaires; and

- telephone interviews with 36 households that had not redeemed vouchers.
- Social landlords and tenants
 - face-to-face (4) and telephone interviews (26) with 30 social landlords participating in the Scheme;
 - telephone interviews with 10 social landlords that chose not to engage in the Scheme; and
 - face-to-face interviews with 30 social tenants receiving an installation.
- Community groups
 - face-to-face (6) and telephone interviews (14) with 20 Community Group Leads participating in the Scheme;
 - face-to-face (1) and telephone interviews (4) with five community group representatives not participating in the Scheme; and
 - analysis of 38 Project Reports submitted by Community Group Leads at the end of their community project.
- Installers and certification bodies
 - telephone interviews with 30 installers; and
 - face-to-face interviews with all 7 certification bodies.

Semi-structured interviews with each group were based on explicit and purposive sampling frames and piloted. Interviews were recorded unless interviewees declined. Interview findings were written up and coded for analysis.

2.4 Research overview

Table 13 provides a summary of the research undertaken including the sample frames and response rates for each participant group. The Technical Report contains further details of the quantitative and qualitative data collection and analysis.

Table 13 Summary of research activity

Research focus	Research activity	Sample frame	Method	Population	Number of responses	Response rate
Private householder's motivations for, and experiences of, installing renewable heating technologies as part of the RHPP2 Scheme	A census of all renewable heating technologies that were installed as part of the RHPP Scheme - Post-installation	All installations for which a voucher was redeemed	Online census	Households = 4,898 Installations = 5,170	Households = 4,136 Installations = 4,358	Households = 84% Installations = 84%
	Follow-up questionnaire (conducted in two waves)	All installations for which a voucher was redeemed and a Post Installation questionnaire was completed	Online census	Households = 4,136 Installations = 4,358	Households = 3,692 Installations = 3,869	Households = 89% Installations = 89%
	Qualitative interviews with owner occupiers who redeemed a voucher	Responses to the Post Installation and Follow-up questionnaires	Telephone interviews	Households = 3,692 Installations = 3,869	Households = 51	N/A

Reasons for non-redemption of vouchers	Census of households that made an application to the Scheme that did not result in a voucher being redeemed	All households that applied for and received a voucher that was not redeemed	Online census	Households = 1,356 ¹¹	Households = 351 ¹²	Households = 26%
	Qualitative interviews with owner occupiers who did not redeem a voucher	Responses to the census of Applied not Redeemed questionnaires	Telephone interviews	Households = 351	Households = 36	N/A
Operation and effectiveness of the Communities Scheme	In-depth qualitative interviews with participating community groups	Leaders of community groups that received approval	Face-to-face and telephone interviews	Community Groups = 33	Interviewees = 20	N/A
	In-depth qualitative interviews with non-participating community groups	Leaders of community groups not participating in the Scheme	Telephone interviews	Community Groups = 6	Interviewees = 5	N/A
Motivations and	Census of all	All installations for	Online	Households	Households	Households

¹¹ This population number is in fact likely to be lower because some applicants will not have received a voucher at all and therefore are not part of the sample frame. The actual population of those receiving a voucher and not redeeming is not known, but is estimated at 819. This gives a response rate of 43 per cent $(351/819) \times 100$.

¹² In total, 595 responses were received. However, just 351 are eligible, while the other 244 indicated that they did not receive a voucher.

experiences of private households in the Communities Scheme	renewable heating technologies that were installed as part of the Communities Scheme	which a voucher was redeemed	census	= 341 Installations = 364	= 222 Installations = 234	= 65% Installations = 64%
Operation and effectiveness of the RSL Scheme	In-depth qualitative interviews with participating RSLs	Registered Social Landlords who received a grant award in Phase Two	Face-to-face and telephone interviews	Landlords = 79	Interviewees = 30	N/A
	In-depth qualitative interviews with non-participating RSLs	Registered Social Landlords who participated in Phase One but not in Phase Two	Telephone interviews	Landlords = 93	Interviewees = 10	N/A
Motivations and experiences of social tenants installing through the RSL Scheme	Census of all renewable heating technologies that were installed as part of the RSL Scheme	Social tenants resident in a property in receipt of an installation	Online census and paper census	Households = 3,598 Installations = 3,763	Households = 1,356 Installations = 1,378	HH = 38% Installations = 37%
	Qualitative interviews with RSL tenants who	Social tenants responding to the census	Face-to-face interviews	Households = 3,598	Households = 30	N/A

	had a renewable heating technology installed in their home					
Role of installers and impact of the Scheme	In-depth qualitative interviews with installers	Sample drawn from various databases of installers	Telephone interviews	Installers = 1,099	Interviewees = 30	N/A
Impacts of the Scheme on suppliers	In-depth qualitative interviews with certification bodies	All certification bodies responsible for micro-generation certification (MCS)	Face-to-face interviews	Certification bodies = 7	Interviewees = 7	N/A

3 Consumer Attitudes and Perceptions

3.1 Overview of household and tenant characteristics participating in the Scheme

This section provides a description of the perceptions and experiences of the different customer groups engaged in the Phase Two Renewable Heat Premium Payment (RHPP2) Scheme. Before summarising this information, we provide an overview of the demographic and property characteristics of the households that make up these groups, identifying differences between customer groups and within the general household population in Great Britain as approximated by the English Housing Survey. This survey excludes households in Scotland and Wales, and comparisons are therefore only to taken to be indicative.

The household characteristics are summarised and compared in Table 14, reporting at household, rather than installation level.

In summary, private households that participated in the **householder voucher scheme**, compared to the published national household population covered in the English Housing Survey, were more likely to:

- be aged 45-64 years;
- live in the South-West;
- have higher incomes (based on household not respondent income);
- live in detached and larger properties; and
- live in older or newer properties.

Comparisons between private households in Phase One (based on the published report) and Phase Two indicate that the demographic profile is very similar.

Householders in the Communities Scheme, when compared to householders who participated in the **private householder voucher scheme**, were more likely to:

- be younger (half were under 45 compared to a quarter for the private householder scheme);
- live in the South-West, North and Wales;
- have lower incomes (but still higher than the national population of households); and
- live in smaller properties including terraced houses and bungalows.

Compared to private households and households in the Communities Scheme, the social tenants who received renewable heating installations as part of the Scheme were more likely to:

- be older and retired;
- have lower incomes;
- live in semi-detached and smaller properties (especially sheltered housing); and
- live in post-war (1945-1980) properties.

Compared to the characteristics of the national population of social tenants (indicated in the English Housing Survey), **social tenants with renewable heating technologies installed as part of the RHPP2 Scheme** were more likely to:

- be older; and
- live in semi-detached properties.

This reflects the use of the Scheme for installations in sheltered and retirement homes.

A detailed comparison of characteristics is provided in Table 14.

Table 14 Characteristics of households installing renewable heat technologies under the RHPP2 Scheme and comparisons with the overall English household population

Household Characteristics	Private Households	Community Group Households	English Household Population (owner occupiers)	RSL Tenants	English Household Population (social tenants)
Age					
16-24	0%	*	1%	0%	5%
25-44	24%	49%	26%	13%	32%
45-64	50%	37%	41%	31%	34%
65+	24%	12%	32%	54%	29%
Region					
London, East & South East	31%	18%	35%	N/A	N/A
South West	18%	24%	8%	N/A	N/A
East & West Midlands	14%	18%	17%	N/A	N/A
North East, North West & Yorkshire	15%	24%	25%	N/A	N/A
Scotland	13%	1%	10%	N/A	N/A
Wales	8%	15%	5%	N/A	N/A
Income					
Up to £15,599	7%	10%	15%	77%	55%
£15,600-£25,999	17%	22%	20%	15%	25%
£26,600-£36,399	17%	22%	19%	6%	11%
£36,400-	16%	14%	46%	1%	9%

£46,799					
£46,800- £71,999	25%	21%		1%	
£72,000+	18%	11%		0%	
Property type					
Detached	65%	57%	25%	3%	0%
Semi-detached	13%	12%	31%	52%	17%
Terraced	5%	9%	26%	19%	27%
Bungalow	17%	20%	10%	N/A	11%
Other ^a	1%	1%	9%	27%	46%
Property age					
Before 1919	26%	35%	19%	1%	7%
1919-1944	8%	11%	19%	9%	11%
1945-1980	23%	23%	40%	46%	59%
1981-2000	12%	19%	12%	10%	13%
2001 or after	29%	11%		1%	
Number of bedrooms					
1	1%	0%	3%	31%	32%
2	9%	9%	21%	39%	33%
3	33%	39%	49%	28%	32%
4	38%	37%	21%	1%	3%
5+	18%	14%	6%	*	0%

Source: Phase Two PI Survey (4,136 households); Communities Scheme Household E-Census (222 households); RSL Tenants Census (1,356 households); General population data is taken from the English Housing Survey 2013. This excludes households in Scotland and Wales and therefore comparisons should be made with caution, and treated as only broadly indicative.

^a This category includes flats, tenements and sheltered housing.

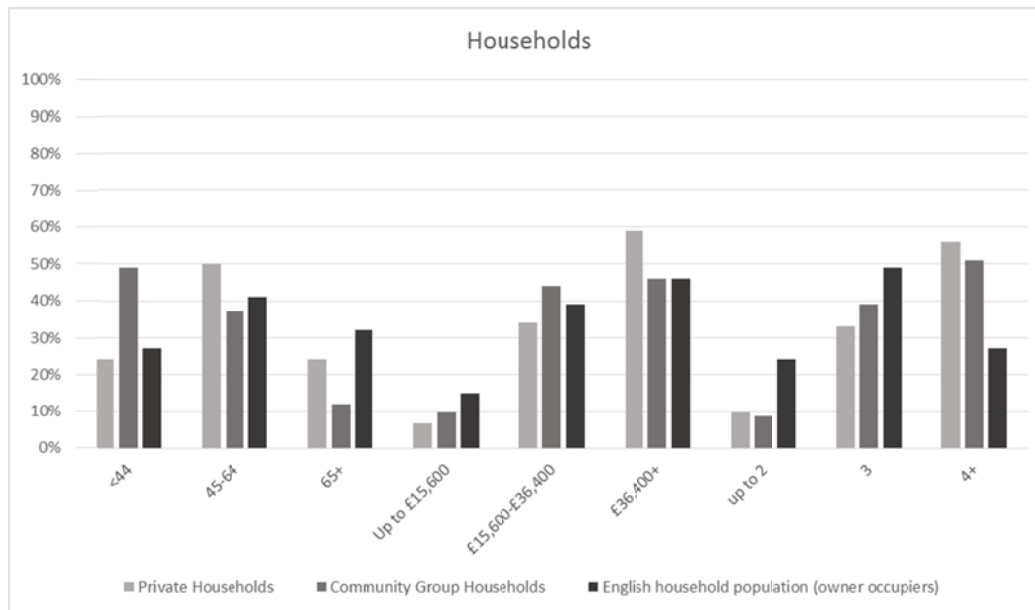
Notes: There is no UK household population survey for comparison. Instead, the English Housing Survey has been used. This excludes households in Scotland and Wales and therefore the survey provides only an indicative basis for comparison.

Where cells have been merged, this is due to differences in the bandings (or lack of bandings) between the different data sources;

The percentage of respondents selecting 'Don't know' has not been reported in the table, so columns may not always sum to 100 per cent. This has a particular effect on property age, where there is a high number of don't knows. 'Prefer not to say' responses have been excluded from the income data and percentages recalculated;

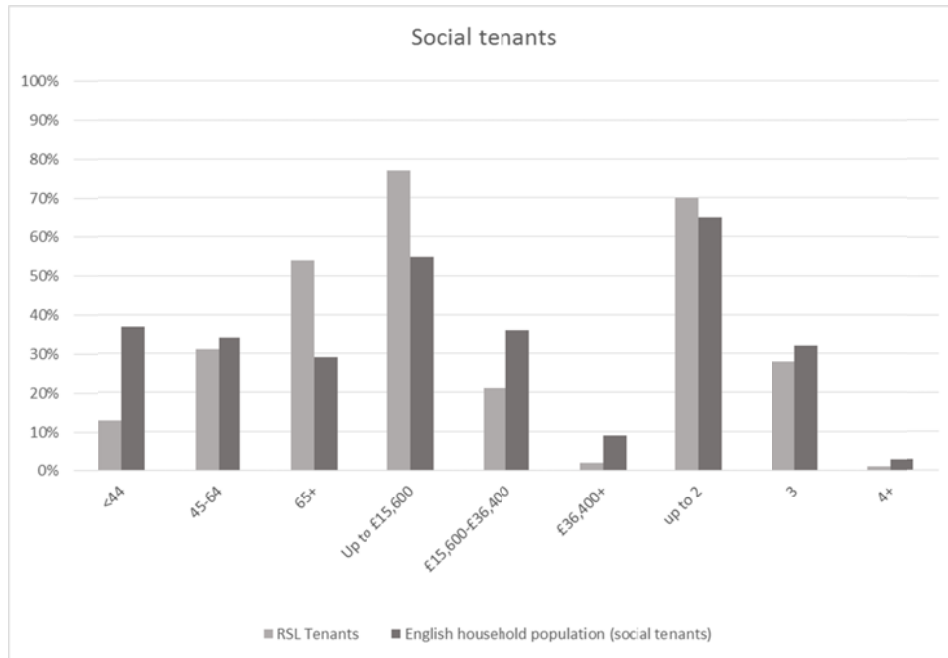
"*" = number of responses in the cell are below three.

Figure 3 A comparison of household characteristics, by age, income and size of properties (no. of bedrooms)



Source: Phase Two PI Survey (4,136 households); Communities Scheme Household E-Census (222 households); General population data is taken from the English Housing Survey 2013. This excludes households in Scotland and Wales and therefore comparisons should be made with caution, and treated as only broadly indicative.

Figure 4 A comparison of social tenant characteristics, by age, income and size of properties (no. of bedrooms)



Source: RSL Tenants Census (1,356 households); General population data is taken from the English Housing Survey 2013. This excludes households in Scotland and Wales and therefore comparisons should be made with caution, and treated as only broadly indicative.

3.2 Motivations for changing heating systems and installing a renewable heating technology

An important part of this evaluation was to identify what motivates people to change their heating system and to install a renewable heating technology. The research collected quantitative and qualitative data from people who installed a renewable heating technology as part of the RHPP2 Scheme to provide some insight in this area.

3.2.1 The most common reasons given by customer groups for installation were reducing dependence on fossil fuels and saving money

Table 15 provides a list of the most frequently reported motivations to install or, in the case of social tenants, to agree to the installation of a renewable heating technology. The information is provided by customer group and technology type:

- Across all customer groups and technologies, the most frequently reported reason given for installations was the need **to reduce dependence on fossil fuels (77 per cent of all installations)**. This was especially important for community scheme households and for installations of ground source heat pumps and biomass boilers. The **rising price of fossil fuels** was also a very important motivation, and the most important for private households (78 per cent of installations) and installations of biomass boilers (83 per cent of installations).
- **The desire to save money** was the second most frequently reported motivation for all three customer groups (**70 per cent of all installations**). This was the main motivation of social tenants, (74 per cent of installations), who identified this as a key motivation to agreeing to the installation. This was only a slightly weaker motivation for private households (69 per cent of installations) and community group households (68 per cent of installations). It was relatively more important for installations of solar thermal (75 per cent of installations).

Installations in social tenant properties were more likely to have taken place because renewable technologies were thought to be **more efficient than the previous heating system (55 per cent of installations)**. This was followed by practical reasons such as constant temperature (50 per cent), easier to use (48 per cent), and reliable supply (47 per cent).

Table 15 Reasons for installing a renewable heating system (households could provide multiple reasons)

	ASHP				GSHP			Biomass				ST				All technologies			
	PHH	RSLT	CG	All	PHH	RSLT	All	PHH	RSLT	CG	All	PHH	RSLT	CG	All	PHH	RSLT	CG	All
Most frequently given reasons																			
Reduce my dependence on fossil fuels	73%	NA	72%	73%	82%	NA	82%	81%	NA	86%	82%	78%	NA	87%	78%	77%	NA	82%	77%
Save money	67%	73%	71%	69%	68%	83%	70%	71%	[77%]	65%	70%	74%	92%	67%	75%	69%	74%	68%	70%
Rising prices of fossil fuels (e.g. gas, oil)	76%	34%	65%	61%	81%	29%	73%	84%	[62%]	78%	83%	76%	42%	72%	73%	78%	35%	73%	69%
It helps the environment	71%	36%	57%	58%	77%	38%	71%	82%	[69%]	83%	82%	79%	49%	91%	77%	76%	38%	79%	68%
Reduce my carbon emissions	63%	28%	57%	51%	67%	26%	61%	74%	[54%]	81%	75%	67%	38%	84%	65%	66%	29%	76%	59%
It's more efficient	66%	55%	57%	62%	69%	57%	67%	59%	[85%]	60%	60%	39%	55%	42%	40%	56%	55%	53%	56%
As a more reliable energy supply	44%	46%	43%	45%	48%	47%	48%	45%	[77%]	37%	45%	22%	51%	33%	25%	37%	47%	38%	39%

Provide a more constant temperature	29%	56%	40%	39%	35%	58%	38%	21%	[77%]	26%	23%	6%	NA	4%	5%	21%	50%	22%	27%
Easier to use / control	17%	51%	18%	29%	19%	53%	24%	19%	[56%]	9%	18%	6%	27%	4%	8%	14%	48%	14%	21%
Bases (total no. of installations)	1,669	941	65	2,675	607	103	710	563	13	86	662	1,519	146	79	1,744	4,358	1,203	234	5,795

Notes: PHH (Private Households), CGHH (Community Groups Households), RSLT (Social Tenant households), ASHP (Air Source Heat Pumps), GSHP (Ground Source Heat Pumps), BB (Biomass Boilers), and ST (Solar thermal);

Multiple responses were allowed;

Excludes four GSHP installations by Community Group Households;

[] indicates when the base is less than 50.

3.2.2 The availability of funding was more important to households in the Communities Scheme than private households

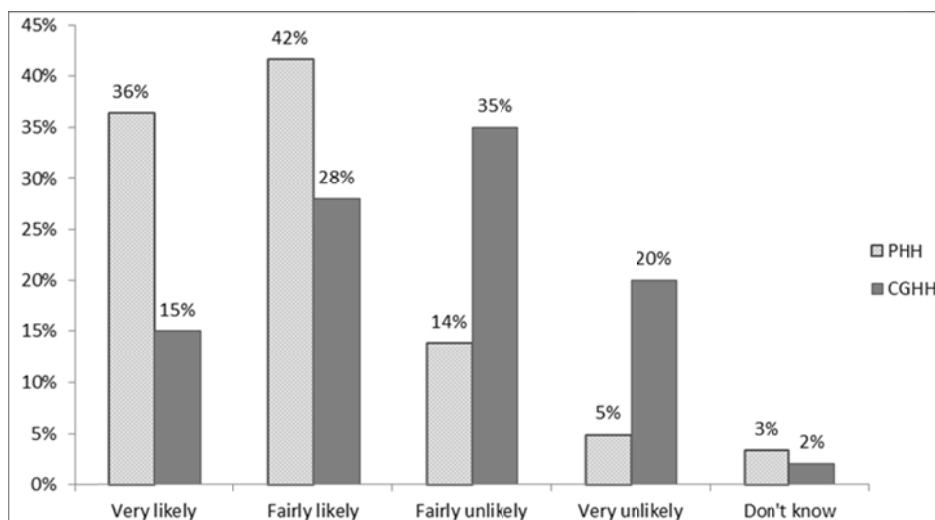
Most of the households reported they had already decided to install a renewable heat technology prior to learning about the Scheme incentive, and around half of the households interviewed had already decided to install a particular technology, most of which had also identified an installer: *'The company that sold [the air source heat pump] to us said its eligible for [RHPP2]. Get an application form, fill it in and away we go, sort of thing'* (Non-redeemed household 9, ASHP, installed).

However, the qualitative analysis revealed a more complex or mixed picture than that of the census questionnaire responses. For instance, some private householders reported that the RHPP2 Scheme provided a 'bonus' or played a small part in their decision to install renewable heat technology: *'The value of the voucher scheme was £1,200 I believe. The overall installation cost me £40,000. I'd made my decision and paid my money long before I'd got the voucher. It was an added bonus.'* (private household, GSHP installed). Other interviewees also explained that the Scheme had brought forward their decision or constituted an important factor in making the final decision to install: *'It's quite a lot of money [...]. So when the grant came in it just made it affordable'* (private household, GSHP installed). In addition, for some interviewees, it was the Scheme in combination with the forthcoming renewable heat incentive (RHI) that led them to install renewable heat technology: *'I think the incentive made the decision for me...it was more expensive than I was expecting, because the heating system needed to be upgraded...it made the decision for me in terms of the pre-payment [towards the cost of the boiler] and the ongoing [RHI] payment.'* (private household, biomass boiler installed).

The availability of grant funding was not a major factor in the decision to install. In the case of private households, 78 per cent of installations would have gone ahead without the Scheme. However, for households in the Communities Scheme, less than half (43 per cent) of all installations would have gone ahead without the RHPP2 Scheme.

Figure 5 compares the influence of the incentive for private households and households in the Communities Scheme. Over half of all the installations (55 per cent) in the Communities Scheme were reported to have been unlikely to take place without the RHPP Scheme, compared to the private householder scheme, where one fifth (19 per cent) of installations may not have gone ahead in the absence of a voucher. In 87 per cent of installations, the owner had heard about the RHI and it is possible that some may have proceeded with their installation in anticipation of the RHI.

Figure 5 Likelihood of installing a renewable heating technology without the RHPP Scheme



Source: *Private Households' Post Installation Census* (base: 4,349 installations); and *Communities Competition Household Census* base: 234 installations).

