Department of Energy & Climate Change

Evaluation of the Domestic Renewable Heat Incentive

Technical Report: Waves 1 – 4 of the domestic RHI census of accredited applicants

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Any enquiries regarding this publication should be sent to us at [insert contact for department].

Contents

1. Introduction

This technical report describes the methodology for the Domestic Renewable Heat Incentive (RHI) census of accredited applicants, including details on the census methodology, implementation and data analysis.

The main report and full data tables are available from*:*
https://www.gov.uk/government/publications/interim-report-from-waves-1-4-of-the-domestic-rhi-census-of-accredited-applicants

Background to the scheme

The domestic Renewable Heat Incentive (RHI) is a financial incentive scheme introduced to encourage a switch to renewable heating systems in the domestic sector. This scheme is replacing the renewable heat premium payment (RHPP) schemes as the Department's main programme of support for domestic renewable heat. Launched on 9 April 2014 in Great Britain, participants of the scheme receive tariff payments for the heat generated from an eligible renewable heating system which is heating a single dwelling. The scheme covers single domestic dwellings and is open to owner-occupiers, private landlords, social landlords and self-builders. There are four renewable heating technologies covered by the scheme:

- Air-source heat pumps (ASHP);
- Ground and water-source heat pumps (GSHP);
- Biomass-only boilers and biomass pellet stoves with integrated boilers; and
- Solar thermal panels.

Further information on the domestic RHI scheme can be found at:

https://www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/renewable-heat-incentive-rhi

2. Objectives of the research project

The research project was designed to provide DECC with an understanding of the motivations and experiences of applicants to the RHI. To collect this information, a census of accredited applicants to the scheme was designed.

The questionnaire aims to find out applicants':

- experiences of the domestic RHI application process;
- motivations for, and barriers to, installing renewable heating technologies; and
- experiences of installing and using their renewable heating systems.

The applicant census was administered as an online questionnaire, sent out on a monthly basis to all owner-occupier first-time applicants who were accredited onto the scheme in the previous month. Private landlords, social landlords and self-builders are not covered by the census.

This project is part of a wider evaluation DECC are carrying out of the RHI, which includes qualitative and quantitative research with domestic and non-domestic customers, and the renewable heat supply chain. Interim findings from research into the non-domestic RHI are available from: https://www.gov.uk/government/publications/evaluation-of-the-renewable-heat-incentive-interim-report-the-non-domestic-scheme

3. Census methodology

A rolling census was chosen to:

- Provide representative data on applications to the domestic RHI (the study population);
- Provide representative data on applications for each of the main technologies currently accredited in the scheme;
- Provide a regular (monthly) 'snapshot'.

The census is delivered through an online questionnaire which is sent out on a monthly basis to all owner-occupier applicants who were accredited onto the scheme for the first time in the previous month.[1]

Customers are required to submit an RHI application for each system they install, therefore a number of applicants have made multiple applications to the scheme. To manage respondent burden, we only approach these customers once (for one of their installed systems), through randomly selecting one of their applications.

We obtain a monthly cumulative dataset of applications to the scheme from the scheme administrator, Ofgem. In total there were 7,051[2] accredited applications from owner-occupiers in the data sets provided for the first four survey waves (and pilot), including all applications up to the end of August.

As this dataset does not contain a unique applicant identifier, we used email addresses as a proxy to identify applicants with multiple applications. This identified 6,179 applicants with one application and 434 with multiple applications. Of the latter, 432 applicants submitted two or more applications.

124 applications (1.8 per cent) did not include an email address and were excluded from the survey, although these applicants were included in the population which was used when generating the calibration weights.

Sampling multiple applicants

As we are conducting a rolling census we do not have the full picture of how many systems customers have installed or plan to install at the time we administer the survey. Where an applicant has more than one application accredited in a single month, we randomly select one

[1] Social and private landlords were excluded from the survey because it was assumed that their motivations and experiences differed sufficiently from owner-occupiers to require a separate analysis, and because sample sizes were too small to allow quantitative analysis.

