

# RHI EVALUATION: SYNTHESIS

*A report by Frontier Economics*

Revised, September 2017



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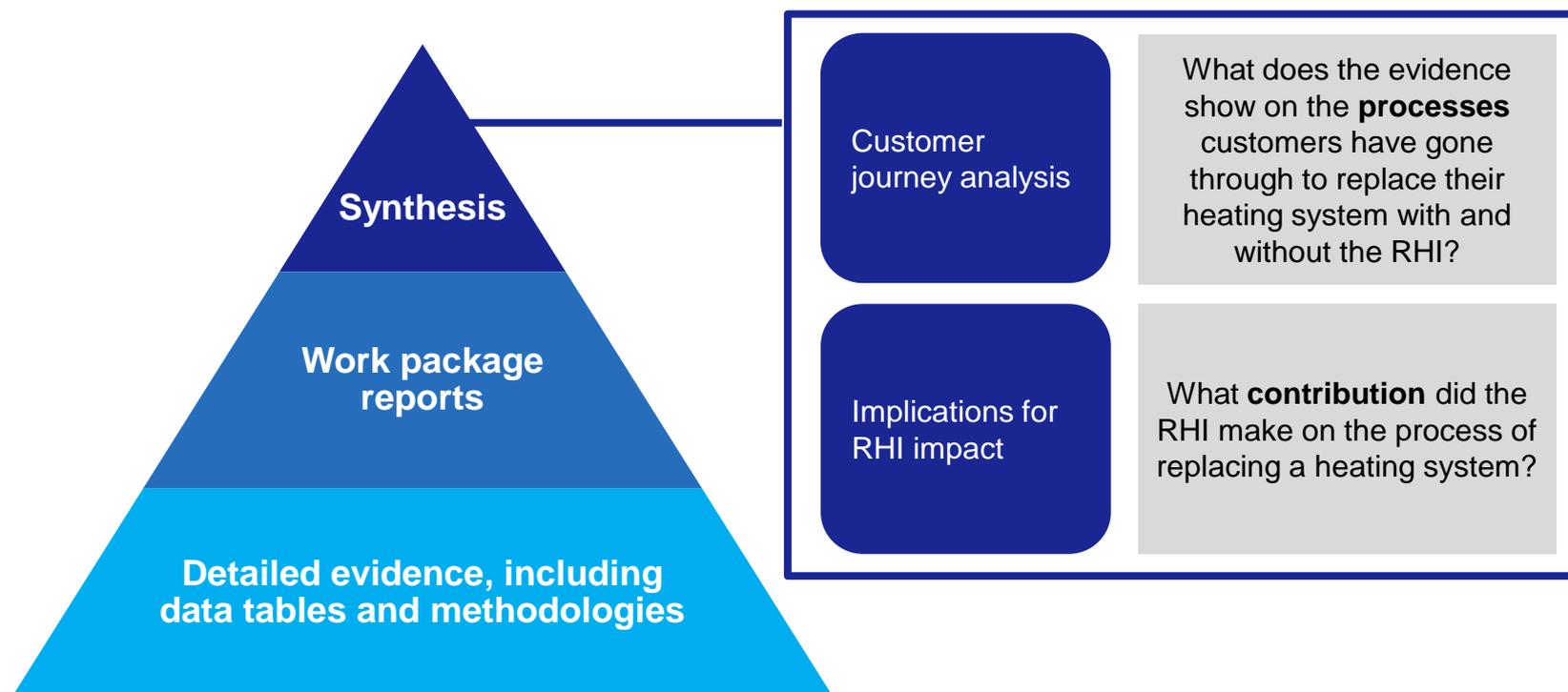
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# 1. EXECUTIVE SUMMARY





# This report synthesises evidence generated from the RHI Evaluation and wider literature to assess the impact of the RHI and how this impact was achieved



This synthesis is based on detailed primary research carried out for the Department of Business Energy and Industrial Strategy (formally the Department of Energy and Climate Change) by Natcen, Eunomia and CSE in 2014-16\*\*, published as work package reports and data tables, including information on the methodologies and details on the specific elements of the scheme (see: <https://www.gov.uk/government/collections/renewable-heat-incentive-evaluation>). **This synthesis should be taken in the context of the full suite of these reports.** We have also drawn on wider published literature.

\* A synthesis based on waves 1-12 of the Census of Domestic Applicants were published in January 2016. This slide pack has been updated to include results from waves 1-24 of the Census. See appendix 3d for details of updates included.

# There is evidence of additionality across all customer groups

Customers perceived the RHI to have had an impact on their decisions and financial motivations were key for owner occupiers and non-domestic applicants.

## Owner occupiers



1

**41% of new applicants** said they would not have replaced their heating system without the RHI and a further **7%** would have installed a non-renewable technology in the absence of the RHI.

However, 23% said they would have installed the same technology without the RHI. 27% didn't know.

The availability of a grant or other funding was the most common reason for applicants to decide to install a new heating system (36%\*).

Policy relevant conclusions

## Non-domestic applicants



4

**63%** said they would not have installed a renewable heating technology without the RHI.

However 23% said they would have installed the same technology without the RHI and 14% said they would have installed another renewable technology.

58% stated that the financial case was the single most important factor in their decision to install a renewable heating technology.

The RHI triggered both replacement of systems (trigger for need) and influenced which technologies to purchase (trigger for choice). These findings suggest that it is possible to deliver additional take up of renewable heating technologies through an incentive scheme.

## Social landlords



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Social landlords said the RHI strengthened the financial case for renewable heating technologies, and in some cases brought forward replacement of old electric storage heaters.

But it was sometimes seen as a bonus, rather than a driving factor.

Their overriding concern was to provide homes which can be affordably heated.

## Installers



3

Installers said financial considerations, including the RHI, motivated consumers (80% said this was a motivation for domestic customer, 75% said this was a motivation for non-domestic customers).

# The profile of the RHI uptake population differs from the UK profile



**Higher income, off gas grid domestic customers are over-represented among applicants**

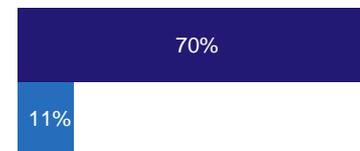
**Proportion of households with weekly income > £1,000\***



Base for RHI= 9,621

- RHI owner occupier applicants (new and legacy, 2014-2016)
- All GB households (2013/14)

**Proportion of households off the gas grid\***



Base for RHI= 35,421

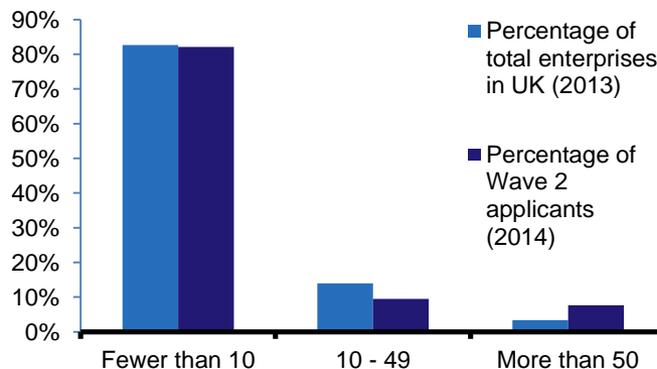
- RHI owner occupier applicants (new and legacy, 2014-2016)
- All GB households (2013)

Note that this is not an entirely like-for-like comparison: Ideally, the income and location of RHI applicants would be compared to GB owner occupiers replacing a heating system.



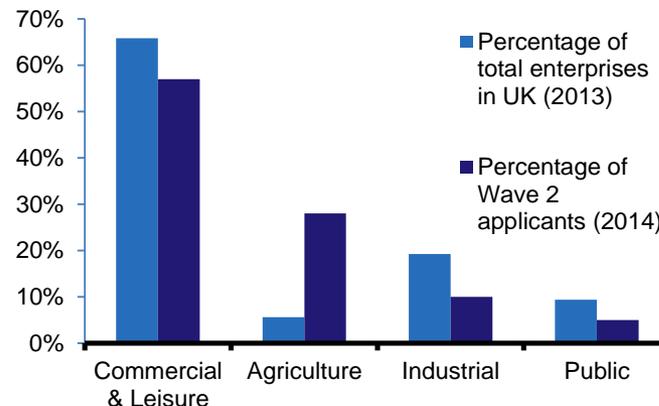
**Large businesses and agricultural businesses are over-represented among applicants**

**Employees per firm**



Base: Wave 2 = 501.

**Sector**



Policy relevant conclusions

Renewable heating technologies will often be more cost-effective off the gas grid. Therefore outcomes on the domestic side suggest that the RHI may have been successful in delivering uptake where it is most cost-effective.

# The majority of RHI applicants are satisfied with their new systems

What does the evidence show?

Renewable heating technologies were not perceived positively in the general population, but those who have taken them up under the RHI have had a good experience.

## General population



42% of people in the general population (both on and off the gas grid) felt renewable heating technologies were expensive to install.

Only 17% of people in the general population felt renewable heating technologies would heat their home better.



Research indicates that **social landlords** would generally prefer gas if available.



81% of domestic applicants were very or fairly satisfied with their renewable heating technology.



## RHI applicants

87% of non-domestic applicants were very or fairly satisfied with their installation and 88% would recommend it to others.



Qualitative research found that some social landlords had negative experiences related to cost and controllability for tenants. Others were happy with maintenance costs.

Policy relevant  
conclusions

These findings indicate that barriers associated with the cost and performance of renewable heating technologies may be at least partly down to perceptions.

# The RHI appeals more to customers proactively replacing heating systems

What does the evidence show?

12

1

## Owner occupiers



- Owner occupiers replaced their heating system if it broke down (30%), or required considerable repairs (31%).
- **However only 32%\* of owner-occupier RHI applicants installed a renewable heating technology because they needed to replace their system.**

4

## Non-domestic applicants



- **Only 14% of non-domestic RHI applicants (excluding those with a newly built building) indicated they replaced a system because of concerns with the performance of the previous system.** 61% were motivated by the financial case, 15% felt the technology was best suited and 6% were motivated by CSR or reputational issues
- Data on reasons for replacing systems in the non-domestic general population is not available.

10

## Social landlords



- **Social landlords carried out planned replacement with and without the RHI.** Social landlords tended to replace systems as they reached the end of their *notional* life, rather than waiting for the system to break down.

Policy relevant conclusions

The RHI appeals more to customers who replace systems proactively (e.g. fitting out a new build) than those who are reactive (e.g. responding to a system breakdown).

# Upfront costs remain a barrier and RHI applicants tend to use their own finances

What does the evidence show?

The RHI is structured to provide an ongoing payment, rather than to cover the upfront costs of the technologies.

<p>12</p> <p>1</p> <p>2</p> <p><b>Owner occupiers</b></p> 	<ul style="list-style-type: none"> <li>• Savings (77%), rather than loans (11% for personal loans and 10% for mortgages/remortgages), were typically used to finance heating system replacements, among domestic RHI applicants and evidence for the wider population shows a similar pattern.</li> <li>• Qualitative interviews with domestic RHI applicants indicated that they may have sometimes been unaware of all sources of funding available, that they may have distrusted some sources of funding, or disliked the idea of being in debt.</li> </ul>
<p>4</p> <p><b>Non-domestic applicants</b></p> 	<ul style="list-style-type: none"> <li>• Upfront costs were the principle concern prior to installing a new system for 42% of non-domestic applicants. 61% of surveyed non-domestic applicants used their own finance to purchase renewable heating technologies. 71% were able to use the type of finance that they initially wanted.</li> <li>• Non-domestic applicants are paid per unit of metered heat consumption. This could lead to an incentive to use heat inefficiently, though the biomass tariff is tiered to mitigate against this. There is some evidence from the biomass supply chain research that inefficient use may be occurring, though the prevalence of this not clear.</li> </ul>
<p>10</p> <p><b>Social landlords</b></p> 	<ul style="list-style-type: none"> <li>• Social landlords primarily financed replacement through internal funding (i.e. from rental income). Where grant funding was sought this was typically to undertake pilots. Borrowing finance was only discussed by council-led social housing providers.</li> </ul>

Policy relevant  
conclusions

The payment design means that upfront costs remain a barrier.