Nearly a third of all installations (29 per cent) under the Communities Scheme were undertaken by owners who were aware of the private householder scheme. For all these installations, financial savings available through the Communities Scheme, and information and support provided by the community group, or a combination of the two, were deciding factors for applying to the Communities Scheme. Additionally, 78 per cent of installations were expected to be subject to application to the Renewable Heat Initiative.

3.2.3. Motivations were also influenced by the need for heating system replacement or installation in new properties

Installation and technology choices are related to the need to replace less efficient or reliable heating systems and when purchasing new properties. Key findings from household surveys and interviews:

- Many of the interviewees explained that they had considered non-renewable technology when replacing an old system or considering which system to install in their new build or renovation property. These two motivations of cost and the environment were commonly cited, either separately, but most often interlinked, reflecting the views expressed in the survey.
- The relatively higher share of old and modern buildings, compared to the overall housing stock reported in the English Housing Condition Survey, that was subject to an installation and the feedback from interviews, indicates that the need to choose a new heating installation was an important factor in driving the interest in renewable heat technologies. Over half of households

interviewed gave either 'need to replace heating system' or 'building a new home' as a reason for choosing to invest in the renewable technology. The reasons varied significantly by technology. Biomass boilers were most frequently installed as replacements for old systems, but least frequently in self builds, while G/WSHP was the technology of choice for self builds.

- The planned introduction of the RHI was considered to be important. Although at the time of application there was some uncertainty over if and when the RHI would begin, the scope for future cost savings was an incentive. The RHI was well known to households (87 per cent of those installing under the Private Household Scheme had heard of the RHI) and was identified as a factor in the decision to install a renewable heat technology by almost half of the sample overall.
- The findings for Phase One were very similar to those for Phase Two, based on comparison with the results published for Phase One.¹³

3.3 Barriers to participation in the Scheme

Despite strong motivations, there were a number of barriers that prevented fuller participation and take-up of the Scheme, but essentially these largely stemmed from the temporary nature of RHPP2. However, for a large number of private households, the barriers did not prevent them from making an installation.

3.3.1 The most frequently cited reason for not redeeming a voucher is that the deadline was missed

The research with participants who applied to the Scheme but did not redeem their voucher reveals that the main barrier to participation in RHPP 2, given awareness and interest, was simply the temporary nature of the Scheme and associated deadlines.

Non-redemption of vouchers by private households was commonly due to missing the deadline. Private households that either did not redeem a voucher or did so after the deadline indicated that the most frequently cited most important reason for non-redemption was 'I missed the deadline and the voucher expired' (30 per cent). Although it was initially assumed that the majority of non-redeemers did not do so because they did not install a renewable heating technology, the responses to the questionnaire show the majority simply forgot to redeem the voucher in time, lost the voucher or cited other similar reasons. In fact, 79 per cent of respondents to the applied not redeemed questionnaire had gone on to install an eligible technology.

¹³ DECC (2013) *Analysis of customer data from phase one of the renewable heat premium payments (RHPP) scheme.* [online] Available at: <https://www.gov.uk/government/publications/analysis-of-customer-data-from-phase-one-of-the-renewable-heat-premium-payments-rhpp-scheme>

Of the reasons concerning non-installation of a technology, financial issues were most commonly cited (20 per cent). The importance of reasons varied according to the different groups of installations not redeemed (Table 16):

- In Group 1, financial reasons were the most important for not redeeming vouchers, for biomass boilers and ground source heat pumps. A range of other reasons were given for not redeeming vouchers for air source heat pump and solar thermal, but largely this was reported simply as missing the deadline.
- In Group 2, missing the deadline was in part due to a later than planned start to an installation, the unexpected length of time for installation, and delays in completions and certifications, or some combination.
- In Group 3, a variety of reasons were provided, but the most frequently reported was 'missed deadline'.

Table 16 Reasons for not redeeming RHPP2 voucher, by group

	Group 1	Group 2	Group 3	All groups
Technical issues	15%	3%	[22%]	12%
Financial issues	25%	6%	[38%]	20%
Issues with the installer	26%	37%	[13%]	29%
Other reasons (incl. missing deadline)	34%	53%	[28%]	39%
Total	100%	100%	[100%]	100%

Base: All AnR respondents (351) with equivalent number of multiple installations (452): Group 1 respondents (189), installations (256); Group 2 respondents (144), installations (162); Group 3 respondents (18), installations (34). Note that %s presented in brackets have a base less than 50.

Interviews with private households indicated that the most common reason for not redeeming the RHPP2 voucher was to do with delays to the installation which meant the deadline had passed. For many, this was linked to delays in a self-build or renovation project: *'I originally applied for the voucher but then I had problems with the builders and the weather... I phoned them [Energy Saving Trust] up to see if I could extend it, but they said no, I had to re-apply.'* (solar thermal, installed).

A minority had had a problem with the installer company and this had led to a delay in the installation or in receiving the MCS accreditation necessary to redeem their voucher before the original deadline: *'I couldn't claim the first voucher because that*

company had gone out of business - I had to wait while they were getting re-registered before I could put the claim in under the new company.' (ASHP, installed).

There was also a small number who reported that they had been confused by the application and claim process: *'The whole process was quite complicated, with the original website request followed by the various other things I had to get together to follow up on that...it was quite a complicated procedure...I just didn't have access to the kind of documentation needed... it's not got any easier with subsequent things.'* (ASHP, redeemed late).

Those who had not installed a renewable heat technology described a variety of reasons for this. Many were in the process of arranging an installation or one was in progress at the time of interview. There was no pattern to the barriers faced, for example:

- One participant had received vouchers for an air source heat pump and a solar thermal system. They were still researching the merits of the technologies but explained they were intending to install solar thermal later in the year.
- Another reported that the energy supply to their house required an upgrade in order to power an air source heat pump and this brought a prohibitive cost, which would not be met by the energy company (£11,000).
- One participant had discovered that their pipework was unsuitable for an air source heat pump system, subsequent to applying for and receiving their voucher.

Two participants were in the process of identifying a local installer who could fit a renewable heat system following issues with their initial company

Short timescales limited the number and scale of projects undertaken by Registered Social Landlords (social landlords). Some projects were scaled back to fit with the timetable. Social Landlords that had applied but not proceeded also cited the lack of time to plan and deliver installation projects. The issue of the short timescale meant that unless social landlords had prior knowledge of installing renewable heat technologies and associated challenges, projects were smaller to reduce the length of time it took to complete. There were also knock-on effects – with time for tenant engagement reduced leaving tenants with less time to decide on whether to have the renewable heat technology installed (see Box 1 for more detail). Social landlords also noted that short-time scales also affected tenant participation: *'The time scale was too short for [the tenants] to make a decision. We underestimated the time it would take to convince people that it was better than what they had. There was nothing to show them about the technology until the end of the process when there was a property that was already done. Trying to get people to*

change from what they had been use to for 20 years was not easy - even though they were dissatisfied with their oil heating.' (Participating RSL 17).

Reasons why participating social landlords did not take up the awarded grant

Thirty-seven social landlord projects (out of 150) withdrew from the Scheme after offer; 113 projects took place, of which 53 projects achieved fewer installations than planned and 60 projects achieved all or more installations than planned.

Interviews with Registered Social Landlords (social landlords) recorded as withdrawing from the Scheme revealed that most of these social landlords had installed the planned number of renewable heat technologies. However, delays in the installation process meant that these social landlords missed the RHPP deadline for claiming for these installations. Reasons for delays included insufficient time to identify suitable properties, problems with engaging installers, planning permission delays and adverse weather conditions. Social Landlords explained that the grant values were small amounts (in relation to the budgets available for portfolio refurbishment) and therefore absorbing the loss of the grant was not perceived to be a significant problem: *'We were not prepared to compromise the tender process just to get a fraction of the cost back through the RHPP'* (Participating Registered Social Landlord 13).

Insufficient time to secure tenant consent or to identify replacement properties where tenants refused (note in two thirds of cases tenants had a choice) was one of key reasons many social landlord projects did not claim the full grant award. As with those who withdrew from the Scheme, some installations took place outside the RHPP scheme. Several Social landlords explained that had the Scheme allowed for greater flexibility in installation dates (especially allowing installations to be moved from the winter into the summer), then more grants would have been claimed.

Other reasons for not achieving the full number of planned installations within the Scheme timelines and regulations, included problems with installer capacity affecting the ability to complete the installations in time and difficulties in identifying suitable properties and substitutes and difficulties in obtaining planning permission.

Most social tenants had the option to refuse new renewable heat technologies.

In the case of tenants, their participation was not always optional, with properties required to undergo refurbishment, but in the case of 66 per cent of installations, tenants reported that they had the choice to refuse the technology and in 27 per cent of installations they did not have a choice. However, the large majority of installations (78 per cent) were wanted. Only 10 per cent of installations were reported not to be

wanted. The main reason for not wanting the new technology (given in 60 per cent of installations where the technology was not wanted, including those who changed their mind) was concern over the possible energy cost. Concerns with disruption, possible difficulties with operating the new system and a lack of knowledge about the system were indicated for between 46 per cent and 48 per cent of installations.

In the majority of cases Communities Scheme projects did not achieve the number of planned installations. Only one project completed the full complement of planned installations. This was due in large part to the uncertainty and timing of the detailed information on the scale of grant available together with the elapsed time necessary to make applications, and then set up and run awareness and engagement activities if successful: *'The timescales were too short for people who had no knowledge of renewable technologies'* (Rural villages group, Community Group 18); *'there was not time for meetings'* (Town-based group, Community Group 1). The other feature that created a challenge reported by some Community Group Leads was the timing of the Scheme. The projects were developed during the autumn and this seasonal aspect provided a barrier: *'It was difficult to get people interested (in making an expression of interest) given the timing, just before Christmas'* (Town-area group, Community Group 5); *'To take people from ground zero to having an installation in place that would entail considerable disruption in terms of what that installation would do to their house, and ask them for an upfront payment, all by the end of March, that was asking way, way too much'* (Rural villages group, Community Group 18).

3.3.2 Private households undertook installation even when vouchers were not redeemed

Private households reported 351 vouchers received were not redeemed in the time required. Only 11 per cent of these planned installations did not proceed. Of the remaining 88 per cent that did proceed, 89 per cent of installations were perceived by households to be eligible for funding under the RHPP2 Scheme, (Table 17). Over half of the households installing an eligible technology reapplied to the RHPP for a voucher (Group 2). The main reason given by those who did not reapply was failure to recognise that reapplication was permissible.

Table 17 Installation activity by private households when not redeeming vouchers

Group	Total responses	Installed an eligible RHT	Installed a non-eligible RHT	Did not install an RHT
Group 1 – Received a voucher but did not redeem	189	124	32	30
Group 2 – Received a voucher but redeemed late	144	144	0	0
Group 3 – Received multiple vouchers but failed to redeem one of them	18	8	1	9
Total	351	276	33	39
	100%	79%	9%	11%

Base: Total responses as included in the table (351 total).

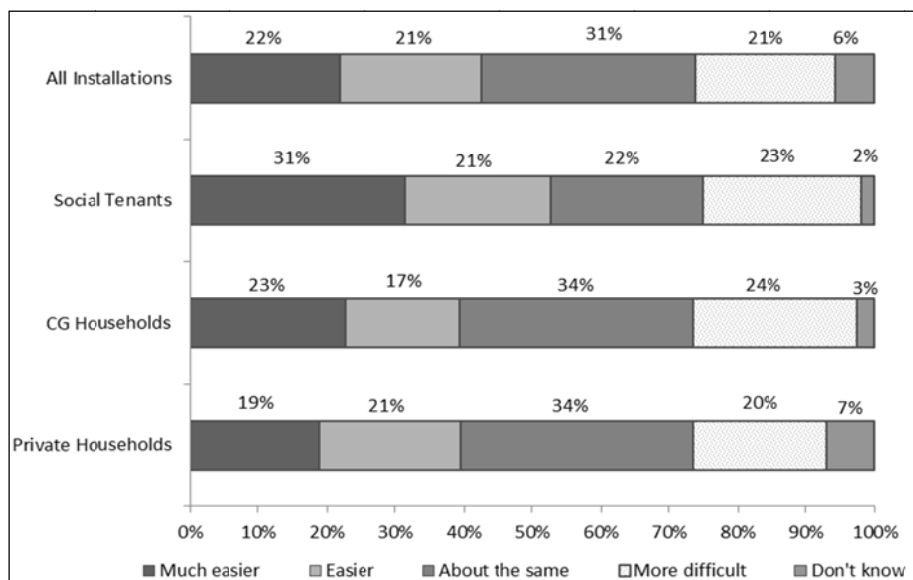
Note: Total responses includes three respondents in Group 1 that selected 'don't know' when asked if they installed an eligible technology and are excluded from other columns.

3.4 The reported performance of renewable heat technologies

3.4.1 The majority of households found the new heating technology at least as easy, or easier to use, than their previous heating system

Across all customer groups, twice as many installations were easier to use, than were more difficult to use, compared to the previous system (Figure 6).

Figure 6 Ease of use of the new renewable heat technology, broken down by customer group



Base (total number of installations): private households (4,282); Community Group households (234); social tenants (1,308); all installations (5,824).

Private households reported that 40 per cent of installations were easier or much easier to use, compared to 20 per cent that were found to be more difficult to operate, compared to the previous system. In the case of biomass boilers, private households reported mixed views, with approximately as many installations being found to be more difficult to use as they were found to be easier to use¹⁴. The new system’s ease of operation compared least favourably to oil central heating systems, with just 36 per cent of all biomass boilers installed proving to be easier to use. In contrast, a higher proportion of installations (63 per cent) that replaced fixed room heating were found to be easier to operate.

Community group households reported that about 50 per cent of installations were easier or much easier to use, compared to 24 per cent that were found to be more difficult to operate, compared to the previous system. As with private

¹⁴ Source: Post Installation (PI) household surveys of owner occupiers.

households, the level of difficulty encountered with operating the new system was more pronounced among households that previously used an oil central heating system.

Social tenants reported that about 52 per cent of installations were easier or much easier to use, compared to 23 per cent that were found to be more difficult to operate, compared to the previous system. Ease of operation was to some extent influenced by the previous technology used by social tenants. In the case of air source heat pumps, tenants who previously used coal or solid fuel systems were more likely to find it easier to operate their system in comparison to those whose previous system was electric, oil or gas central heating.

3.4.2 Reliability of system performance and lessons for future installations

The introduction of novel technologies can be expected to bring ‘teething problems’ and the need for manufacturers and installers to learn how to fine-tune the operation of new heating technologies to housing condition and user needs.

As indicated in Table 18, for private households, the majority of the faults encountered were perceived to be due to installation, rather than manufacturing, except for biomass boilers, where manufacturing faults were perceived to be more common. Installation faults were reported in nearly a third of installations that encountered faults, but are not significantly influenced by the type of technology.

Table 18 The nature of reported faults by private households, by renewable heat technology installation

	Biomass boiler	Solar thermal system	Air source heat pump	Ground/water source heat pump	All technologies
Manufacturing faults	128	51	150	65	394
Installation faults	98	161	260	101	620
Total installations where support was required	353	463	942	358	2,116
Manufacturing fault rate	36%	11%	16%	18%	19%
Installation fault rate	28%	35%	28%	28%	29%

Base: 2,116 FU installations which required advice/assistance/guidance.

In the post-installation phase, advice and guidance was commonly sought when systems proved faulty. For **approximately two thirds of installations in private households, users have needed advice or assistance for their space heating technology**. Similarly, users in more than half of the installations in community group households (57 per cent) reported that they have needed advice or assistance for their new technologies (Table 19) since installation

Table 19 The need by customer group, for advice, guidance, or assistance

	Biomass boiler				Solar thermal				Air source heat pump				Ground/water source heat pump			All technologies			
	PHH	CG	RSLT	All	PHH	CG	RSLT	All	PHH	CG	RSLT	All	PHH	RSLT	All	PHH	CG	RSLT	All
Yes	69%	69%	84%	69%	34%	35%	61%	37%	64%	65%	72%	67%	66%	73%	67%	55%	57%	71%	59%
No	31%	31%	*	31%	65%	65%	29%	62%	35%	34%	20%	29%	34%	16%	31%	45%	43%	20%	39%
Don't know	0%	0%	0%	0%	1%	0%	10%	2%	0%	1%	8%	3%	0%	10%	2%	0%	0%	8%	2%
Base	513	86	13	612	1,347	79	146	1,572	1,467	65	952	2,484	542	104	650	3,869	234	1,215	5,318

Source: PHH FU questionnaire; CG census; RSLT census;

Notes: tenant data includes advice and assistance given pre-installation;

“*” = number of responses in the cell are below three.

Social tenants also confirmed that they have required advice and assistance from landlords and other representatives on various occasions, primarily before installation. In nearly three-quarters (71 per cent) of tenant installations, most tenants contacted their landlords at least once, of which 32 per cent asked for advice and assistance up to 3 times before installation. Reporting on their new systems' reliability, social tenants confirmed that a majority of installations (76 per cent) were satisfactory or very satisfactory, while only 8 per cent were considered to have poor reliability and did not meet users' expectations.

The learning derived from the resolution of these faults can be expected to lead to reduced levels of faults and improved operation in the future (Box 2).

Improving the operation of renewable heat technologies – the case of heat pumps

Tenants' experience with using air source heat pumps for two years provides some evidence that the Scheme has contributed to driving improvements in calibrating them for use in the UK housing stock. Some tenants interviewed experienced problems and malfunctions in the first year of operation. Tenants described the fan 'cutting out' leading to loss of heat and sometimes power. Although tenants were not entirely sure of the reasons for the faults, many were told that the 'original settings' were not set correctly.

Tenants affected received multiple visits from installers and manufacturers throughout the first winter of operation. In some cases manufacturers appeared to have identified a solution to the problem relating to the 'settings' and implemented corrections ahead of the second winter of operation. In other cases, tenants speculated that insufficient insulation led to the fan overheating, and landlords invested further to add insulation in the spring/summer between the first and second winter of operation, so that the heat pumps subsequently function without problems.

3.4.3 Experience of room heating was satisfactory, although there was some dissatisfaction with ASHP during the coldest days and nights

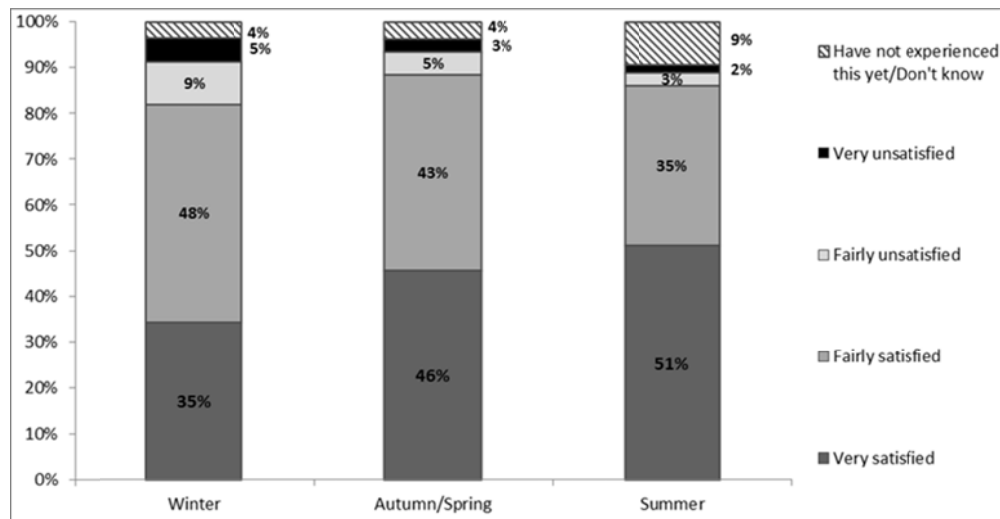
Satisfaction levels with the household temperature achieved and the amount of time the new system takes to achieve the desired level of comfort, were very high across all technologies considered. Household census data and qualitative interviews show that:

A large share of installations used by private households (90 per cent); community group households (94 per cent); and social tenants (81 per cent) were reported to achieve a comfortable (or 'about right') temperature. This finding was consistent across all technologies considered: *"It works brilliantly. It keeps the house warm at the right temperature."* (Tenant 5);

When assessed during the coldest days and nights, as reported by householders¹⁵, the temperature achieved by air source heat pump installations was revealed to be the least satisfactory, with 12 per cent of installations in private households, 18 per cent of installations in tenant households and 11 per cent of installations in the Communities Scheme reported as providing a level of temperature judged 'too cold' or 'much too cold' during the coldest days. Similar observations were made as regards the temperature achieved during the coldest nights by air source heat pump installations in private households (12 per cent); tenant households (19 per cent); and households in the Communities Scheme (5 per cent). Nevertheless, interview findings suggest that air source heat pump users were generally very satisfied with the temperature provided by their renewable heating technology.

Satisfaction levels reported by all customer groups with the time taken to achieve the desired level of comfort: were very high, over 80 per cent, across all installations for each season (Figure 7). Satisfaction levels were the lowest in the winter and highest in the summer.

