



optiheat



University of
BRISTOL

Audit samples

MCS/Optiheat/Bristol
Uni - July 2024



28 audits completed

- Mix of tenures
- Primarily documenting
- Some advice given
- Conducted by MCS

Airport road -
January 2025



25 audits completed

- All new co-located new builds
- All BCC social housing
- Primarily documentation
- More commentary on system design

Nesta/BCC - June to
November 2025



39 audits completed

- All BCC social housing
- Mix of property archetypes
- Evolution: commissioning, onsite repairs, recommendations, design commentary

Typical issues - Failed to:



Seal external pipes against water ingress:

23
(Q21)



Insulate external pipework: gaps around valves or strainers:

18
(Q17)



Install Heat Pump on a level surface :

18
(Q9)



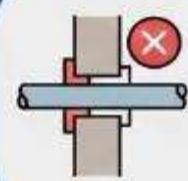
Install continuous insulation through the building fabric and into the building:

17
(Q19)



Insulate all accessible pipes from reused/extended systems

17
(Q24)



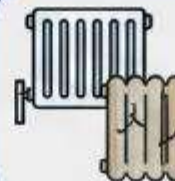
Sleeve and seal the pipework passing through the external building fabric:

17
(Q16)



Use UV-resistant insulation on external pipework:

15
(Q20)



Install replacement/new heat emitters

5
(Q30)



To route and support electrical cables:

5
(Q26)

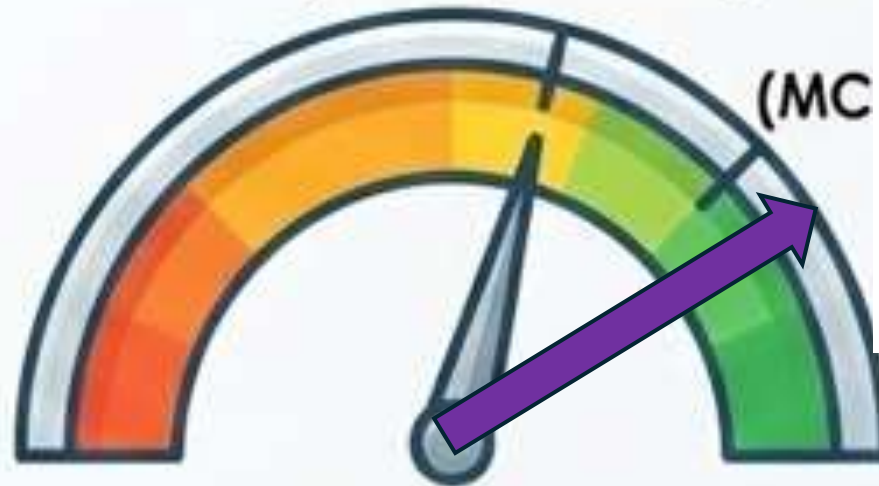


Set up arrangement under the HP for condensate run off to drain:

4
(Q15)



2.6
(Average SCOP)



(MC 3 - 3.5

(Smart tariff/ gas
standing charge
removal)

Smart Tariffs can change the game!



Heat pump in situ performance: a national issue

<https://es.catapult.org.uk/report/electrification-of-heat-summary-reports-and-datasets/>

[EOH DATA](#) Open Energy Monitor

BEIS Electrification
of Heat

Average SCOP 2.8

Home Surveys and
Install Report

CATAPULT

LCPDelta

Grid
Operator
Group





[More about Cosy heatpumps here.](#)



Boiler Beater

Our live dashboard shows that over the last year **80%** of Cosy heat pump customers paid less to heat their home than they would with a gas boiler.

Last 30 days average [COP](#)

4.12

(kWh out to kWh in)

Last 90 days average COP

3.89

(kWh out to kWh in)

Last year average [SPF](#)

3.68

Full-year heating & hot water efficiency

80%

of Cosy heat pumps have been cheaper to run over the last year than a gas boiler. Those on our heat pump tariff, Cosy Octopus, saved on average £219 a year vs a gas boiler.