# Biomass has been favoured by non-domestic and domestic applicants, but this is changing over time

What does the evidence show?

By the end of April 2017:

- Biomass capacity made up 86% of non-domestic full application capacity under the RHI.
- 31% of **new** domestic (excluding social landlords) accreditations were biomass

These figures have fallen from a January 2015 peak of 97% and 56%, respectively. The reductions have coincided with degressions to the non-domestic small biomass and domestic biomass tariffs between 2014 and 2017\*\*.

**Owner occupiers**



**Non-domestic applicants**



For domestic owner-occupier applicants, the RHI tariff payable influenced the technology choice of 45%\* of applicants “a great deal,” especially for those installing biomass systems (58%\* said their choice was influenced “a great deal” by the tariff).

The qualitative research with participants in the biomass supply chain has indicated that biomass may have had fewer non-financial barriers compared with heat pumps:

- Seen as more familiar technology / similar to existing systems (e.g. oil boilers).
- More likely to work in older buildings.
- Easier to install.

This research (carried out in February and March 2015) also suggests that tariffs were, at that point, perceived to be generous.

**Social landlords**



- **Once again social landlords are the exception, with biomass boilers making up only 3% of installations in this group by August 2015.**
- Social landlords were reluctant to require tenants to handle the fuel and the budget needed for periodic fuel delivery. They also felt there was a risk of tenants burning inappropriate and possibly damaging fuels such as broken up wooden pallets. While these problems could apply to individual installations, communal biomass boilers could be attractive.

**Policy relevant conclusions**

The relative importance of financial and non-financial barriers in determining the difference in uptake between biomass and heat pumps is not clear, as it is not clear whether actual returns vary by technology. There may be different drivers for different groups.

Sources - see numbered list in Annex 3b (pages 50-51). \* Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants – see list in Annex 3d.

\*\* A full list of degression announcements for all technologies are available at: <https://www.gov.uk/government/statistics/rhi-deployment-data-april-2017>

# Installers are the most important source of information for owner occupier and non-domestic applicants

Most MCS heat registered installers served both domestic and non-domestic markets (71%) and installed a range of heating technologies, including non-renewable (44% install non-renewable).

1

## Owner occupiers



- 71%\* of owner occupier new applicants indicated that they had heard about renewable heating technologies from installers.
- Research also shows that installers were an important and highly trusted source of information: 33% of new applicants who accessed more than one information source chose installers as the most trusted and 57%\* of new applicants heard about the RHI from installers.

4

## Non-domestic applicants



- Qualitative research indicates that installers played an important role in informing businesses about the RHI and its benefits.
- Nearly half (48%) found their installer from a recommendation from somebody else.

10

## Social landlords



- **Social landlords gained information from a wider set of sources.**
- These sources range from active desk research and using consultants, membership of professional associations where technologies are presented and discussed, receipt of sales literature and calls from suppliers. They also used existing relationships with suppliers and contacts with other social housing landlords (who may have had experience with renewable heating technologies).

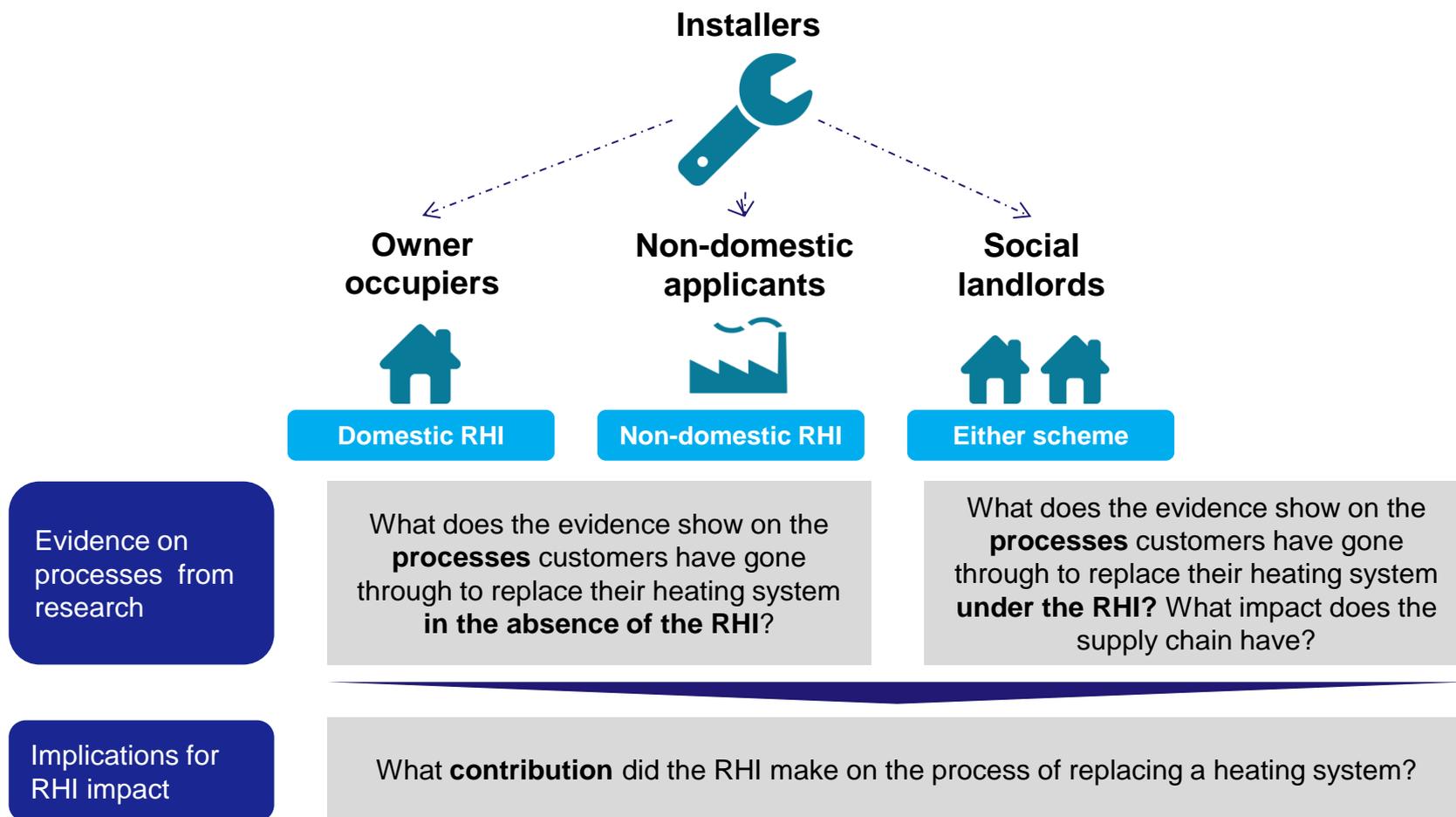
Policy relevant conclusions

Installers were an important and trusted source of information.

# 2. CUSTOMER AND SUPPLIER JOURNEYS



We have drawn together the available sources to describe customer journeys with and without the RHI, and to determine the impact of the RHI



We have structured our report around a particular sequence of steps in the customer journey. However, it is clear that alternative sequences could be possible. The processes described in this report should not be understood as representing a single customer journey.

# We have indicated the level of confidence and relevance of each piece of evidence

<p><b>Confidence</b></p> <p><i>How confident are we that this source is providing an accurate description of the population it covers?</i></p>	<p><b>Relevance</b></p> <p><i>Is the population covered by the source appropriate for the questions we are looking to answer?</i></p>
<p> Research which covers a sufficiently large and representative sample, for a given group. <b>This should allow reasonable inferences to be made of the population it is sampled from.</b></p>	<p> Relates the appropriate type of customers (for example, owner occupiers), and the appropriate type of customer journey (e.g. those that took up the RHI).</p>
<p> <b>Research which is not necessarily representative of the population it is sampled from.</b> For example, qualitative research is not designed to determine how prevalent a view is within the population, though it can map the range of perspectives and explain varying influences of different factors. .</p>	<p> Relates to the right type of customers (for example owner occupiers), but not the specific customer journey (for example, inferring the behaviour of non-RHI consumers from those that took up the RHI).</p>
<p> A hypothesis which will require testing. We have based this on industry knowledge or intuitive deductions, however there is <b>no research directly underlying it at present.</b></p>	<p> Does not relate to the appropriate type of customers (for example, drawing on a result from owner-occupiers to suggest what might be happening to RSL tenants).</p>

A piece of evidence can score highly on one scale and low on the other – for example:

This could be a large, representative survey of owner-occupiers on the RHI, which we are using to draw conclusions about those that did *not* take up the RHI.

This could be a qualitative survey of owner-occupiers on the RHI which might not be guaranteed to be representative, but provides results for the customer group we are interested in.

# 2A. OWNER OCCUPIERS





# Owner occupier RHI applicants are a particular subset of the wider population

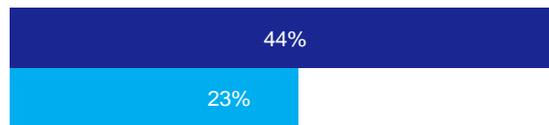


1

20

Disproportionately more likely to be high-income

## Estimated proportion of households with weekly income > £1,000\*



Base for RHI=9,621

- RHI applicants (owner occupiers, new and legacy, 2014-2016)
- All GB households, including RHI applicants (2013/14)

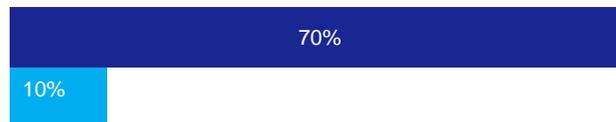


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19

Disproportionately more likely to be off the gas grid

## Estimated proportion of households off the gas grid\*



Base for RHI= 35,421

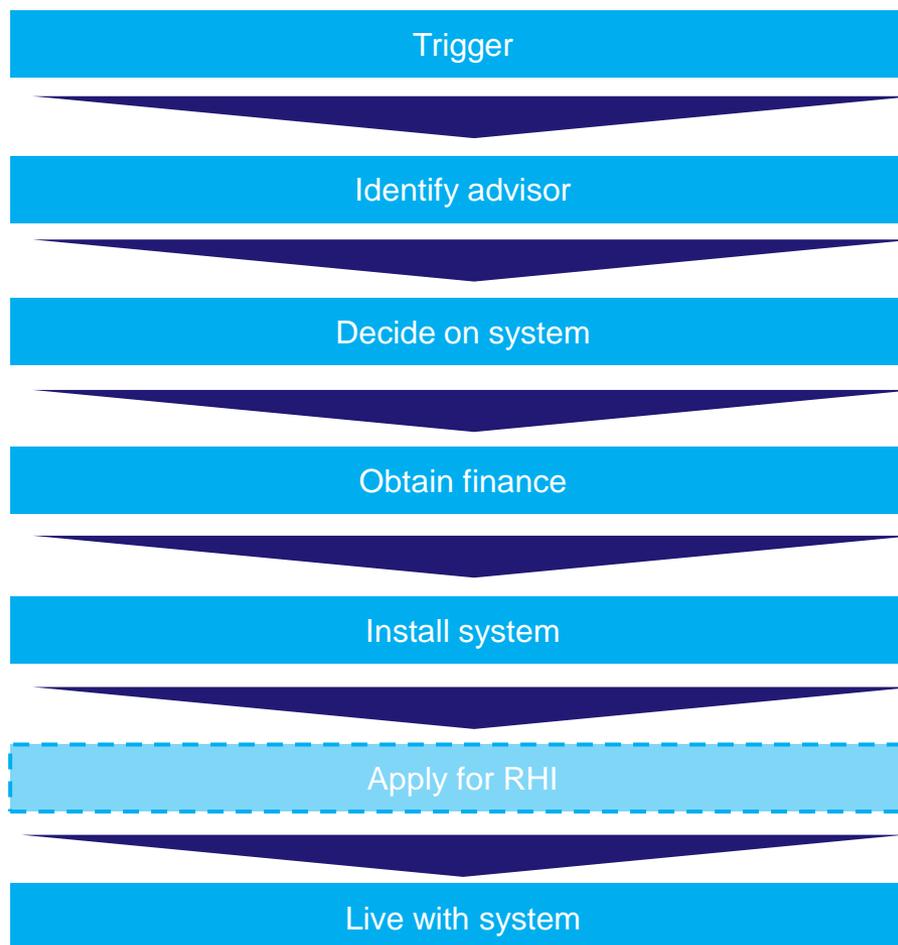
- RHI applicants (owner occupiers, new and legacy, 2014-16)
- All GB households, including RHI applicants (2013)



Note that this is not an entirely like-for-like comparison. Ideally, the income and location of RHI applicants would be compared to GB owner occupiers replacing a heating system.