Figure 7 Levels of satisfaction across all technologies and user groups as regards the amount of time it takes for renewable heat technologies to reach the desired level of comfort, broken down by season

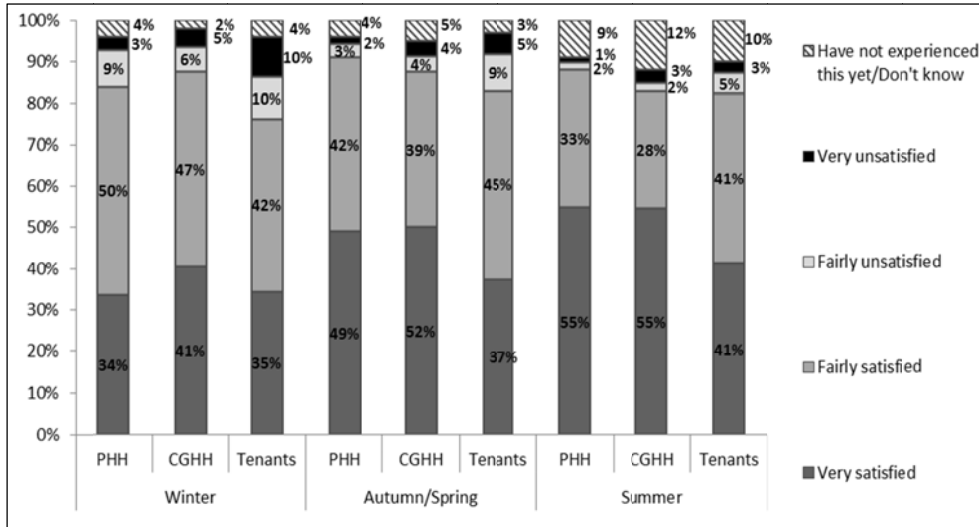


Base (total number of installations): winter (3,828); autumn/spring (3,756); summer (3,702).

¹⁵ Questionnaires asked about the coldest days and nights but did not define "coldest". Respondents were able to interpret this according to their own perception.

A majority of installations were judged either very satisfactory or fairly satisfactory as regards the amount of time it takes for the system to achieve a desired level of comfort in winter across all user groups- notably in private households (84 per cent); community group households (88 per cent); and tenant households (77 per cent), (Figure 8).

Figure 8 Levels of satisfaction as regards the amount of time it takes for renewable heat technologies to reach the desired level of comfort, broken down by customer group¹⁶



Base (total number of installations in each season): private households (2,498); CG (155); social tenants (1,175; 1,103; 1,049); all installations (3,828; 3,756; 3,702).

Supplementary heating was used during the winter months (December-February), in over half of the installations in community group households (55 per cent) and tenant households (52 per cent), typically a wood burning stove in the case of community group households and, an electric fan heating system in the case of social tenants. Conversely, a majority of installations in private households (69 per cent) did not require a supplementary form of heating during the coldest months. A small number had wood burners for aesthetic reasons: *'We don't really need them. We just like to look at the fire'* (ASHP).

New installations tended to be used more than the previous heating systems, across customer groups, with more than two-fifths of installations in private households (43 per cent) and community group households (equally 43 per cent) turned on more frequently in comparison to previous systems. On the other hand, about 21 per cent and 12 per cent of installations in community group and private households respectively were used less in comparison to previous heating systems.

¹⁶ This analysis excludes solar thermal installations.

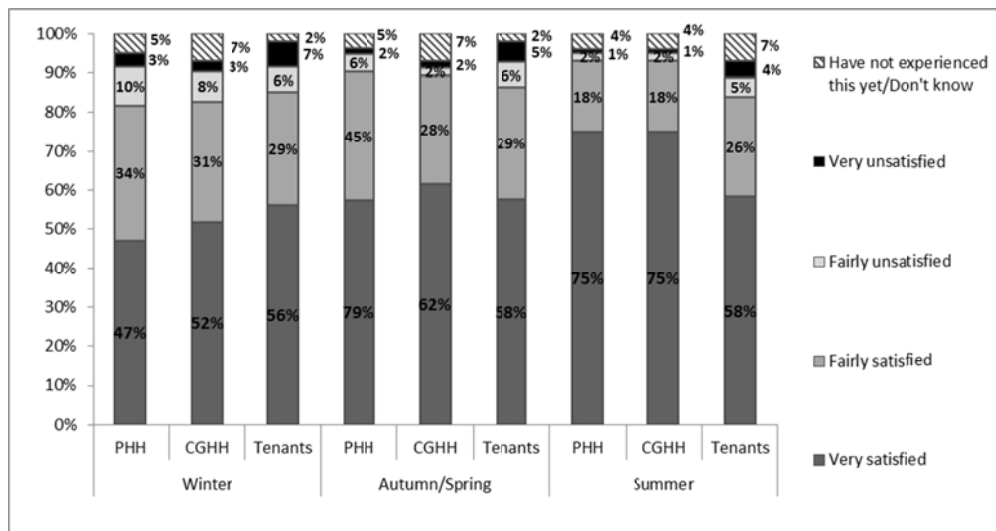
Evidence from the tenant census indicates that half of the installations in tenant households (50 per cent) were used to heat more rooms than before. Interview findings further indicated that tenants with heat pumps and biomass boilers were able to heat their homes more ‘uniformly’ compared to previous heating systems such as electric storage heaters: *‘It’s definitely warmer than before... The thing that’s good about it, there is a consistent heat throughout the whole house, whereas before there was a huge big night storage heater in the hall and a couple in here [front/dining room], the heat now is more consistent’* (Tenant 17, Biomass Boiler Installation).

3.4.4 Experience of hot water provided by the technology was satisfactory

Most users in each of the three customer groups were satisfied with the amount and temperature of hot water available from their installation at different times of the year.

During the coldest months, the provision of hot water by installations was reported to be satisfactory, with 81 per cent of installations in private households found to be at least fairly satisfactory; 83 per cent in community group households; and 85 per cent in tenant households, (Figure 9).

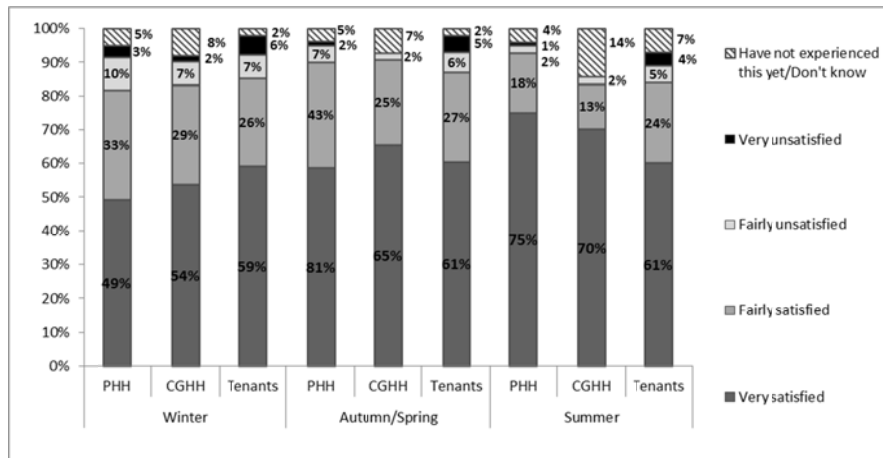
Figure 9 Levels of satisfaction with the amount of hot water available across seasons, broken down by customer group



Base (total number of installations): private households in each season (3,721); Community Group households (234; 234; 234); social tenants (1,292; 1,224; 1,208).

Installations were also deemed satisfactory in relation to the temperature of hot water available during winter months. More than four-fifths of installations (80 per cent) across all customer groups were reported to heat water to satisfactory temperatures, (Figure 10): “I can actually run a shower off the hot tap now, whereas before it was like a little trickle, and it would take all week to fill up the bath... It’s so nice to have a warm house” (Tenant 10).

Figure 10 Levels of satisfaction with the temperature of hot water available across seasons, broken down by customer group



Base (total number of installations): private households in each season (3,721); Community Group households (234; 234; 234); social tenants (1,290; 1,234; 1,227).

Solar thermal installations were reported to be the least satisfactory, largely due to their inadequate provision of hot water (at satisfactory temperatures) during the coldest months. Dissatisfaction levels were the highest among social tenants, with nearly 3 in 10 installations (29 per cent) reported to not be meeting users’ expectations: ‘You assume it’s going to save you money, but it’s not unless it’s very hot summer days. Had I known it would have been so much hassle at the time, I would have not gone through with it. It has not made any difference to us because you just have to have a really sunny day or just have to accept that it is going to be a bit tepid’ (Tenant 29). Solar thermal systems were therefore often complemented with other heating installations, mainly immersion heaters. A few of the social tenants interviewed reported that they received installations of new gas boilers at the same time as the solar thermal installation which increased satisfaction levels in relation to the amount of hot water available.

Conversely, reported satisfaction levels with the other technologies were highest in autumn / spring, but lowest in summer. The same pattern was observed for the temperature of the hot water. The implication of this is that solar thermal technologies perform better in summer, while the other technologies perform best in autumn / spring, but less well in summer when they are being used more sparingly.

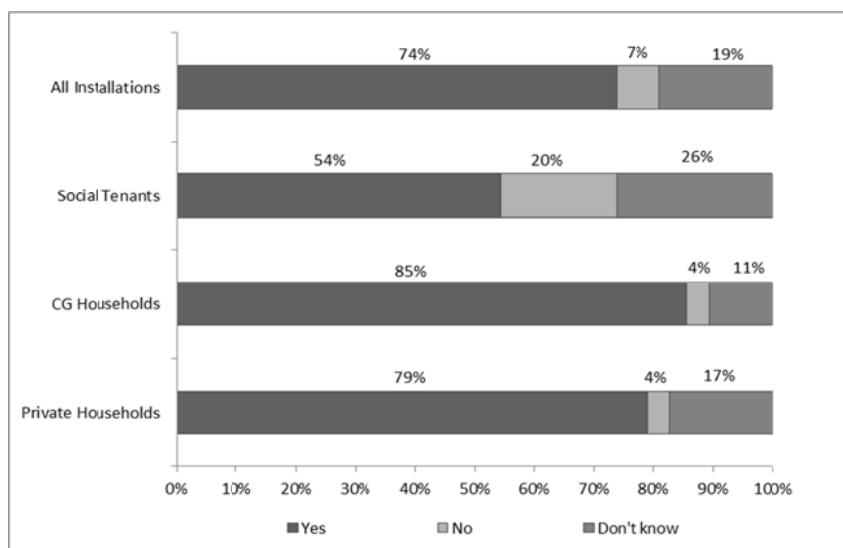
3.5 Cost savings

There is currently no objective data available to measure the effect of the take-up of renewable heat technologies on energy bills. As part of the censuses, customer groups were asked whether they expected cost savings and whether they had seen a reduction in energy bills following the installation of their renewable heating system. Private householders who installed a renewable heating technology were asked to comment on their expectations of savings at the time of the post installation questionnaire. However, as households in the Communities Scheme and tenants were asked to complete only one questionnaire, they were asked to comment on expected savings having lived with the technology for a relatively longer time than private householders. It is possible that this may have affected the response given by each of the groups.

3.5.1 There is a high expectation of savings in the long-run

Across the three customer groups, 74 per cent of installations were expected to provide cost savings in the long-run (Figure 11). When comparing the three customer groups, fewer social tenants expected their renewable heating technologies to result in cost savings. In this case, users of 54 per cent of installations expected their system to provide cost savings in the long-run. The effects of a further 26 per cent were uncertain. In contrast, users of 79 per cent of installations in private households, and 85 per cent of installations in the Communities Scheme expected their renewable heating technology to provide cost savings in the long run.

Figure 11 Expected savings from renewable heat technology installation by customer group



Base (total number of installations): private households (4,342); CG (234); social tenants (1,333); all installations (5,909).

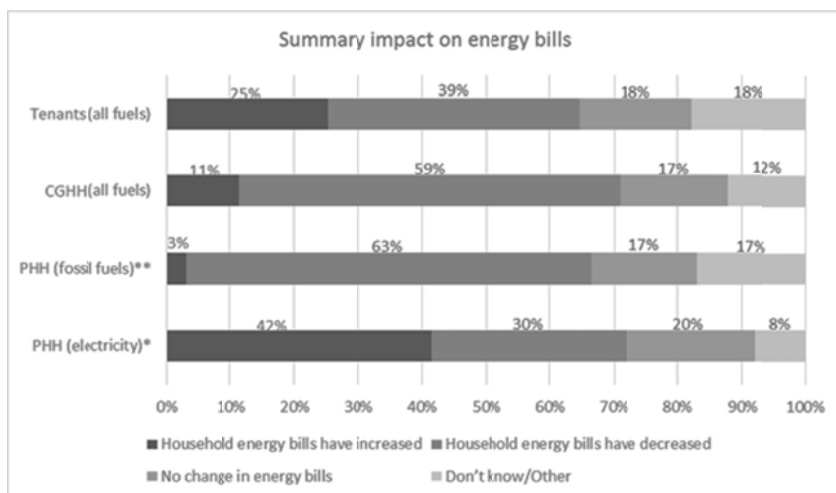
Expectations are very similar across technologies. The least confidence in cost savings was from installations of air source heat pumps, reflecting the significance of this technology for social tenants.

3.5.2 The perceived impacts of the new heating systems on energy bills are uncertain

Private households provided mixed views on the impact of installations on energy bills

The follow-up questionnaire with private households asked, by fuel type, whether there had been any perceived impact on energy bills. The overall impact across fuel types was not recorded (see Figure 12).

Figure 12 Reported impacts of renewable heat installations on energy bills



* Electricity bills only; ** Fossil fuels (coal, gas, oil, LPG). Base (excludes “not applicable”); Tenants (1,237), CGHH (Community Group Householders) (148), PHH (Private Householders reporting impacts on fossil fuel bills (1,857), PHH (Private Householders reporting impacts on electricity bills (2,983).

Note: no overall figure available for all fuels for private households. Effects were reported separately for different fuel types.

For 42 per cent of installations, private household users reported an increase in electricity bills, but for 30 per cent, users reported a decrease and for 20 per cent, no change. In the cases where installations replaced fossil fuels (gas, oil, coal, LPG), and excluding installations where there was no fossil fuel replacement, for 63 per cent of installations users reported a decrease in fuel bills and in only 3 per cent of installations was there a reported increase. There was no change reported for 17 per

cent of installations while 'don't know' was reported for another 17 per cent of cases. Excluding solar thermal installations, which have a smaller effect on replacements of fossil fuel, a decrease in fuel bills was reported for 69 per cent of installations.

Households who took part in interviews were however, clearer about the impact on energy bills and that they had reduced compared to previous systems, or achieved the performance against expectations (in new builds or renovations with which there was no previous system to compare): *'Our oil bills were very big - going back a few years they were very big and then we realised how much we were using and paying, and we started economising...the price of oil was going up and up, and it's like throwing money out of the window... we're saving about £500 to £600 [a year]. I thought it would be £200 to £300, maybe £400.'* (Ground Source Heat Pump); *'I run a spreadsheet on exactly how much fuel is used and the hours the boiler is on...I can work this out at exactly 4.9p per kilowatt hour, which is what the manufacturers said'* (Biomass boiler, self-build).

There were divergent reports on the price of wood pellets for biomass boilers, with different patterns reported in different areas. A small number reported that the price was rising locally; a similar number reported that the price was reducing.

A small number of interviewees reported that it was too early to estimate cost savings, although they expected them to be reduced. In the same vein, where the new systems have been installed in a new build house, interviewees did not have previous costs to compare it with, although they expected the costs to be lower than an alternative (non-renewable) system would have been: *'I've only ever had that system in this house so I've got nothing to compare that to. If I didn't have that heating system here, I suspect my bills would probably be about 20 per cent higher.'*

3.5.3 Community group households generally reported a decrease in overall energy bills since the installation of their renewable heat technology

The majority (59 per cent) of installations were reported to have led to a decrease in overall energy bills since installation. Only 11 per cent of installations were reported to have led to an increase in energy bills.

3.5.4 Tenants provided mixed views on the perceived impacts of the installation on energy bills

Evidence from the tenant census indicated that for 39 per cent of installations, users reported a reduction in overall household energy bills. Conversely, for 25 per cent of installations, users reported an increase in energy bills since the installation of their technology. This effect is similar across technologies.

However, interview findings with tenants indicated that most were unsure about current and expected future changes in fuel bills. This was a particular concern among users of solar thermal systems who did not know how much hot water was provided by the solar thermal system, but also because of other contextual factors

(such as: billing arrangements / fuel mix / milder winters). Tenants with new (more efficient) gas boilers installed at the same time as their solar thermal panels tended to report lower bills – however, it is not possible to identify what proportion of the savings (if any) can be apportioned specifically to the solar thermal system.

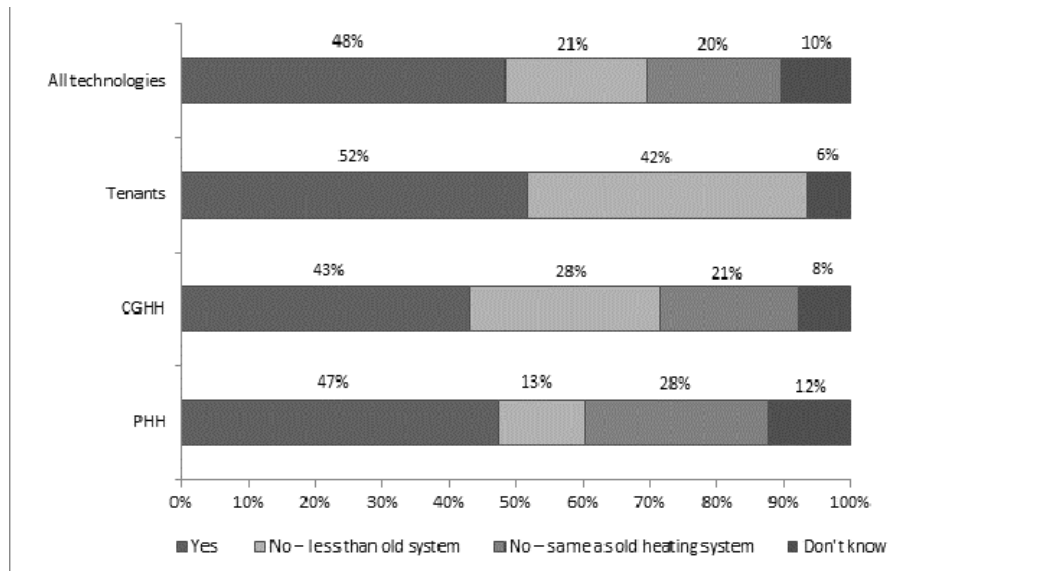
Users of biomass boilers reported that the price of pellets (and the fact that more bags of pellets were required than they had initially anticipated) constituted a source of concern and uncertainty about future savings on fuel bills.

3.6 Additional use of new renewable heating and hot water systems

Owners of renewable heat installations were asked in the follow-up questionnaire whether they ran the new system for longer time periods (Figure 13) or at higher temperatures (Figure 14) compared to the previous system.

In almost half of all installations (excluding solar thermal), technologies were reported to be run for longer periods than in the previous heating system. Similarly, a little over half of the installations in tenant properties were run for longer time periods than in the previous heating system. One fifth to a quarter of all installations were run for periods similar to that of the previous heating system.

Figure 13 The share of installations that are run for longer periods^[1]

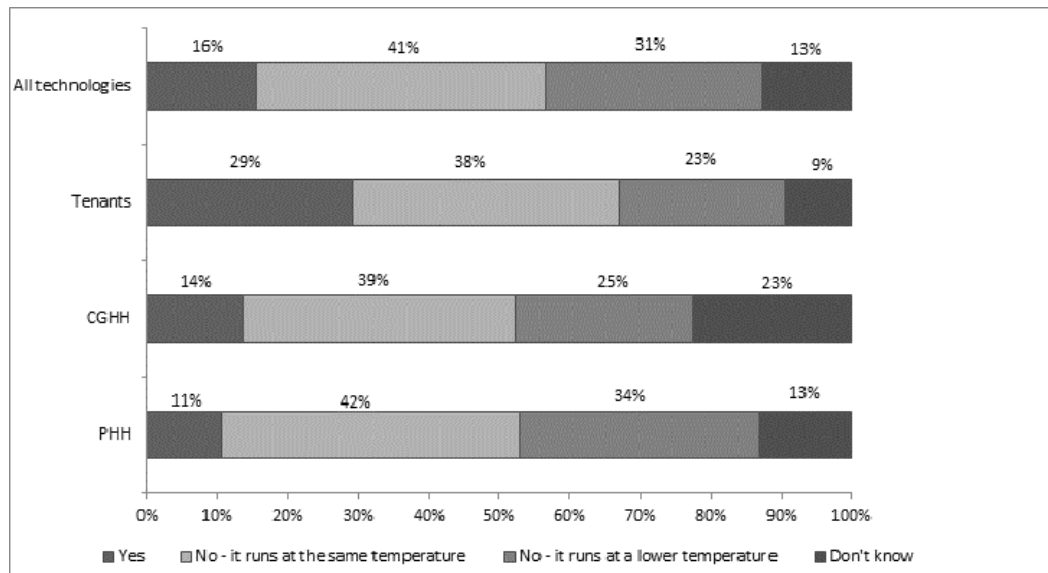


Base (total number of installations): private households (2,522); Community Group households (155); social tenants (970); all installations (3,647).

^[1] This analysis excludes solar thermal installations. Please also note that the proportion of users who leave their new systems for fewer hours and for the same number of hours are as follows: (1) PHH: 13 per cent and 28 per cent respectively and (2) CGHH: 21 per cent and 28 per cent respectively. This distinction was not made by tenants.

Unlike installations in private households, more installations in tenant households were run at a higher temperature (29 per cent) compared to those that were run at a lower temperature (23 per cent). This suggests the use of the new heating system to provide extra heating compared to the previous system. Whether this has resulted in higher energy costs or reflects lower energy costs is not clear.

Figure 14 The share of installations that are run at a higher temperature



Base (total number of installations): private households (2,522); Community Group households (155); social tenants (894); all installations (3,571).