Pre-installation



Pre installation: What we learned

- Lack of organisational skills in heat pumps
- No detailed specification for retrofit or new builds
- Disparate approaches across different teams
- Lack of tools used to help the management of projects
- MCS/ Trustmark aren't good measures of quality

Pre installation: Recommended Actions

Action 1. Establish the Organogram of Officers

Action 2. Understand current skills/ knowledge

Action 3. Set up a Heat Pump Working Group

Action 4. Undertake Heat pump training: technical non technical

Action 5. Find a good installer

Non- Technical Heat Pump Training

Key aims of the programme

- Empower teams to oversee the design, delivery and operation
- Raise quality standards at all stages
- Effectively facilitate remedial works where needed

Format

- 1.5 days, in-person
- Day 1 Classroom-based, with group exercises;
- Day 2 Site visit to 1-2 local heat pump installations.

Share resources for onward learning and reference

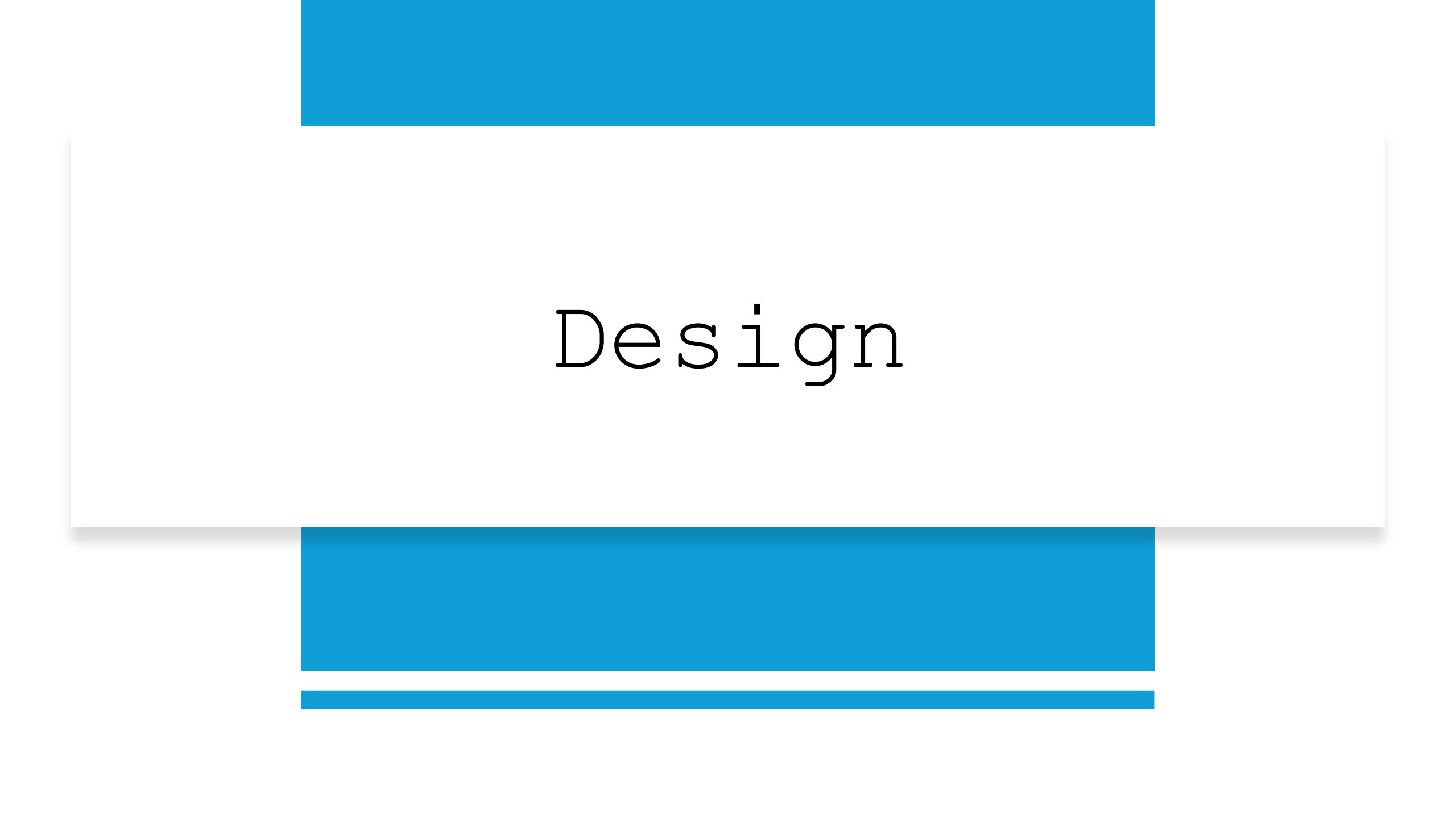


Training enquiries
www.greenregister.org.uk

Key takeaways

1. Taking responsibility for your own learning is critical
2. Important to understand existing organisational competencies
3. Building strong relationships between internal stakeholders can help lay foundation for chance to take place
4. Invest in understanding how to find the best installers





Design

Design: What we learned

- Lack of detailed specification for installers
- Often poor system designs are the foundation of poor-quality installs
- Lack of skills to check designs amongst delivery teams
- M&E consultants often the worst designers
- Lack of heat loss calculations to size heat pumps correctly

Bad
design
Bad
instal

Heat Pump Design Calculations

| PROPORTIONS, ENERGY CONSUMPTION, AND PERFORMANCE | | |
|--------------------------------------------------------------------------------------------------------------------|----------|------|
| Proportion of space heating and water heating demand provided by heat pump (excluding auxiliary/immersion heaters) | % | 100 |
| Capacity @ design conditions | kW | 5 |
| Renewable heat | kWh/yr | 5930 |
| Electricity consumed by HP (excluding auxiliary/immersion heaters) | kWh/yr | 3522 |
