Early findings from an evaluation of the UK government's Non-Domestic Renewable Heat Incentive

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Abstract

This paper presents early findings from research carried out with non-domestic consumers as part of the evaluation of the United Kingdom (UK) government's Renewable Heat Incentive (RHI). The non-domestic scheme supports renewable heating in the commercial, public, industrial, community infrastructure, and district heating sectors by providing a payment for each kilowatt hour (kWh) of renewable heat generated, payable over 20 years.

The evaluation is primarily a process one, focused on the administration, delivery and performance of the scheme to date. We also aim to create new insights into the motivations and barriers experienced by non-domestic renewable heat customers. The first phase of evaluation research with non-domestic organisations included four projects; a wider non-domestic awareness survey, qualitative research with possible applicants**,** a survey of applicants, and qualitative interviews with multiple applicants.

Early findings from the evaluation show that amongst applicants and the wider non-domestic population financial motivations dominate, with energy saving or green motivations present but generally secondary. In this context the RHI is playing an important role in incentivising the installation of renewable heat technologies. Although applicants, possible applicants and the wider non-domestic populations all expressed concerns about the performance of the technologies prior to installation, these were not matched by applicant's experiences.

Introduction

This paper presents early findings from research carried out as part of the evaluation of the United Kingdom (UK) government's Renewable Heat Incentive (RHI). Although the commissioned evaluation covers the non-domestic and domestic consumers, we focus here on the non-domestic scheme. Research has been carried out to assess the administration, delivery and performance of the scheme. In addition the evaluation aims to map the motivations and barriers to installing Renewable Heating Technologies (RHTs) and applying for the RHI.

Our research builds a picture of these attitudes and barriers across scheme applicants, potential applicants, and the wider non-domestic population. In addition we have explored organisation's decision making around RHTs including how investment decisions are appraised, their experiences of the RHI application and RHT installation processes, and their satisfaction with the technologies once installed. Findings will be used to inform scheme development, and to provide wider learning for the Department of Energy and Climate Change (DECC) about interventions of this kind with non-domestic consumers.

We begin by providing an overview of the context for, and design of, the non-domestic Renewable Heat Incentive, followed by a summary of the performance of the non-domestic scheme to date. Sections 3 and 4 summarise the objectives of the evaluation and the methodology of the non-domestic strand. Section 5 presents early findings from the evaluation, including headline measures of awareness of the scheme and eligible technologies, satisfaction with the application and installation processes, and customer's satisfaction with their installations. Looking across the four main research projects in this strand of the evaluation we also examine to what extent scheme applicants are similar to the wider non-domestic population.

The UK Renewable Heat Incentive (RHI)

Non-domestic and domestic use of heat is responsible for producing around a third (32 per cent, 182 $MtCO_{2e}$, in 2009) of the UK's greenhouse gas emissions. Renewable heat meanwhile, in 2012, represented only 2.3% of total heat usage. DECC aims for renewable heating to make a contribution towards the UK's 2020 target of 15% of energy from renewable sources.

There are a range of renewable technologies that can provide low carbon heat, hot water and cooling, but all face significant barriers. Factors such as the upfront cost of installation, an underdeveloped UK supply chain, unfamiliarity to consumers and space requirements mean that these technologies are unlikely to reach their full mass market potential yet. But many are sufficiently established that they can already be a practical solution for many homes and businesses.

In 2011, to catalyse the low carbon heating market, the Government introduced the Renewable Heat Incentive (RHI) and Renewable Heat Premium Payment (RHPP) schemes. The RHI scheme was for non-domestic consumers while the RHPP (currently being evaluated separately) was an interim scheme for households, in anticipation of a full domestic RHI. The Domestic RHI was launched in April 2014. Both are available to customers installing renewable heat technologies in Great Britain.

By bridging the gap in upfront and on-going costs between low and high carbon heating, these policies aim to accelerate the uptake of low carbon technologies. The schemes have additional objectives to contributing towards the UK's 2020 carbon reduction target, they are designed to support the innovation and investment which will help to grow the supply chain, deliver the reduction in costs and increases in performance needed for low carbon heat technologies to reach mass market level, and increase consumer awareness and interest in these technologies.