Note: This analysis excludes solar thermal installations.

3.7 Users' overall satisfaction with their new technology is high

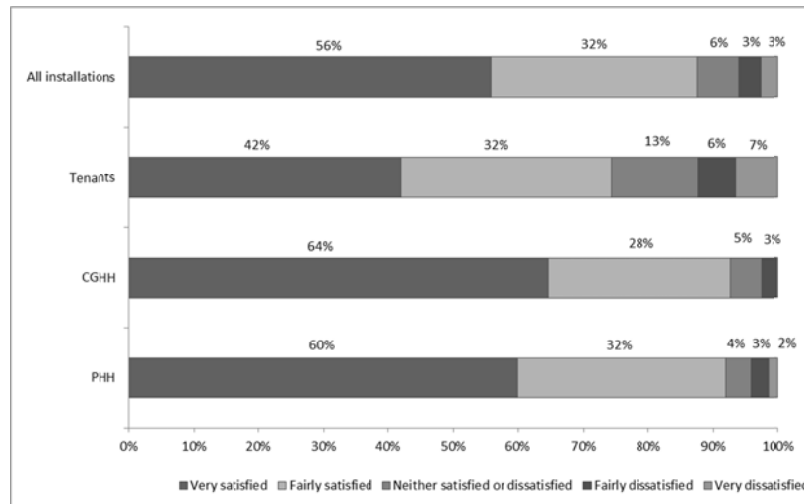
In general, all three customer groups reported high levels of satisfaction with the performance of their renewable heat technology (Figure 15).

Satisfaction levels with installations, across all technologies, for all three customer groups, was high at 88 per cent. For installations in private households and households in the Communities Scheme, satisfaction was high at 92 per cent¹⁷. There was no significant association found between the overall level of satisfaction reported by private households and community group households, and the technology installed.

¹⁷ Source: Post Installation (PI) household surveys of owner occupiers and follow-up (FU) surveys. This compares with 89% reported in the immediate post-installation survey. Follow up survey results were used as they give a measure of satisfaction once the technology has been used for a heating season.

The tenant census also indicated that a majority of installations gave satisfaction, 42 per cent of installations were reported to be very satisfactory while a further 32 per cent were deemed fairly satisfactory¹⁸. Overall, biomass boiler and ground source heat pump installations were considered to be the most satisfactory by social tenants.

Figure 15 Overall satisfaction levels across customer groups



Base (total number of installations): private households (3,869); CGHH (234); social tenants (1,343); all installations (5,446).

3.7.1 Post-installation advice and guidance is important in ensuring high levels of satisfaction

Results from the census of private households and community group households indicated a positive link between the overall level of satisfaction and the quality of the service (including written information and detailed explanations) provided by installers. Evidence from the tenant census indicated that for 58 per cent of all installations, explanations given by landlords (or by representatives) and/or installers on how to use the new technology were either very satisfactory (23 per cent) or fairly satisfactory (35 per cent). Conversely, for 13 per cent of all installations in tenant households, the level of advice and support received upon the installation of the new technologies was deemed unsatisfactory. Qualitative interviews with a sample of surveyed tenants indicate that this source of dissatisfaction could be due to a lack of proper guidance – either via demonstrations or written material – on how to use the new technology: *‘We are still waiting for the*

¹⁸ Source: postal and online census of all tenants where Registered Social Landlords have installed renewable heat technologies.

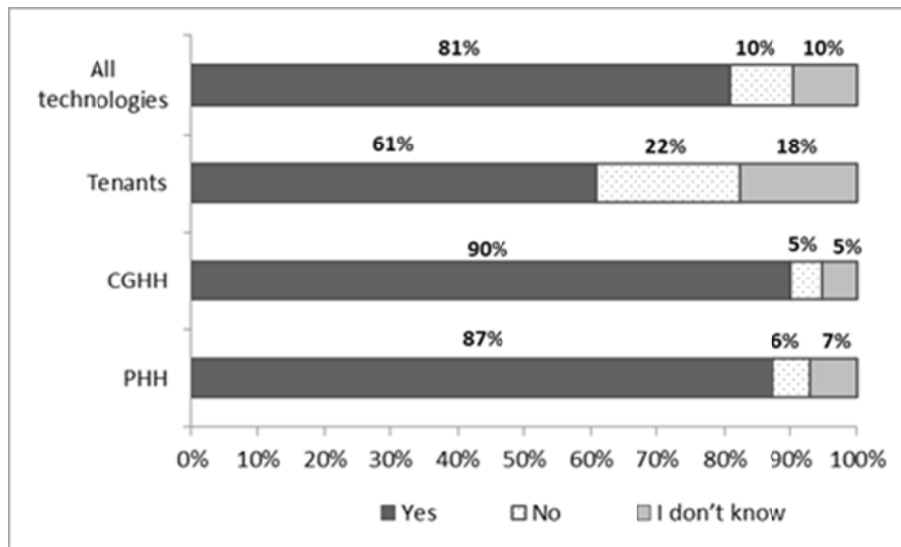
proper instructions on how to use it. All we got is a print out...from the man from the council. It's not great.' (Tenant 7)¹⁹.

The nature of the previous heating system had only limited influence on users' satisfaction with the performance of their renewable heat technology. As far as space heating technologies were concerned, there was no substantive association between private households' reported level of satisfaction with their current technology and the type of technology previously installed or their satisfaction with their previous technology.

3.8 The large majority of users would recommend renewable heat technology

The large majority of installations (81 per cent) across all three customer groups had or would be recommended to a third party; 87 per cent of installations used by private households, 90 per cent of installations used by community group households and 61 per cent of installations used by social tenants would be recommended, (see Figure 16 and Table 20).

Figure 16 Willingness to recommend the technology installed



Base (total number of installations): private households (3,693); CG households (234); social tenants (1,306); all installations (5,233)

Users of ground source heat pumps were more likely to recommend the installation of their renewable heating technology to others than users of any other technology type. However, recommendation was high across all renewable heating technology types.

¹⁹ Source: 30 qualitative interviews with tenants who had an RHT installation in their home (drawn from questionnaire respondents who agreed to participate in further research).

Table 20 The share of installations that would be recommended, by customer group and technology

Answer	ASHP				GSHP			BB				ST				All technologies			
	PHH	RSL	CG	All	PHH	RSL	All	PHH	RSL	CG	All	PHH	RSL	CG	All	PHH	RSL	CG	All
Yes – I would recommend	86%	60%	91%	75%	92%	70%	88%	91%	[57%]	87%	90%	87%	61%	92%	85%	88%	61%	90%	82%
No – I would not recommend	6%	22%	*	13%	4%	16%	6%	4%	[21%]	8%	5%	6%	23%	*	8%	6%	22%	5%	10%
Don't know	8%	18%	6%	12%	5%	14%	7%	5%	[21%]	5%	5%	7%	16%	5%	8%	7%	18%	5%	10%
Bases (total number of installations)	1,467	1,079	65	2,611	542	122	664	513	14	86	613	1,347	163	79	1,589	3,869	1,306	234	5,409

Source: Private Householder follow censuses; community group questionnaires, social tenant questionnaires

Notes: Excludes four Community Group GSHP installations;

[] when the base is less than 50;

“*” = number of responses in the cell are below three.

3.9 Key lessons

3.9.1 Specific scheme results

- **Motivation of households:** The motivation for participation in the RHPP Scheme of private households was similar with or without the Communities Scheme projects. Both were driven by a combination of concern over rising fuel prices and environmental concerns. Social tenants however, placed greater weight on cost savings and less weight on environmental issues.
- **Satisfaction of households:** All customer groups expressed high levels of satisfaction with the performance of the renewable heat technologies despite the reported levels of faults. The majority of households would recommend their new heating systems.

3.9.2 Implications for domestic RHI

- **Targeting different types of households:** The three sub-schemes collectively achieved installations across a wide range of households. However, in the absence of the RSL and Communities schemes, the RHPP Scheme would have been dominated by older, more affluent households living in large, detached houses and for whom the incentive provided was marginal. The Communities Scheme did manage to move the household profile towards the average household distribution, with slightly younger households on lower incomes in smaller properties. The RSL Scheme made a major difference in the household profile, with households on lower incomes in smaller properties.
- **Use and performance of novel technologies:** There were no major reported concerns over the purchase of a novel renewable heating system – households were well informed based on their own research and, in the case of social tenants, were well informed and briefed on the use of the renewable heat technology. A high level of satisfaction with the heating and hot water performance of renewable heat technologies was reported, across all technologies, by all customer groups.
- **Choice of technology:** Choice was based on information provided by the installer and, in some cases, manufacturer. The reported performance levels of individual technologies were similar, with consistent feedback about the use and costs across the eligible technologies. However, whether the technology was being installed as part of a new build or refurbishment did have some influence, for example, ground source heat pump installations were associated especially with larger new build houses. The refurbishment of social housing was associated with air source heat pump installations.
- **Cost savings and the use of the heating system:** Feedback from users on the levels of cost savings and the adoption of new behaviour in the use of hot water and heating systems did not provide clear evidence of the effects on energy bills. This highlights the importance of the need to meter properties to capture energy use more accurately. Separate research has been commissioned by DECC to analyse metering data collected from metered households in the RHPP Scheme.

3.9.3 Wider lessons for domestic energy efficiency programmes

- **Maintenance and refurbishment cycles:** The motivation to examine the choice of new and replacement domestic heating systems is unlikely to be strong until such time that, due to age and/or costs of maintenance/operation of heating systems, or because of building refurbishment / new build, a new heating system is required. The other contextual factor influencing levels of motivation is the current and expected level of fuel prices – concerns over rising prices could accelerate replacement decisions. Subject to the maintenance and refurbishment cycle noted above, other factors such as government incentives, begin to influence the choice of heating system. The combination of environmental concerns and the anticipated availability of cost savings from the RHI, combined to encourage the choice of renewable heat technologies over competing fossil-fuel based systems.

4 The Effectiveness of Engaging Communities to Deliver Renewable Heating Technologies

4.1 The Communities Scheme piloted an approach to support communities to deliver clusters of domestic renewable heating systems

4.1.1 Scheme objectives

The Phase Two Renewable Heat Premium Payment (RHPP2) Communities Scheme piloted an approach to providing communities with the opportunity to cost-effectively organise local buying groups for renewable heating systems, potentially accessing bulk discounts and facilitating easier deployment for installers. The Scheme was targeted at making renewable heating affordable for a wider demographic (than may have been the case for the householder scheme) to include middle to low income households.

The Communities Scheme sought to encourage the take-up of vouchers in private households, by using community groups to raise awareness, and to engage and recruit households that were interested in renewable heat technologies, in their defined spatial area of influence. The Communities Scheme targeted existing community groups to act as facilitators. They were allocated vouchers on the basis of their assessment of local interest and issued with application forms to distribute to households to complete. Households then applied to the Scheme in the same way as the private householder scheme, but using a different application form and receiving a higher voucher value that is specific to that community project.

Annex 1 provides a schematic description of the Communities Scheme and the customer journey.

4.1.2 Schemes were delivered across England, Scotland and Wales

There were 39 projects delivered by 36 community groups (one group delivered four projects).

Table 21 Number of community group project by country/region

Country/region	Number of community group projects	Country/region	Number of community group projects
Scotland	4	East Midlands	1
Wales	5	West Midlands	1
North East England	1	East of England	3
North West England	2	South West England	7
Yorkshire and Humberside	8	South East England	7

Source: DECC administrative data.

4.2 A variety of community groups participated, motivated by, and with experience of, the promotion of environmental sustainability

This section draws on data collected from 25 qualitative interviews with Community Group Leads – individuals who led a Communities Scheme project application and delivery. Of these 25 interviews, five were undertaken with Community Group Leads who were each from a project that did not achieve any household installations. Throughout the report, the two samples are distinguished as either a ‘community group’ or a ‘no installations community group’.

On the basis of interviews with representatives of community groups, and a review of application and post-project questionnaires administered by the Energy Saving Trust, most of the community groups had prior interest in, and experience of, promoting renewable energy, for example through LEAF²⁰ or CERT.²¹ None of the 25 community groups participating in the interviews were formed for the purpose of RHPP2.

²⁰ Local Energy Assessment Fund which promoted a communities-based approach to low carbon energy.

²¹ Carbon Emissions Reduction Target - a geographically based scheme requiring energy companies to provide subsidised energy efficiency measures and was replaced by the Green Deal and ECO programme.

In summary:

The community groups were broadly focused upon community action to promote renewable energy in order to reduce the environmental impact of fossil fuels and reduce the energy bills of low income households. Most of the Community Group Leads had a personal interest in promoting renewable energy. They had established the group or took a lead within it on the agenda of promoting renewable energy for these interrelated reasons: *'We're very interested in community based action to promote energy efficiency measures. We really need active localism to do this'* (Rural villages group, Community Group 2). Even where the group had no experience of promoting renewable heat technology, all had experience of promoting environmental sustainability at community level: *'[Participation in the Communities Scheme] was a desire to somehow kick-start renewable heat in this area, and make a bit of noise about it'* (Town-based group, Community Group 1).

By definition, the community groups were targeting a defined geographical area – a 'community'. However there were differences in the size of the 'community' targeted. The majority of the 25 groups targeted a geographical community of/or surrounding a town, village or group of neighbouring villages. Five of the 25 groups targeted broader, regional areas. One of these groups was an umbrella organisation for voluntary and community sector groups across a region and supported eleven different community groups to participate in the Scheme. Another group developed a 'hub and spoke' model, with the group supporting smaller community groups in three subsidiary areas. Only 4 of the 25 groups targeted an urban area with properties that were not necessarily off-gas grid (one was town-based, but seeking to engage off-grid homes in the surrounding area). Of these, three did not achieve any installations.

4.3 Community groups were supported to develop their projects, but faced barriers in engaging middle to low income families

4.3.1 The Stage One application stage was straightforward for the community groups who participated in the research

The Energy Saving Trust and DECC held two sets of seminars, at the beginning and end of the project development stage, in different regions of the UK to support the Scheme. Many interviewees had attended and found them useful. They provided an opportunity to find out more detail about the Scheme, but also to meet with other community groups. This networking provided both a source of information and the basis for further contact and liaison during the later development and delivery of the Scheme. The availability of project funding was central to community groups' decisions to apply to the Scheme at Stage One.

Key to the Scheme was the use of the Index of Multiple Deprivation (IMD) Lower Super Output Areas (LSOAs). Community projects were encouraged to target households within the lower 50 per cent of LSOAs in order to reach low and middle income groups. At Stage One, community group leads based estimates of likely installations on calculations of interest and eligibility from previous schemes or, from early engagement activities such as the use of email distribution lists.

4.3.2 The Stage Two application stage was more complex than Stage One, but the co-design support was well received

Successful community groups received a grant to develop a detailed application for a RHPP2 community project. This included securing expressions of interest from households by applying for a voucher through the Scheme. A spreadsheet provided a weighted calculation of the energy savings to be achieved by IMD rating and the resultant discount available for each expression of interest in a technology installation. Every household was not required to be in the eligible LSOAs areas, but the greater the number would result in a higher grant score.

One of the aims of the RHPP2 Communities Scheme was that projects would be co-designed by community groups with their peers (other participating groups) and the Energy Saving Trust. There were three key aspects provided by the Energy Saving Trust: workshops at the start and end of this development stage; 'Basecamp' – an online community to access and share information and practice; and, ongoing support and advice by telephone and email. The workshops were seen by most of the Community Group Leads to have been useful, for similar reasons as at Stage One. There were mixed views of Basecamp. Although many found it a useful forum for sharing information and ideas, those with experience found it of less use. There was a broad consensus that it would have been helpful to have greater moderation of the commentary on the site.

There were also mixed views about the *ad hoc*, responsive support provided by the Energy Saving Trust. There was some frustration that they were unable to answer all of the queries that community groups had and that time was taken to revert to DECC to find the answers; and that there were not always answers available, as the Scheme was developing: '*It was difficult to get definitive answers. It felt like DECC and the Energy Saving Trust were rushed and unsure of the answers*' (Rural area group, Community Group 8).

There were mixed views of whether the grant funding received was sufficient. Many reported that it did not cover the final amount of time invested. All of the Community Group Leads were clear that the provision of grant funding for project development and delivery (with additional funding to attend workshops) was essential for their participation in the Scheme. It had been a central factor in their decision to apply. There were mixed views of whether the funding received was sufficient. The amounts received varied quite considerably dependent on the LSOA and technology mix reflecting the intended scale of a project at Stage One - £3,000 for a small town-based project; £23,000 for a large rural area project. Most groups, whatever the size of their project, reported spending more time (staff and volunteers) than they had expected in submitting their applications for funding. Larger groups had additional resources to draw on: '*[Project leads] used a lot more than our allocated hours for this project. We have a few other projects going on so we were able to cross-subsidise this one*' (Large rural area group, Community Group 12).

4.3.3 Project implementation: community groups found it difficult to work within defined LSOA areas

All of the community groups faced challenges in: securing sufficient expressions of interest from their targeted LSOAs for their Stage Two applications; and, converting expressions of interest to installations in their project delivery.

Community groups were required to map interested households against their LSOAs to ensure eligibility in relation to voucher levels. For some of the groups, the task was time consuming but relatively straightforward, as they were targeting a rural area where all households were eligible (due to its LSOA ratings). Wealthy households living in eligible LSOAs could also be included. In community groups covering mixed areas, the ability to include households outside of eligible LSOAs was helpful in engaging middle to low income households, but it also created complications as these had to be offset by sufficient expressions of interest from those within the eligible areas. There were also households within eligible areas that did not have sufficient insulation (equivalent to the household scheme requirements) and therefore were not eligible for the Scheme, with community groups unable to assist with this cost.

To address the challenge of securing both sufficient expressions of interest and subsequent installations, some of the community groups widened their initial target area. For many, this was quite small-scale expansion to bring in bordering LSOAs. For others, a larger-scale change was undertaken. Three groups participating in the research targeted the area around a rural town, but later expanded this to include a greater area of their county. An urban group expanded to include the surrounding, rural area. This created additional challenges as widening the target area required further mapping of interested households against eligible areas.

The key barrier to converting expressions of interest to installations identified by Community Group Leads was the cost of installing renewable heat technology, even after the voucher value had been considered. Almost all of the community groups expected the vouchers to provide a higher value discount than what was awarded: *'Initially, we thought that we would be able to get a grant to cover 60-70 per cent of equipment. Once we did the calculation, it turned out to be more like 20 per cent of equipment. But if you can cover the 80 per cent yourself then you don't need a subsidy! The people that ended up installing could have installed the equipment anyway! The Scheme ended up subsidising people who could afford it!'* (Large rural area group, Community Group 16).

This was the case across those groups with and without experience of promoting renewable heat technologies and those who achieved and did not achieve installations: *'We got the EOs in place before Stage 2 when the voucher rates and the IMD calculation were set. Initially we thought that the voucher would cover 50 per cent of the cost – in the end it was more like 30 per cent. This was completely inaccessible to the most deprived.'* (Large mixed urban and rural area, No Installations Community Group 2).

When households discovered the value of the voucher, many of them withdrew from the Scheme. To maintain the voucher values awarded to their project, community groups were

required to replace each household with an equivalent. This created further delays and complications.

4.3.4 Project implementation: Installers played a central role in the development of the community projects

Community groups sought to identify installers who could complete the installations within the timescales of the Scheme. Installers were asked to provide estimates of the cost of installing different eligible technologies, which were used to promote the Scheme with households and in some cases to undertake assessments of interested households to provide them with a recommendation of suitable technology and a specific quote for the installation cost. Some community groups already had established links with installers through previous schemes. Groups provided the form to apply for the voucher and recommended installers, but households arranged their own installations, as with the private household scheme.

Whether they had existing links with them or not, key considerations when identifying installers were to: ensure installer capacity to deliver the expected demand (both within individual firms and across the range of installers identified); ensure all potential technologies were available (although there were two urban groups focusing upon solar thermal); work with local firms who would support local people; and, ensure a fair price. *“It’s a big thing around here about local businesses. People prefer to work with people from down the road.”* (Village-area group, CG7)

Some installers were referred to as ‘partners’ by the Community Group Leads. Most of the community groups had held community events where installers had been present to demonstrate the technologies and to answer questions about costs and cost savings. These were seen as central to raising interest in the Scheme. One community group was approached by a major energy company to work in partnership for the Scheme. The group was an umbrella organisation promoting take-up across a large sub-region of the UK. It was a symbiotic relationship; the company offered the community group the scale they required for a large project and the community group offered the energy company a credible voluntary and community sector partner. Another community group formed a partnership with a large installation company in their region. The company had its own supply chain of installers and sub-contracted organisations for all technologies across the region. The relationship between the community group and the company pre-dated the RHPP2 Scheme. The company went into administration, seriously impacting upon the success of the local scheme, with just a single installation achieved from over 50 expressions of interest. This provides a stark example of the importance of the relationship with installers and their key role in schemes; with just one installer as a partner, the group had little time to identify and recommend others to participating households.

4.4 Community groups were successful in promoting renewable heat technologies despite the barriers in converting interest into installations

In addition to community events, Community Group Leads reported that face-to-face contact was important in engaging households. Door-knocking was seen to be particularly effective, but

it required capacity. It enabled the community group members to talk about the Scheme and the technologies face-to-face as a trusted source of advice and to answer householders' questions.

Many of the Community Group Leads described in their interview and in their Project Report that the project had been a success. This was related to their learning from the project and the advantages they could identify rather than the number of installations achieved.