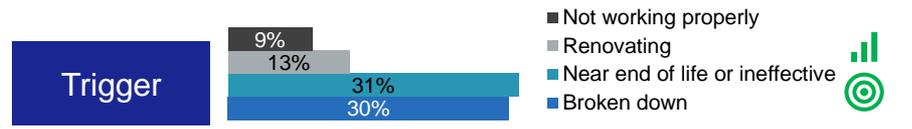
We have represented the customer journey of owner occupiers in seven stages



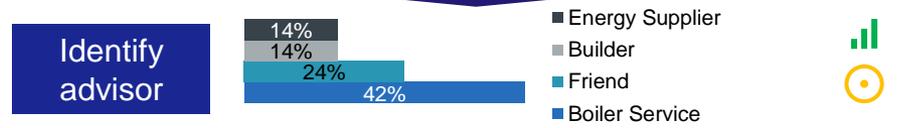


# In the general population, systems are commonly replaced by owner occupiers due to (impending) breakdown

12 Most owner occupiers replaced their heating system if it **broke down, or required considerable repairs**. (Single response – top four reasons shown, base =1,807).



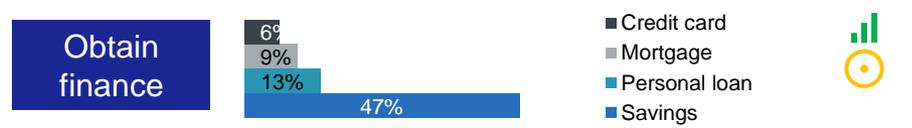
12 **Virtually all homeowners surveyed consulted someone for advice – most commonly a boiler service company**. (Multiple responses – top four reasons shown, base =1,807).



12 **Owner occupiers reported cost as most important factor when choosing**. (Single response - top four reasons only shown, base =2,848).



12 **Savings were the most common method of finance**, followed by various forms of loan (mortgages, personal loans, credit cards etc.). (Multiple responses- top four reasons shown, base = 2,848).



12 **In an emergency scenario, owner occupiers are likely to make a “like-for-like” replacement**. Although it is feasible that customers may be slightly more open to alternatives under non-emergency scenarios, they still overwhelmingly chose the incumbent technology.

84% of owner occupiers on the gas grid said they would be likely to install a gas condensing boiler in an emergency situation.

12 **Those owner occupiers with gas boilers generally feel existing systems meet their needs**, as do many rural off-grid households. Urban off-grid households express concern over expense and difficulty of control.

Generally satisfied, except urban off-grid households with electric resistive

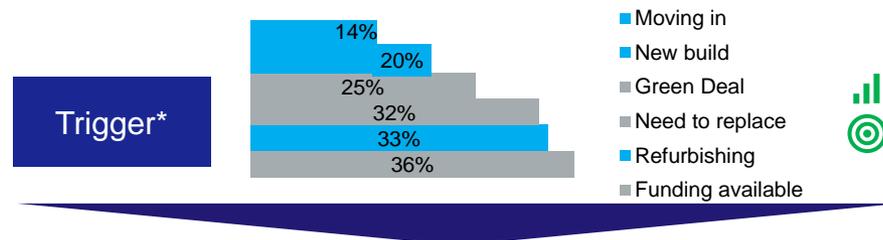
Sources - see numbered list in Annex 3b (pages 50-51).



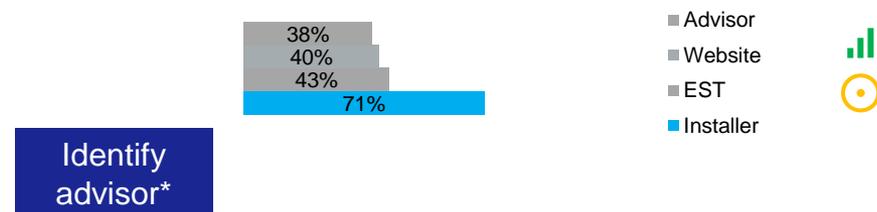
# Owner occupier RHI applicants were much more likely to have property work or the availability of funding as a trigger



1 **The graph shows that triggers relating to property work** (highlighted in blue) **are particularly important.** "Need to replace" was only cited as a trigger by 32%\*, far less than the wider population (70% - see previous slide). (Multiple response, base = 3,673\*).



1 *Of all households excluding legacy applicants surveyed* (not just those replacing due to renovations), **71%\* heard about renewable heat technologies from an installer.** Installers were also the most trusted source of information. (Multiple response, base = 5,518\*).

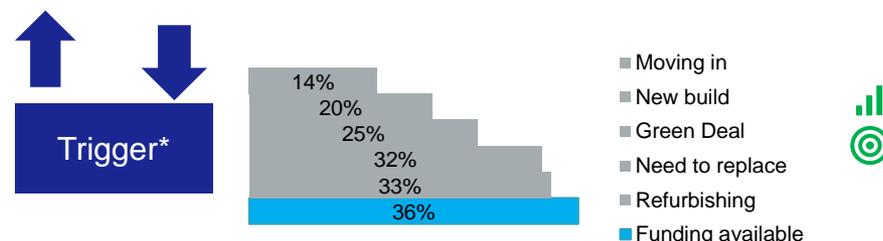


1 **58% of applicants found out about the RHI from an installer** (multiple response, base = 5,501).

2 Qualitative research suggests they may have found out about the installer from sources such as word-of-mouth, or cold-calling.

Installers may contact households

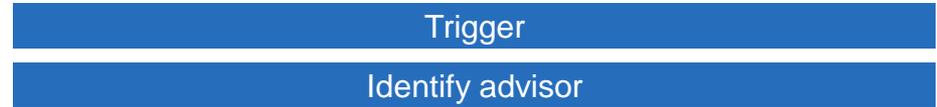
1 **36%\* of surveyed applicants cited the availability of funding as a trigger in itself.** (multiple response, base = 3,673). **80%** of domestic market installers perceived that domestic customers were motivated by financial reasons, including the RHI tariff payments. **56%** of installers (serving the domestic market only) and **80%** of installers (serving both the domestic and the non-domestic market) believed that the RHI had led to an increase in enquiries.





# For owner occupier RHI applicants, financial reasons were stated as the key driver of system choice

See previous pages for a description of these stages



1

As with non RHI applicants in non-emergency situations, **cost appears to be a key driver** of whether a renewable heating technology was taken up. Financial reasons were stated as the main reason for choosing a renewable heating technology (although environmental reasons were also very significant). The presence of the RHI was a particularly important factor for biomass.

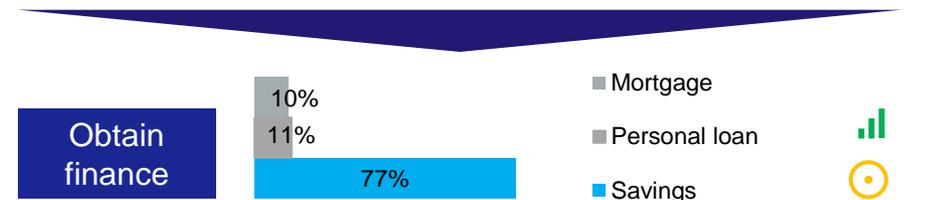


1

Of all households surveyed, **savings were most commonly used to finance the system**, with loans less important than for the population as a whole (multiple responses, base = 5,436).

2

Interviews indicate many applicants may not be aware of all sources of funding, that they may have distrusted some sources of funding, or disliked the idea of being in debt.



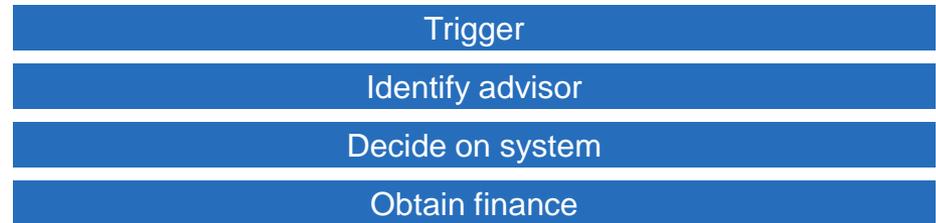
See following pages for a description of these stages



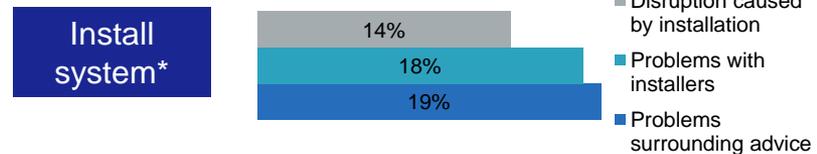


# Owner occupier RHI applicants are mostly happy with the application process and renewable heating technology

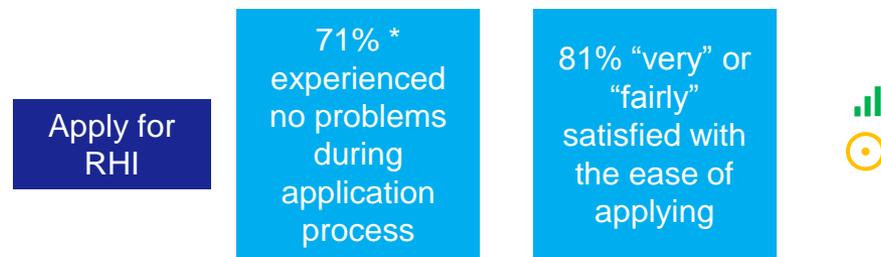
See previous pages for a description of these stages



1 **60% of owner occupier new applicants did not face any difficulties during the installation process.** For those that faced difficulties, the most important were problems with advice, problems with installers and disruption (multiple responses, base = 5,476).



1 **Most applicants were satisfied with the RHI application process.** The most common problem was "the application was originally rejected", followed by "unclear what information I needed to provide". Issues included a lack of digital literacy, technical issues, or receiving incorrect or insufficient information from installers.



1 **Satisfaction with different aspects of renewable heating technologies was relatively high.** Applicants who installed a ground source heat pump were most likely to report satisfaction (83% were very or fairly satisfied).