The Non-Domestic Scheme

The non-domestic scheme supports renewable heating in the commercial, public, industrial, community infrastructure, and district heating sectors by providing a payment for each kilowatt hour (kWh) of renewable heat generated, payable over 20 years. Table 1 provides tariffs for selected technologies available through the scheme. The non-domestic RHI has been available to customers since November 2011, and is administered by Ofgem (the Office of Gas and Electricity Markets).

Table 1. Non-domestic Renewable Heat Incentive tariff rates for selected technologies

Technology	**Tariff level**[1]
Biomass – Small (<200kW)	*8.4p (Tier 1); 2.2p (Tier 2)*[2]
Biomass – Med (200kW-999kW)	*5.1p (Tier 1), 2.2p (Tier 2)*
Biomass – Large (≥1MW)	*2.0p*
Ground Source Heat Pump (GSHP)	8.7p (Tier 1); 2.6p (Tier 2)
Solar Thermal	10.0p/kWh

[1] Tariff levels presented here are current as of 13th August 2014 and may have changed since evaluation research was carried out. For more information and a full list of tariffs offered by the RHI see: https://www.gov.uk/government/speeches/increased-support-for-renewable-heat

[2] For small and medium sized Biomass plants (<1MWth) and Ground Source Heat Pumps successful applicants can receive two different tiers of payment. The Tier 1 tariff (a higher tariff) is paid until the installation has operated up to 15 per cent of the annual rated output (i.e. the equivalent of 1,314 hours at the rated capacity of the installation), whilst the Tier 2 tariff (a lower tariff) applies the operation of the installation beyond 15 per cent of the annual rated output. The tiering system has been introduced so that installations with high load factors are not over-supported.

The eligible technologies for the non-domestic scheme are; solid biomass, ground-source, air-source or water-source heat pumps, solar thermal collectors, biomethane injection, combined heat and power (CHP), deep geothermal and biogas combustion. Installations must be new, and commissioned on or after the 15th July 2009. Support for air-source heat pumps, combined heat and power (CHP), and deep geothermal was added to the non-domestic RHI after this research commissioned and therefore was not in scope of the evaluation.

Overview of the Non-Domestic scheme's performance so far

By March 31st 2014 there were 3,769 accredited applications to the non-domestic RHI (generating heat eligible for payment of the RHI tariff). Figure 1 shows the number of accreditations per quarter rising since the scheme launched.

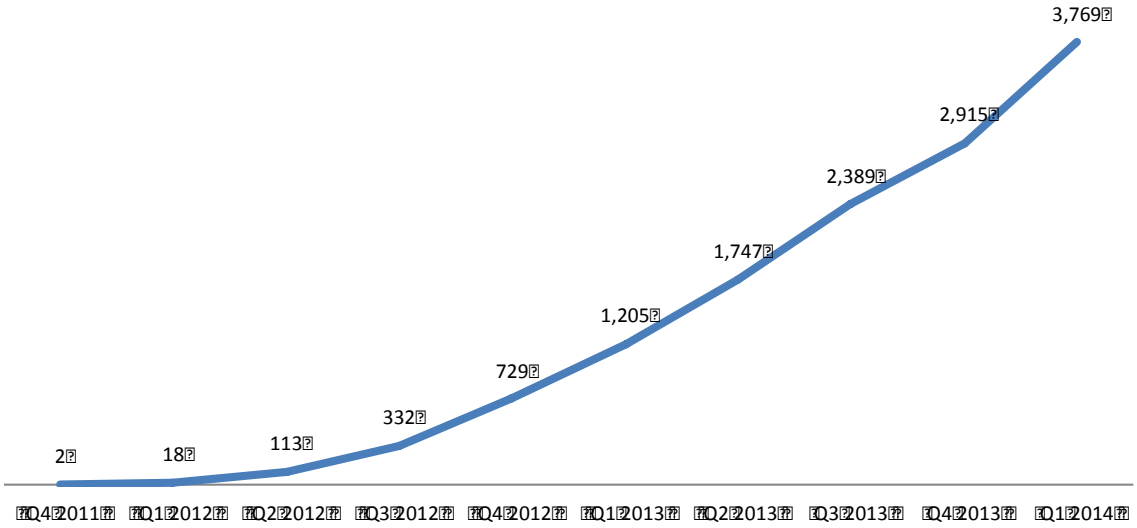

Figure 1 Cumulative number of accredited applications to the Non-Domestic RHI (31st March 2013)

