



UK Government

RAF008/2324: Evaluation of the Heat Network Efficiency Scheme

Phase 2: Process Evaluation of the HNES (Funding Rounds 1 and 2) and Impact Evaluation of the HNES Demonstrator (revenue funding)

Acknowledgements

This independent evaluation report was led by RSM UK Consulting LLP, with support from CAG Consultants, ACE-Research (The Association for Decentralised Energy), and Winning Moves. We are grateful for the input provided by all of the interviewees who participated in the research and for the guidance of the DESNZ research managers.



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Any enquiries regarding this publication should be sent to us at: heatnetworks@energysecurity.gov.uk

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Glossary

Assessors – Expert Technical Advisors (TA) from Ramboll, who are responsible for reviewing the applications received and making recommendations for funding to the Investment Committee (IC).

BEIS – The Department for Business, Energy and Industrial Strategy (now dissolved).

Building Management System (BMS) – A BMS is a computer-based control system installed in buildings that controls and monitors its main mechanical plant such as boilers and ventilation to maintain optimum comfort conditions. Typically found in larger buildings, a BMS provides comprehensive control over the building's mechanical and electrical systems, encompassing heating, ventilation, lighting, and hydronic systems¹.

Capital Grants – HNES capital grants fund up to (but not including) 50% of the delivery (installation) of eligible heat network intervention/improvement measures. They have a budget of up to £30m in total for projects across FY23/24 and FY24/25².

Capital Projects – Capital projects are successful applicants to HNES who have been awarded capital funding to deliver (install) eligible intervention/improvement measures.

Citizens Advice – Citizens Advice offers online and in-person advice on various topics including bills, benefits, grants and council tax to people across the UK.

Competition and Markets Authority (CMA) – The CMA is the UK's principal authority responsible for competition and consumer protection. It enforces competition and market regulation by investigating cases, providing rulings, issuing penalties, and supporting government and other market regulators.

Consultants – Consultants are specialist third parties who conducted HNES optimisation studies for revenue projects or supported capital projects to deliver and/or commission improvement measures. In some cases, they also advised on the technical and data-specific aspects of projects' applications to the scheme.

Consumer Scotland – Consumer Scotland is the statutory, independent body set up by the Scottish Parliament to promote consumer protection across water, energy and postal services.

¹ The London School of Economics and Political Science (LSE). (2024). Building temperatures and BMS from [https://info.lse.ac.uk/staff/divisions/estates-division/a-z-of-services/maintenance/building-temperatures-and-bms#:~:text=A%20Building%20Management%20System%20\(BMS,common%20in%20a%20large%20building](https://info.lse.ac.uk/staff/divisions/estates-division/a-z-of-services/maintenance/building-temperatures-and-bms#:~:text=A%20Building%20Management%20System%20(BMS,common%20in%20a%20large%20building).

² It is important to note that the figures included in this report represent the period of time from which this report was written. Figures should therefore not be taken as up to date for the Scheme, which has had additional funding allocated and further funding rounds since the report was written. The latest funding awards for HNES can be found on the Gemserv website: <https://gemserv.com/heat-network-efficiency-scheme-hnes/>

Customer Detriment – Customer detriment is the potential harm or disadvantage that heat network consumers may face due to factors such as high prices, poor service quality, unreliable supply, or lack of choice and transparency³.

Customers In Need – Dwellings supplied heat/energy by a heat network, in which a resident or residents are considered financially vulnerable and will therefore benefit significantly from reduced costs for heating or service improvements through HNES support. This includes any of the following categories (or equivalent) of status or accommodation type: social housing; low-income housing; customers in fuel poverty; extra care housing; low-income care homes and supported housing.

Delivery Partner, Gemserv – Gemserv is the HNES delivery partner and was also the delivery partner for the HNES Demonstrator Scheme. Gemserv are responsible for the mobilisation and day-to-day delivery of HNES and ongoing performance monitoring.