[2] This number is higher than the count published by DECC (7,046) due to 5 accreditations that have been subsequently withdrawn

application to be the focus of the survey. Applicants that successfully apply for further installations after being invited to take part in the survey in a previous wave are not invited to participate again.

4. Questionnaire design

The questionnaire was developed by NatCen and the Centre for Sustainable Energy (CSE) with input from DECC and the scheme delivery partner, Ofgem.

The questionnaire covers:

- how people made the decision to install their technology
- their experience of installing the technology
- how they funded purchase and installation
- their confidence in the technology installed
- how people found out about the Renewable Heat Incentive scheme
- how they selected an installer for their technology
- the costs of purchasing and installing the technology
- other work undertaken at the same time as installing
- the process of applying for the Renewable Heat Incentive scheme
- satisfaction with the technology
- attitudes to energy saving

Scripting

The scripting (or programming) of the questionnaire was carried out by Peak Answers. The resulting survey was checked by Peak Answers and NatCen researchers prior to being issued.

Pilot sample

A pilot was carried out to test the questionnaire questions and routing. This was sent to all 432 applicants in the first month of the scheme (from launch on 9th April to 30th April). Feedback from the pilot was incorporated in the final questionnaire. In addition, analysis of the responses to the first full survey wave (running in June 2014 with applicants accredited onto the scheme in May) prompted the inclusion of additional answer categories to four questions, for which corresponding open text answers were coded for analysis.

5. Fieldwork

The first full survey wave was carried out in June 2014. All eligible applicants accredited in the previous month, for whom an email address was available, were contacted by email and invited to take part in the survey.

The census was conducted as an online questionnaire by Peak Answers. Waves are administered monthly based on data from Ofgem of installations accredited in the previous month. Although fieldwork periods are defined for each wave, in practice each wave stays open until no further responses have been received for four weeks. The current report includes responses received until the official end of wave 4, on 7 October 2014.

Non-responders were sent two reminders via email (two and three weeks after the questionnaire was issued).

Response rates

Table 5.1 Response rates by wave

Wave	Month	Accreditations[3] [4]	House-holds invited to census[5]	Invalid responses[6]	Valid responses	Response rate
Pilot	April 2014	432	N/A pilot data			
1	May 2014	731	689	26	328	48%
2	June 2014	1,042	956	66	444	46%
3	July 2014	2,508	2,289	133	1,228	54%
4	August 2014	2,338	2,152	95	1,056	49%
Total		**7,051**	**6,086**	**320**	**3,056**	**50%**

[3] Monthly counts will differ from DECCs Official Statistics on deployment levels because (a) private and social landlords are excluded from this survey, (b) DECC's reporting periods are slightly different to the wave definitions for this survey, (c) withdrawn applications.

[4] The accreditations column in tables 5.1-5 includes 432 applicants included in the pilot.

[5] Applicants that did not supply an email address in the application were not invited, nor were any of the 432 applicants that took part in the survey pilot. Also, applicants that were accredited for more than one RHT were invited to answer questions in relation to only one of these.

[6] See "Treatment of partial responses" below.

Table 5.2 Response rates by technology				
Technology	**Accreditations**	**Households invited to survey**	**Valid responses**	**Response rate**
Air source heat pump (ASHP)	2,422	2,125	1,050	49%
Biomass boiler	1,619	1,423	696	49%
Ground source heat pump (GSHP)	1,070	978	508	52%
Solar thermal	1,940	1,560	802	51%
Total	**7,051**	**6,086**	**3,056**	**50%**

Table 5.3 Response rates by application type				
Application type	**Accreditations**	**Households invited to survey**	**Valid responses**	**Response rate**
Legacy customers	6,035	5,148	2,633	51%
New customers	1,016	938	423	45%
Total	**7,051**	**6,086**	**3,056**	**50%**