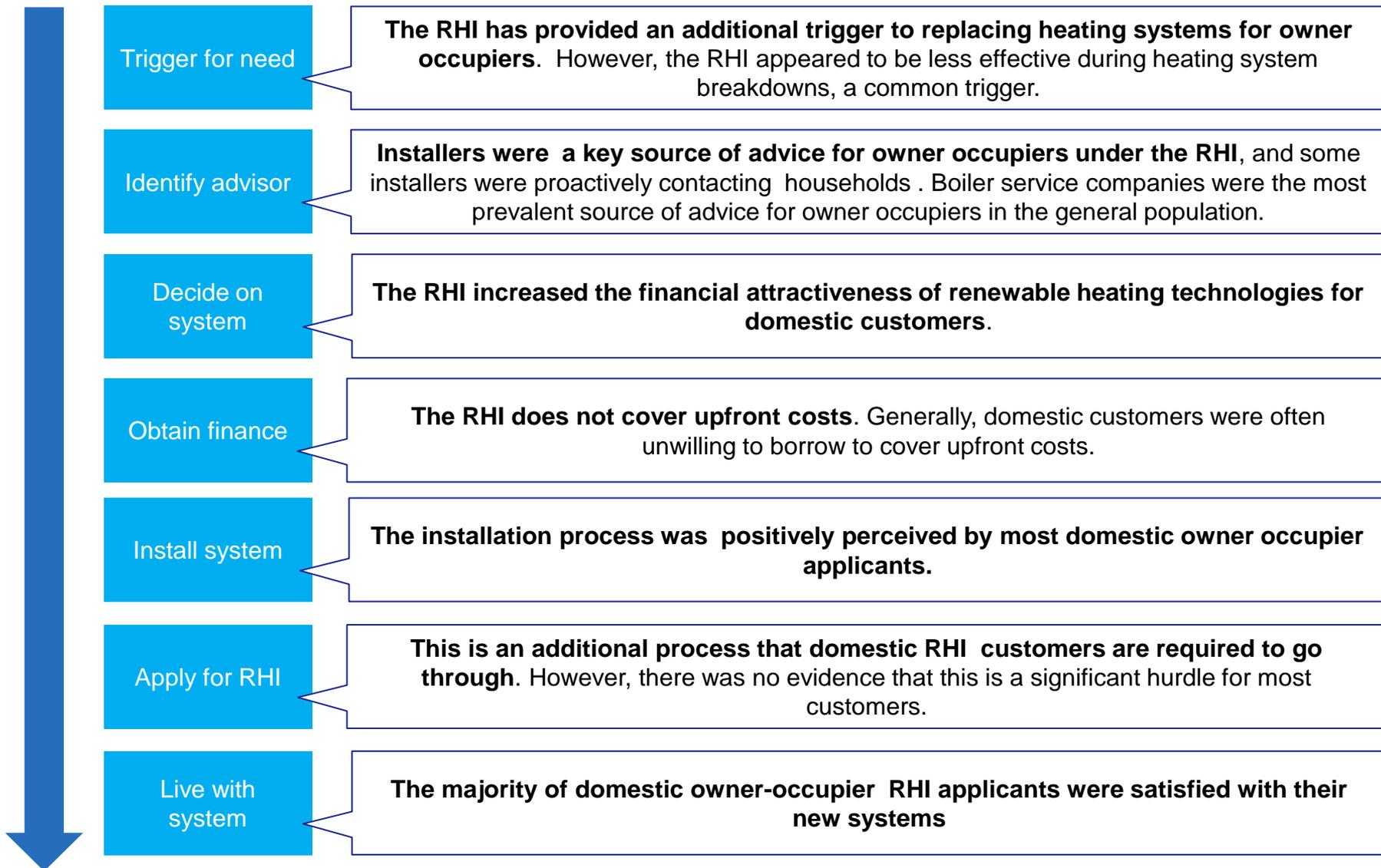




# The RHI has impacted some processes within the customer journey for owner occupiers



Department for  
Business, Energy  
& Industrial Strategy





# Further research would be required to fully understand why uptake of biomass has been higher than expected



18

By the end of April 2017\*:

- Biomass capacity made up 86% of non-domestic full application heat capacity under the RHI.
- 31% of **new** domestic (excluding social landlords) accreditations were biomass

These figures have fallen from a January 2015 peak of 97% and 56%, respectively. The reductions have coincided with degressions to the non-domestic small biomass and domestic biomass tariffs between 2014 and 2017\*\*.

4

Qualitative research with the biomass supply chain (covering both domestic and non-domestic markets) has indicated that biomass may have had fewer non-monetary barriers compared with heat pumps:

- Seen as more familiar technology
- More likely to work with existing heating system
- Easier to install

This research (carried out in February and March 2015) also suggests that tariffs were, at that point, perceived to be generous

But the relative importance of financial and non-financial barriers in determining higher than expected domestic biomass uptake under the RHI is not clear.

\*Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants – see Annex 3d. These figures do not include biomethane generation.

\*\* A full list of degression announcements for all technologies are available at: <https://www.gov.uk/government/statistics/rhi-deployment-data-april-2017>



# Evidence on triggers and upfront costs may be relevant for future policy



## Triggers

System breakdown was a common trigger for replacement outside the RHI for domestic owner occupiers.

System breakdown was a less common trigger for domestic RHI applicants – triggers such as refurbishment more significant.

## Upfront costs

Domestic owner occupiers were wary of financing renewable heating technologies through loans.

Domestic RHI applicants tended to be disproportionately well-off.

Evidence observed under the RHI

Implications

The RHI may have been less effective at targeting the common scenario of system breakdown. This could partly because MCS installers are required to give homeowners a cooling off period before they can install. It may also be because renewable technologies are less familiar to consumers.

The RHI may not have overcome upfront cost barriers for many households.

# 2B. NON-DOMESTIC RHI

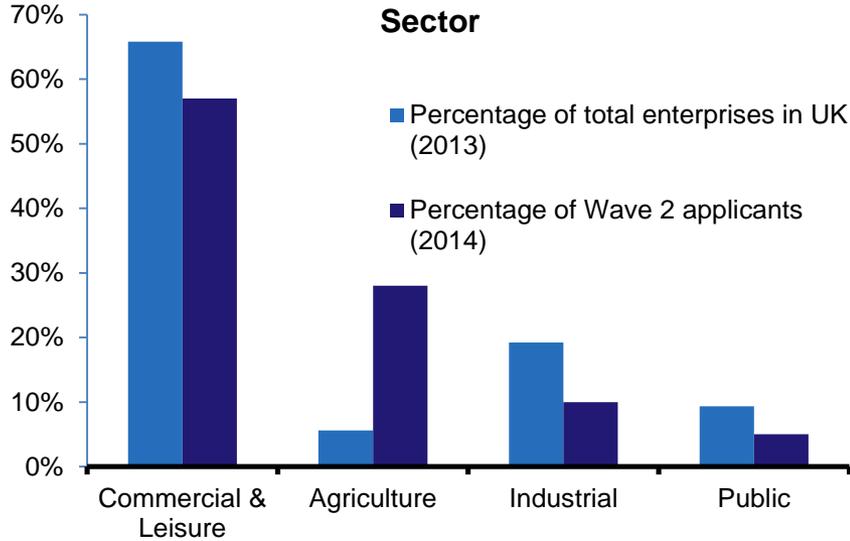




# Agricultural businesses and large organisations are over represented among non-domestic RHI applicants, compared to the general population



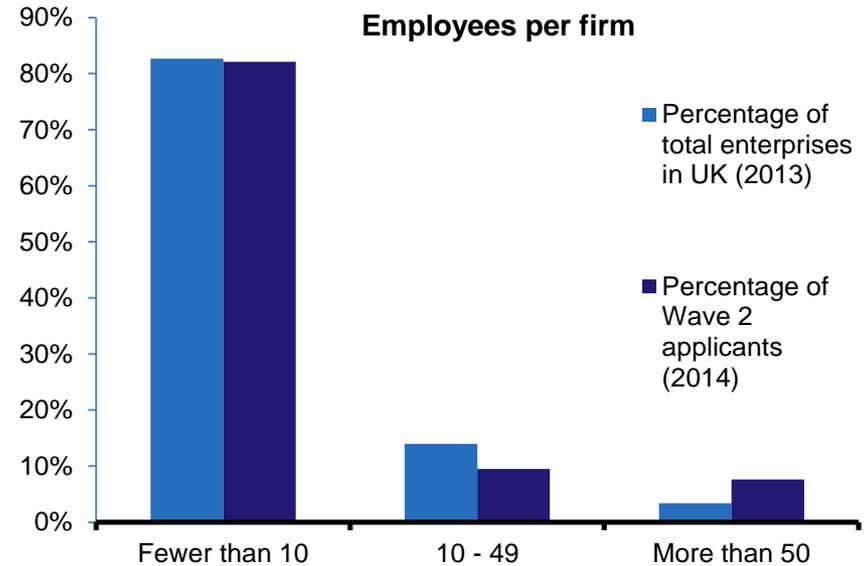
4  
23



Base: Wave 2 = 501.

Businesses in the agriculture sector are over represented among applicants, in comparison to the UK profile (the UK profile is based on 2013 data)

The size of applicant firms to date follows a similar pattern to the general population, though uptake is higher among larger organisations in comparison to the UK profile. Public sector organisations may be in part responsible for this: more than half of the public sector organisations applying have more than 50 employees.



Base: Wave 2 = 501.

4  
23



# Limited evidence is available on the customer journey for non-domestic non-RHI applicants

13

Triggers may be related to **commercial need** (existing system broken or near end of life, expansion in business activities) or the **potential for financial savings** (e.g. the perception that investment in the new system will pay back within 2 years).

Trigger



Identify advisor



Decide on system

The decision may be related to the **relative costs**, the **risks of disruption to the business**, and the impact that low-carbon investment could have on the **reputation with customers**.

13

13

There may be diversity in how companies fund changes in heating systems. **These could be part of normal operating costs, internal budgets or external sources.** Recent research for BIS found that only 19% of SMEs had sought external finance in the last 12 months. We therefore might expect that many firms would fund these installations without external finance.

Obtain finance



Install system



Live with system

24

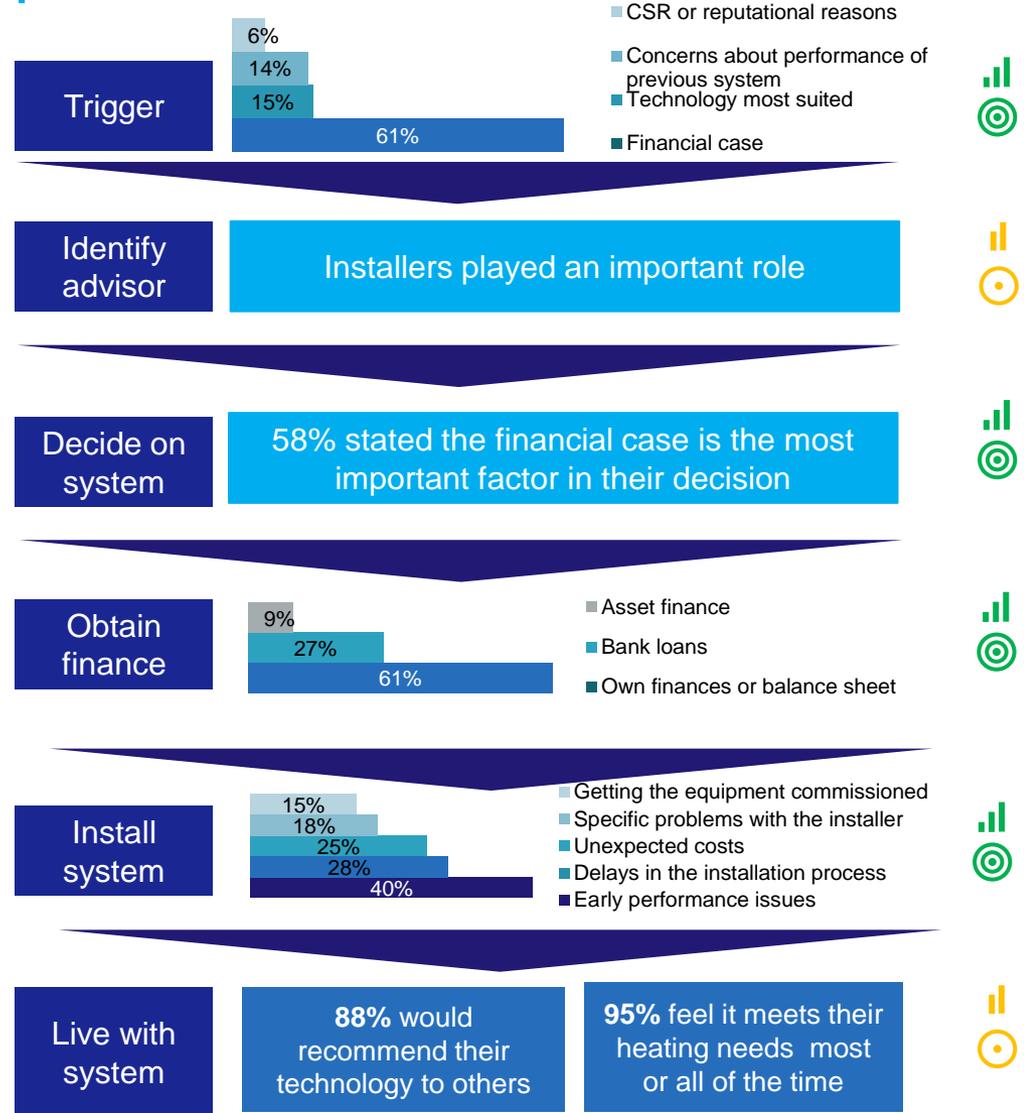
Due to a lack of evidence on non domestic customer journeys, this slide presents plausible hypotheses, generally based on research into SME behaviour in relation to energy efficiency.