Groups with less experience of delivering funded projects reported that the Scheme had built their confidence. They had learnt about how to manage their capacity and how to plan for bidding for resources. Those with more experience of delivering funded projects, but less with promoting renewable heat technologies or other energy efficiency projects had built expertise and capacity for supporting and delivering schemes with this agenda in the future.

'For us, as an organisation we are a lot more knowledgeable about the practical problems around renewable tech and the practical problems that people in the communities where we worked face. We also learned about the importance of using community leaders to build trust and raise interest.' (Large rural area group, Community Group 16)

Many of the interviewees highlighted that the Scheme had promoted much greater awareness of renewable heat technologies across their communities, both in and outside of the specific target areas. They thought that this would promote take-up in the longer term (notwithstanding that issues around high up-front costs must be addressed for low to middle income groups to install). The Scheme had also provided groups with expanded mailing lists of interested households who could be engaged in events or future schemes.

'The Scheme has drawn attention to alternative technologies and there is a growing interest and awareness in these.' (Village-area group, Community Group 15)

The majority of respondents to the Communities Scheme household census (68 per cent of households) reported that they were not a member of the community group when they participated in the Scheme. A quarter (26 per cent) of households first heard of the community group through their promotion of RHPP2, with half (54 per cent) either having prior knowledge of the group through other activities or word of mouth.

Receiving support from a community group was an important factor for those who had installed renewable heating technologies as part of the Communities Scheme. Just under a half (48 per cent) of all installations would have been either very or fairly unlikely to have been proceeded with, in the absence of support from the communities group.

4.5 Community groups achieved mixed success with securing planned installation capacity, with the lack of additional finance for households a barrier to take-up

4.5.1 Overall, a low number of installations were achieved against the target, although a small number of projects achieved them

The Scheme achieved mixed success; £3 million was originally allocated to community groups through the RHPP2 Communities Scheme (of a £8 million budget), of which only 29 per cent was awarded to a value of £0.9m. Of the 480 voucher applications submitted by households, 365 (76 per cent) were redeemed by them against the cost of an installation.

Most of the community groups did not achieve their target for installations as calculated in their project plan.

- Four projects achieved more than 50 per cent of their projected installations (70 per cent, 94 per cent, 98 per cent and 100 per cent);
- Five achieved between 31- 50 per cent;
- Four achieved between 21-30 per cent;
- Ten projects achieved between 11-20 per cent;
- Sixteen projects (41 per cent of the total) achieved less than 10 per cent of vouchers awarded redeemed by households; and
- Eight projects achieved no installations.

The one group with four projects achieved mixed success, reflecting the range of barriers faced in local delivery; they achieved 0 per cent, 13 per cent, 14 per cent, and 19 per cent of their targets.

4.5.2 Some households were unable to proceed with planned installations due to planning and other barriers linked to property type

Some Community Group Leads reported that having decided to proceed with a renewable heat installation, some households experienced barriers to this being achieved. Examples included small numbers of properties that:

- **Were working farms** and were only eligible for commercial schemes;
- **Were required to obtain approval** from their local authority that installations (air source heat pumps) were allowed under permitted development rights (changes home owners can make without planning permission). These were not always obtainable within the timescale of the Scheme;
- **Required planning permission** for the installation of solar thermal and biomass boilers (also not always obtainable within the scheme timetable); and

- **Renewable heating technology was not suitable for the property.**

A number of illustrative examples were provided by Community Group Leads on the latter point. One group, working across a number of local authorities, had a project in a town. They reported that the air source heat pumps and solar thermal technologies that they received vouchers for were not suitable for any interested householders' properties. This was not established until the assessments were carried out once the vouchers had been awarded: *'Quite a few households failed the electricity test... their electricity supply could not cope with heat pumps. We did not have the £1000s needed nor the timescale to get the network upgraded in time.'* (Large mixed urban and rural area, No Installations Community Group 2).

One group found that although there was interest in biomass boilers, the local roads were unsuitable for the delivery of pellet fuel. Another group targeting an urban area also found that properties were unsuitable, because assumptions about the standard of insulation materials installed, based on energy efficiency and building standards, were not met. The properties were modern builds and should have met set building standards, but when the assessments were carried out for the Scheme, many were found to have been built to sub-standard: *'The proposed estate was all mixed tenure affordable housing... When they built affordable housing, everybody involved [was] trying to cut corners... So we found out, for example, that the roof insulation was not at the level that RdSAP assumed.'* (Town-area group, experience, No Installations Community Group 3).

Due to their age, many rural properties were reported to lack the necessary insulation to qualify for the Scheme. There was no funding available to install the required insulation in time for the Scheme. However, this was not uniform across the participating nations. In Scotland, it was reported to be less of an issue due to previous targeted schemes and the availability of additional funding to address any short falls: *'We have had schemes running for insulation for years and most houses are up to scratch now. We had one or two houses that needed to be done after installation [and EST agreed to that]... We used the Scottish Home Insulation Scheme to finance those improvements.'* (Town and rural area group, Community Group 13).

4.5.3 There was a lack of installer capacity in some of the communities, but other examples of effective partnership working

The availability of installers to carry out assessments and provide quotes, and then to install a renewable heat technology, before the end of the Scheme (including once extended), was another key barrier to success in some of the projects. A few of the Community Group Leads reported that there was a lack of available installers who were able to carry out the work, particularly across larger rural areas.

There was reported to be low installer capacity in some urban areas. A few of the Community Group Leads explained that although they were available locally, installers lacked the capacity to meet demand. Efforts were made to assign households to other installers, but they were not always able to meet the deadline either, due to the demand. One Community Group Lead explained how the key installer associated with their scheme pursued larger scale, higher value contracts with Registered Social Landlords (social landlords).

There were examples of effective working with installers which facilitated (relatively) successful schemes (see Box 3 below). One of the successful community groups (Community Group 18; 34 vouchers awarded, 30 redeemed) explained that they worked with a biomass boiler installer who brought 15 clients to the Scheme.

Example of partnership working with installers

This community group in Scotland (Community Group 13) is a non-profit organisation with a long history run by a voluntary committee, but with paid full-time staff. The organisation provides energy advice with a focus on addressing fuel poverty, but has supported and promoted renewable heat technologies for the past three years. The island supported by the organisation has a heavy reliance on oil and electric energy and there is a growing interest in and demand for renewable technologies.

There are four installers (MCS accredited) on the island and the Community Group Lead explained that they were happy to support the Scheme; the winter is a quiet time for them and they have to let staff go most years, however the Scheme had to be delivered across this time. The group held a meeting with them early on in the application process, which enabled them to plan.

The development grant from DECC supported a range of marketing activities, with a range of events, including one targeting the over-60s.

The four installers were able to provide a choice of technologies, specifications and thus price – prices for the same equipment were broadly the same. Biomass boilers were the most popular, with some Air Source Heat Pumps. The Scottish Government provides an interest-free loan scheme for renewables:

'This was a significant help and enabled uptake. It is much easier to pay off the money monthly rather than to come up with the lump sum upfront. This was very important. We would not have achieved as many installations as we did without it.'

There was so much demand for biomass boilers that installers' stock was exhausted and more had to be ordered from the manufacturers. The extension enabled the use of stock that arrived after the original scheme deadline.

Installers have taken a great deal of care to support households with their renewable heat technology.

'They do as much as possible to help household understanding of how to use it. Because it's a small, tight community, negative feedback about a particular installer or a particular technology would spread very quickly – so they have a strong incentive to help.'

Fuel for biomass boilers is expensive on the island. Following their installation, households have started to support each other by sharing the cost. The group reported that people will bulk-buy when they go to the mainland and then split this between neighbours at cost when they return.

Another group (Community Group 10), which is small and volunteer led, covering a large rural area, worked with two local 'embedded' installers as they wanted to support local business and provide an installer that local people could trust. One installer became the primary partner; he was described as 'adaptable', which was important as the Scheme was 'unpredictable'. The group held community events, referred to above. Both the group and the installers worked through 'a rigorous process' to ensure people were well informed about the technology suitable to them and that they were informed prior to agreeing to an installation. For example, the need to keep biomass fuel dry and, how to use hot water when you have a solar thermal system: 'The installer wasn't there to sell he was there to guide people...so moving away from the whole commercialism of energy' (Village-area group, Community Group 10).

The installer has since taken on more staff. The group was allocated 50 vouchers and 34 of these were redeemed.

4.5.4 The availability of interest free loans in Scotland was key to projects' achievements there and the lack of additional, affordable finance was a barrier to schemes in England and Wales

In Scotland, covering the cost of installing a renewable heating technology was less of a barrier than in England and Wales because of the availability of interest free loans from the Scottish Government that covered up to 75 per cent of the cost²². This type of loan was used to fund 72 per cent of all (33) installations reported by Scottish households who responded to the evaluation census questionnaire.

A few of the community groups in England and Wales attempted to identify additional sources of finance for households. Two groups targeting urban areas worked with local credit unions to provide loans to households, but the cost of these remained prohibitive to low income households. Another group worked with a local energy cooperative partner to provide access to affordable finance, but there was no take-up amongst the participating households. One group working in an urban area, which did not achieve any installations, developed their scheme in partnership with the local authority. The intended model was that the local authority would provide grants to households to match-fund the value of the RHPP2 Communities Scheme voucher. However, following liaison with DECC and after the award of vouchers, it was established that this could not be provided due to public sector financing rules. The group subsequently identified local credit union finance, but they considered the rates to be too high for low income households and the predicted return available through the RHI was deemed to be too low for the group to consider it appropriate to recommend them.

4.5.5 Community groups had mixed results in achieving discounts from installers

Almost all of the community groups sought to secure discounts from installers on the basis of the volume of work expected to be achieved through the Scheme. Some installers were reported to be happy to offer a discount, others as being reluctant to provide one.

Discounts achieved ranged from 5-20 per cent off the commercial price, with installations priced at, or closer to, the commercial (trade) rate rather than the domestic rate. A 5 per cent discount

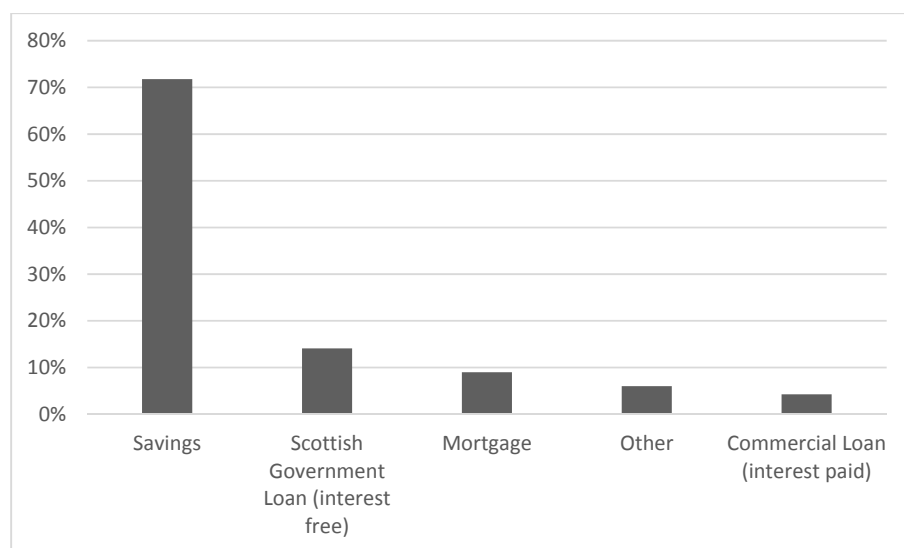
²² [online] Available at: <http://www.greenerscotland.org/warm-homes/advice-grants/home-renewables-loan-scheme>

was the most commonly reported discount achieved. Discounts tended to be linked to installed volumes, which if not achieved meant discounts were not payable.

A small number of the community groups agreed referral fees with installers. These were fees paid to the community group for their referral to the installer (£50, Community Group 9, £20 Community Group 1, 2.5 per cent of total cost Community Group 4). These fees were used by the community group to supplement funding from DECC.

Figure 17 shows how installations were paid for. The majority (72 per cent) were funded through savings. More expensive installations were statistically more likely to be funded through savings. Savings were more likely to be used to fund the installation when the respondent was retired.

Figure 17 Sources of funding used to pay for renewable heat installations



Source: Communities Scheme Household Census. Base: 234 installations.

Over half of all installations (59 per cent) did not receive a discount on either the cost of the installation or the technology. A fifth of installations reported receiving a discount of which nearly a half received a discount on just the equipment, and nearly half received a discount on both the labour cost of installation and the cost of technology with the remainder receiving a discount for installation only.

4.6 Key lessons

4.6.1 Specific scheme results: Successful groups had shared features of effective partnership working, networking, a well-developed infrastructure and strong project plan

Overall the Scheme had mixed results. It was effective in reaching off-grid communities and high carbon heating systems were replaced (68 per cent of installations replaced oil-based water and heating systems). Although many of the groups reported securing discount agreements with installers, it seems that few were realised, because the required volumes of

installations were not achieved. Nonetheless, it does indicate the potential for these in future community and cluster based schemes to help reduce the up-front cost barriers to those on middle and low incomes.

An analysis of the four groups with a project that was successful in achieving its targets (see 4.5.1) indicated that each had the same combined features:

- **Effective partnership working with installers:** Which was established from the earliest stages of the Scheme so that there was close working throughout, including joint events where installers explained the technologies and promoted and provided referrals to the Scheme.
- **Networking with other community groups:** Beyond learning from other groups at scheme events, there was close working with other groups to promote the Scheme widely, including using others' networks, email lists, and events. Where groups were covering a wide area, groups more local to specific communities were used to promote the Scheme there more effectively using specific local knowledge.
- **Having a well-developed infrastructure and paid staff:** The ability of full-time staff to devote time to managing the project and working effectively with others including volunteers, so that a team approach was achieved; and, experience delivering community projects including promoting renewable heat technology.
- **Having a well-developed project plan:** There were realistic targets based on knowledge of local interest and the suitability of housing stock, developed by paid staff with experience of delivery who were able to react quickly to problems with take-up and work with installers and other groups/networks in the ways outlined above.

4.6.2 Implications for RHI: Working with community groups helped raise awareness of renewable heating

Community groups played role in promoting renewable heating. Nonetheless, if low to middle income households are to be engaged through community approaches, greater incentives are required to address the high up-front costs that are incurred when installing renewable heat technologies. The community groups who participated in the RHPP2 Communities Scheme were motivated to promote the take-up of renewable heat technology due to the potential for long-term impact on fuel poverty and the cost savings associated with moving away from fossil fuels as well as environmental concerns. Schemes that do not include benefits for middle to low income groups are perhaps unlikely to receive the same commitment from these groups. The higher level of financial support available through the Scheme, compared to the private household scheme, was an important factor in securing take-up.

4.6.3 Wider lessons for domestic energy efficiency programmes: Community groups played a role in promoting renewable heating

Community groups provided an additional mechanism for promoting the renewable heat agenda and the installation of technologies, especially in off-grid areas located in more rural areas. Locally-based groups were well placed to engage local households and to build local

awareness and local installer capacity. Most reported that they had been able to work well with local installers, who were keen to work with them to build a local market and increase their number of clients. There were also limits to local installer capacity in some areas. Longer timescales would allow planning for demand and also enable greater planning and flexibility in responding to issues as they emerge and particularly for those organisations that rely on volunteer contributions.

Most of the Community Group Leads felt that the Scheme had not been designed with adequate community group involvement and that their concerns and feedback were not always addressed; or, the structures of the Scheme meant that changes could not be made. They saw greater, earlier involvement of community groups as key to effective design, particularly in understanding rural issues.

5 The Effectiveness of Engaging Registered Social Landlords in Delivering Renewable Heat Technologies

5.1 Scheme objectives

Registered Social Landlords (social landlords) are providers of social housing, registered with the appropriate devolved authority in each part of the UK. For the purpose of RHPP, all types of Social landlords were able to bid for funds - including local authorities, charities, private companies (including Arm's Length Management Organisations) and partnerships.

Landlords are obliged to keep accommodation provided to tenants in a reasonable state of repairs. In relation to heating, landlords are generally responsible for keeping fixed heaters and the 'structure and exterior' of premises in good condition. Social landlords are also guided by standards determined by devolved governments which include energy efficiency, heating and comfort standards.

The main aim of the social landlord competition was to encourage the installation of renewable heat technologies in social housing, particularly in off-grid areas.

5.2 Characteristics of social landlords

5.2.1 Typology of participating social landlords: 'Early Adopters' and 'Experimenters'

Based on the interviews with the participating social landlords, it is possible to identify two broad types of social landlords – 'early adopters' and 'experimenters' – participating in the Scheme (Table 22).

The interest, motivation and subsequent scale of application was directly related to the extent of previous experience and knowledge of the use of renewable heat technologies and government programmes supporting their use. 'Early adopters', social landlords with previous experience of installing renewable heat technologies, submitted applications for larger volumes of installations than those social landlords who were 'experimenters', who were trying out the Scheme and/or renewable heating technologies.

Table 22 A summary of the types of Social landlords participating in the Scheme

'Early Adopters' Projects	'Experimenters' Projects
<ul style="list-style-type: none"> • Existing programme of renewable heat technology installations in place, or extensive prior experience of renewable heat technologies • Mostly convinced about renewable heat technology • Many installations included in the RHPP2 application / applications in multiple rounds • Strong existing links with installers and manufacturers, plugged into 'industry networks' 	<ul style="list-style-type: none"> • Usually limited experience of renewable heat technologies • Unsure about renewable technologies • Few properties included in the RHPP2 application • Approached and 'persuaded to try' by installers, manufacturers or energy suppliers
<p><i>'Project linked to wider refurbishment programme transforming performance of hard-to-heat homes. Decision to move forward taken in 2011'</i></p>	<p><i>'The rationale for participation was to install a range of renewable heat technologies, singly and in combination, to allow for meaningful comparisons. We wanted some decent data to inform future investment'</i></p>
<p><i>'We have a strategic focus on our sustainability target for minimum SAP of 65 in all properties. [] We have a £1m annual budget dedicated to achieving this'</i></p>	<p><i>'For us RHPP was a little scheme, we had little to lose, we were quite interested in solar thermal, we thought let's have a go'.</i></p>

5.2.2 Social landlords consider the choice of heating systems in the context of building maintenance cycles and refurbishment programmes. When faced with the need to replace or improve heating systems, tenant welfare issues are important and include the cost and performance of heating systems

Social landlords are responsible for managing social housing. This includes regular maintenance and occasional refurbishment and modernisation of buildings including heating systems. Decisions on heating technologies are taken in the context of the planning and review of building maintenance cycles and refurbishment programmes. In this context there are a number of reported factors that influence the decisions as to which heating system to use. The main ones are described below, based on interviews with a selection of social landlords:

Improving tenant welfare and reducing tenant fuel bills was a key motivation: Almost all participating social landlords described an interest in improving the welfare of tenants as the key motivation for considering the installation of renewable heat technologies and the use of the Phase Two Renewable Heat Premium Payment (RHPP2) Scheme. One interviewee explained that the interest in tenant welfare is directly linked to the social mission of the Registered Social Landlord as an organisation which is to provide housing to those who need it and that the housing provided should be warm and affordable. Most social landlords identified reducing tenant fuel bills, addressing fuel poverty and providing appropriate heating as the main methods for improving welfare. A few social landlords explained that the fuel poverty agenda had become increasingly important to the organisation.

'The initiative was driven by residents' concerns over cost of energy bills and difficulty heating homes and happened to coincide with the launch of RHPP.' (Participating Registered Social Landlord 6);

'The goal was to provide lower cost heating and better warmth for tenants.' (Participating Registered Social Landlord 22);

'Our interest in RHPP / renewable heat stems from [our] commitment to address fuel poverty.' (Participating Registered Social Landlord 20).

Gaining experience of renewable technologies (trials, pilots, etc.) was also an important motivating factor for applying: Several social landlords participated to gain experience of renewable technologies and gather data on performance. These applications were mostly for small numbers of installations.

'One driver for applying to RHPP was really to test some technologies. We don't have enough information / experience of what works best so schemes that allow us to get some money whilst trying out on a small number of properties are helpful in that regard.' (Participating Registered Social Landlord 14);

'...interested in RHPP2 as a good opportunity to get more experience in renewables. There is no explicit strategy for renewables within the organisation but we recognise that this is the direction of travel.' (Participating Registered Social Landlord 24);

'...attracted by being able to learn about renewable heat and begin to embrace sustainability in a big way.' (Participating Registered Social Landlord 4);

'This was an opportunity to install and learn what the issues are and figure out if this is something to develop for the future.' (Participating Registered Social Landlord 18);

'The rationale for participation in this project was to install a range of renewable techs, singly and in combination, so we can do some meaningful comparisons between technologies.... We wanted some decent data to inform future investment in this area.' (Participating Registered Social Landlord 29).

Complementing existing programmes of heat technology replacements was a contributing factor for 'Early Adopter' projects: Many social landlords reported that they already had plans in place for installing renewable heat technologies in their housing stock. The

RHPP was considered to make these plans more affordable: *'We were planning to upgrade our off-gas portfolio anyway...so this scheme appealed.'* (Participating Registered Social Landlord 15); *'We had the experience of RHPP1 and the programme for replacing heating in ... off-grid homes so we were always going to go for any other sources of grant funding.'* (Participating Registered Social Landlord 28).

Some social landlords also report added value in terms of scope, with RHPP acting as a complement to other related investment programmes: *'RHPP fits in with existing refurbishment plans.'* (Participating Registered Social Landlord 7).

5.3 Influences on the participation of social landlords

As noted above, almost all participating social landlords described an interest in improving the welfare of tenants as the key motivation for considering the installation of renewable heat technologies and the use of the RHPP2 Scheme. Here we summarise some of the other influences on their participation.