Table 5.4 Response rates by number of applicants per applicant				
Number of applications by applicant	**Accreditations**	**Households invited to survey[7]**	**Valid responses**	**Response rate**
Single application	6,179	5,675	2,841	50%
Multiple applications – same month	709	344	182	53%
Multiple applications – first month	82	63	32	51%
Multiple applications – later month	81	4[8]	1	
Total	**7,051**	**6,086**	**3,056**	**50%**

Table 5.5 Applications without email addresses				
Wave	**Month**	**Accreditations**	**Accreditations without email address**	**Percent without email address**
1	May 2014[9]	1,163	13	1.1%
2	June 2014	1,042	27	2.6%
3	July 2014	2,508	37	1.5%
4	August 2014	2,338	47	2.0%
Total		**7,051**	**124**	**1.8%**

[7] The number of invitations does not correspond to the number of accreditations because applicants included in the pilot and those without email addresses were not included.

[8] These applicants were identified as multiples through further analysis of contact information after the sample was issued.

[9] Includes April pilot data

Data processing

Treatment of partial responses:

Some respondents were found to drop out of the questionnaire at various points, although analysis did not find any particular pattern or specific trigger for this to happen. A cut-off point has been fixed at which point a respondent's response is treated as valid and included in analysis. A response was treated as valid if a respondent had completed half of the questionnaire. The exact point chosen was a question just over half way through the questionnaire, which signals the end of one block of questions and starts a new block. This corresponds with the question *"Did you face any of the following difficulties in meeting the requirements of the Renewable Heat Incentive (RHI) scheme?"*. A response to this point is approximately 54 per cent complete (depending on routing).

Responses that did not reach this question are treated as invalid and not included in the analysis.

Quality assuring data

Peak Answers carried out checks on achieved results data sets to ensure all variables and records were included.

NatCen reviewed files on receipt to check for correct answer routing, missing data, and implausible values.

Coding of free text answers

All open-text answers were coded by Peak Answers before analysis. Quality was monitored by checking a minimum of 10% of each coder's work.

NatCen provided the code frames to Peak Answers on the basis of a first analysis of open text answers, and the frames are updated by Peak Answers as appropriate.

Storage

Data used and collected in this study are treated as personal and confidential data, and transferred and stored in accordance with ISO 27001:2005 Information Security Management. This includes strong procedures governing the storage, access and handling of information. Compliance with procedures is monitored through reporting of issues, internal audits and ISO surveillance visits every six months.

6. Weighting

The report presents findings at two levels; application and applicant, as appropriate to the question. Questions on awareness of the scheme, for example, are presented at the applicant level, while questions on the application process are presented at the application level. Application level data were weighted, to reflect the sampling of multiple applications. Data at the applicant level are presented unweighted, as all applicants are included in the census. Analysis of response rates by different characteristics (application type, technology, property, floor space, self-build, number of occupants, and previous system) showed little non-response bias.

Two stages of weighting were applied to the data at the application level: firstly selection weights, which adjust for different selection probabilities of applications, and secondly calibration weights, which adjust for non-response bias.

Selection weights

Applications from single and multiple applicants have different selection probabilities. Single applicant applications are included in a census and receive a selection weight of one. Where an applicant submits multiple applications in the same month one application is randomly selected to be surveyed. If households submit multiple applications across months the first application submitted is selected and subsequent installations are not included (to reduce applicant burden). These applications should be weighted by the total number of applications made by the applicant in order to make the data representative of all installations. However, to avoid extreme weights and because very few applicants made applications for more than two installations, all multiple applicant applications were weighted with a weight of two.

As we are not capturing multiple applications made across waves, we may introduce some bias; either because these applicants have different views, or because they are more likely to submit applications for particular technologies first. Based on current data, this may mean the views of solar thermal applicants with more than one system may be underrepresented. However, the impact of this is likely to be minimal, as at present the number of effected applicants is small. This number will rise with subsequent waves and we may revise our approach for future reports.