# There is good evidence on the customer journey for non-domestic RHI applicants



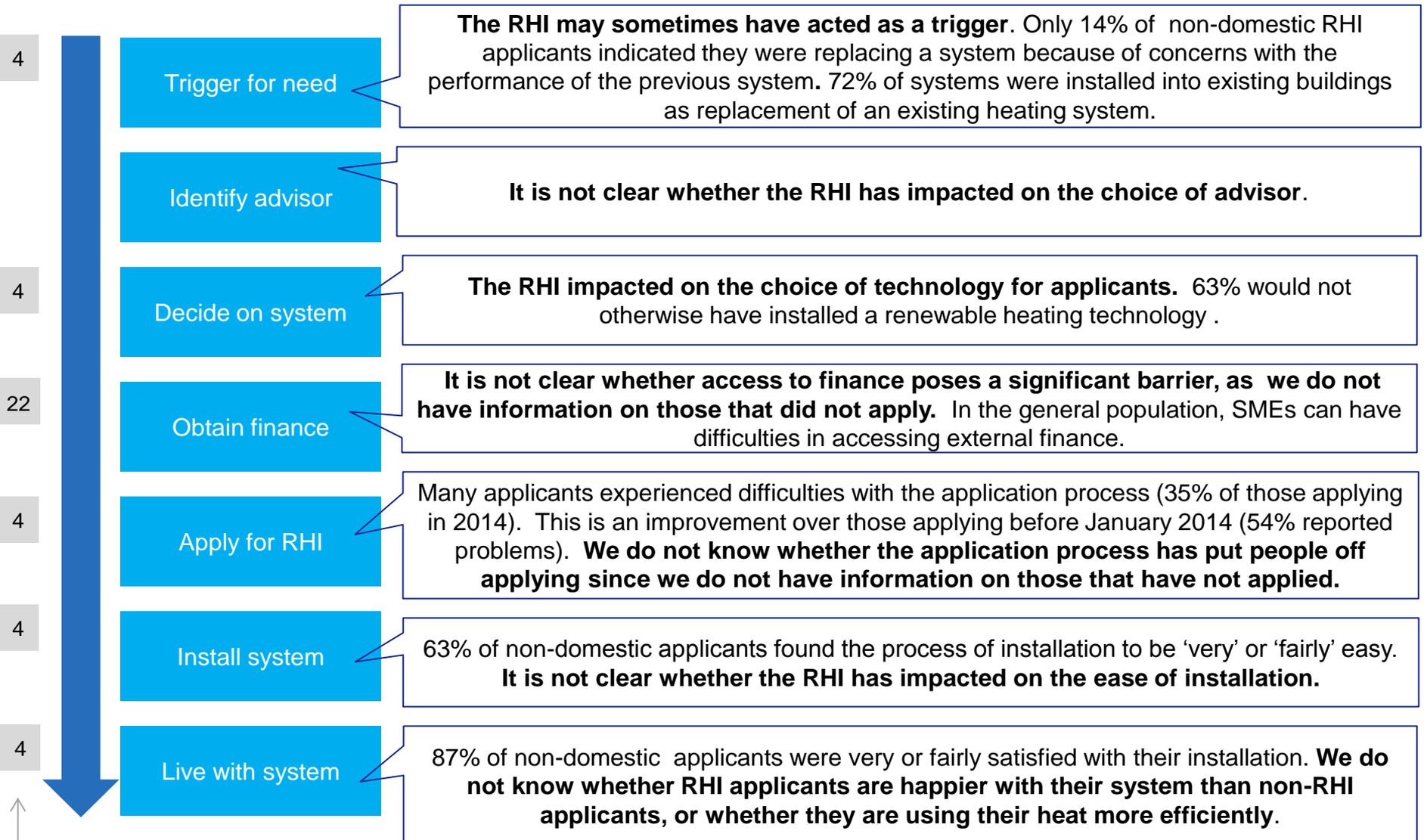
- 4 **For those installing in an existing building, concerns about the performance of the previous system were only a trigger 14% of the time.** 72% of systems were installed into existing buildings as replacements of existing systems (single response, base = 501).
- 4 **Qualitative research suggests that installers were making some non-domestic applicants aware of the RHI (as with domestic customers).** They also advised on the potential benefits.
- 4 **Financial and technical reasons dominated in terms of motivations.** 63% of non-domestic applicants would not have installed a renewable heating technology without the RHI. Further, 39% of applicants stated that depression (tariff reductions for new applicants) affected decisions on timing of their application, the technology type or size or how it has been operated.
- 4 **61% of non-domestic applicants used their own finance to purchase renewable heating technologies.** The larger biomass installations were the most likely to be bought using loans or finance packages (single response, base = 501). 71% of applicants have been able to use the type of financing they initially wanted.
- 4 **63% of non-domestic applicants found the process of installation to be 'very' or 'fairly' easy.** Despite this, 62% experienced problems with the installation of the system, for example unexpected costs (multiple response, base = 501).
- 4 **87% of non-domestic applicants were very or fairly satisfied with their installation.** 48% of applicants joining between January and December 2014 retained back up systems, though this had declined from 60% for those joining before January 2014.



Sources - see numbered list in Annex 3b (pages 50-51).



# The RHI has impacted some but not all processes within the customer journey...





# Some outcomes may be particularly relevant for future policy



Observed effect	Evidence to explain effect
<p>18</p> <h3>Dominance of biomass</h3> <p>86% of non-domestic installations are biomass (making up 86% of capacity)</p>	<p>4</p> <p><b>There are fewer non-financial barriers</b> . Qualitative evidence from the biomass supply chain suggests that it is perceived as easy to install, customers are familiar with it, it is suitable for older buildings <b>and tariffs, at the time of research were perceived to be generous by some.</b></p>
<p>4 23</p> <h3>Low levels of external financing</h3> <p>61% of non-domestic applicants used their own finance to purchase renewable heating technologies.</p>	<p>22</p> <p>Most firms are choosing to finance the installation of renewable heating technologies themselves and 71% of applicants have been able to use the type of financing they initially wanted. However, 74% of MCS installers operating in the non-domestic market felt that finance was the key barrier preventing consumers from choosing renewables.</p>



# Insights for policy can also be gained in relation to banding



## Observed effect

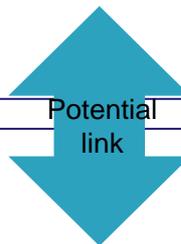
## Evidence to explain effect

4

### Response to tiering and banding

23% of all biomass installations were in the 190-199kW range though only 18% of biomass applicants stated that either tiering or banding had an impact on the size of the installation

The observed data suggests that applicants were sensitive to the magnitude of financial incentives. Some participants in the qualitative research believed installers were providing undersized 199kW systems (and using a gas boiler or multiple small installations to supplement capacity).



4

### Retention of back up systems

48% of non-domestic applicants have retained a back up system

The reasons provided included:

- to provide **extra heat** during extreme weather conditions (42%);
- when **insufficient temperature** is provided by the installation (42%); and
- when the installation is **out of service** (39%).

Multiple responses were possible.

# 2C. SOCIAL LANDLORDS





# For social landlords, the dominant trigger for replacement was systems nearing the end of notional life

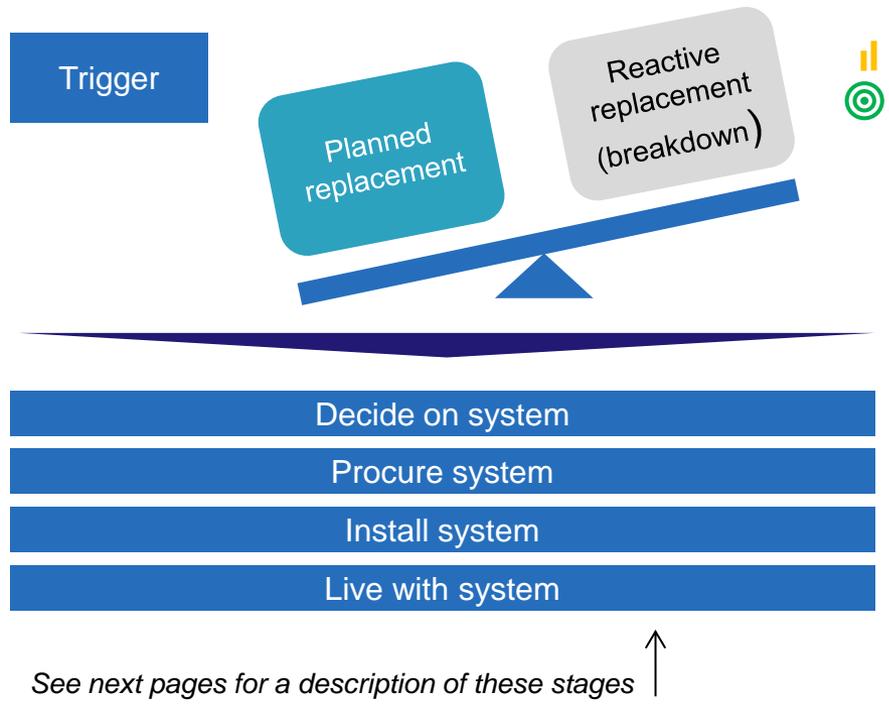
10

**Planned replacement, based on the notional life of the equipment** was the dominant trigger. The asset management database<sup>1</sup> was the fundamental driving tool for decisions. Decisions could be planned years in advance. This meant it was important for social housing providers to understand what grants loans and subsidies would be available in the future.

**Reactive replacement** of systems (due to breakdown) was perceived to be rare.

Other influencing factors included:

- **Government policy** – which might strengthen the case for replacing systems.
- **Tenant-related factors** – where systems are not providing adequate heat, are expensive or difficult to use.
- **Avoidance of ‘pepper potting’** – Social Housing Providers (SHPs) wished to avoid installing new systems at different times and creating a scenario where an area has mixed system types and ages.



↑

<sup>1</sup>The asset management database records the specification and expected lifespan of heating systems allowing social housing providers to plan for their replacement over a long time horizon.



# For houses and flats connected to gas, gas is the fuel of choice



10

Social housing providers reported how their **social and charitable objectives focussed on providing decent and affordable housing to those that need it**. These objectives colour all aspects of their asset management and procurement and translated to an overriding concern to provide homes which can be affordably heated.