Over four fifths (81%) of accreditations are for small solid biomass boilers (installations under 200 kW), a further 12% are for medium biomass boilers (200-1000 kW). Table 2 shows the number of accredited applications by technology and tariff band:

Table 2. Number of accredited applications to the Non-Domestic RHI by technology and tariff band (March 31st 2014)

Tariff Band	**Accredited installations**	
	Number	% of total
Small solid biomass boiler (< 200 kW)	3,044	81%
Medium solid biomass boiler (200-1000 kW)	446	12%
Large solid biomass boiler (> 1000 kW)	17	<0.5%
Solar thermal (< 200 kW)	124	3%
Small water or ground source heat pump (< 100 kW)	122	3%
Large water or ground source heat pump (> 100 kW)	10	<0.5%
Bio-methane	3	<0.5%
Biogas	3	<0.5%
Total	**3,769**	

The research objectives and design of the evaluation

DECC commissioned an evaluation of the RHI in January 2014, from a consortium led by NatCen and including Eunomia, Frontier Economics and the Centre for Sustainable Energy. Although the commissioned evaluation has collected data to support a potential future impact evaluation, it is primarily a process evaluation, focused on the administration, delivery and performance of the scheme to date. We also aim to create new insights into the motivations and barriers experienced by non-domestic renewable heat customers, widening the evidence base for policy making in this area, and informing both the future of the RHI and wider DECC policy. The evaluation's high-level research questions are included in Table 2. Of these research questions the initial phase of the commissioned evaluation with non-domestic organisations focused on the first three (although questions 4-6 are addressed to a lesser extent). Research with the supply chain for renewable heat will be carried out throughout 2014, and high-level outcomes from the scheme are reported as part of DECC's official statistics[3].

Table 3. High level research questions for commissioned evaluation

	High level research questions
How is the scheme being administered?	1. How effectively and efficiently has the scheme been administered and delivered?
The customer journey/experience	2. What factors (for example confidence, awareness, cost, or environmental concerns) have enabled or prevented uptake of renewable heat technology (RHT) through the RHI? 3. What has the impact of installing RHT been for customers?
The market and supply side	4. How is the installer market adapting to the introduction of the RHI? 5. What has been the impact of the RHI on the RHT industry, supply chain and investment community? 6. What has been the impact of the RHI on the development of RHTs?
High-level outcomes	7. How much renewable heat has been produced (TWh) under the RHI? 8. How many, and what type of, renewable heating systems have been installed?

While we could investigate the delivery and administration of the scheme and the impact of installing renewable heat technologies through a survey of applicants, assessing the factors enabling or preventing wider take up of the RHI and/or renewable heating technologies required us to speak to organisations that are not currently part of the scheme. To help identify and define the research projects we wanted to carry out, we mapped three populations for the evaluation, summarised in Figure 2.

Whole population

The whole population includes all non-domestic organisations in Great Britain, including the commercial, public, industrial, community infrastructure, and district heating sectors. These

[3] Available from: https://www.gov.uk/government/collections/renewable-heat-incentive-renewable-heat-premium-payment-statistics

organisations may or may not be aware of renewable heat or the RHI, and carrying out research with them allows us to assess awareness of the scheme and technologies. In addition we are able to explore attitudes to energy saving and renewables and, where they are aware of renewable heating technologies, their perceptions around them.

Potential applicants

To fully understand the barriers to installing renewable heat faced by organisations we decided we needed to carry out research with potential applicants. This acknowledges that there are organisations for which renewable heat and the RHI are not an option, either because the technologies are not applicable to them, or simply they are not aware of them. Potential applicants are therefore organisations that had the potential (including a good level of awareness and understanding) to install renewable heat or apply to the RHI and decided not to.