Table 5.6 Multiple application numbers

Number of applications by the same applicant	Accreditations	Applicants
1	6179	6179
2+	872	434
Total	**7,051**	**6,613**

Calibration weights

Selection weights were adjusted using calibration weighting. This process reweights the distribution of certain variables to match population totals, minimising nonresponse bias where the variables used for calibration are related to survey participation. Based on assessment of factors which we would expect to be associated with people's responses and looking at the response rates across different variables, the variables included in the calibration weighting were:

- Application type
- Type of technology
- Type of property[10]
- Floor space (square metres) divided in five categories
- Self-build
- Number of occupants[11]
- Previous system.

These variables were chosen by assessing response rates by different groups identifiable from data in the sampling frame and from previous experience with surveys run with this population.

The next table presents the estimates of the weighted and unweighted sample compared to the population distribution:

Table 5.7 Weighting

	Population (%)	Unweighted sample (%)	Weighted sample (%)
Type of application			
New	14.4	13.8	14.4
Legacy	85.6	86.2	85.6
Technology type			
Air Source Heat Pump	34.3	34.4	34.3
Biomass	23.0	22.8	23.0

[10] Flat, maisonette and terrace house were combined in one category as there are few applicants living at these types of property (4.2%). The other categories are detached house or bungalow and semi-detached house or bungalow

[11] Responses with missing information about the number of occupants were treated as a group and included in the weighting.

	Population (%)	Unweighted sample (%)	Weighted sample (%)
Ground Source Heat Pump	15.2	16.6	15.2
Solar thermal	27.5	26.2	27.5
Type of property			
Flat + Maisonette + Terrace house	4.2	3.9	4.2
Detached house or bungalow	82.4	82.3	82.4
Semi-detached house or bungalow	13.5	13.8	13.5
Floor space in square metres			
Less than 100 m^2	10.6	10.7	10.6
100-149 m^2	26.1	26.8	26.1
150-199 m^2	24.5	25.5	24.5
200-249 m^2	17.0	16.7	17.0
250 m^2 or more	21.9	20.4	21.9
Self-built			
Yes	16.4	15.9	16.4
No	83.6	84.1	83.6
Number of occupants			
0 - missing	17.0	16.1	17.0
1	5.6	6.1	5.6
2	41.9	46.6	41.9
3	12.5	11.9	12.5
4 or more	23.0	19.2	23.0
Previous system			

	Population (%)	Unweighted sample (%)	Weighted sample (%)
Boiler	71.0	72.1	71.0
First Heating	18.5	17.8	18.5
Other	10.5	10.1	10.5

Annex A: Aggregated analysis categories

For the analysis presented in Figure 2.7 of the main report we combined questionnaire responses into related categories. These are set out below;

Table A.1 Aggregated analysis categories		
Difficulties faced in the overall process of installing the RHT (Figure 2.7)	No difficulties	• None
	Technical/practical difficulties	• Unsure which technology to choose • Difficult to integrate renewable heat technology with existing heating system • House or garden technically unsuited to renewable heating technology installation • Disruption caused by installation • Required survey or engineer report before installation of the system • Planning permission required • Already installed when bought the house
	Difficulties in relation with installer/assessor	• Lack of assessors to undertake the Green Deal Assessment • Identifying or finding an installer • Identifying or finding a Green Deal Assessor • Lack of local installers • Lack of trusted installers • Lack of competent installers (lack of tech knowledge, caused damage etc.) • After sales service not good/poor
	Lack of information /advice	• Lack of information or advice • Unclear information or advice • Not clear who to go to for advice • Didn't know how to find out who was accredited to install the system
	Financial difficulties	• Insufficient savings • Difficulties accessing a loan • Finance package not available • Still waiting for RHI payment/RHI not as expected
	Other difficulties	• Objections from family and friends • Objections from neighbour • Other

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