HNES Demonstrator⁴ – The HNES Demonstrator provided heat network upgrade funding to successful applicants prior to the launch of the main HNES. It was a £4.175 million grant support programme for FY 21/22, split by revenue grants (budget up to £0.375) and capital grants (budget up to £3.8m).

Department for Energy Security and Net Zero (DESNZ) – DESNZ (inaugurated in February 2023 as a result of the restructuring of the Department for Business, Energy and Industrial Strategy), referred to as the Department.

Energy Ombudsman – The Energy Ombudsman is a free and impartial service that aims to resolve disputes between consumers and suppliers in the energy sector.

External Consultants – See ‘Consultants’.

External Partner – An external partner is an organisation that is supporting Gemserv (see ‘Delivery Partner’) to deliver the HNES and the HNES Demonstrator. This includes Ramboll (supporting Gemserv on application assessment), Turner and Townsend (on pre-application engagement/support and cost consultancy), and Lux Nova Partners (on legal advice).

Green Heat Network Fund (GHNF) – The GHNF is a DESNZ capital grant funding programme⁵ that supports the commercialisation and construction of new and existing low and zero carbon (LZC) heat networks in England.

³ The Department for Energy Security and Net Zero. (2023). Heat networks regulation – consumer protection from <https://assets.publishing.service.gov.uk/media/64d0bb84a4045e0011a84b44/heat-network-consumer-protection-consultation-document.pdf>

⁴ The Department for Energy Security and Net Zero and The Department for Business, Energy & Industrial Strategy. (2021). Heat Network Efficiency Scheme Demonstrator from <https://www.gov.uk/government/publications/heat-network-efficiency-scheme-demonstrator>

⁵ For more information about the GHNF, see here: <https://www.gov.uk/government/publications/green-heat-network-fund-ghnf>.

Heat (or Hydraulic) Interface Units (HIUs) – A HIU is a device that provides centralised heating and hot water for multiple properties using one large heat source.

Heat Network – A heat network is the system of insulated pipes which transports heat from a source (or multiple sources) to more than one end user. There are two types⁶ of heat networks:

1. **A communal heat network** which supplies heat and hot water to a number of customers within one building only.
2. **A district heat network (district heating)** which supplies heat and hot water to customers in more than one building. District heating networks can range in size from a few hundred metres supplying just a few homes to several kilometres of pipe supplying heat and hot water to multiple buildings in a development.

Heat Network Transformation Programme (HNTF) – The HNTF is a government initiative to support the development and decarbonisation of low and zero carbon heat (and cooling) networks. The programme includes the HNES, GHNF, Heat Network Zoning, Market Frameworks, Consumer Protections and Sector Skills.

Heat Network Zoning – Heat network zoning is the identification and designation of zones where heat networks provide the lowest-cost, low-carbon heating option.

Heat Networks Delivery Unit (HNDU) – This Department for Energy Security and Net Zero team provides support and guidance to local authorities in England and Wales who wish to explore heat network opportunities.

Heat Networks Investment Project (HNIP) – The HNIP was the previous government capital grant funding programme for heat networks which provided £320m to gap fund projects in England and Wales.

Heat Network Efficiency Scheme (HNES) – HNES is a £32m⁷ grant support programme. It is a government scheme that provides funding to public, private and third-sector applicants in England and Wales to improve the performance of existing/operational heat networks where customers and/or operators are experiencing sub-optimal outcomes.

Net Zero – The term ‘Net Zero’ refers to a balance between the carbon emitted into the atmosphere and the carbon removed from it. The Net Zero strategy sets out policies and proposals for decarbonising all sectors of the UK economy to meet our net zero target by 2050.

Ofgem – Ofgem is the UK's energy regulator that regulates energy markets for consumer protection.