Applicants

The applicant population included all applications to the scheme as of the end of December 2013. In total there were 4,199 applications, of which 2,917 were accredited, 1,213 were in the application process, and 106 had been rejected, withdrawn, or cancelled.

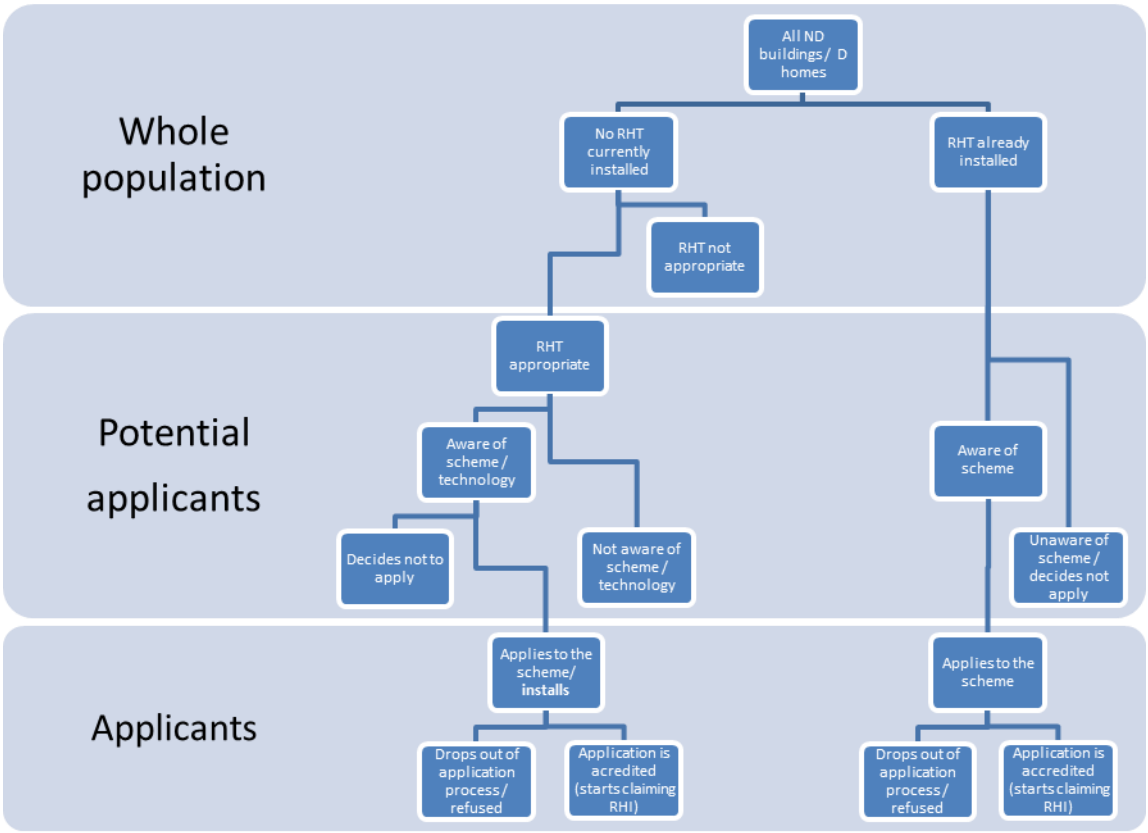

Figure 2. Study populations for the RHI evaluation

Non-domestic evaluation research methodology

The first phase of evaluation research with non-domestic organisations included four projects, designed to answer the first three high-level research questions. Of these the wider non-domestic awareness survey, qualitative research with possible applicants and survey of applicants were part of

our original research specification. Designing the survey of applicants revealed that there were fewer distinct applicants than the number of scheme accreditations. To explore this issue in more detail we added a piece of qualitative research focused specifically on those applicants who had more than one accredited technology. These interviews looked at the organisation's motivations for installing renewable heat, their views of the financial and business case for installing and their experiences of the application process.