5.3.1 Opportunities to develop suitable projects for application (planning / cycles)

For larger social landlords, their existing programmes and cycles of replacement of off-gas heating systems determined the scale, location and type of installations, in turn reflecting the age and state of repair of non-renewable heating systems. In some cases, to take advantage of the RHPP some social landlords accelerated certain schemes.

Solar Thermal installations were not bound by the same constraints as this technology does not require the replacement of existing heating systems. However, even for solar thermal, landlords installed solar thermal alongside new gas boilers and as part of the process of other refurbishment such as (CERT-funded) insulation.

'Experimenters' projects had greater flexibility in terms of planning cycles. However, even where projects involved a small number of installations, the fit with existing refurbishment and upgrade cycles was important. For example, one landlord explained that they only considered installing a renewable heat technology when a property became 'void' (between tenancies) within their programme of refurbishment of voids at the end of the tenancy.

5.3.2 RHPP supported organisational priorities and targets

Some social landlords also identified the RHPP as a means of delivering against sustainability targets within the corporate strategy. Some, ALMOs (Arm's-Length Management Organisations) have targets agreed for fuel poverty and carbon reduction which are driven by the local authority's steer.

The RHPP was also identified as supporting the achievement of certain quality standards. For example, all Scottish social landlords mentioned the Scottish Home Quality Standard (mandatory in 2015) as a motivating factor. Similarly, in England some social landlords mentioned improving buildings' energy efficiency ratings as an important factor.

In particular, RHPP was identified as an affordable and effective way for meeting sustainability and building energy standards for the Registered Social Landlord's off-grid properties: '[we

had] *costed bringing in gas mains and it was extortionate, so RHPP was the alternative option.*' (Participating Registered Social Landlord 1); *'It is a priority for us to find a suitable heating system for [off-grid] properties.'* (Participating Registered Social Landlord 17).

5.3.3 Installers played a role in raising awareness

Activities by installers, manufacturers and energy suppliers played a role in raising the awareness of the Scheme among social landlords, with several approached by supply side actors and encouraged to consider it. Energy suppliers appear to be more important for this customer group than for the other two, with CERT and ECO having required suppliers to deliver measures in social housing and therefore to create links with social landlords.

Many social landlords had interactions and agreements with project partners (installers / energy / suppliers / manufacturers) at the point of considering an application for RHPP grant funding. Many social landlords then reported working closely with their partners to scope out the project, estimate costs and prepare the bid (in a few cases, bid preparation was outsourced completely by the social landlord).

The choice of technology was also influenced by installer / manufacturer advice and market actions. Plans for ground source heat pump installations for many of those landlords interviewed, were strongly influenced by actions of a UK-based manufacturer of ground source heat pumps which offered a discount on the price of the heat pump and for arranging for CERT funding to be secured. This meant that the cost to a social landlord of installing a ground source heat pump would be the same as an air source heat pump – the social landlords involved explained that they would have not considered ground source heat pumps without this 'price match' offer.

5.4 Reasons for social landlords not participating in Phase Two of the RHPP Scheme

Information in this section is obtained from qualitative interviews with 10 Registered Social Landlord Leads that applied to RHPP1, but were either not successful or were successful but withdrew from the Scheme.

The interest in RHPP for the non-participating social landlords was similar to those of the participating social landlords, with reducing fuel bills/ addressing fuel poverty and gaining experience in new technologies mentioned as the main motivators. Some non-participating social landlords also mentioned greater energy efficiency and a reduction in carbon emissions as important factors in their interest in RHPP.

Obtaining further evidence about renewable heat technologies was also a motivating factor for applying to RHPP1: *'We wanted to use this pilot [RHPP1] to investigate the benefit and feasibility of [X] in different properties with a boiler already in place... We did not want to apply for a large-scale project without knowing if the technology would be of any benefit for their tenants'* (Non-participating Registered Social Landlord 37).

The sources of information used to make these assessments varied. A few had prior experience with these technologies (from installations in new-build or other contexts), while others spoke

about what they had heard about these technologies in general. A few mentioned receiving information from installers, manufacturers and energy companies. Ultimately though, many of the non-participating social landlords were not convinced about the performance and benefits of the four eligible renewable technologies (relative to costs and in terms of the net effect on tenants' bills). Solar thermal, in particular, was deemed not feasible following cost / benefit assessment; *'When they [sub-contractor undertaking assessment] factored the costs in they realised that the cost to the customer will be a lot more meaning they would not save any money. Because of this they ceased any future work'* (Non-participating Registered Social Landlord 33).

Some unsuccessful social landlords were not sure as to why their application had not been successful and stated they did not get any or detailed feedback. Some also reported that rejected RHPP1 applications led them to believe that future applications would also be dealt with accordingly. As such, providing specific feedback on why a particular application failed may have encouraged further applications to subsequent RHPP competitions within Phase Two of the Scheme²³. For example, one interviewee (wrongly) believed that RHPP was not relevant to their *'pepper-potted'* housing stock while another believed that their stock was *'too well insulated'* to score well in the application matrix.

'We couldn't understand why it was scored so lowly/... There was not much detail in the feedback.' (Non-participating Registered Social Landlord 32).

A few social landlords also expressed uncertainty over RHPP benefits and RHI payment rates: *We are reluctant to sign up to anything that we think is subject to arbitrary change.'* (Non-Participating Registered Social Landlord 1); *'Government policy is not stable enough to build a business case.'* (Non-Participating Registered Social Landlord 33).

Further to these concerns, some interviewees also reported a lack of organisational capacity to complete the application and/ or undertake the preparatory work (e.g. identification of properties).

'RHPP would require property surveys, which we [the team] do not have time to do.' (Non-participating Registered Social Landlord 36).

'RHPP applications take too much time and effort to prepare...works well for social landlords that are already planning RH schemes and have large scale projects that are ready to go.' (Non-participating Registered Social Landlord 37).

Organisational structure also appeared to influence capacity and capability to bid for and securing funding; a few talked about needing teams or individuals dedicated to identifying and bidding for funding and of securing funding for renewable heat technologies through other streams (such as CERT, ERDF and commercial RHI).

The process of identifying interviewees from social landlords that did not participate in RHPP2 but had applied to RHPP1 revealed that staff turnover can lead to loss of organisational

²³ Responding to feedback from RSLs who applied to the RHPP1 Scheme, the RHPP2 application process was revised to provide additional explanation to potential applicants on the scoring system.

knowledge and affect a Registered Social Landlord's ability to respond to funding. Several officers that led bids to RHPP1 had moved on to different roles and new officers were lacking in knowledge about the RHPP1 experience:

'The guy who was doing my job before me was looking into putting solar panels, but I really don't know too much about it' (Non-participating Registered Social Landlord 39).

5.5 Influence of Registered Social Landlord approaches on tenant participation and satisfaction

5.5.1 Methods of consultation and engagement were important in establishing participation and achieving high levels of satisfaction

Tenant engagement at application stage

In order to manage expectations, the extent of tenant engagement by landlords at the initial scoping stage was relatively limited. Many social landlords preferred not to formally engage with tenants so as to not raise expectations and only sought to gauge the level of interest in broad terms. On the other hand, some 'Early Adopter' social landlords had already engaged with tenants and secured agreement as part of their existing programme of works, and therefore additional engagement for RHPP was not required.

Tenant engagement activities

Social landlords undertook a wide range of tenant engagement and consultation methods including leaflets, demonstrations, home visits, resident meetings and using tenant liaison officers / managers. Information disseminated to the tenants included information on the technologies considered, their performance (e.g. impact on fuel bills) and time scales for installation. The approach for information dissemination ranged from printed information material to face-to-face individual meetings.

'We carried out quite a lot of intensive [tenant engagement] work... sent out a letter, went to see them and arranged an event in the town hall to discuss, as a group, any fears, concerns or questions they might have about the system.' (Participating Registered Social Landlord 30).

Installers and manufacturers also participated in Registered Social Landlord engagement activities: *'We did a roadshow at a village hall with [name of manufacturer].'* (Participating Registered Social Landlord 29).

'Engagement was done through housing officers and publications [the publication showed how ASHP works]... [Arranged a meeting at] nearest city hall where me [Registered Social Landlord lead] and one of the contractors would demonstrate how the ASHP would work on a laptop and answered any questions. Tenants had an opportunity to sign up to the technology at this stage'. (Participating Registered Social Landlord 9).

The extent of engagement and consultation varied. Many successful projects had high levels of engagement activity. Some projects that did not complete the number of installations planned believed that longer timescales would allow them to deliver more engagement activities which

might have led to higher take-up. ‘Experimenters’ social landlords could not stagger the programme of installations: this made it more difficult to speak to tenants about the actual experience of installation and performance of a renewable heating technology. It also made it more difficult to find alternative properties to substitute for refusals: *‘The time scale was too short for [the tenants] to make a decision. We underestimated the time it would take to convince people that it was better than what they had. There was nothing to show them about the technology until the end of the process when there was a property that was already done. Trying to get people to change from what they had been used to for 20 years was not easy - even though they were dissatisfied with their oil heating.’* (Participating Registered Social Landlord 18).

Landlord actions and information provided were important for accepting the technology for some tenants. In particular, discussions about costs savings with landlord or installer representatives where tenants were given particular estimates about savings appear to have made an impression on tenants. A landlord who had participated in Phase One of the RHPP1 Scheme explained that information gathered from the first phase was used to explain the benefits of the technologies to tenants in RHPP2: *‘Communication [with tenants] was easier this time [for RHPP2], after having the experience of RHPP1... [For RHPP1] we didn’t know what the experience and the running costs would be like. We did some careful monitoring [of RHPP1 installations] so we were able [for RHPP2] to give better information to customers on running costs... We had better uptake as a result [because of] fewer tenant refusals.’* (Participating Registered Social Landlord 17).

Tenants interviewed confirm that letters and visits to their home (in households where heat pump and biomass boiler installations were proposed) by landlord representatives were the main forms of contact pre-installation. Several tenants also spoke about visits or other face-to-face contact with the installer. Tenants with solar thermal panels installed mostly reported that they had limited contact with their landlord prior to installation, though tenants did not perceive this to be a problem (i.e. they were satisfied with the contact received). A Registered Social Landlord interviewee explained that solar thermal seemed so simple to Registered Social Landlord staff that the information they provided to tenants focused on the promoted the savings on hot water heating bills and that it was a ‘fit-and-forget’ technology, rather than explaining how the technology worked. Reflecting on the information provided to them by the landlord representative prior-to installation, a tenant explained: *‘He [the Landlord representative] didn’t say much really...they basically said that it was an experimental thing and did we want to be part of it so we said yes we’ll give it a go’* (Tenant 13 – Solar Thermal).

Users of most installations were satisfied (38 per cent) or very satisfied (25 per cent) with the information provided by their landlord prior to installation. However, for a majority of installations, users indicated that they would have liked more information about the renewable heat technology, particularly regarding how controls would work (60 per cent) and the effect on energy bills (57 per cent). Similarly, the tenants interviewed expressed appreciation when they felt they were being given honest and balanced information about the implications of installing a renewable heat technology. Others expressed a preference for more accurate and more honest information to be provided – particularly related to cost savings: [The chat] *‘was definitely skewed towards having it [a GSHP], spinning all the positives, but they were quite*

straightforward [with the information]' (Tenant 10); 'They were not so honest about the costs... obviously the people that manufacture them obviously want to sell them so they aren't going to paint a too darker picture about them.' (Tenant 17).

Responses to the tenant questionnaire, show that for the majority of installations (78 per cent) users were favourable to the installation of renewable heat technology in their homes. This holds across all technologies. The landlord's level of engagement prior to the installation of the new technology was considered very satisfactory (28 per cent) or fairly satisfactory (34 per cent). However, for 8 per cent of installations, users were reported to have been fairly dissatisfied and 10 per cent very dissatisfied. Statistical analysis showed a moderate positive association between tenant satisfaction with landlord pre-engagement and both the ease of installation and overall satisfaction with technology²⁴.

On the whole, tenants interviewed with heat pumps or biomass boilers had no or very little awareness and knowledge of renewable heat technologies prior to engagement by their landlords for this scheme. Tenants with solar thermal systems mostly indicated that they had some prior knowledge of the technology. TV programmes and word-of-mouth provided information about the renewable heat technologies prior to landlord engagement.

5.5.2 Training and support provided by Registered Social Landlord improved levels of satisfaction

Registered Social Landlord training and support to tenants

Many social landlords recognised that post-installation training and support was needed for heat pumps in particular because they were prone to inefficient use. Several Registered Social Landlords undertook extensive engagement work with tenants post-installation, such as producing manuals / guides, training staff members to respond to queries and sending winter reminders to tenants to change the settings.

'Tariffs and payment, getting it set properly: you have to spend tons of time on education [of tenants]. For us, 80 per cent of the work has been post-installation.' (Participating Registered Social Landlord 10).

Where Registered Social Landlord projects replaced electric storage heaters with heat pumps, some social landlords identified that training and support was required to change the electricity tariff from a differential electricity tariff (Economy 7 or Economy 10) to a regular (non-differential) tariff to realise cost savings. A few social landlords commissioned voluntary and community sector organisations to provide advice and help with the change.

'We encouraged tenants to switch to standard tariffs at the time of installation, or before. Despite significant effort from us, there have been instances where tenant bills have risen following installation as they have not switched.' (Participating Registered Social Landlord 5);

'... asked fuel poverty charity to visit tenants about changing their tariff. About half were not on the right tariff' (Participating Registered Social Landlord 23).

²⁴ This finding is valid and statistically significant across all technologies, except biomass boilers where there are too few observations to test.

One Registered Social Landlord reported that they controlled heat pumps remotely to reduce the need for tenant training and support. Another landlord stated that they decided to remove air source heat pumps from a small number of households because, in their view, tenants could not adapt their behaviour around opening windows and doors for the system to operate effectively and cost-efficiently and this put tenants at risk of receiving high electricity bills.

Registered Social Landlords' post-installation activities for solar thermal and biomass boilers were more limited. In contrast to heat pumps, there had only been limited post-installation training and support for solar thermal and biomass boilers. Most social landlords were satisfied with the training by installers for all technologies. Notably, some included post-installation engagement in the contracts (e.g. providing written material, demonstrating use, etc.). A few reported dissatisfaction with initial training and support offered by installers.

'The contractor did not properly explain system operation to residents as was expected. Residents complained that they did not know how to use it. This meant that [we] had to knock on all of the doors and check that people knew how to operate the system' (Participating Registered Social Landlord 2).

A few 'early adopter' social landlords reported investing in or training in-house staff to be able to respond to ongoing maintenance issues due to usage.

Tenant views on training and post-installation support

Users of installations (58 per cent) felt very satisfied or satisfied with the information they received from their landlord or installer on how to use their new technology. However, for 11 per cent of installations, users were dissatisfied and for 13 per cent of installations users were very dissatisfied.

Tenants interviewed reported a mixed picture of receiving some form of explanation or demonstration about using their renewable heating technology from installers. Tenants were broadly confident in using the thermostat, several stated that they would like to be able to control the timer/clock (for heat pumps and solar thermal) and did not know how to do this (some had requested help / some had not). A few stated that they were told explicitly not to touch any controls other than the thermostat. A few tenants were very dissatisfied and reported receiving very little useful information from their landlords or the installers.

'We are still waiting for the proper instructions on how to use it. All we got is a print out which I've stuck on the airing cupboard door. The engineers once they saw it, they actually photocopied it... the print-out came from the man from the council. It's not great.' (Tenant 7)

None of the tenants who moved to a property where a renewable heat technology had been previously installed were proactively offered a demonstration or advice on the system by the landlord, though one received a leaflet. Tenants reported requesting help when they need it.

'When we first moved in here, we asked someone to explain it. And I don't think he knew how to use it properly. He sort of showed us – but it goes in one ear and comes out the other. He did say, any problems to call us.' (Tenant 6)

Regarding other advice about getting the most out of the system, some tenants recalled receiving advice from installers about some aspects (such as opening internal doors, not bleeding radiators, etc.) though this was not systematic. Only one tenant with solar thermal panels recalled receiving advice on changing the hours of hot water use (and the tenant has not changed their behaviour as a result). Similarly, one tenant reported being invited to a meeting about energy use (did not attend). Most tenants who previously had electric storage heaters also did not mention advice relating to switching tariffs, though one tenant stated that she received a letter from the landlord with instructions to do so.

5.6 Benefits to social landlords

5.6.1 Total value of grant leverage was significant

The overall budget for the RHPP2 Scheme was set at £11 million. The maximum amount of grant per landlord was set at the approximate £162,000 (GBP equivalent of €200,000) to ensure that the budget was spread between landlords and alignment with the European Commission's *de minimis* threshold²⁵.

The maximum grant levels per installation offered to social landlords in RHPP2 were:

- solar thermal - £2,000;
- air source heat pump - £4,400;
- ground source heat pump - £6,000; and
- biomass boiler - £5,200.

Based on the analysis in Section 2.1, the total grant leveraged by the 78 participating social landlords over the time of the Scheme was £7.4m. This represents around two thirds of the available grant: 3,763 installations were achieved when 5,718 were planned. This is a lower level of utilisation than for the other two scheme elements.

5.6.2 Grants made a significant contribution to installation costs

The total cost of the installations undertaken by social landlords was approximately £30m²⁶, of which the grant funded approximately 25 per cent of this cost. The rate of grant paid to total costs is substantially higher than for private households (6 per cent) but lower than for the Communities Scheme (33 per cent).

Social landlords' finance for the installation came from existing budgets available for refurbishment programmes (capital accounts), external funding such as Carbon Emission Reduction Target (CERT) grants and, in some cases, small pots of funding that were available in the organisation for 'innovative' projects.

²⁵ State aid notification is not required below this level. Above this level, landlords can request the 'block exemption'.

²⁶ £29,027,728 total project costs reported by RSLs in claims to EST (source: RHPP Scheme data – Phase Two Final 28 May 2014).

As a result, applications to RHPP were framed by the need to fit with previously agreed annual budgets and annual planning cycles, state aid rules as well as the practical feasibility of what could be achieved, set by RHPP (and sometimes CERT) timescales.

For some 'early adopters', the budgets for installations of renewable heat technologies had been secured and agreed as part of multi-year investment plans. In these cases, additionality is likely to be limited. In other 'early adopters' and in 'experimenters', the grant was effectively used to bridge the higher capital cost associated with the renewable heat technology compared with a conventional heating system. In some cases it was reported that the level of grant was not too far off funding the whole of this marginal cost. '*Without this [the grant] we would not be putting in [the renewable technologies installed] because the technology is too expensive*' (Participating RSL 22).

In this context it is worth noting that in urban on-grid areas social landlords were less convinced by the cost and performance of renewable heat technologies compared to alternatives, with some expressing a preference to use district / communal heating schemes (funded through commercial RHI).

As previously noted, most of the funding for the RHPP projects would have been spent on renewable heat technologies -although not necessarily for the same properties and technologies that were installed through RHPP. Some social landlords changed investment plans to take advantage of the Scheme, for example bringing forward boiler replacements and associated budgets into the 2012-13 financial year, from future years. The need to secure sufficient funds to cover the up-front costs of installing renewable heat technologies is a major reason why the RHPP Scheme did not lead to substantial numbers of additional installations by social landlords. A number of social landlords explained that, due to the high upfront costs, expanding investment plans to take advantage of the Scheme was very difficult: '*[The RHPP2 grant level] was not sufficient. [In addition to the technology, the installation required] new insulation, a new heating system and other modifications. It was a lot of money. We could only do it because it was only [a small number of properties]. We cannot repeat the exercise across many properties*' (Participating RSL 16).

5.6.3 The RSL competition provided important learning opportunities

Social landlords interviewed agreed that participating in the RHPP Scheme was beneficial to their organisation through gaining further understanding of how to plan and deliver investments in renewable and other new technologies in the future: "*If the possibility comes up again we will be much better placed to take advantage of it as we have learned a lot from the process. We now also have better information on running costs which we can use to inform [potential] customers*" (Participating Registered Social Landlord 17).

Social landlords who were 'early adopters' of renewable heat technologies (benefitting from participation in RHPP1 or CERT) believed they were able to apply lessons learned from their prior experience and were therefore at an advantage in completing the planned installations within the project timescales. They indicated that much of the required work (such as deciding on the technology and products to be installed, surveying properties, appointing an installer, engaging with tenants) had been done prior to the RHPP application: [Asked about success

factors for the project] *'Having an installer in place through our framework contract; working with a single installer – no mixed liabilities; sorting out the planning permission; a good relationship with the manufacturer – we were familiar with the product.'* (Participating Registered Social Landlord 15)

Thus, learning benefits from RHPP2 were more substantial for social landlords in the 'experimenters' group who did not have extensive prior experience of such schemes. Planning lessons recounted by social landlords include:

- Landlords learned that engaging with tenants early in the process and undertaking tenant liaison during and after installation ensured take-up by tenants and minimised issues faced during installation and post-installation. Landlords recounted that the experience for tenants was generally positive; and having undertaken a scheme, the levels of interest and demand from tenants who were not included in the earlier phase increased.
- Landlords learned that housing stock assessments are needed prior, or as part of, planning investments in renewable heat technologies. These included collecting information about existing heating sources, heating performance of the building, the need for planning permission and assessment of the suitability of the technology for the particular building and tenant occupier. Some landlords were able to develop ways of integrating the Scheme with planned heating maintenance and replacement programmes: *"In retrospect, we should have done more survey work upfront before submitting the application because it then turned out that the data that we used was not accurate and we could not install [the technology] in most of these [...] identified properties. But we learnt about the practical realities of installing [the technology] through this scheme – so that is a useful outcome in itself"* (Participating Registered Social Landlord 14).
- The process of participating in RHPP2 enabled landlords to understand what skills and expertise they had in-house to respond to new funding opportunities and to install/adopt new technologies. Furthermore, these skills were enhanced and developed through participation in the Scheme. Some participating social landlords suggested that the scheme had helped raise awareness of renewable heat technologies and shared learning of the benefits and practicalities among others in their organisation (such as other departments of a local authority): *"[Participating in RHPP] has prompted other Registered Social Landlords to come and have a look at what we have done. It has helped educate other housing providers [about the technologies]"* (Participating Registered Social Landlord 11).