⁶ The Department for Energy Security and Net Zero. (2023). Evaluation of the Heat Networks Investment Project from [Evaluation of the Heat Networks Investment Project – Final report \(publishing.service.gov.uk\)](#)

⁷ Since this report was written, HNES has been allocated additional funding. More information can be found here: [Apply for the Heat Network Efficiency Scheme \(HNES\) - GOV.UK](#)

Operators – Heat network operators are building owners or managers who are responsible for complying with all relevant legislation. They supply heat and/or cooling to more than one end user, and charge those end users for the supply of heating, cooling or hot water.

Optimisation Study – A heat network optimisation study is a process of assessing the performance of existing district heating or communal heating projects that are operating sub-optimally and resulting in poor outcomes for customers and operators, and assessing packages of improvement measures. These studies are funded from the revenue grants provided by the HNES and HNES Demonstrator (See ‘Revenue Grants’).

Public Sector Decarbonisation Scheme (PSDS) – The PSDS provided grants for public sector bodies to fund heat decarbonisation and energy efficiency measures. The scheme supports the aim of reducing emissions from public sector buildings by 75% by 2037, compared to a 2017 baseline, as set out in the 2021 Net Zero and Heat and Buildings strategy⁸.

Revenue Grants – Grants to fund up to 100% of procurement or mobilisation of external third-party support to carry out optimisation studies. There is up to £2m available in total across projects for revenue grants across FY23/24 and FY24/25⁹.

Revenue Projects – Revenue projects are successful applicants of HNES or HNES Demonstrator who have been awarded funding to procure or mobilise support to undertake optimisation studies.

⁸ The Department for Energy Security and Net Zero. (2023). Heat and buildings strategy from <https://www.gov.uk/government/publications/heat-and-buildings-strategy>

⁹ It is important to note that the figures included in this report represent the period of time from which this report was written. Figures should therefore not be taken as up to date for the Scheme, which has had additional funding awarded and further funding rounds since the report was written. The latest funding awards for HNES can be found on the Gemserv website: <https://gemserv.com/heat-network-efficiency-scheme-hnes/>

Executive Summary

Programme Overview

It is important to note that the figures included in this report represent the period of time from which this report was written. Therefore, figures do not represent the current status of HNES, which has had additional funding allocated and further funding rounds since the report was written. Some projects have also since withdrawn from the Scheme. The latest funding awards for HNES can be found on the Gemserv website¹⁰.

At the time of writing, the Heat Network Efficiency Scheme (HNES) was a £32 million revenue and capital grant support programme spanning FY23/24 and FY24/25. An additional £45m capital grant funding to 27/28 was announced in December 23. It supports improvements in existing district and communal heating projects that are performing sub-optimally and aims to reduce carbon emissions by making heat networks more efficient, reduce customer detriment to improve consumer confidence, and help prepare the heat network market for sector regulation and standards. Launched in February 2023, the scheme is open to public, private, and third-sector applicants in England and Wales, with funding to be spent by 2028. The scheme will deploy £2 million in revenue grants for procuring third-party support to identify causes of sub-optimal performance and recommend costed improvement options, and £75 million (previously £30m) in capital grants for the installation of measures to improve efficiency and address sub-optimal outcomes.

At the time of writing, HNES was in its sixth funding round. Across the initial five rounds it has received a total of 254 applications. £25.4 million has been awarded to 133 projects across the first three rounds. This consisted of £23.4m to 35 capital projects and £1.96m to 98 revenue projects.

The HNES Demonstrator, a predecessor scheme to HNES, was a £4.175 million grant support scheme conducted over a single round during FY21/22, split by revenue grants (budget up to £0.375) and capital grants (budget up to £3.8m). It supported enhancements to existing heat network or communal heating projects and aimed to achieve short-term and sustained efficiencies in fuel consumption and carbon emissions, addressing areas of customer detriment (heat network consumers impacted by cost-of-living and cost-of-energy pressures)¹¹. The HNES Demonstrator, open to public, private, and third-sector applicants in England and Wales, provided capital grants for up to (but not including) 50% of eligible project costs¹² to make

¹⁰ Gemserv. (2023). Heat Network Efficiency Scheme (HNES) from <https://gemserv.com/heat-network-efficiency-scheme-hnes/>

¹¹ Previous work by the Department has indicated that some existing heat networks in England and Wales are operating sub-optimally, leading to customer detriment. In addition, the cost-of-living crisis has resulted in additional pressures on energy tariffs for some heat network customers, particularly where networks operate at lower efficiencies and increasing fuel costs are passed through.