Table 4. Projects commissioned in initial phase of the non-domestic evaluation

	Wider Non-Domestic awareness survey	**Qualitative research with possible applicants**	**Survey of applicants**	**Qualitative research with multiple applicants**
Sample size	620	23*	620	20
Sample frame	Online panel of business and public sector organisations	Bespoke sample frame drawn from business registers	All applicants to the scheme as of December 2013, n=4,199	A purposive sample of multiple applicants (more than 1 accredited installation as of December 2013)
Mode	Online survey	Telephone interview	Telephone survey	Telephone interview
Data	Quantitative	Qualitative	Quantitative	Qualitative
Respondent	Individuals who are part of their organisations decision making process around renewable heat	Respondents who are aware of and had the opportunity to install renewable heat/apply to the RHI	Applicant registered with scheme	Applicant registered with scheme who has installed more than one RHT
Sample criteria	Sector, country (England, Scotland)	Sector, Region	Sector, Technology (non-biomass oversampled)	Sector, technology (non-biomass oversampled)
* The initial research designed aimed for 40 interviews however recruitment of suitable organisations was challenging				

Research design

Wider Non-Domestic awareness survey. To collect meaningful data on awareness and perceptions of renewable heat from the non-domestic population we needed to contact the right respondent. While in smaller organisations one person may cover a variety of roles, and therefore be able to give an organisational perspective, in larger organisations decisions around heating systems and estate management are likely to be made by specialist teams. In the wider awareness survey therefore we only included respondents who were part of their organisation's decision-making process around heating systems. The functional roles selected by respondents are summarised in Figure 3. The sample was stratified by industrial classification, ensuring that we had robust estimates across five high level sectors: public, leisure, industry, commercial, and agricultural. Respondents were quota sampled from a non-domestic panel, and as such this survey provides an indication of awareness levels rather than precise estimates.

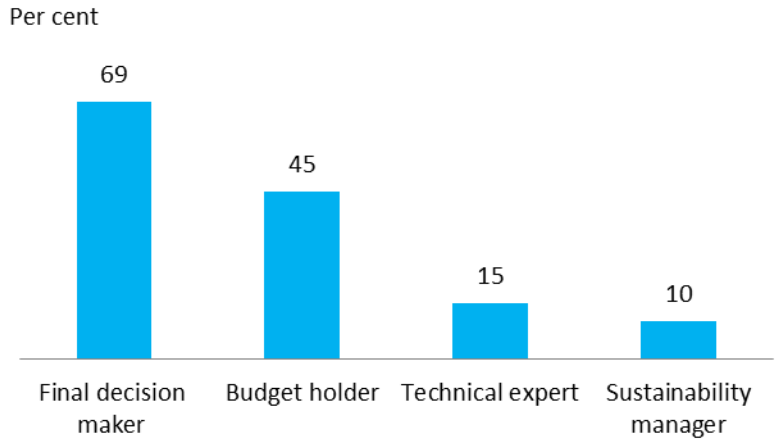

Figure 3. Role of respondents interviewed as part of the non-domestic wider awareness survey (respondents could select more than one category, Base = 610)

Qualitative research with possible applicants. This project aimed to find organisations close to the scheme but not actually participating in it, to examine in detail the barriers to renewable heat technologies and the RHI. To find organisations that might be aware of RHTs and have the potential to install them we built a sample frame of similar organisations to those already accredited to the scheme. Interviewers then contacted organisations by telephone with a short screening survey to find those that had at least considered renewable heating technologies since the period of eligibility accepted by the scheme (15th July 2009). In some cases these organisations had installed a renewable heating technology but had not gone on to apply to the scheme, others had decided not to install renewable heat at all.

Survey of applicants. The applicant survey was designed to give representative estimates of the views of the applicant population as of December 2013 when our sample file was supplied. Table 1 shows that over 90% of scheme uptake is made up of small and medium biomass boilers. The applicant survey therefore oversampled any non-small and medium biomass installations, while maintaining the overall representativeness of the survey. In addition the sample was stratified by broad industrial sector (as in the wider population survey), application status, Government Office Region (an administrative geography) and whether the installation was in a postcode with access to mains gas.