5.6.4 Benefits to social landlords and tenants

The social landlords interviewed, reported receiving verbal feedback from tenants regarding improvements in comfort, satisfaction with the renewable heating technology and perceived cost-savings. Several social landlords emphasised their social or charitable mission and the efforts to reduce fuel poverty through participation in the RHPP Scheme. While the interviewed social landlords were not collecting any monitoring data on tenants' fuel bills, a few suggested that fuel bills savings would result in benefits to the tenants and the landlord. For example, for

the landlord, it was hoped that any fuel bill savings would lead to tenants' improved ability to pay their rent and consequently greater income stability for the landlord. When asked about benefits to their organisation, a landlord stated: *'We know this was the right thing to do for the residents. It has contributed to lower bills; they are able to adequately heat their homes. The fact that the bills are less means that, for those who are paying their own rent, it is easier for them to pay their rent – this means income coming in [to the landlord]'* (Participating Registered Social Landlord 26).

Another landlord said: *'[Participating in the Scheme] shows that we are a caring landlord addressing fuel poverty by giving [tenants] the choice of what to have installed'* (Participating Registered Social Landlord 24).

5.6.5 Commercial benefits

Some social landlords reported anticipated long-term costs savings in maintenance costs as a result of the reduction in damp, condensation and mould from use of heat pumps (especially where these renewable heating technologies replaced storage heaters.). One landlord explained that they did not factor in such benefits, which they perceived to be additional, when making decisions about investing in a renewable heat technology: *"A satisfied tenant in a properly heated home leads to lower maintenance costs for us from associated problems such as damp and condensation... that is an additional benefit for us, not currently factored in our financial calculations"* (Participating Registered Social Landlord 6).

Social landlords also reported learning more about the supply chain for renewable heat technologies, including the availability of equipment, capacity and the capability of installers in their area, and that this would help them to be better prepared for future investments in renewable heat in their housing stock. The investment by social landlords in renewable technologies has enabled a few to develop new business services (Box below).

Business and Job Creation

A few social landlords have also used RHPP to develop new service offers / income ventures:

One Registered Social Landlord has up-skilled 25 maintenance staff through a City & Guild qualification and is now providing maintenance services ('warranty calls') to other organisations.

One Registered Social Landlord is now an installer of renewable heat technologies; this Registered Social Landlord was used as the installer by a Registered Social Landlord who reported choosing the company as their installer on the basis of their knowledge and experience of working with social housing tenants.

5.7 Key lessons

5.7.1 Specific scheme results

- **Grant levels and marginal costs:** the grant was used to offset some or all of the additional capital costs associated with the renewable heat technology compared with a conventional system. This in turn meant that the take-up was often linked to the planned cycle of heating replacement schemes of the Registered Social Landlord, and the related internal budgeting cycle. CERT funding was often used to top-up finance. Given that the grant provided approximately 25 per cent of the installation cost, the grant would have made a significant contribution to the additional cost of renewable heat technologies compared to conventional technologies.

5.7.2 Implications for the domestic Renewable Heat Incentive (RHI)

- **The importance of social landlords in driving demand for renewable heat technologies:** The social housing market represents a significant share of the total renewable heat technology market. As noted in the next section, some installers have targeted and specialised in providing services to social housing providers. Unlike other purchasers, social landlords are motivated to install renewable heat technologies by expected improvements to tenant welfare (comfort and lower heating bills), rather than financial returns for their organisation. Given the difficulties faced by community groups in targeting low income households in off-grid areas because of household financial constraints, projects in social housing provided scope for testing and demonstrating the benefits of renewable heat technologies that smaller households and private tenants might benefit from.
- **Importance of up-front costs:** perhaps inevitably, successful Registered Social Landlord applicants would have liked to have seen provisions for at least some up-front payment to ease cash flow problems. This is not confined to smaller social landlords. Cash flow problems were also exacerbated in some cases with reported delays in securing payment from the Energy Saving Trust.

5.7.3 Wider lessons for domestic energy efficiency programmes

- **Tenant engagement:** Both Registered Social Landlords and social tenants reported on the importance of effective engagement between landlords and tenants, in raising awareness, encouraging and explaining the technologies and the installation process and managing post-installation problems. These needs were generally well recognised by landlords who used effective means to achieve the necessary levels of communication and advice.
- **Recognition of constraints on Registered Social Landlord capacities:** During interviews, social landlord, in particular smaller ones, identified management constraints which limited their take-up and number of installations achieved. These could be addressed as part of a programme of support for social landlords, especially those operating in off-grid areas. These issues included the need for:

- housing stock assessments
- planning issues
- technology and supplier information;
- the operation of a procurement process to select an installer;
- tenant engagement before and after installation;
- management of projects, including use of reserve lists of projects/ buildings; and
- building flexibility into housing capital and revenue expenditure plans.

6 The Role and Influence of Installers and Impacts on Installers

6.1 Installers play a vital role in the effectiveness of the RHPP Scheme

Although the Renewable Heat Premium Payment (RHPP) Scheme was directed at different customer groups, the effectiveness of the Scheme rested in part on the role and influence of installers of renewable heating technologies on the level of awareness of these technologies and of the Scheme and through detailed information and advice on the choice of technology.

The role of installers was examined through 30 interviews with a purposive sample of installers. In addition, this section draws on the perceptions of households, Registered Social Landlords (social landlords), and the certification bodies responsible for the operating standards in the installer industry, in respect of the role and influence of the installers.

6.1.1 Awareness raising and provision of information to customers is a key role played by installers

According to installers, householder perceptions and knowledge of renewable heat technologies varies widely, from customers with limited information to people that have undertaken considerable research; the latter include those seeking to undertake major renovations of their homes and customers with homes off the gas grid, as well as some community group leads. The growth in availability of more efficient and reliable technologies and the increased market size and demonstration of the operation of renewable heat technologies, including in public buildings, were cited as factors that had helped to build confidence and change perceptions about installation.

Levels of understanding and knowledge of renewable heat technologies were generally considered by installers to be high and improving amongst social landlords – one firm, with detailed experience of the sector, felt that installing such technologies *'is becoming more and more mainstream in the social housing sector'* (medium-sized²⁷ installer, mainly supplying air source heat pumps as well as biomass boilers and solar thermal, no. 6). This installer felt that much social housing building stock lent itself to renewable heat technology retrofit and observed that of the social landlord properties they had surveyed *'about 90 per cent'* were already well insulated prior to an air source heat pump installation, whereas in the private sector a number of properties they had investigated were inadequately insulated for air source heat pumps.

The full operational and performance implications of installing renewable heating technologies, however, are less well understood by some householders, especially those previously only used to using gas-fired boilers. Consequently, there is a need for improved customer understanding of the implications of installation, particularly for heat pumps which require behavioural changes

²⁷ Installers were assigned one of the following categories based on numbers of full time equivalent employees: micro (<10 employees); small (10-50 employees); medium-sized (51-250 employees).

to be effective. Installers therefore recognise they have an important role in promoting renewable heat to consumers, especially in raising awareness of operational issues which had previously not been recognised or understood (for example, lower temperature radiators fitted with heat pumps).

6.1.2 Installers played an important role in market making for the RHPP Scheme

Installers used their market reputation and track record to attract new clients, and used this opportunity to highlight the incentive under the RHPP

Installer reputation and word-of-mouth recommendations were important in helping installers to find business opportunities under the RHPP – particularly the smaller firms: one said *‘Word of mouth counts for a lot’* (micro, biomass boiler installers, no. 7); another that *‘clients find us’* (micro, solar thermal installer, no. 23).

Some installers did however hold back from advertising during the RHPP Scheme, either because the domestic RHI had yet to be introduced or they felt that the market was insufficiently developed to respond. One installer felt advertising was much less effective than reputation: *‘Over the years we’ve done a lot of advertising but it hasn’t worked - 90 per cent of the work that we undertake is because of referrals/recommendations. We have been in the industry for many years and have worked hard to build a reputation. Now that work is coming into fruition’* (micro, biomass boiler and solar thermal installer, no. 22).

Once installers had engaged with potential customers, and discussed the viability of installing renewable heat technologies, installers helped to play a key role in market making for the RHPP grant, by raising awareness of the Scheme and influencing the final technology choices made by customers.

Discounting is not yet widespread and there were mixed opinions about the effects of the RHPP grant on decision making

There was no evidence from installers that they offered discounted rates to customers and over half of all private householder installations (59 per cent) were reported²⁸ not to have received a discount on either the cost of installation or the technology.

Although installers reported that the RHPP grant had had some effect on consumer decision making, several installers also felt that some householders treated the grant as a ‘bonus’ (reflecting the householder’s ability to more easily fund the technology). For example, one firm observed that with respect to the £1,300 grant on an air source heat pump: *‘70 per cent of people want the RHPP, the other 30 per cent [are] not bothered. Depends on people’s financial situation’* (micro, installer of all four technologies, no. 24).

This opinion was not restricted to heat pump customers, but was reflected across installers of both biomass boilers (*‘it is not a crucial element in decision-making’* – micro, biomass boiler installer, no. 13) and solar thermal systems: *‘I can’t think of any [biomass boiler or solar thermal sales] that come down to RHPP. RHPP was a nice addition but was not a determining factor for any sales’* (micro, biomass boiler and solar thermal installer, no. 13).

²⁸ Via the post-installation questionnaire sent to all householders who had installed.

Overall, grant levels under the RHPP2 Scheme were not regarded by installers as being sufficiently large enough to have a decisive effect on customer purchasing decisions.

Some installers reported that for some RSLs the RHPP grant was far more significant as an influencing factor in their decision making process, helping installers to secure orders. Around a quarter of the installers interviewed had worked with RSLs, including under the RHPP. Several could see the benefits to RSLs of having the RHPP, suggesting that the grant helped to push RSLs into committing to renewable heating technologies. One said they did not believe *'that many RSLs would go ahead with installations if it wasn't for RHPP'* (medium-sized, ASHP, GHSP and solar thermal installer, no. 2).

In the case of community groups, installers considered that, based on limited experience, they appeared to have good knowledge of the technologies on offer and potential implications of purchase. One reported positive experiences in this regard with the community groups they had done business with: *'They tend to be well organised and well researched. They come to us really knowing the type of equipment they want to use. They've thought through the whole issue, including the fuel supply chain'* (small, biomass boiler installer, no. 9).

Another firm was also very positive about community groups but felt they were *'less well organised than social landlords'* (small, ASHP, GHSP and solar thermal installer, no. 8).

The inability of community groups to convert initial householder interest into actual purchases did affect a few installers, who recounted that it had been challenging to convert initial expressions of interest from householders into sales: *'Of those 35 "hot leads", which were only really expressions of interest, we only converted two into sales'* (small installer of all four technologies, no. 15).

6.1.3 Installers are developing good relationships with manufacturers which can benefit both parties

Installers in general demonstrated a very good understanding of the supply base for the technologies they installed; and there was widespread feeling amongst them that non-UK manufacturers were well established and could demonstrate long track records in the deployment and performance of their renewable heating systems. Installers indicated that the scale and maturity of overseas markets, particularly for biomass boilers and heat pumps, has given non-UK companies a competitive advantage, especially those from Scandinavia, Germany, Austria and Italy. One installer said that for heat pumps, *'foreign firms were dominant'* (medium, ASHP, GSHP and solar thermal installer, no. 2); another that *'EU manufacturers have such a huge head start on UK manufacturers'* (small, heat pump installer, no. 4).

For domestic-scale biomass heating, an installer felt that the UK has not got *'any really good mainstream biomass boiler manufacturers. All the good stuff comes from Austria and Germany'* (small installer installing all four renewable heat technologies, no.15); another noted that *'in terms of boiler development it's extremely weak; there isn't really a UK manufacturer. There are credible manufacturers of subcomponents such as flues and interface units, but the majority of the technology remains an import market'* (small, biomass installer, no. 9).

However, several installers did note that they were now using UK brands, particularly for heat pumps. One felt that UK heat pump technologies were 'very good' (medium-sized, ASHP installer, no.10), but that the majority of UK manufacturers were giving installation agreements out too freely in order to deploy as many systems as rapidly as possible, suggesting that this was impacting on market share – manufacturers '*should be more selective over who they authorise to install their equipment.*' One heat pump installer also predicted that, on the assumption that the domestic RHI goes ahead: '*within 10-15 years I firmly believe that we will be making significant catch-up with EU manufacturers*' (small, GSHP and ASHP installer, no.4).

Installers perceived that relations with manufacturers are now being helped by inward investment and more established sales infrastructure being established by foreign manufacturers, which was taken to be suggestive of a more established market with increasing competition likely.

Installers reported that the trend to buy direct from manufacturers can result in a slightly better price as well as bringing loyalty incentives to installers. For example, manufacturers were said to have rewarded installers with regional service or installation partnerships under which new installation or servicing opportunities were passed to preferred installers to help develop brand loyalty.

6.1.4 Growing market maturity is reflected in the development of business models and market segments

The complexity and diversity of the renewable heat technology supply side is evident from the firms consulted and a range of business models are apparent in the market, reflecting different customer types, geographies (regional versus national) and single specialised or multi-technology focused installers.

Broadly, there are three main groups of installers - those who focus exclusively on renewable heating technologies; a second group which offer other MCS technologies such as solar PV; and a third group of mainstream heating engineering and electrical engineering installers – often sole traders and microbusinesses – who have seen an opportunity to diversify their business into renewable heating.

A discrete part of the supply chain clearly recognises the market opportunity to supply to social landlords and has focused their efforts during the RHPP competitions to benefit from this incentive. These firms are typically larger than most (i.e. small to medium rather than micro) and with business models which vary from an entirely in-house operation through to sub-contractual models which allow a greater spread of projects nationally.

A number of biomass installers were also found to have focused primarily on commercial markets (i.e. to benefit from the client interest generated by the non-domestic RHI). Many such firms anticipated growth in domestic installations once the domestic RHI was in place, at which point they would explore this area of the market more proactively.

Smaller installers tend to focus at a regional level as it is easier to build market knowledge, service their existing customer base and generate referrals, helping to build their brand.

6.1.5 Installation services and advice are generally regarded as good by consumers

As previously noted, customers reported a high level of satisfaction with their new heating systems, and support provided by installers, despite various ‘teething problems’.

The apparently high level of customer satisfaction of installations is echoed by certification bodies, who rarely found faults in installations that would be a danger to occupants. All certification bodies noted that the most common non-conformances found during their annual installer ‘surveillance visits’ related to issues around the application of their quality management system to the administrative side of their business. These non-conformances tend to be relatively minor in nature. One certification body (no.1) observed that: *‘We very rarely find major non compliances – anything of great concern. What we do find is an aspect of the administration that could be improved or a document that can’t be found on the day.’* Another certification body (no. 6) said that a non-conformance *‘could be something minor like not providing the right information over to the client on commissioning....instruction manuals, warranties...that sort of thing.’*

6.2 The Scheme had mixed impacts on installer operations and overall business

6.2.1 RHPP boosted confidence, signalled the introduction of the domestic RHI and provided opportunities for RSLs to incorporate renewable heating into their property portfolio

Most installers provided thoughts on whether the RHPP had helped to generate interest and demand in purchasing and installing renewable heating systems. Two thirds of installers were positive about the role played by the grant in generating and sustaining demand amongst both private householders and social landlords.

In several cases, installers noted how the RHPP Scheme had helped to act as a *‘stop gap’* to the domestic RHI (micro, biomass boiler and solar thermal installer, no. 13) and that it *‘maintains the continuity’* (micro, GSHP installer, no. 4) in demand until the domestic RHI was launched. In a few cases, firms said that the grants were *‘generous enough’* (micro, ASHP/GSHP installer, no. 29) or *‘took the chill off’* (micro, biomass boiler installer, no. 7) – both biomass boiler installers.

Importantly, for a number of installers, the grant also had a signalling effect to potential customers, providing them with confidence that the delayed domestic RHI would be introduced and hence committing to investments.

Of the roughly three quarters of installers that provided a view, around half explicitly said that they did not derive any real market advantage from installing renewable heating systems under the RHPP Scheme. This view was expressed by installers of all sizes and installing different technologies as well as serving different regions, working in private households. In many cases, the volumes of business generated through the grant were insufficient for the company to change its business model (e.g. to focus more on renewable heat technologies instead of fossil-fuel based systems), reconfigure its market strategy or expand their business. One commented

that the RHPP: *'has been good at maintaining the supply chain but not building it up'* (small, biomass boiler installer, no. 3).

Of those installers that did derive some market advantage from installing under the RHPP Scheme, views ranged from the positive influence that the grant had on making renewable heat technologies more affordable to customers, and hence triggering more sales; another said that they had noticed increased consumer interest as a result of the Scheme – *'it has certainly resulted in more enquiries from potential customers [although the] conversion rate is yet to be determined'* (micro ASHP/GSHP installer, no. 29). One renewable heat technology manufacturer had even diversified into managing installations in order to more rapidly deliver orders under the social landlord competition.

Installers supplying the growing social landlord market, on the other hand, appeared to have benefited the most of all installers, increasing revenues and the size of their business to meet demand. The important effect of the grant on social landlords was recognised by several firms – it had *'raised the profile of renewable heating technologies within social housing providers and has made people commit to doing a bit more'* (medium-sized, mainly ASHP installer, no. 6). One went further, suggesting the grant had been essential in driving purchases of heat pumps from social landlords (but not from private householders).

6.2.2 Market barriers to take-up continue to operate despite RHPP

Despite the RHPP grant scheme, installers emphasised that a number of barriers still exist to the wider market development of renewable heat technologies. The main reason for customers not installing renewable heat technologies was the high initial capital cost.

The promise of the RHI in this regard was seen as vital: *'If the RHI gets on as well as the solar PV, and brings down pricing considerably then this will do us all a great favour'* (micro heat pump installer, East of England, no. 14). However, at the time of consultation (prior to the announcement confirming the start of the domestic RHI), some installers identified the uncertainty surrounding the domestic RHI as a significant barrier to market development, the lack of such a long-term financial incentive was delaying investment decisions amongst potential customers.

Further barriers to the take-up of renewable heating included the lack of suitable building types (for example, limited space in smaller properties and the limited levels of insulation/air tightness in older properties were particular issues for several installers of heat pump technologies) and competition with fossil fuels, particularly for houses already connected to the gas grid.

6.2.3 RHPP had some limited impacts on competition and partnering

Around half of installers consulted felt that the grant scheme had led to more accredited installers joining the market, particularly for heat pumps and biomass boilers:

- **Heat pumps** - there appeared to have been a surge in heat pump installers in some regions. One installer felt *'everyone [was] trying to get on the bandwagon'* (micro, multi-tech installer, South West, no. 24). One explanation given was that installers were

moving from other sectors such as solar PV. Increased competition had in turn *'driven prices down'* (micro, multi-tech installer, South East, no. 29).

- **Biomass boilers**- all firms who expressed a view said that more installers had entered the biomass market. One small specialist biomass installer (no. 9) in the South West said the RHPP Scheme had *'stimulated the market and made more competition, and competition will drive price down.'* However, another questioned the role of the RHPP Scheme in the rise in biomass boiler installers, saying it was *'due more to the [commercial] RHI'* (micro biomass boiler installer, North West, no. 22).

There was no evidence that reductions in system prices were a result of cheaper, less robust technologies being installed or reduced quality of installation.

The RHPP Scheme appeared to have had little influence on strategic partnering between firms. Although sub-contracting was mentioned by a few installers, most installers appear to do the jobs completely in house, offering a one-stop service to customers, and prudently build their own installation team to service growing market demand as the need arises. Installers who do work with other companies tend to have established partnerships and there has been limited scope for RHPP to incentivise change.

6.2.4 No impacts on innovation were identified, although demonstration effects from wider deployment are feeding back into product designs

There is no evidence from installers that the RHPP Scheme has leveraged new products into the UK market or stimulated innovation. A key reason is that the market has developed over a long time period which has inevitably seen new innovations and improved products coming on stream. For example, heat manufacturers are recognising the opportunity to introduce new innovations into the UK so that technologies operate more effectively in the UK climate - German and Japanese manufacturers have introduced updated controls, compressors and improved system efficiencies. One firm said: *'ASHP manufacturers are piling a lot of money into innovation. Different gases, different functionality to allow the technology to function better in the UK'* (small installer installing all four renewable heat technologies, no.15).

Demand from installers for smaller, more compact boilers which suit the UK market (i.e. suited to small houses with no basements) is also now being translated into new products.

6.2.5 According to installers, improvements in skills are being driven by both compliance with MCS standards and the need to respond to new commercial needs and opportunities

Overall, around half of installers interviewed specifically mentioned actions they were taking to improve skills within their company. The interviews revealed that the RHPP itself was not the primary motivation for improving installer skills; rather the key driver was to maintain and improve the quality and diversity of their services and to maintain competitiveness – a faster installation with fewer mistakes is a more profitable one.