| Electricity consumed by immersion (supplied as part of HP) | kWh/yr | 0 |
| Fuel consumed by auxiliary/other heat sources | kWh/yr | 0 |
| HP combined performance SCOP | SCOP | 2.68 |
| Star Rating / Flow Temperature | 3 / 50°C | |
| Outside air temperature | -1.64°C | |



x

Renewables Ltd
Certification Number [redacted]





Design: Recommended Actions

Action 1. Review and update existing specifications/ employer requirements

Action 2. Monitor the implementation of specification KPIs.

Action 3. Seek expert advise to check designs/ build internal skills

Heat Pump Guidance Doc



4.4. SCOP performance requirements

What to decide

Set minimum and aspirational SCOP (Seasonal Coefficient of Performance) and SPF (Seasonal Performance Factor) thresholds for installed systems. See also '4.4 System design temperature limits'.

Determine how performance will be verified and incentivised. This includes deciding whether to link payment or preferred supplier status to in-situ performance outcomes.

What you need to know

SCOP (Seasonal Coefficient of Performance) is a standardised, modelled performance metric, representing the average system efficiency over a 12-month period. COP (Coefficient of Performance) is a snapshot measure of efficiency within a defined time period under specific conditions.

SPF (Seasonal Performance Factor) is defined as a real-world, measured efficiency metric across 12 months.

SCOP and SPF are key indicators of system performance and, therefore, running cost. SCOP is calculated as the ratio of total heat output (kWh) to total electrical energy input (kWh). A higher SCOP/SPF indicates better performance and, therefore, lower running costs. Note that SCOP and SPF are often used interchangeably.

Based on Ofgem's April-June 2026 energy price cap unit rates, a minimum SCOP/SPF of around 3.65 is required simply to match the running costs of the gas boiler being replaced (assuming 85% boiler efficiency).

Real-world monitoring data from the Electrification of Heat Demonstration Project (average SPF = 2.8) and HeatPumpMonitor (average SPF = 3.9) show that SPFs vary

significantly depending on installer competence, system design and commissioning quality. High SCOPs can be achieved across all housing types and building ages.