Qualitative research with multiple applicants. Contact data provided for the applicant survey showed there were fewer distinct applicants than applications to the scheme. We added a specific question to the applicant survey to investigate this further. Table 5 shows that overall, 30% of applicants have submitted more than one application. These applications can either be for multiple installations of the same technology or for a mixture of different technologies.

Table 5. Number of applications per RHI applicant

Number of applications	1	2	3	4	5+
Applicants (per cent)	70	14	5	3	8
Base: 620 Data taken from survey of applicants					

Results

Wider Non-Domestic awareness survey

Over half (58%) of organisations reported they either ‘know a lot’ or ‘know a little’ about renewable heat technologies, with the remainder (42%) either being aware of renewable heat technologies, but not understanding them or never having heard of them.

Awareness levels for specific technologies were highest for Biomass boilers (57%), Ground Source Heat Pumps (58%) and Solar Thermal (58%) systems. Although awareness of these technologies is similar, organisations were much more likely to consider installing Solar Thermal systems (53%), rather than Biomass boilers and Ground Source Heat Pumps (27% and 32% respectively).

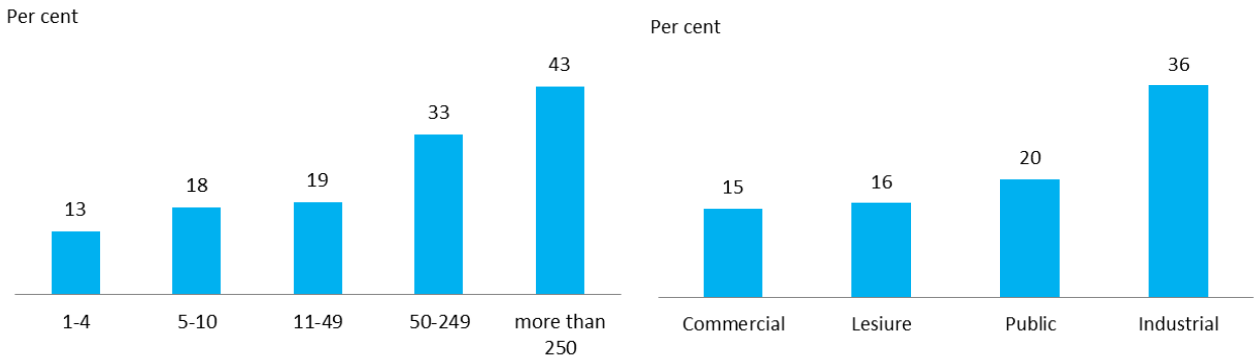

Figure 4. Percentage of organisations aware of the RHI broken down by number of employees (left) and industrial sector (right) Base: 602

The majority of respondents (79%) had not heard of the RHI prior to the survey, in contrast to the number aware of the eligible technologies. Larger firms were more likely to have heard of the scheme (Figure 4), with twice as many of the largest (those with more than 250 employees) aware of the scheme compared to the average (21%). Looking at respondents by sector, awareness in industrial organisations was 16% higher than the in the public sector, the second highest figure.

Half of respondents in to the survey (Figure 5) were very concerned about future energy price rises, compared to a quarter who thought the environment and use of renewable sources were very important. This shows that while environmental concerns do matter to organisations, financial ones appear to be more important.

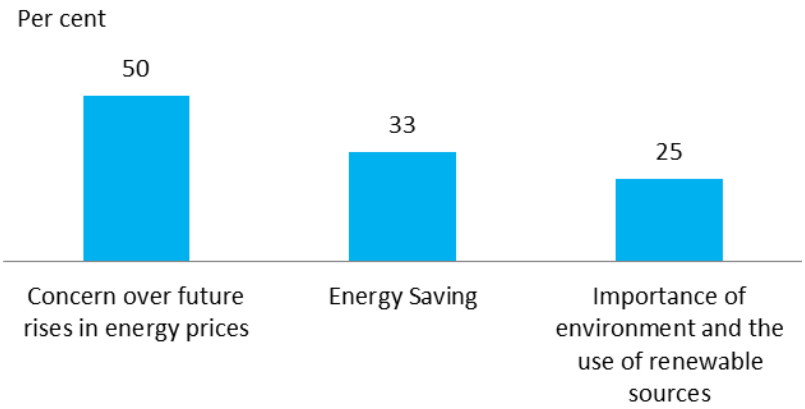

Figure 5. Percentage of Wider Non-Domestic awareness survey respondents who were very concerned about; future energy price rises (Base: 618), energy saving (Base: 619), and the environment and the use of renewable sources (Base: 611)