¹² Up to £3.8m in grant funding to part-fund the delivery (installation) of eligible intervention/improvement measures.

network upgrades, and revenue grants of up to 100%¹³ of eligible costs to identify improvements. The HNES Demonstrator supported 73 heat networks to identify cost-effective improvement measures (revenue grants)¹⁴ and supplied capital grants to 37 existing heat networks to implement heat network improvement measures.

Evaluation Scope and Approach

RSM UK, supported by ACE Research, CAG Consultants and Winning Moves, have been appointed by the Department for Energy Security and Net Zero (DESNZ, the Department) to conduct process, impact and value for money evaluations of HNES throughout its duration.

This report reflects Phase 2¹⁵ of the evaluation (October 2023 to January 2024) and provides the **first process evaluation of HNES** (covering its first two funding rounds) and an **impact evaluation of the HNES Demonstrator revenue projects**.

Data collection has involved interviews with officials from the Department, assessors, delivery partners, successful and unsuccessful applicants, and non-applicants of HNES, as well as revenue project operators and consultants from HNES Demonstrator projects. Interviews were conducted from November 2023 to January 2024. In addition, online surveys were issued to successful and unsuccessful applicants to HNES between October and December 2023.

The impact evaluation also encompassed a review of the HNES Demonstrator projects' Optimisation Study final reports; and an analysis of HNES application data, focusing on revenue projects that transitioned into applications for HNES capital funding.

HNES (Funding Round 1 and 2) Process Evaluation Findings

The process evaluation sought to understand what has worked well, what could be improved and lessons for different projects in HNES. The following are the key findings:

Scheme Launch, Promotion and Awareness

What worked well

- Gemserv's efforts, alongside their sub-consultants, proved successful in promoting HNES. The use of a variety of channels including industry events, social media, and

¹³ Up to £0.375m in grant funding to fund procurement or mobilisation of external support to carry out Optimisation Studies. These studies will assess heat network projects to identify causes of sub-optimal performance and recommend costed intervention or improvement measures.

¹⁴ GOV.UK. (2023). £32 million boost to upgrade existing heat networks and reduce energy costs from <https://www.gov.uk/government/news/32-million-boost-to-upgrade-existing-heat-networks-and-reduce-energy-costs>

¹⁵ Phase one of the evaluation was a scoping phase, so no evaluation findings were produced.

collaborations with industry bodies significantly enhanced awareness across a broad spectrum of potential applicants.

- HNES's appeal exceeded expectations, particularly in attracting smaller-scale and independent developers. This response highlights the scheme's effective alignment with evolving heat network technologies and the tangible benefits perceived by these developers.
- Communications from the Department and industry bodies were instrumental in raising scheme awareness. Their involvement played a crucial role in informing a wide range of potential applicants about the opportunities offered by HNES.
- The webinars conducted as part of the scheme's promotion were generally well-received by most, providing valuable insights into the application process.

What could be improved:

- The uptake of the scheme, especially in the social housing sector, was impeded by resource limitations within applicant organisations. These constraints often included a lack of specific expertise or insufficient time to engage fully with the application process.

Key Lessons:

- To address the challenge of resource constraints, there is a need to make scheme information more accessible and understandable. This approach should focus on reaching a wider audience, including those without industry connections or in-depth knowledge, ensuring that the scheme's benefits and application process are clear to all potential applicants. The Department may wish to consider offering additional guidance to projects on how time should be allocated across various sections of their application. Alternatively, in principle, a new operation model could be considered whereby different organisations are procured and mobilised to handle the application process for applicants on their behalf and charge a fee for their services, allowing them to earn commission whilst encouraging active participation from applicants who find the process more challenging. This might also release economies of scale.