HeatPumpMonitor demonstrates that installations by highly trained engineers with expertise in low-temperature design consistently achieve SPFs above 3.5, with top-performing systems exceeding 4.5. In contrast, large-scale field trials, such as the Electrification of Heat Demonstration Project, show average SCOPs are around 2.8. Bristol City Council's heat pump audits observed that underperforming systems are often linked to insufficient installer training and lack of performance monitoring.

Homes with very low space-heating demand often exhibit lower overall SPF as a greater proportion of annual energy use is associated with DHW production, which is typically less efficient than space heating. SPF figures should be interpreted in the context of heat demand, system design and operating strategy, rather than considered in isolation.

Note also that suboptimal usage patterns (i.e. resulting in lower SPF) may be desirable in conjunction with a variable tariff where the loss of efficiency is more than offset by the cost savings.


Your choices

- Minimum design SCOP requirement for all installations: across 12 months
- Minimum actual SPF requirement for all installations: across 12 months
- Provisional COP requirement for all installations: across 3 months of the heating season (e.g. Oct-Dec) as an early indication of performance.
Aspirational SCOP threshold: across 12 months
To qualify for performance bonuses or preferred contractor status.
- SPF to be assessed and verified via:
- MID-class metering
Note: this has greater uncertainty than MID-class metering and can vary between heat pump brands, but is integrated into the controller as standard for most brands.
- Performance-linked terms:
- Retain a percentage of payment until SCOP is verified: %
- Offer performance-linked bonuses: % uplift for SPF above
- Contractors must also provide actual on-board monitoring performance data (SPF) for those installs, where available.
Note: actual performance data (SPF) is ideally MID-metered data. Where onboard system controller data of historical performance are provided, take note of the heat pump system controller manufacturer as this will have an impact upon the accuracy of the readings.

Design Action 2: Monitor the implementation of specification KPIs.

Full designs saved here: [\[link to folder\]](#)