▶ **For houses connected to gas, a mains fired boiler system serving a radiator circuit was considered the most desirable system.**

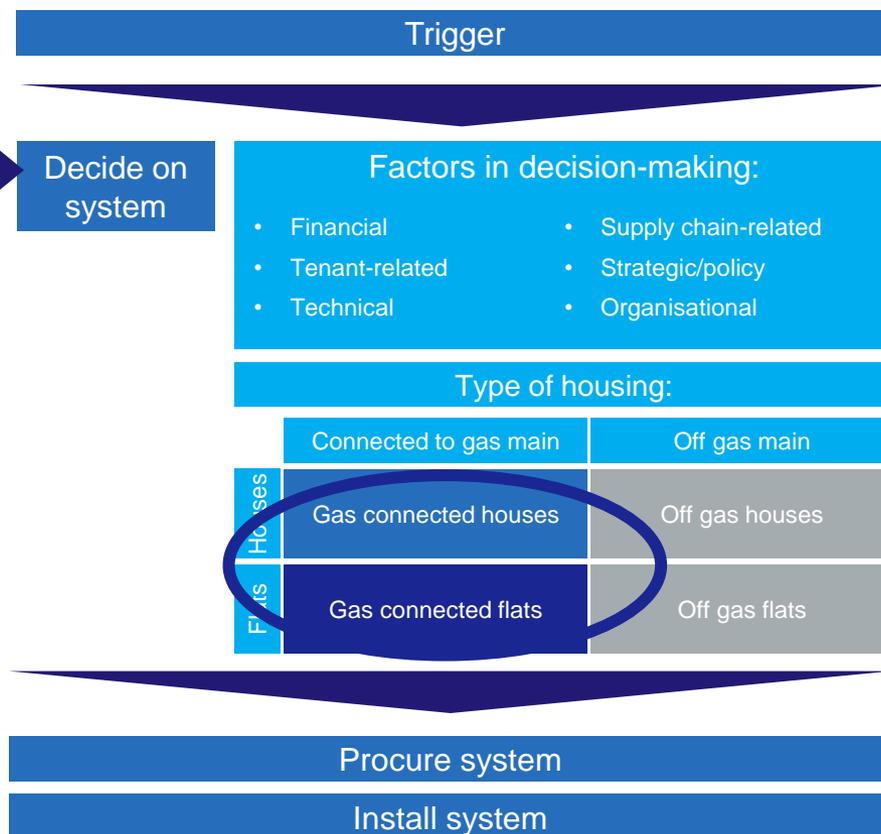
▶ **For flats connected to gas, a communal gas fired boiler was considered most desirable.**

- **Tenant-related factors:** Gas system is affordable for tenants and easy to control.
- **Technical factors:** Individual gas systems might be deemed unsuitable in blocks of flats for safety reasons.
- **Upfront and maintenance costs:** Gas systems were considered expensive to manage but despite this were the favoured option where available.

15

16

Moore et al found that tenants were given a choice on whether or not to have their heating system replaced with a heat pump. This research also found that some refused. This is backed up by evidence from the Renewable Heat Premium payment (RHPP) scheme evaluation.

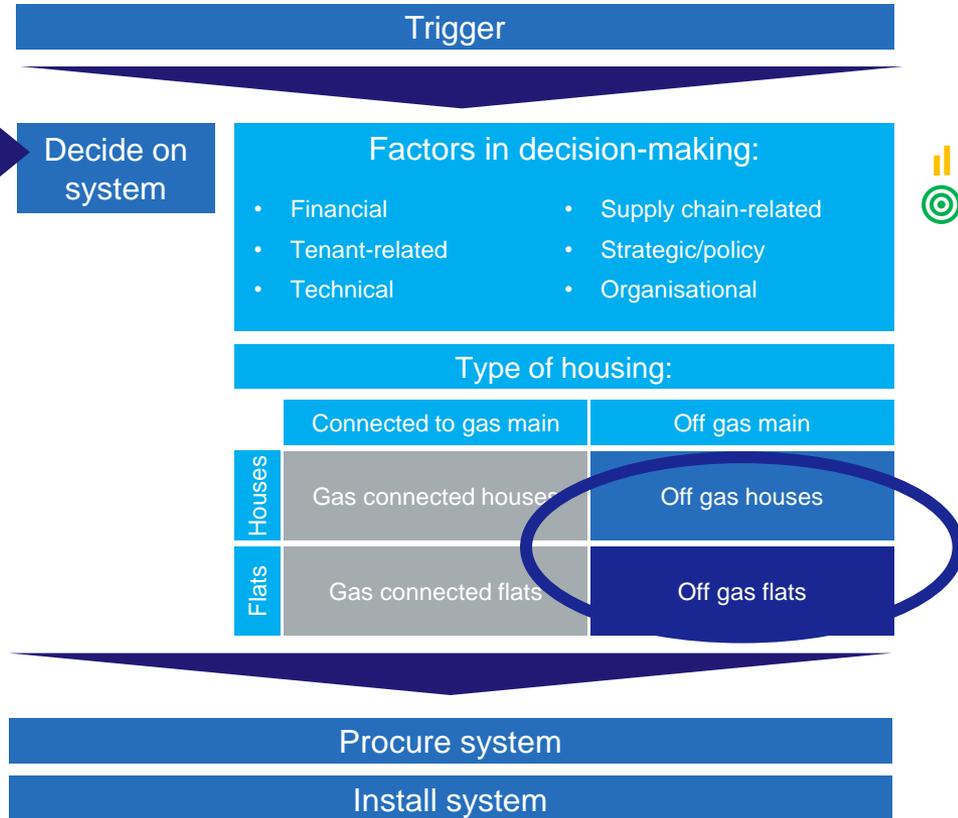




# For off-grid properties, electric storage heating has been commonly installed in the past, but renewable heating is also an option

10

- **Historically a lot of electric storage heating has been installed in off gas areas.**
- ASHPs were seen as an increasingly viable option for off gas areas because of their comparability with traditional systems in terms of size, and relative ease of installation (for example, compared with GSHPs).
- **Even so, social landlords sometimes preferred electric storage heating to renewable heating technologies:**
  - **Tenant-related factors:** renewable heating technologies were sometimes found difficult to use by tenants.
  - **Technical factors:** Next generation electric storage heating tended to be seen as reliable and easy to maintain.
  - **Upfront and maintenance costs:** renewable heating technologies were considered to have higher capital and maintenance costs than electric heating systems.
  - **Supply chain factors:** Concerns were raised about the quality and expertise of renewable heating technology installers and reliability of biomass supplies.
  - **Strategic/policy factors:** renewable heating technologies were not always considered as likely to reduce the costs of heating the home to a reasonable level (as measured by the SAP rating).





# Systems can be procured through tendering to third party contractors



14

Swan et al also found that the largest source of information on renewable technologies is professional networks, particularly other social housing providers (62%).

10

Social landlords were well informed about new heating technologies through channels such as desk research and using consultants, sales literature and calls from suppliers and existing relationships with suppliers.

Landlords could finance replacement through internal funding. Where grant funding was sought this was typically to undertake pilots. Borrowing finance was only discussed by council-led social housing providers.

16

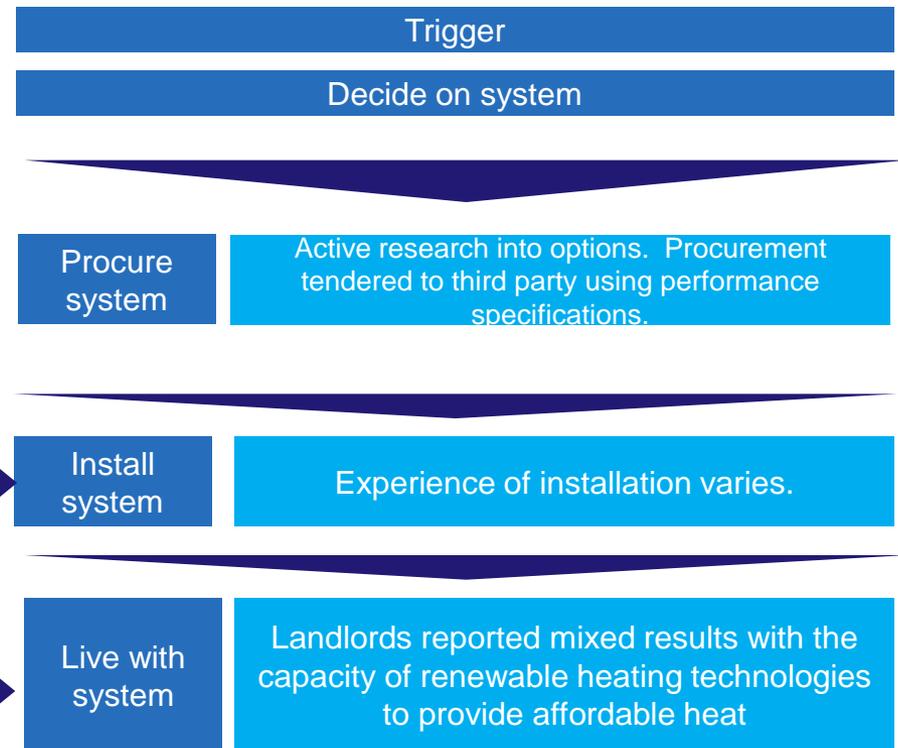
72% of tenants reported that installation was easy in the RHPP evaluation.

15

Moore et al found that there was a low level of dissatisfaction among tenants around disruption during installation.

16

Social tenants were generally positive about their new installation under the RHPP.



10



# Landlords could have multiple reasons for applying or for not applying



## Reasons for applying for RHI

### • Payback income

- For some SHPs the RHI was very important for making a business case for renewable heating technologies over other technologies.
- Where loans had been used, the RHI income could be used to pay off loans demonstrating a clear link between RHI payments and the additional costs.
- For others RHI was critical to supplement maintenance costs as renewable heating technologies were considered too expensive otherwise.

### • Performance

- Some felt the RHI income was not a critical factor since other factors were also important e.g. reliability and ease of use.
- Some SHPs had installed renewable heating technologies regardless of the RHI as they considered it the best technology therefore RHI was considered a bonus.

## Reasons for not applying for RHI

### • Policy change

- For some there was a concern around the stability of the policy after changes to the ECO funding criteria.

### • Resources and priorities

- Some SHPs had priorities focused on areas other than renewable heat, e.g. around improving fabric and insulation, sometimes with a focus on improving SAP ratings.
- SHPs did not always have time or resources to apply for schemes. Applying was described as a resource intensive process.

### • Suitability of technologies

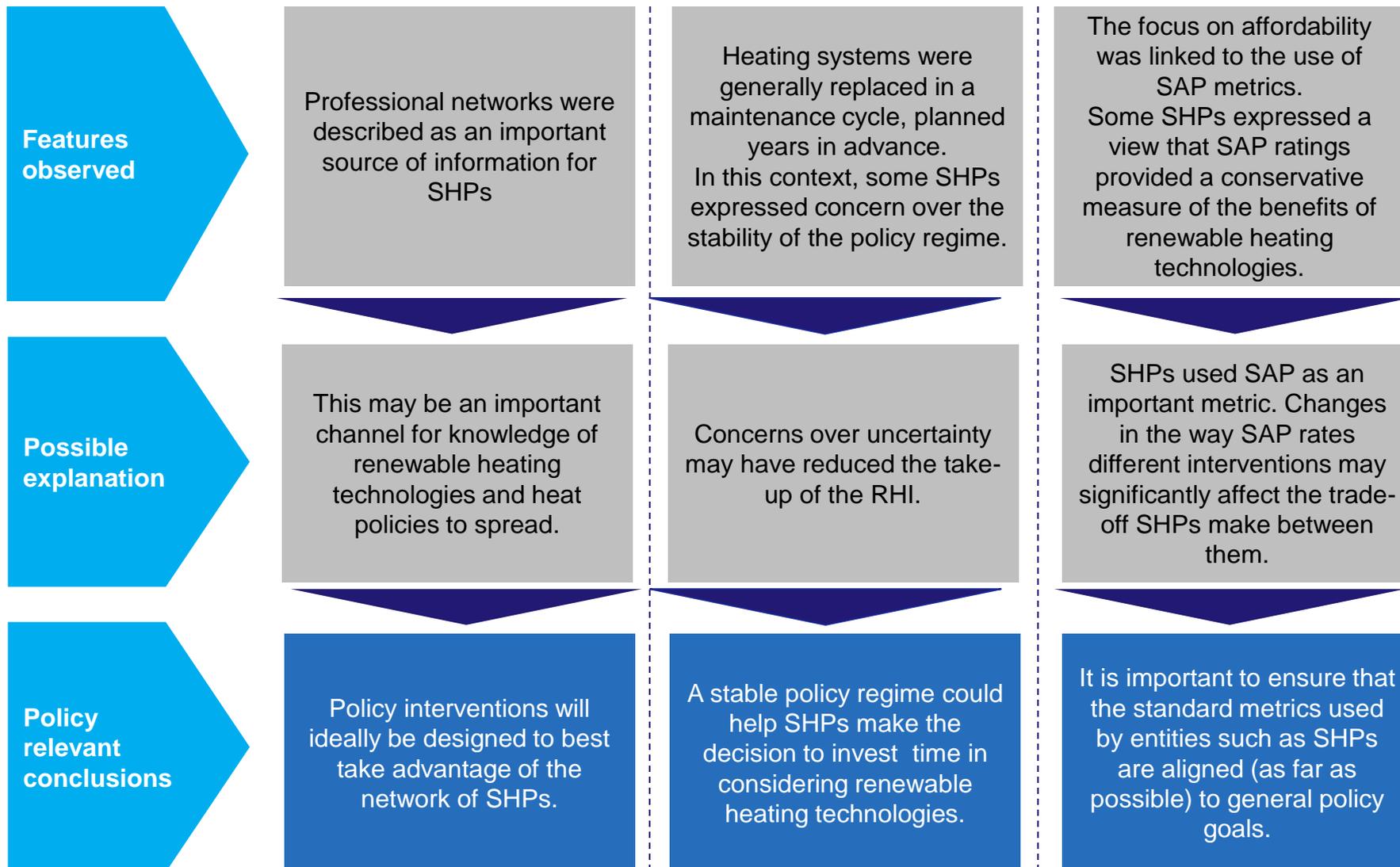
- SHPs often perceived that renewable heating technologies would not be suitable. For example, biomass boilers were often not considered appropriate because of the fuel storage requirements and issues with tenants handling solid fuel.