Application Process and Support

What worked well:

- Those with prior experience of the HNES Demonstrator found navigating HNES more straightforward, indicating the value of previous engagement with similar schemes.
- A majority of applicants were highly satisfied with the HNES application process. Key to this success were the roles played by relationship managers, delivery partners, and external consultants, who significantly aided applicants through the process.
- HNES effectively funded projects that focused on addressing customers in need and delivering social impacts. Public sector entities, particularly housing associations and local authorities, observed higher application success rates, aligning well with the scheme's objectives.

What could be improved:

- Both successful and unsuccessful applicants, particularly from private companies, struggled with unclear eligibility and scoring criteria, especially regarding the need to address customer detriment. Clearer guidance from the Department's HNES team was needed for crafting successful proposals.
- Completing technical aspects of the application form proved challenging for applicants in round 1, particularly for those without in-house expertise. This issue was more acute in capital applications, with over half of the applicants facing technical difficulties. From round 2 onwards, these technical issues were addressed e.g. allowing copying and pasting into cells, and addressing locked sections of the form.
- Numerous applicants encountered issues in meeting and reporting baseline technical data requirements. Determining the level of detail needed for specific calculations, such as energy efficiency figures, was also challenging.
- The high resource cost of application, compared to the potential funding amount, was a significant barrier for smaller projects. There is some evidence that this may be because these projects had fewer internal resources, including limited technical expertise, compared to larger projects.

Key Lessons:

- Providing more comprehensive support and clearer guidelines for application forms can assist applicants throughout the process. This could include more direct communication from Gemserv and the provision of further guidance on the eligibility criteria.
- Enhancing the online application system's functionality and user experience, including formatting and adapting the form for different heat network types, as well as offering detailed examples of completed application forms and customer detriment reduction calculations could reduce technical difficulties and improve the overall application experience.

Post-Application Experiences and Outcomes

What worked well:

- The majority of applicants, especially local authorities, experienced a straightforward and effective funding and drawdown process. Policy stakeholders highlighted positives such as swift approvals and prompt award letters.
- Applicants appreciated the substantial support available once funding was approved, including assistance with monitoring, reporting templates, and diligent communication from Gemserv and the Department.

What could be improved:

- Post-award, delays to implementation of funded measures were noted, primarily due to internal governance issues of the project, bureaucratic hurdles like lengthy procurement processes, organisational changes, and technical or data issues.
- The rigid funding timelines, driven by the government's requirement to spend funding within the fiscal year, posed challenges for some applicants, particularly for large-scale projects and local authorities.

Key Lessons:

- Enhancing internal governance processes, particularly for local authorities, may reduce delays in project initiation and implementation. This includes a smoother setup of purchase orders by expediting the setup of purchase order data and ensuring the accurate provision of bank details, and addressing technical and data-related issues.
- Applicants suggest a need for more flexibility in fund expenditure and project timelines, including options for rollover of unspent funds to the next fiscal year to accommodate diverse project needs.
- Providing clearer guidelines and communication on the funding and drawdown process, including precise timelines for projects to commence, can enable better preparation and planning for the networks involved.

Impact Evaluation Demonstrator Scheme Findings

The impact evaluation has considered what benefits and outcomes can be directly attributed to the HNES Demonstrator. In particular, it has assessed whether optimisation studies allowed operators to make informed decisions on: whether they should improve their heat network; what improvements they should make; the cost and best means of funding required to implement improvements; whether HNES funding should be sought; and, why improvements have or have not proceeded.

Value and Effectiveness of Optimisation Reports

- Operators found the optimisation studies valuable, particularly for identifying specific measures to enhance heat network efficiency. The detailed and in-depth nature of the studies, underpinned by robust data, enabled the provision of tailored recommendations for each network.
- Despite their overall value, some operators found the reports too technical and challenging to understand. Concerns were also raised about the practicality and financial feasibility of implementing the suggested recommendations.
- Operators believed that optimisation study recommendations varied in their effectiveness. While some were seen as highly valuable, others were viewed as less effective due to their technical complexity and/or the significant added costs of the recommended measures.