Consequently, most installers found it hard to link any demonstrable improvement in knowledge and skills to the RHPP2 (or wider RHPP) Scheme. This was true across all renewable heat

technologies and different sizes of company. Installers recognise however, that more installations supported by grant funding do provide opportunities to learn on the job – which itself is regarded as a critical aspect of developing experience and competence in this sector. The implication is that skills have been retained and developed through the RHPP2 grant scheme. That said, since the evidence suggests that many householders would have installed systems despite the grant, it seems plausible that this learning would have happened anyway, although the RHPP requirement that installations be certified by the Micro-generation Certification Scheme (MCS)²⁹ to be eligible for the RHPP voucher, may have contributed to additional learning.

Installers recognise that MCS standards are a critical requirement of a fair and transparent renewable heating market and that they help to drive up the quality of installers. Enhancing installer skills is achieved either in-house, through independent training companies or through manufacturer sponsored training courses. This latter approach was frequently mentioned by installers, partly because systems - especially biomass boilers - often work very differently. Manufacturers also use such training as a way of building brand loyalty with installers and to improve the quality of installations using their products. Such actions help to minimise poor quality installations and protect brand reputation.

6.3 Key lessons from the RHPP Scheme

6.3.1 The RHPP Scheme has provided some funding continuity for installers and, for some, important opportunities to exploit new market niches

The RHPP has helped to provide both funding continuity for installers and incentives to end users in the absence of the domestic RHI; it has also helped to widen the market and support market niches. For example, some social landlords would have had difficulty in the absence of the grant with committing to renewable heating systems.

The feedback opportunities and demonstration effects provided for installers have enabled improvements to be made in both the quality of the technology and in the capacity and quality of the supply-side.

The opportunity presented to installers by the RHPP to engage with different client types, covering private householders, community groups, and especially social landlords, has enabled some firms to explore new market opportunities.

The RHPP has helped to reinforce the value gained from MCS accreditation, for example in improving quality, by stipulating that all installers taking part in the Scheme register with a recognised certification body. Certification bodies seek to ensure that installers have the relevant competence and systems to protect consumers; they also undertake site surveillance to ensure installations comply with MCS standards. These visits do make an impact – for example, one installer had changed their supplier of air source heat pumps because a certification body inspector found a theoretical shortfall in the thermal store across a number of

²⁹ Micro-generation Certification Scheme – sets technical standards for installers to comply with *Available at:* <http://www.microgenerationcertification.org/mcs-standards/mcs-standards>

units. The company made the decision to swap their supplier because it wished *'to avoid any problems in the future'* (Small heat pump installer, no.15).

6.3.2 The RHPP has important implications for the roll out and success of the domestic RHI

The RHPP has helped to test the demand for renewable heat technologies across a number of market 'niches' (for example, different building types in different regions and with different ownership structures – private versus social). This opportunity to 'road test' the viability of new technologies in different settings and to see what works well has provided an important demonstration effect for installers that should help them to illustrate the potential for such systems: One installer for example had helped to improve renewable heating installations where systems were not performing as designed, building a reputation for themselves in the process for troubleshooting – *'[We're] out there putting right what's gone wrong and finding the flaws and faults...we're actually feeding stuff back to manufacturers'* (Small, multi-tech installer, no. 15). Installers are using their experiences and insights gained through the RHPP supported projects to more actively promote appropriate renewable heating systems with the added support of the domestic RHI. This should act as a powerful 'multiplier'.

Glossary

Air source heat pumps: (ASHP): ASHP extract heat from the outside air and deliver it inside a building at a higher temperature. ASHP use electricity to run and can provide space heating and hot water. They can be configured to distribute heat around a building via a wet central heating system and provide domestic hot water (known as air-to-water system). Air-to-air systems produce warm air which is circulated by fans and ducts to heat a building. Air-to-water ASHP systems certified by MCS were eligible for the RHPP.

Applicants: Private households, community groups and social landlords were required to complete an application process in order to claim the RHPP. The term applicant is used in the relevant sections of the report to describe these actors in their role as applicants for RHPP.

Applications: Private households, community groups and social landlords were required to complete an application process in order to claim the RHPP. The application process varied for each group. Applications were submitted to the Energy Saving Trust, the administrators of the schemes.

Biomass boilers: Biomass boilers can burn a variety of fuels including logs, pellets or chips, and are connected to a central heating and hot water system. Burning biomass does release CO₂, but it is considered renewable as the emissions released during combustion are equal to that which was absorbed by the plant when it was growing.

Certification body (CB): An independent body able to provide written assurance (a certificate) that the product, service or system in question meets specific requirements. In the context of RHPP, certification bodies certify installer companies that can demonstrate that they meet MCS requirements. Certification bodies also certify that technologies meet MCS requirements.

Community Group Leads: The person in each of the community groups responsible for the delivery of the local project under the Communities Scheme.

Communities Scheme: The RHPP2 Communities Scheme aimed to support communities to deliver clusters of domestic renewable heating systems. It piloted an approach to providing communities with the opportunity to cost-effectively organise local buying groups for renewable heating systems, potentially accessing bulk discounts and facilitating easier deployment for installers. The Communities Scheme provided funding to community groups to develop and deliver projects that provided RHPP2 vouchers to householders which provided a discount on the cost of installing renewable heat systems.

Department of Energy & Climate Change (DECC): DECC is the government department that funded the RHPP Scheme.

Energy Saving Trust (EST): The administrator of the RHPP Scheme.

Feed-in Tariff (FIT): The Feed-in Tariff (FIT) scheme is a government programme designed to incentivise the uptake of a range of small-scale renewable and low-carbon electricity generation technologies.

Ground source heat pumps (GSHP): GSHP extract ambient heat energy from the ground or from a body of water such as a pond and deliver it inside a building at a higher temperature. A loop of narrow pipes is buried in the ground either in a trench or, if space is constrained, a bore hole. They can be configured to distribute heat around a building via a wet central heating system and provide domestic hot water.

Installation: A term used to describe a single installation of an RHPP eligible technology. The eligible technologies cover air and ground source heat pumps, biomass boilers, and solar thermal panels. Equipment must be certified under the Microgeneration Certification Scheme (MCS) in order to be eligible for the RHPP.

Microgeneration Certification Scheme (MCS) An internationally recognised quality assurance scheme, supported by the Department of Energy & Climate Change. MCS certifies microgeneration technologies used to produce electricity and heat from renewable sources. MCS also certifies installation companies to ensure the microgeneration products have been installed and commissioned to the highest standard for the consumer. The certification is based on a set of installer standards and product scheme requirements.

Owner occupiers: A person who owns the property in which they live.

Private household: Individuals who own their own property and live within England, Wales or Scotland could apply for the RHPP for installations at their primary residence. The Scheme did not apply to residents of Northern Ireland, the Isle of Man or the Channel Islands. For solar thermal products, any householder in England, Scotland and Wales could apply. For ground to water, air to water or water to water heat pumps, and for biomass boilers, householders without gas central heating in England, Scotland and Wales were able to apply (in other words those who were not connected to the gas grid and relied on fuels such as oil, liquid gas, solid fuel or electricity for their heating).

Registered Social Landlord (RSL): A registered provider of social housing; also the technical name for social landlords.

Registered Social Landlord Competition: Registered providers of social housing were able to bid for funds to install renewable heating technologies in their housing stock. These competitions were open to all social landlords; this included local authorities, charities, private companies and partnerships.

Renewable Heat Incentive (RHI): The RHI is a government incentive programme to support the installation of renewable heat technology. Participants of the Scheme are paid for generating and using renewable energy to heat their buildings. The RHI has a domestic and non-domestic component. The Domestic RHI was launched on 9 April 2014 and is open to homeowners, private landlords, social landlords and self-builders. The non-domestic RHI was launched in November 2011 to provide payments to industry, businesses and public sector organisations.

Renewable Heat Premium Payment (RHPP): The Renewable Heat Premium Payment (RHPP) was a government scheme that provided a grant towards the capital cost of installing renewable heating technologies in domestic properties. The eligible technologies included air

and ground source heat pumps, biomass boilers, and solar thermal panels. Grants were available to private households, community groups and the social landlord sector. The Scheme operated from August 2011 to March 2014, ahead of the launch of the domestic Renewable Heat Incentive (RHI) on 9 April 2014. The Scheme was funded by the Department of Energy & Climate Change (DECC) and was administered by the Energy Savings Trust (EST).

Renewable Heat Premium Payment Phase One Scheme (RHPP1): The first phase of the RHPP Scheme, RHPP1, ran from 1 August 2011 to 31 March 2012 and involved two mechanisms: a householder scheme and a social landlord competition.

Renewable Heat Premium Payment Phase Two Scheme (RHPP2): RHPP2 opened in April 2012 and was due to close in March 2013, but was extended until the end of March 2014. The RHPP2 Scheme (abbreviated simply to 'the Scheme' throughout this report) incorporated three mechanisms: a householder scheme, a social landlord competition and a Communities Scheme.

Social tenant: A person who rents a property from a registered social landlord.

Solar thermal: Energy from sunlight is absorbed by the solar panel that is typically mounted on a building rooftop. The panel converts the sunlight into heat energy which is then transferred into water for use within a building.

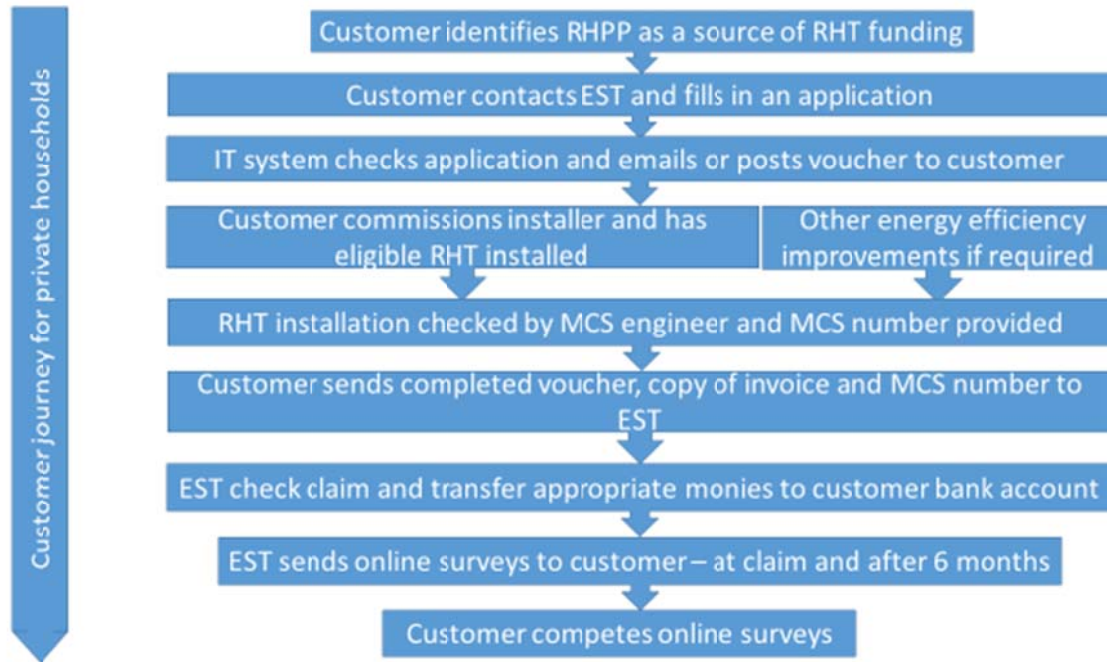
Vouchers issued: Following a successful application to the RHPP under the private household and Communities Scheme mechanisms, a voucher was issued by the scheme administrator / community group.

Vouchers expired: Under the household and Communities Scheme mechanisms within the RHPP, vouchers were issued to householders following successful application to the RHPP. These included an expiry date which defined the date by which a valid claim must have been received by the Energy Saving Trust, the scheme administrators. If the voucher was not claimed (redeemed) by this date the voucher was said to have expired and it could not be used. However, in such circumstances, householders did have the option to reapply.

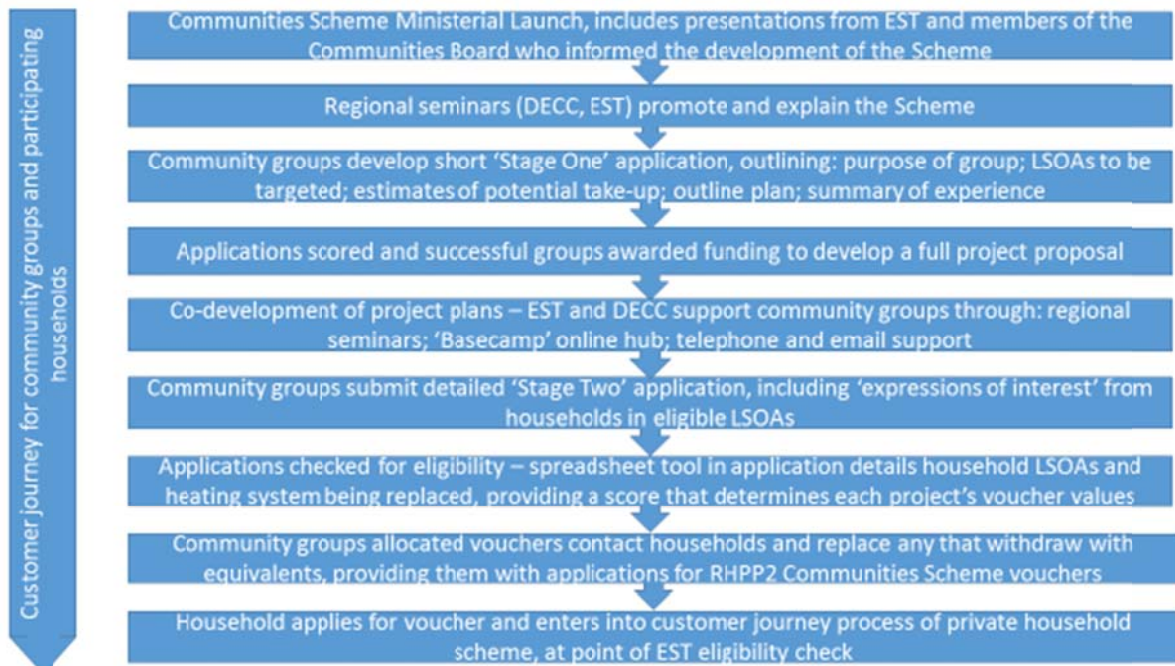
Vouchers redeemed: Following a successful application to the RHPP under the private household and Communities Scheme mechanisms, a voucher was issued by the scheme administrator. In instances when a successful claim has been submitted to the scheme administrator involving the submission of the necessary paperwork, the voucher is said to have been redeemed and payment made.

Annex 1 Schematic descriptions of the RHPP2 Scheme

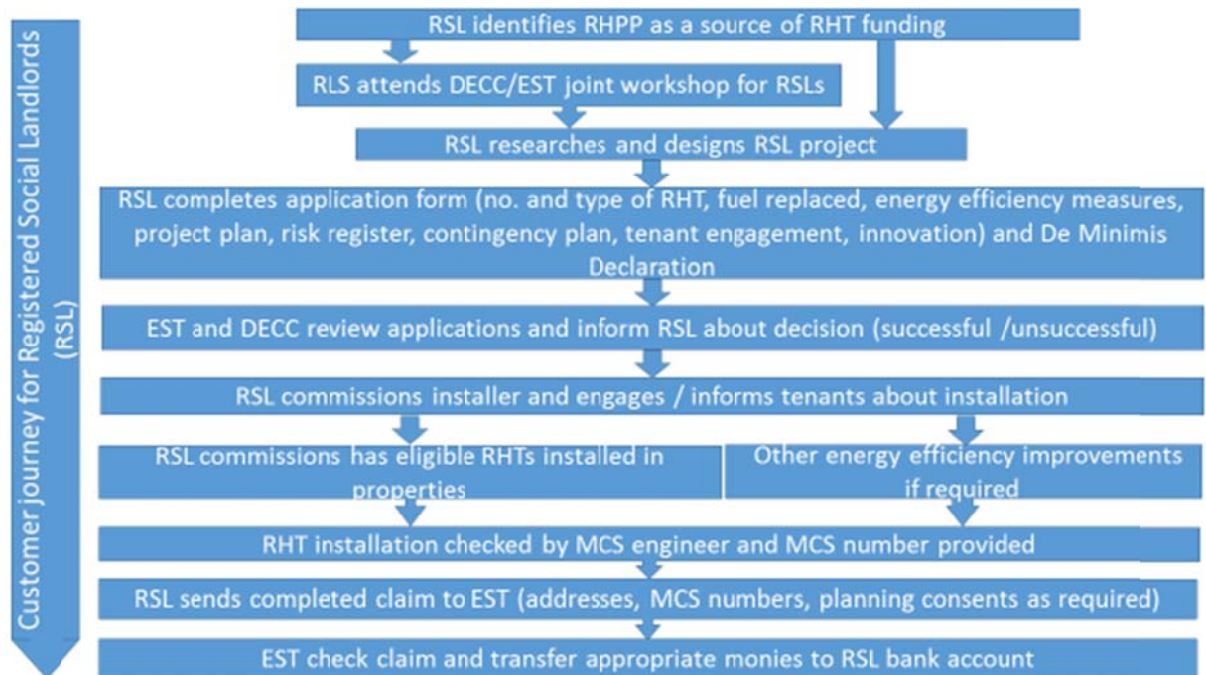
A1.1 Private Households Scheme



A1.2 Communities Scheme



A1.3 Registered Social Landlords Competition



Annex 2 Outline of the analysis methodology

A2.1 Quantitative analysis

The approach to reporting the quantitative analysis follows government advice³⁰. It can be summarised as follows:

- **Units of analysis** – In the analysis of customer journeys, because some customers have applied and redeemed more than one voucher, there is a difference between the number of customer responses and the number of installation responses. Customers with multiple installations complete a survey response for each installation. The context should make clear which unit of analysis is being used. Generally, when describing the customer (e.g. property type, year when property was built) the unit of analysis will be households or the responding member of the household (age). In all other cases (e.g. describing experiences with technologies) the unit of analysis will be the installation.
- **Confidence intervals** – Confidence intervals have not been applied to the data. When reporting the results from a census, confidence intervals are normally not indicated as the actual values for the variables are available for more or less all members of the underlying population; sampling error is not present (as no sampling took place). High levels of non-response may justify the use of confidence intervals, under the assumption that non-response was random; or random conditional upon a set of explanatory variables.
- **Treatment of ‘no response’ (i.e. item non-response), ‘prefer not to say’ and ‘don’t know’** – We have included all ‘prefer not to say’ and ‘don’t know’ responses as a substantive category in statistical analysis. However, where appropriate and with adequate notes to readers, certain charts will omit these responses. For factual questions with a high percentage of ‘prefer not to say’ responses, statistical tests were used to examine whether the response is associated with a set of key independent variables to identify possible bias. For attitude questions, this response is an important finding in itself and would not require correction. Item non-responses (where no response at all has been given) have been omitted from the analysis and percentages calculated are based on the number of non-missing responses³¹.
- **Response rates** – Response rates are analysed as part of the assessment of non-response bias which was undertaken in connection with analysing the need for, and possibility of, post-stratification weighting.
- **Weighting** – The case for post-stratification weighting of responses for identified non-response bias was examined for each census. The needs and possibilities were discussed with DECC and it was concluded that no post-stratification weighting should

³⁰ [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263009/dwp-research-style-guide-oct-2013.pdf See sections 3.4 to 3.7.

³¹ Analysis of the RHPP1 customer data excluded non-responses and calculated the average income using the interval midpoints. See: <https://www.gov.uk/government/publications/analysis-of-customer-data-from-phase-one-of-the-renewable-heat-premium-payments-rhpp-scheme>

be used for any of the censuses, given the lack of population level information on what kind of household (or individual respondent) characteristics account most for non-response.

- **'Substantive' significance** – measures of association were used for selected cross-tabulations (Cramer's V for categorical or Kendall's tau-b for ordinal data) to identify the association of substantive significance, i.e. links that are strong enough to be meaningful for analytical conclusions (statistical significance testing was not feasible, save for analysing non-response patterns, given that the data does not come from random sampling). We only report associations that are substantively significant. These are association values that show at least 'medium' strong association. In line with standard conventions: 0 - 0.19 = weak association; 0.2 - 0.49 = medium association; 0.5+ = strong association.

The technical report provides a detailed analysis of each census.

A2.2 Qualitative analysis

The approach to reporting the qualitative analysis follows government advice³².

Specialist software was used for the analysis of the qualitative data. The approach to qualitative analysis followed the following scheme:

- Summaries of interviews were produced by the interviewer, structured by the topic guide used to guide the interview discussion and including verbatim quotes;
- A coding frame was developed by a member of the research fieldwork team, building from the topic guide and developed through the application to a sample of their own interviews (n=3-5);
- The coding included categorical codes – organising information about the community groups – and content codes – organising data from the interviews;
- This coding frame was shared with the rest of the research fieldwork team for comment, drawing on their interviews and developed further;
- Following discussion, a further iteration was produced;
- The coding frame was shared with the client for comment;
- The coding frame was entered into the software and members of the research team applied it to a sample (n=4) of their interviews. It was then reviewed again through team discussion (aided by notes made during coding);
- The coding frame was amended as required and shared with the client;

³² [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263009/dwp-research-style-guide-oct-2013.pdf See sections 3.1 to 3.2.

- The dataset was coded by members of the research fieldwork team;
- Data coded in the development of the frame was recoded;
- Coding was reviewed and items coded as 'other' across themes were reviewed by the project manager and discussed across the team;
- New coding was applied where applicable;
- An analysis plan was developed that identified the codes and combinations relevant to each research question;
- The client is invited to comment on the analysis plan;
- Analysis was undertaken using the analysis plan as an initial guide;
- Additional combinations were explored as issues emerged, so that the final analysis was an iterative process;
- A fieldwork team meeting reviewed the findings of the analysis.

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