Qualitative research with possible applicants

Qualitative interviews with possible applicants provide insights into the barriers to RHTs and the RHI experienced by organisations that ultimately did not either go on to install a heating system or apply to the scheme. Barriers relating to awareness and understanding of the RHI included uncertainty about specific elements of the scheme design, with some interviewees assuming the RHI was an upfront grant (as opposed to a tariff), or that scheme targeted insulation. There were also uncertainties about the eligibility of systems, retrospective eligibility and metering requirements.

Barriers to the technologies themselves included worries over fuel sources and storage for biomass. Despite the relatively high take up of biomass boilers in the scheme so far it appears there are still concerns about the technology from possible applicants. Organisations were also concerned about the efficiency of renewable heating technologies in general, and their ability to deliver energy savings.

Survey of applicants

The applicant survey provided more information about the characteristics of applicants. The majority (68%) have fewer than 10 employees, while a further 18% have between 10 and 49. Although only 7 per cent have more than 250 employees, this is higher than the proportion of large organisations in the wider UK business population (0.5%)[4]. While numbers of leisure and commercial, industrial and public organisation are broadly in line with the UK business population, agricultural organisations are over-represented in the applicant base (23% of applicants relative to 5% nationally.) Just under three quarters (73%) of applicants did not have access to mains gas; these are organisations for which the financial case for renewable heat technologies may be more attractive.

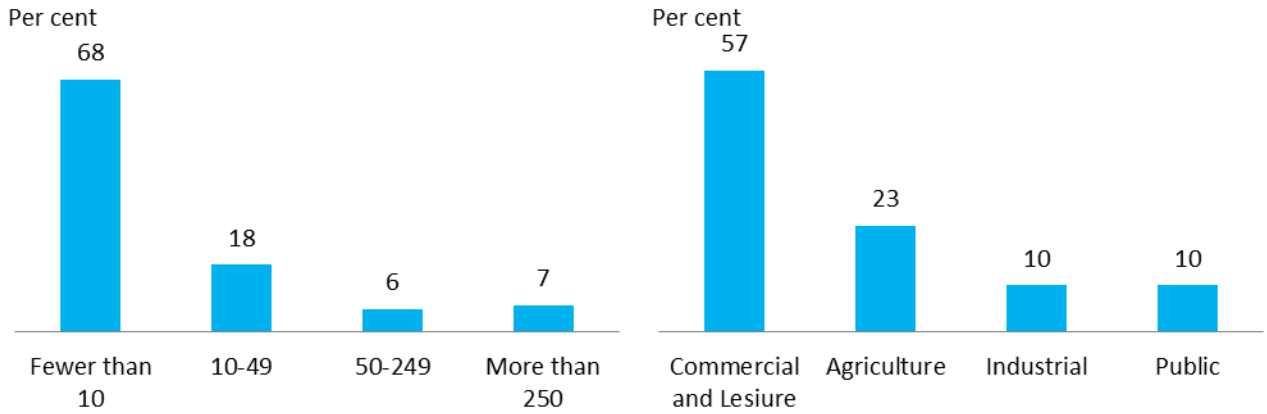

Figure 6. Scheme applicants profiled by number of employees (left, applicant survey, Base: 620) and industrial sector (right, scheme administrative data)

Renewable heat technologies were mainly installed as a replacement for an old system (65 %), 20% provided a replacement and expansion of heating capacity and 12% were expansion only. The majority of installations under the scheme were funded by applicants using their own finance, partly reflecting the fact that current take up of the scheme is predominantly smaller scale cheaper technologies (small and medium biomass boilers).