| ID Number | Address | Postcode | Local Authority | Date of heat pump installation | Installer Name | Installer Company | Number of bedrooms | Previous heating source (e.g. gas boiler) | Heat loss calculation (Peak heat loss from home in kW) | Heat Pump Size (kW) | % size difference | Hot water tank size (L) | Design flow temperature | Justification if greater than |
|-----------|------------|----------|-----------------|--------------------------------|----------------|-------------------|--------------------|-------------------------------------------|--------------------------------------------------------|---------------------|-------------------|-------------------------|---------------------------|-------------------------------|
| BGH101 | [REDACTED] | BS11 1D | BCC | 17/11/2025 | [REDACTED] | [REDACTED] | 2 | 5.51 | 8 | 36.86% | 150 | 45 | | |
| BGH102 | [REDACTED] | BS11 1E | NS | 17/11/2025 | [REDACTED] | [REDACTED] | 3 | 3.37 | 3.5 | 3.78% | 175 | 40 | | |
| BGH103 | [REDACTED] | BS11 1E | NS | 15/12/2025 | [REDACTED] | [REDACTED] | 2 | 3.5 | 4 | 13.33% | 150 | 40 | | |
| BGH104 | [REDACTED] | BS11 1E | NS | 15/12/2025 | [REDACTED] | [REDACTED] | 3 | 6.112 | 7 | 13.54% | 210 | 45 | | |
| BGH105 | [REDACTED] | BS11 1N | BCC | 13/01/2026 | [REDACTED] | [REDACTED] | 3 | 4.4 | 6 | 30.77% | 150 | 45 | | |
| BGH106 | [REDACTED] | BA15 1E | BANES | 19/01/2026 | [REDACTED] | [REDACTED] | 1 | 3.857 | 5 | 25.81% | 150 | 45 | | |
| BGH107 | [REDACTED] | BA15 1E | BANES | 26/01/2026 | [REDACTED] | [REDACTED] | 3 | 3.27 | 6 | 58.90% | 150 | 45 | | |
| BGH108 | [REDACTED] | BS11 1E | BCC | 19/01/2026 | [REDACTED] | [REDACTED] | 3 | 3.75 | 5 | 28.57% | 200 | 45 | | |
| BGH109 | [REDACTED] | BS11 1E | BCC | 05/01/2026 | [REDACTED] | [REDACTED] | 2 | 3.74 | 5 | 28.83% | 150 | 45 | | |
| BGH110 | [REDACTED] | BS11 1E | NS | TBC | [REDACTED] | [REDACTED] | | | 8 | | | | | |
| BGH111 | [REDACTED] | BS11 1E | BCC | 09/02/2026 | [REDACTED] | [REDACTED] | 4 | 4.28 | 8 | 60.59% | 250 | 45 | | |
| BGH112 | [REDACTED] | BS40 1E | NS | 02/02/2026 | [REDACTED] | [REDACTED] | 4 | 5.8 | 8 | 31.88% | 250 | 40 | | |
| BGH113 | [REDACTED] | BS40 1E | BANES | 02/03/2026 | [REDACTED] | [REDACTED] | 3 | 4.6 | 6 | 26.42% | 200 | 40 | | |
| BGH114 | [REDACTED] | BS29 1E | NS | 23/02/2026 | [REDACTED] | [REDACTED] | 3 | 3.7 | 5 | 29.89% | 210 | 45 | | |
| BGH115 | [REDACTED] | BS40 1E | NS | 02/03/2026 | [REDACTED] | [REDACTED] | 4 | 4.66 | 8 | 52.76% | 180 | 45 | | |
| BGH116 | [REDACTED] | BS51 1E | BCC | 02/03/2026 | [REDACTED] | [REDACTED] | 3 | 7.5 | 8 | 6.45% | 200 | 45 | | |
| BGH117 | [REDACTED] | BS11 1E | BCC | 23/03/2026 | [REDACTED] | [REDACTED] | 6 | 5.3 | 7 | 27.64% | 400 | 45 | | |
| BGH118 | [REDACTED] | BS9 1E | BCC | 23/03/2026 | [REDACTED] | [REDACTED] | 4 | 6.3 | 8 | 23.78% | 250 | 40 | | |
| BGH119 | [REDACTED] | BS11 1E | BCC | 09/03/2026 | [REDACTED] | [REDACTED] | 3 | 4.3 | 7 | 47.79% | 175 | 43 | | |
| BGH153 | 127 | BS51 1E | BCC | 16/03/2026 | [REDACTED] | [REDACTED] | 3 | 6.75 | 8 | 16.95% | 150 | 50 | Age of the property and s | |



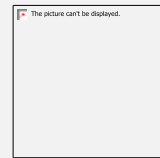
Design Action 3: Seek expert advise to check designs/ build internal skills

- Heat Geek/ Warmur academy trained a good start
 - Manufacturers can be a big help (free)
 - Asking installers to use consistent design tools e.g. Spruce etc (see guidance docs)
-

Design Key Takeaways



**Guidance and
specification critical
at design stage**



**Need skilled
individuals to quality
assure this phase**

Installation

Installation: what we learned

- Audit results show lack of competency amongst average installer
- Poor design but also poor implementation
- Commissioning of systems particularly poor in new builds
- No monitoring or post install evaluation taking place

Installation: Recommended actions

1. Self led non-technical 5 point checklist
2. Monitor each installation
3. Embed self auditing within the delivery process



[Air Source Heat Pump 5 point check for non technical staff](#)

Acknowledgements: thanks to the manufacturers for supplying the information provided and also Mick Wall for the Vaillant information on his Energy Stats website.

User guidance: This guide has been produced by Bristol City Council (BCC) as part of the Optiheat project and references secondary resources where helpful. BCC take no liability for usage of this form by third parties.