Factors Influencing Implementation Decisions:

- Operators reported that their decisions to implement recommendations from optimisation studies were influenced by factors including cost, potential return on investment, and long-term carbon savings. The quality of the studies and their technical and financial aspects were crucial in these decisions.
- Operators reported that challenges arose due to differing internal stakeholder opinions on funding sources, especially for the required 50% capital costs not covered by HNES, leading to delays in implementation.

Next steps:

- HNES funding has been a major motivator for many operators to consider substantial improvements to their networks. At the time of writing, 23% (17 out of 73) of the Demonstrator revenue projects have successfully applied, and been granted capital funding from HNES¹⁶, indicating a strong uptake and commitment to network enhancement.
- A significant number of projects from the Demonstrator scheme are in discussions internally regarding the implementation of measures and securing additional funding, particularly the 50% capital costs to complement HNES funding.

Interim Contribution claims

Based on the evaluation findings, this report has provided an update of the interim Contribution Claims. This update has tested each contribution claim, evaluating the current and expected evidence against the backdrop of the programme's Theory of Change (Annex 3). Given the

¹⁶ Five Demonstrator revenue projects also successfully converted to Demonstrator capital projects.

early stage of analysis, all contribution claims are inconclusive at this stage and will be further tested throughout the evaluation. This is explained further in the main body of the report.

Phase 3

Phase 3 of the HNES evaluation (January 2024 to June 2024) will focus on two key aspects of HNES: the **second process** evaluation of both revenue and capital projects, and the **interim impact evaluation** of revenue projects¹⁷.

The **process evaluation** will assess the delivery of HNES. It will gather insights on how projects managed the procurement for optimisation studies (revenue projects) and upgrade works (capital projects). The evaluation will explore the execution of these works, including how stakeholders were convened, agreements reached, and any barriers or facilitators encountered during the process. The process evaluation will also focus on the lessons learned from HNES delivery and how these insights may be used to enhance further rounds of HNES as well as future schemes.

The **interim impact** evaluation of the revenue projects funded under HNES will evaluate the perceived value, anticipated impact, and forthcoming steps for revenue projects, seeking to understand the broader influence of these projects beyond the scope of HNES funding. The evaluation will use qualitative methods to understand the influence of the optimisation studies on decision-making within revenue projects. This will involve assessing whether the studies enabled operators to make informed decisions about improving their heat networks, the nature of possible improvements, and the anticipated savings from these measures. The evaluation will also explore whether operators are applying similar improvement strategies in projects outside of HNES and if the studies contribute to internal business cases or investment decisions. As in the current phase, the Phase 3 evaluation will further develop the contribution analysis based on additional evidence.

¹⁷ This Phase 3 evaluation report has now been published.

Report Scope and Introduction

*This evaluation report focuses on the **process** evaluation of the first two funding rounds of **HNES** and the **impacts** of the **HNES Demonstrator (revenue funding)**. It presents learnings, drawing on projects' experiences, and is designed to inform future funding rounds' delivery of HNES.*

This chapter provides an overview of the UK heat network sector and policy, HNES specifically, and the purpose of the report.

UK Heat Network Sector and policy

The UK's heat network sector, currently meeting approximately 3%¹⁸ of the nation's heat demand, is set for substantial growth and development¹⁹. As the country progresses towards its 2050 Net Zero emissions target, heat networks are expected to play a pivotal role in the decarbonisation of heat. The Climate Change Committee (CCC) estimated in 2015 that around 18% of UK heat will need to be supplied by heat networks by 2050 for the UK to meet its carbon targets cost-effectively²⁰.