### • RHI tariffs

- For some the RHI tariffs were not thought to provide enough of a business case for renewable heating technologies due to all the additional costs of switching including foregone rent, while properties were being refitted.



# The research leads to some insights for policy



# 2D. INSTALLERS



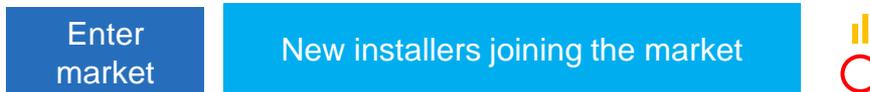


# The supply chain is responding to the RHI, but barriers remain



3

**22% of MCS installers had been active for less than 2 years.** A further 41% had been active for 3-5 years.



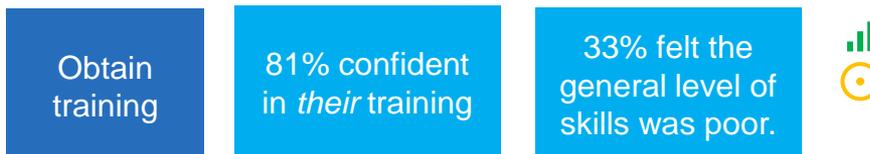
3

**Many MCS installers (21% of those serving the domestic market only and 28% of those serving both the domestic and non-domestic market ) felt the RHI had led to a greater range of models on the market.** Similar proportions felt the RHI had improved the quality of renewable heating technologies. Only 22% felt there had been an increase in the number of lower quality technologies on the market.



3

There was no evidence that the RHI affected the level of training within the industry. 90% of MCS installers received training from manufacturers. **Installers were typically confident in their own training, but less so in the general level of industry skills.**



3

**MCS installers tended to access customers via recommendations from other customers** (42% of domestic market installers and 37% of MCS non-domestic installers). Financial benefits appeared to be the main selling point. Upfront costs were the main reason why customers did not go on to install renewable heating technology. However technical suitability was more of an issue for GSHPs and ASHPs.



3

**MCS installers perceived that financial barriers remain.** The majority of organisations in the domestic (61%) and non-domestic (63%) markets reported that either 'some' or 'a lot' of potential customers did not go on to install a renewable heating technology after enquiring.





# MCS installers generally perceive a positive impact from the RHI



## Positive

- 3 • **58% of MCS installers felt that the influence of the RHI has had a 'positive' impact**
- Organisations that installed biomass technologies were the most likely to cite positive impacts associated with the RHI, including an '*increase in enquires*' (85% compared to 62% for installers that did not install biomass), an '*increase in sales*' (71% compared to 43%) and a '*greater range of models available*' (34% compared to 18%).
- 42% of MCS installers in the non-domestic market felt that '**none**' of their installations would have gone ahead without the RHI. This figure compares to 23% for the domestic market.
- 4 • Some participants in non-domestic supply chain felt that degression could lead to more demand in the medium-and-large-scale markets. More established businesses suggested that degression could have a positive effect on the market as 'opportunistic organisations' disappear.

## Less positive

- **8% of MCS installers believed the RHI to have had a 'negative' impact.** 34% of MCS installers believed that it had both a '*positive and a negative*' influence.
- MCS installers that had been installing renewable heating technologies for longer were less likely to view the RHI as having a wholly positive impact, in particular those that had been installing for over 6-10 years (51%). This compares with 73% for organisations that had been installing for under 3 years.
- Of the installers that reported negative impacts, the most frequently cited negative impacts of the RHI included:
  1. Uncertainty due to the nature of the degression mechanism
  2. An increase in the number of lower quality technologies on the market
  3. A decrease in the market share of some technologies due to lower tariff payments
- There is some qualitative evidence from the biomass supply chain research that the RHI tariff structure may have led to inefficient sizing or inefficient use of heat, though the prevalence of this is not clear.
- 4

# 3. ANNEXES



# 3A: METHODOLOGY





# This annex outlines the five stages of the synthesis methodology

The synthesis process was led by **Frontier Economics**, with expert input and analysis from the consortium (**Natcen, Eunomia and CSE**) and **DECC**.



The evaluation research comprised of new qualitative and quantitative evidence collected by Natcen, Eunomia and CSE. It was peer reviewed by the consortium, and quality assured by policy and analytical experts at DECC.



# The first stage was to review the evaluation evidence against the original research questions

1

Review of evaluation research against original evaluation research questions

The consortium and DECC assessed the extent to which 24 research projects had answered the 100+ original research questions

Each question was RAG rated according to the following criteria

- R** Not there and not likely to be available
- A** Not there but could be produced from further analysis of the data
- G** There and ready to be synthesised

The outputs were summarised in a spreadsheet tool for DECC. This fed into the first workshop.

# The first workshop provided an opportunity to peer review emerging themes and evidence against evaluation questions

## 2 First workshop with consortium to identify emerging story and key themes

May 2015. Led by Frontier Economics with attendees from DECC, Natcen, Eunomia and CSE.

### Before the workshop

- Exhaustive review of **draft evaluation outputs**
- Identification of **emerging story** and **key themes** for discussion
- **RAG rating analysis**

### At the workshop

- **Discussion and challenge** of emerging stories and key themes from the strand reports and answers to the research questions.
- **Identification of gaps and potential sources to fill the gaps**, based on RAG rating analysis
- Discussion of **key methodological issues** and how we could best structure the outputs to capture the learning and present the evidence in a compelling way.

### Outputs of the workshop

- Agreement methodology (**customer journey analysis**) .
- It was agreed that this could provide a useful structure for the analysis allow exploration of both impact and process issues.

# We then reviewed the research again to construct customer journeys to explore the RHI process and its impacts

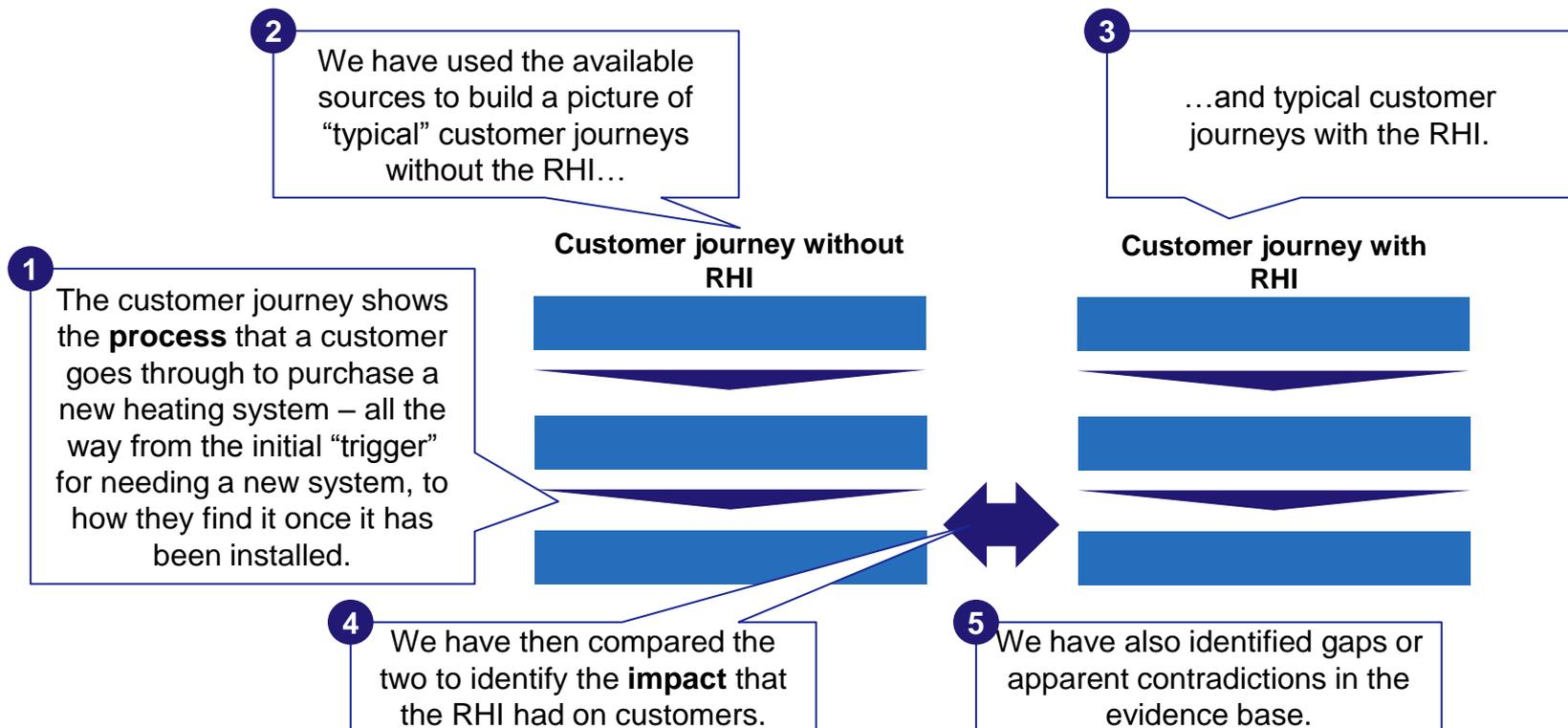
3

Further review of evaluation research

4

Review of wider evidence

Wider evidence was identified through consultation with experts in the consortium and DECC, and through Google Scholar searches. See Annex 3b for full list of sources.



# The final workshop brought together the consortium to discuss and challenge the findings

## 5 Second workshop with consortium to discuss and challenge synthesis findings.

September 2015. Led by Frontier Economics with attendees from DECC, Natcen, Eunomia and CSE.

### Before the workshop

- Review of **final evaluation outputs and wider evidence.**
- Construction of draft **customer journeys**, and review by DECC and all consortium members.

### At the workshop

- **Roundtables to discuss and challenge**

**Roundtable 1:**

- What have we learnt from the RHI evaluation?

**Roundtable 2:**

- Where are the areas of contradiction/conflict? What is baffling/surprising?
- What gaps still remain?

**Roundtable 3:**

- What are the implications for future policy development?

### Outputs of the workshop

- Finalised customer journey analysis.
- Agreement on themes for cross cutting findings.