Site Visit Date:

Site Visit Time:

Audited by:

Company/Organisation:

| Primary details | |
|--------------------------------------------------------------------------|--|
| Installation site address | |
| Installer name (if known) | |
| Installers MCS number (if applicable) | |
| Heat Pump make and model (found on the data plate on the heat pump unit) | |

Controller to access key information



SCOP:

Steps to Check SCOP on Daikin Altherma (MMI Controller):

1. **Access Menu:** Go to the main menu and select "Information."
2. **Energy Data:** Choose "Energy Data."

Key takeaway s

1. Using the tools can provide a learning opportunity for yourselves e.g. 5 point check list
2. Monitoring is essential!
3. Installer self audit can save problems down the line

The image features a white background with four decorative blue geometric shapes in the corners. Each corner has a large light blue triangle pointing towards the center, with a smaller, darker blue triangle overlapping it. The text is centered in a monospaced font.

Post
installation

Post installation: what we learned

- Handover often poor and not tailored to resident needs
- Technical audits provide excellent insights
- Skills gaps amongst support officers
- Maintenance and Service teams skills gaps
- Disputes with contractors difficult to resolve without monitoring





Post installation: recommended actions

Action 1: Handover review

Action 2: Undertake technical audits as standard on sample of installations

Action 3: Review maintenance regimes/ skills amongst technical teams

Action 4: Mandate monitoring on all installs



Post Installation Action 2: Undertake technical audits as standard on sample of installations

How to guide for audits and repairs

Purpose

This document has been created as a "how to" guide for capturing data whilst auditing heat pumps and recording repairs. These materials were created for use whilst auditing housing in the Bristol area and may require repurposing for use by different authorities in different areas. The intent of these materials is to provide guidance on how to record audit findings in a meaningful way for non-technical personnel, generate reports for repairs, collect repair results, and generate repairs reports.

[You will need a google account to use this "how to" guide.](#)

Create your audit sheet and reports

1. We have created both a [Template for audits sheet](#) and a [Template for repairs sheet](#). Create a copy and save it to your preferred google drive location. We recommend that you check the questions included within these sheets to ensure they are fit for your purpose.
2. Once you are happy with the content of your sheet, you can share a link directly with the engineers that are conducting your audits. Responses will be collected in the owners google form.
3. Once you have collected some responses, you can view your results in a google sheet as in the picture below.



4. To turn your results into individual reports, go to "Extensions" and then "Apps script".



Social housing heat pump installation audit

This audit form was developed by Bristol City Council and Nesta to provide a clear process for auditing and quality assuring heat pumps installations in social housing. If you would like to repurpose this form, please read the instruction provided.

[Instructions on how to generate reports from google form responses can be found here.](#)

The name, email, and photo associated with your Google account will be recorded when you upload files and submit this form

* Indicates required question

Email *

Your name and organisation

Name of installation company (as per MCS certificate)

Installation postcode

First line of installation address

Bristol City Council social housing repairs form

This form is to be used to record the outcomes of each repairs visit. We appreciate that every job is slightly different. If you identify a fix/ issue that is not on the original audit sheet, we would encourage you to address it and record the action in this form.

During your site visit, please ensure you have:

- A copy of the audit form with repairs recommendations
- A copy of the handover guidance sheet to provide to the tenant
- Conducted a handover to the tenant
- Access to the Daikin controller instructions sheet to provide (if necessary)
- A camera

If you have any feedback on this sheet please let Richard Gardner know so that it can be incorporated.

The name, email, and photo associated with your Google account will be recorded when you upload files and submit this form

* Indicates required question

Full address: *

Postcode *

Date of repair: *

MM DD YYYY

__ / __ / ____

Post installation Action 4: Mandate monitoring on all installs



Heat Pump Remote Assistance Guide for Social Housing

Last updated: 25th March 2026

This was independent research was carried out by the University of Bristol between December 2025 and April 2024. This document is a best attempt to capture the information gathered. Technology offerings change rapidly, and the authors take no responsibility or any decisions taken based on these findings, now or into the future.