[4] See: http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html

The survey showed that, despite some reservations prior to installation, applicants were overwhelming happy with the performance of their systems once installed. The performance of the technologies was listed as the most important uncertainty prior to installation by 17% (the heat output) and 16% (reliability) of applicants. Over a quarter (28%) of applicants reported they had 'no concerns' before installing their RHT. Despite expressing concerns prior to installation, 90% of non-domestic RHI applicants were very or fairly satisfied with their renewable heating systems, and 93% would recommend their renewable heating technology.

The two most important motivations cited by applicants for installing their renewable heating systems were financial (Figure 7), specifically the RHI tariff (40%) and the running costs of renewable systems (18%). It is likely there is some overlap between these categories. Environmental considerations were the third highest followed by availability of feedstock (which is specific to biomass systems). This echoes the priorities of organisations in the wider awareness survey where, although the environment and renewable energy were considered important, financial considerations were more so.

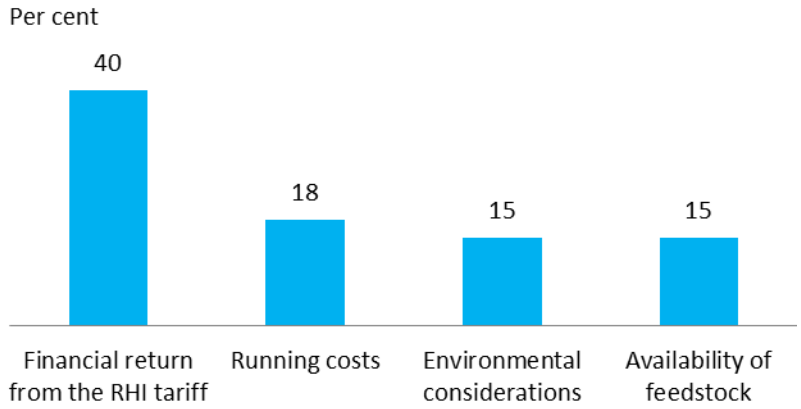

Figure 7. Applicant's motivations for installing from the applicant survey (reason selected as 'most important' Base: 602)Before an applicant to the scheme can receive payment for the renewable heat they generate their application must be accredited by the scheme administrator (Ofgem). Our research found that 54% of applicants reported experiencing a problem during the application process. The majority of these problems related to complexity, some of which may result from the scheme design.

Installation of the system itself was rated as easy or very easy by 63% of respondents; the most commonly cited problems were unexpected costs or delays to installation (cited by 32 and 33% of respondents respectively). These findings suggest that applicants so far have been relatively accepting of delays and unexpected costs associated with their installations. The majority were positive about the installation process.

Qualitative research with multiple applicants

Interviews with multiple applicants focused largely on the application process which they felt could better acknowledge their requirements, including dedicated case handling from the scheme administrator, and the ability to link their applications together, reducing the burden on them per application.

They were generally happy with the performance of their systems, although reported some issues with biomass fuel quality. Despite their negative perceptions of the application process multiple applicants had plans to install further renewable heating technologies.

Conclusions

Non-domestic RHI applicants are not currently representative of the wider (UK) non-domestic population. When compared with national estimates applicants are more likely to be large organisations or in the in the agricultural sector. To an extent this is supported by our wider awareness survey which shows higher awareness of the RHI amongst larger organisations. Industrial organisations however, who show higher awareness than any other sector are not well represented at present. This suggests there are barriers other than awareness for industrial organisations limiting their involvement in the scheme.

Amongst applicants and the wider population financial motivations dominate, with energy saving or green motivations present but generally secondary. In this context the RHI is playing an important role in incentivising the installation of renewable heat technologies.

Awareness of renewable heat technologies in the wider non-domestic population is higher than awareness of the RHI. The RHI is a financial incentive and we have seen that financial motivations are key for organisations. This suggests that increasing awareness of the RHI may have a positive effect on uptake, especially for those already aware of the renewable heat technologies.

Although applicants, possible applicants and the wider non-domestic populations all expressed concerns about the performance of the technologies prior to installation, these were not matched by applicant's experiences, where 90% are satisfied with the performance of their technology. Once the benefits of the technologies become better known (93% of applicants would recommend their system) these barriers may reduce.

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