# 3B: SOURCES



# Research commissioned for this evaluation



Reference number used in this document	Authors	Date	Title
1	Natcen and CSE	2017	Census of Domestic RHI Applicants
2	Natcen	2015	Qualitative research with Domestic RHI applicants
3	Eunomia and Natcen	2015	MCS Installers Survey
4	Eunomia and Natcen	2015	Survey of Non-Domestic RHI Applicants Wave 2 and Qualitative Research: Non-Domestic Large Installations Supply Chain
5	Eunomia	2014	Evaluation of the Renewable Heat Incentive: Interim Report: Non domestic scheme
6	Eunomia	2014	Qualitative research: Investors
7	Eunomia	2014	Qualitative research: Multiple applicants
8	Eunomia and Natcen	2014	Survey of Non-Domestic RHI Applicants Wave 1
9	Eunomia and Natcen	2014	Qualitative Research: Possible applicants to the non-domestic scheme
10	CSE	2015	Survey of Social Housing Providers

Reference number used in this document	Authors	Date	Title
11	DECC	2015	Public Attitudes Tracker Survey, Wave 14
12	IPSOS Mori and EST	2013	Homeowners' Willingness To Take Up More Efficient Heating Systems
13	DECC	2014	Research to Assess the Barriers and Drivers to Energy Efficiency in Small and Medium Sized Enterprises
14	Swan et al	2013	"Adoption of sustainable retrofit in UK social housing", Structural Survey Vol. 31
15	Moore et al	2015	Improving the installation of renewable heating technology in UK social housing properties through user centred design'. Indoor and Built Environment
16	DECC	2015	Evaluation of the Renewable Heat Premium Payment Scheme Phase Two
17	DECC	2013	Final RHI Impact Assessment: RHI Tariff Review, Scheme Extensions and Budget Management
18	DECC	2015	RHI deployment data: September 2015 and September 2016
19	DECC	2014	Sub-national electricity and gas consumption statistics
20	DWP	2015	Family Resources Survey: financial year 2013/14
21	BFP	2014	Property data report
22	BIS	2012	SME Access to external finance
23	ONS	2013	UK Business: Activity, Size and Location, 2013
24	BIS	2015	Small Business Survey 2014: SME employers

# 3C: NOTES RELATING TO CHARTS



Data from Natcen's topline results file. "What is your household's total income before tax [...] as well as income from other sources such as interest from savings?"

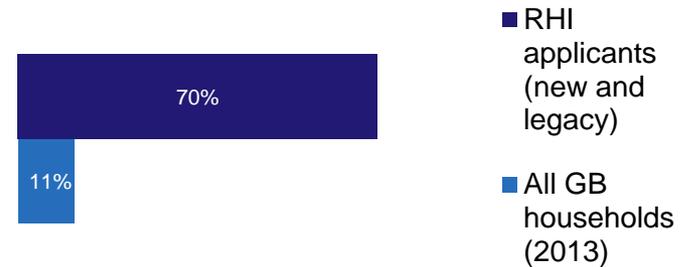
Proportion of households with weekly income > £1,000



Data from the Family Resources Survey: financial year 2013/14 (latest year available). This source was chosen as it contains official statistics produced by Government.

Data from Natcen's topline results file. "Is your home connected to the National Gas Grid?"

Proportion of households off the gas grid

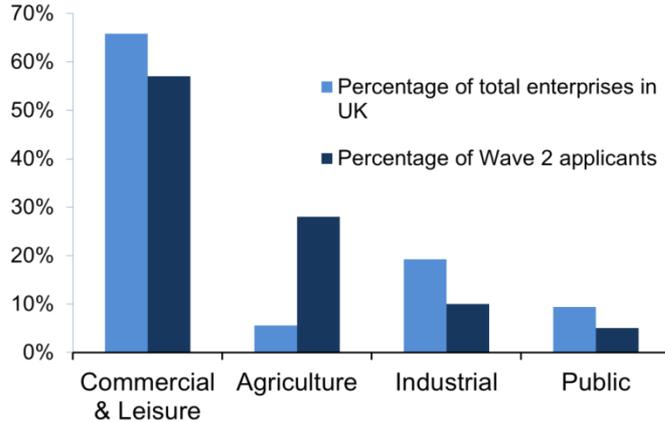


Data from the Sub-national electricity and gas consumption statistics

# Notes for Charts



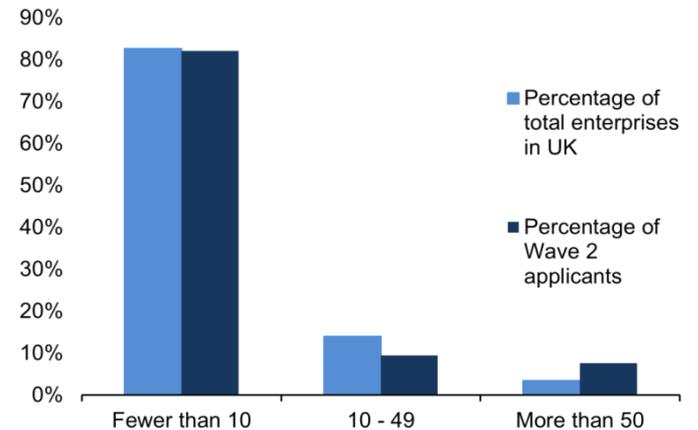
Categories used by Eumonia were mapped to SIC codes as follows



UK SIC 2007 Classification	Classification in this document
Agriculture, forestry & fishing	Agriculture
Production	Industrial
Construction	Industrial
Motor trades	Commercial & Leisure
Wholesale	Commercial & Leisure
Retail	Commercial & Leisure
Transport & storage (inc. postal)	Industrial
Accommodation & food services	Commercial & Leisure
Information & communication	Commercial & Leisure
Finance & insurance	Commercial & Leisure
Property	Commercial & Leisure
Professional, scientific & technical	Commercial & Leisure
Business administration and support services	Commercial & Leisure
Public administration and defence	Public
Education	Public
Health	Public
Arts, entertainment, recreation and other services	Commercial & Leisure

Data is taken from (4) and from ONS: TABLE A1.2 UNITED KINGDOM - NUMBER OF LOCAL UNITS in VAT and/or PAYE BASED ENTERPRISES in 2013

Data is taken from (4) and from ONS: TABLE A1.1 UNITED KINGDOM - NUMBER OF LOCAL UNITS in VAT and/or PAYE BASED ENTERPRISES in 2013



# 3D: CHANGES MADE TO REFLECT DATA FROM WAVES 13-24



# Significant updates made to reflect data from waves 13-24



The January 2016 publication of this synthesis report included findings from waves 1-12 of the domestic applicant census. This version has been updated so that all findings from the domestic census reflect those from waves 1-12 and 13-24 of that census. Any changes of more than 1 percentage points are noted in the tables below and indicated with a \* within the slides above.

Full results from waves 1-24 of the domestic census, and commentary on changes over time, are available at: <https://www.gov.uk/government/collections/renewable-heat-incentive-evaluation>

Slide number	Data used in 2016 report (waves 1-12)	Revised data (waves 1-24)	Explanation of update
5	The availability of a grant or other funding was the most common reason for applicants to decide to install a new heating system (41%).	The availability of a grant or other funding was the most common reason for applicants to decide to install a new heating system (36%).	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants
6	Proportion of households with weekly income > £1000. RHI Households: 37% Base for RHI: 10,341	Proportion of households with weekly income > £1000. RHI Households: 44% Base for RHI: 9,621	In the January 2016 version, the income calculations were based on a subset of the data from waves 1-12 (the base figure presented was also incorrect). The calculations have now been updated to include all data from waves 1-24 with the correct base figure.
6	Proportion of households off the gas grid. RHI households 72% Base for RHI: 25,568	Proportion of households off the gas grid. RHI households 70% Base for RHI: 35,421	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants
8	However only 35% of owner-occupier RHI applicants installed a renewable heating technology because they needed to replace their system.	However only 32% of owner-occupier RHI applicants installed a renewable heating technology because they needed to replace their system.	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants

# Significant updates made to reflect data from waves 13-24



Slide number	Data used in 2016 report (waves 1-12)	Revised data (waves 1-24)	Explanation of update
10	For domestic owner-occupier applicants, the RHI tariff payable influenced the technology choice of 44% of applicants and especially for those installing biomass systems (60% said their choice was influenced by the tariff).	For domestic owner-occupier applicants, the RHI tariff payable influenced the technology choice of 45% of applicants “a great deal,” especially for those installing biomass systems (58% said their choice was influenced “a great deal” by the tariff).	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants and revised to add “a great deal” for accuracy
11	73% of owner occupier applicants indicated that they had heard about renewable heating technologies from installers. Research also shows that installers were an important and highly trusted source of information: 33% of new applicants who accessed more than one information source chose installers as the most trusted and 59% of new applicants heard about the RHI from installers.	71% of owner occupier applicants indicated that they had heard about renewable heating technologies from installers. Research also shows that installers were an important and highly trusted source of information: 33% of new applicants who accessed more than one information source chose installers as the most trusted and 57% of new applicants heard about the RHI from installers.	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants
16	Proportion of households with weekly income > £1000. RHI Households: 37% Base for RHI: 10,341	Proportion of households with weekly income > £1000. RHI Households: 44% Base for RHI: 9,621	In the January 2016 version, the income calculations were based on a subset of the data from waves 1-12 (the base figure presented was incorrect as it did not reflect this). The calculations have now been updated to include all data from waves 1-24.
16	Proportion of households off the gas grid. RHI households 72% Base for RHI: 25,568	Proportion of households off the gas grid. RHI households 70% Base for RHI: 35,421	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants

# Significant updates made to reflect data from waves 13-24



Slide number	Data used in 2016 report (waves 1-12)	Revised data (waves 1-24)	Explanation of update
19	<b>The graph shows that triggers relating to property work</b> (highlighted in blue) <b>are particularly important.</b> “Need to replace” was only cited as a trigger by 35%, far less than the wider population (70% - see previous slide). (Multiple response, base = 1,223).	<b>The graph shows that triggers relating to property work</b> (highlighted in blue) <b>are particularly important.</b> “Need to replace” was only cited as a trigger by 32%, far less than the wider population (70% - see previous slide). (Multiple response, base = 3,673).	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants
19	<i>Of all households surveyed</i> (not just those replacing due to renovations), <b>73% heard about renewable heat technologies from an installer.</b> Installers were also the most trusted source of information. (Multiple response, base = 3,115).	<i>Of all households excluding legacy applicants surveyed</i> (not just those replacing due to renovations), <b>71% heard about renewable heat technologies from an installer.</b> Installers were also the most trusted source of information. (Multiple response, base = 5,518).	Clarification added that all households does not include legacy applicants here. Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants
19	<b>41% of surveyed applicants cited the availability of funding as a trigger in itself.</b> (multiple response, base = 1,233).	<b>36% of surveyed applicants cited the availability of funding as a trigger in itself.</b> (multiple response, base = 3,673).	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants
19	Trigger chart Moving in: 11% New build: 13% Green Deal: 25% Refurbishing: 34% Need to replace: 35% Funding available: 41%	Trigger chart Moving in: 14% New build: 20% Green Deal: 25% Refurbishing: 33% Need to replace: 32% Funding available: 36%	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants
19	Identify advisor chart Advisor: 38% Website: 38% EST: 44% Installer: 73%	Identify advisor chart Advisor: 38% Website: 40% EST: 43% Installer: 71%	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants

# Significant updates made to reflect data from waves 13-24



Slide number	Data used in 2016 report (waves 1-12)	Revised data (waves 1-24)	Explanation of update
20	Across the main reasons given, <b>45%</b> were financial (e.g. saving money or claiming the RHI), <b>21%</b> were attitudinal (e.g. liking the technology or hearing recommendations from others),	Across the main reasons given, <b>42%</b> were financial (e.g. saving money or claiming the RHI), <b>23%</b> were attitudinal (e.g. liking the technology or hearing recommendations from others),	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants
21	Install system chart Disruption caused by installation: 14% Problems with installers: 28% Problems surrounding advice: 30%	Install system chart Disruption caused by installation: 14% Problems with installers: 18% Problems surrounding advice: 19%	The figures used in the 2016 report incorrectly calculated the thematic totals without recognising that the question was a multi-code. Simple additions of response options led to an overstatement of the proportion of applicants falling into each thematic category. This analysis has been revised and the figures have been updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants
21	67% experienced no problems during the application process	71% experienced no problems during the application process	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants
21	Where problems were encountered, this was mainly due to the process being unclear	The most common problem was "the application was originally rejected", followed by "unclear what information I needed to provide"	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants
21	80% were very or fairly satisfied with their renewable heating technology	78% were very or fairly satisfied with their renewable heating technology	Updated to reflect the new data from waves 13-24 of the Census of Domestic Applicants



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