If you are a heat pump manufacturer and would like to contribute to this work, please fill in this online form and we will get in touch: <https://forms.office.com/e/n6YX8BrGhS>



Heat Pump Remote Assistance Guide for Social Housing

Many heat pump providers now offer services that allow a resident's heat pump settings to be viewed and modified remotely. This is usually called "remote monitoring" however we prefer the term "remote assistance" as we feel this language is potentially less abrasive to residents/ tenants. We have surveyed a range of heat pump manufactures and third-party suppliers to understand how these services work and what advantages they could bring to housing providers. Not all providers offer the same functionality, and in this document we will try and highlight some of the features that you might want, and how to implement them.

The case for Remote Assistance

Remote visibility of heat pump settings provides a range of possible advantages:

1. Remote diagnostics can save engineers' time on site (BCC estimate cost of £100 per home visit on average)
2. Simple fixes can be performed remotely
3. System performance can be evaluated more easily
4. Usage patterns can be observed, enabling remote assistance viewers to support residents better

| | A | B |
|----|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Manufacture | Grant |
| 2 | Model | The econet Smart Controller built around the Arion |
| 3 | In Built / 3rd Party Controller | In built |
| 4 | Meta Data | |
| 5 | Resources | |
| 6 | Who is answering these questions? | Renewables development manager at Grant |
| 7 | When are they answering these questions? | 19/02/2026 |
| 8 | How are they answering these questions? | Teams call |
| 9 | Variables | |
| 10 | What variables are collected? | |
| 11 | | A wide range of settings can be viewed via the web front end or via the screen in home. A subset of these variables can be altered remotely (specifically water and temperature set point), although no record is kept of these changes. |
| | Are any variables not stored/treated differently? | |
| 12 | Where is Data Stored? | Currently stored locally by Grant, although they are migrating to a cloud provider. |
| 13 | What time resolution are variables stored at? | Dashboard refreshed regularly during a demo, suggesting 1-5 minute time resolution. |
| 14 | Connectivity | |
| 15 | | WiFi is currently used to connect the gateway to the internet. The gateway connects to the heat pump using CAT5 via the unit's control |
| | How is connectivity with the home achieved? | |
| 16 | Does the gateway require a dedicated power supply? | Yes |
| | | The unit has a SIM card slot although at the moment |



Key takeaways

- Technical audits are a really valuable learning opportunity
 - Handover needs skilled people and resources
 - Monitoring, Monitoring, Monitoring!
-

Resources: Website (draft!)

The screenshot shows a web browser window with the URL <https://www.optiheat.uk>. The page features a green header with the OptiHeat logo (a house with a checkmark and a gear) and the tagline "Resources to help deliver heat pumps in social housing." Navigation links for "Home", "About", "Resources", and "Manufacturers" are visible, along with a search icon. The main content area includes the title "OptiHeat Project" and a welcome message. It describes the project as a collaboration between the University of Bristol and Bristol City Council, aimed at supporting social housing providers. It mentions a series of events in Spring 2026 and a repository of resources. A section titled "Heatpump information for social housing providers" discusses the transition to heat pumps and the resources created. Another section, "Supporting the Process", lists four main steps: Pre Install, Design, Installation, and Post Install. The page concludes by stating that the website is structured to help users find relevant resources.

https://www.optiheat.uk

optiheat
Resources to help deliver heat pumps in social housing.

Home About Resources Manufacturers Search

OptiHeat Project

Welcome to the OptiHeat Project website.

OptiHeat is a collaboration between the University of Bristol and Bristol City Council, with the aim of supporting social housing providers that want to deliver heat pumps into their housing stock.

During the Spring of 2026 we will be running a series of event across the UK.

This website also contains a repository of the resources that we have found and produced, all of which are free to download.

Heatpump information for social housing providers

Across the UK housing providers are making the switch the heatpumps. As part of the OptiHeat project we have created resources to support this transition.

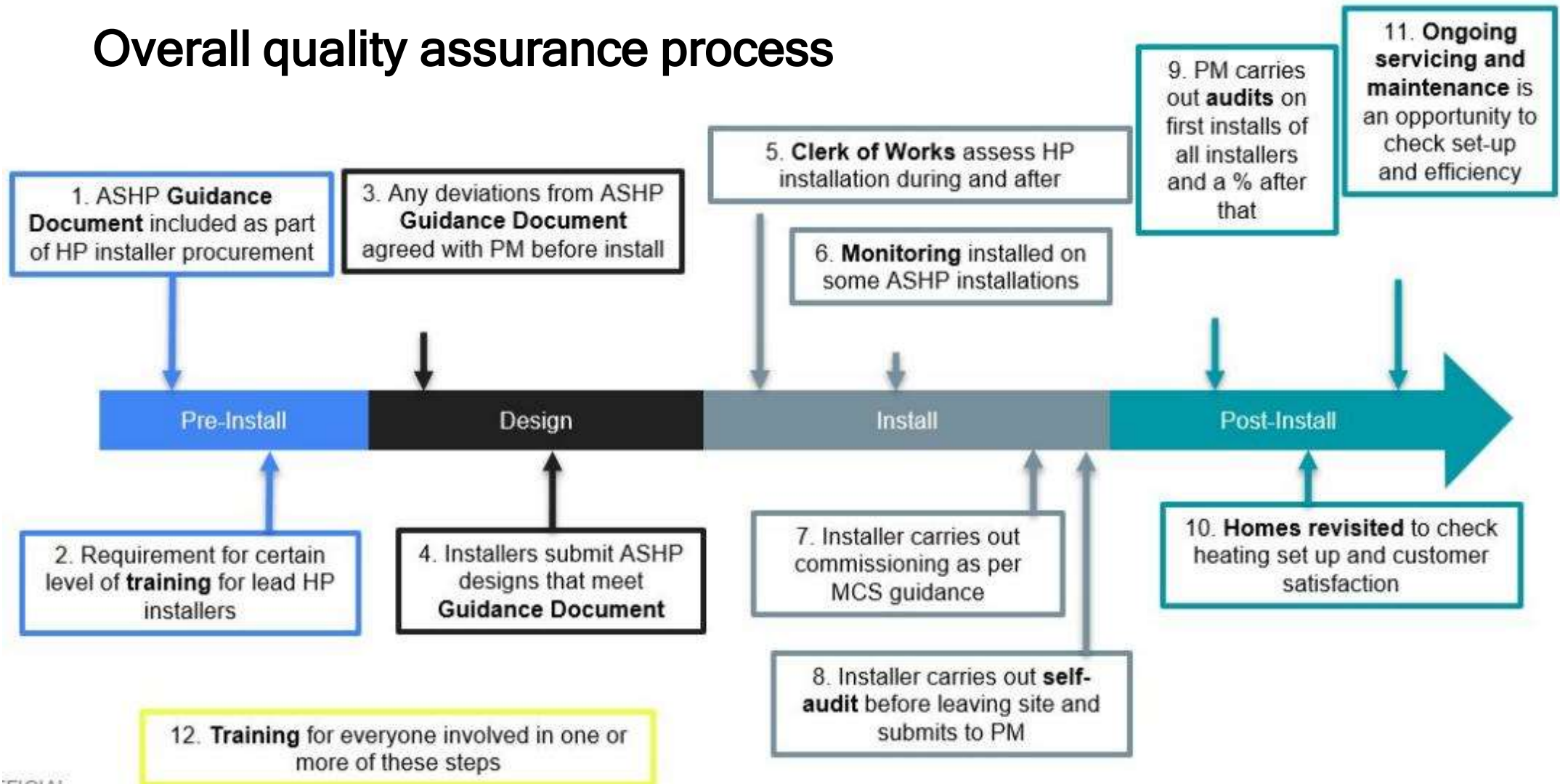
Supporting the Process

We have broken out resources down into four main steps, that reflect the steps that housing provider has to go to when installing heatpumps. These are:

- Pre Install
- Design
- Installation
- Post Install

This website is also structured in this manner to help you find the resources that are most relevant to you.

Overall quality assurance process



OFFICIAL