The Heat Network (Metering and Billing) Regulations 2014, effective from 18th December 2014, marked a significant step towards fuller regulation of the UK's heat network sector. The regulations required network suppliers to submit operational and performance data to the Office for Product Safety and Standards (OPSS), enhancing sector transparency. With approximately 11,847 registered heat networks in the UK, 78% of which are communal, this data collection has been vital in shaping policy and investment²¹.

The Competition and Markets Authority (CMA), in its 2018 market study, recommended further regulation of the sector. The government's response, through public consultations in 2020 and a policy outline in 2021, led to the inclusion of heat network provisions as part of the Energy Bill in July 2022²². The Energy Act 2023 appoints Ofgem as the heat networks regulator,

¹⁸ The Department for Energy Security and Net Zero. (2023). Heat network zoning: consultation summary: [Heat network zoning: consultation summary - GOV.UK](#)

¹⁹ BEIS. (2018). Experimental statistics on heat networks from <https://www.gov.uk/government/publications/energy-trends-march-2018-special-feature-article-experimental-statistics-on-heat-networks>

²⁰ BEIS. (2021). Heat Networks: building a Market Framework from <https://assets.publishing.service.gov.uk/media/61c47750e90e071965f133ee/heat-networks-market-framework-consultation-govt-response.pdf>

²¹ DESNZ (2023). Heat Networks registered under the Heat Network (Metering and Billing) Regulations statistics: December 2022 from <https://www.gov.uk/government/statistics/heat-networks-registered-under-the-heat-network-metering-and-billing-regulations-statistics-december-2022>

²² BEIS. (2021). Heat Networks: building a Market Framework from <https://assets.publishing.service.gov.uk/media/61c47750e90e071965f133ee/heat-networks-market-framework-consultation-govt-response.pdf>

establishing an authorisation regime with standards for pricing, consumer information, service quality, and carbon limits²³.

In addition, to help improve the quality and efficiency of heat networks, the government is developing the Heat Network Technical Assurance Scheme (HNTAS) in close collaboration with industry. Once introduced in regulation, HNTAS will mandate that heat network Responsible Parties demonstrate compliance with a set of minimum technical requirements, many of which build on the CIBSE Heat Networks Code of Practice (CP1). The government's work will legally oblige heat network operators to adhere to minimum technical standards. HNTAS is also expected to introduce stakeholder engagement mechanisms, governance structures to ensure accountability and enable decision making, and provide training courses for new roles such as HNTAS assessors. Ultimately, HNTAS aims to protect consumers through improving network performance and reliability, cut emissions by improving system efficiency, enhance long term heat network affordability, and boost investor confidence.

In addition, to encourage private investment, the Department is implementing heat network zoning. Central and local government are working with industry and local stakeholders to identify and designate zones where heat networks are the lowest-cost solution to decarbonising heat. This aims to provide developers with rights and powers for rapid and cost-effective network expansion²⁴. This, and The Future Homes Standard²⁵ will require new build homes to be future-proofed with low carbon heating and world-leading levels of energy efficiency. They will add to the wider body of regulation designed to promote heat network decarbonisation.

The government is also supporting the heat network sector directly, notably through the Heat Network Transformation Programme (HNTF). In place since 2013, this programme aims to foster a sustainable heat network market across England and Wales, and includes the Green Heat Network Fund (GHNF, England only), a capital grant fund supporting the construction of new low and zero carbon heat networks, the Heat Networks Skills Programme, and the Heat Network Efficiency Scheme (HNES). Further details are provided on the scope of HNES below. HNTF, which operates alongside programmes supporting decarbonisation of the wider heat sector, aims to improve consumer outcomes and confidence in heat networks as a technology that can provide fairly priced and reliable low carbon heating and cooling.

In addition, the government's Heat Networks Delivery Unit (HNDU) provides grants and expert guidance to local authorities in England and Wales for early-stage heat network development

²³ The Department for Energy Security and Net Zero. (2023). Heat networks regulation – consumer protection from <https://assets.publishing.service.gov.uk/media/64d0bb84a4045e0011a84b44/heat-network-consumer-protection-consultation-document.pdf>

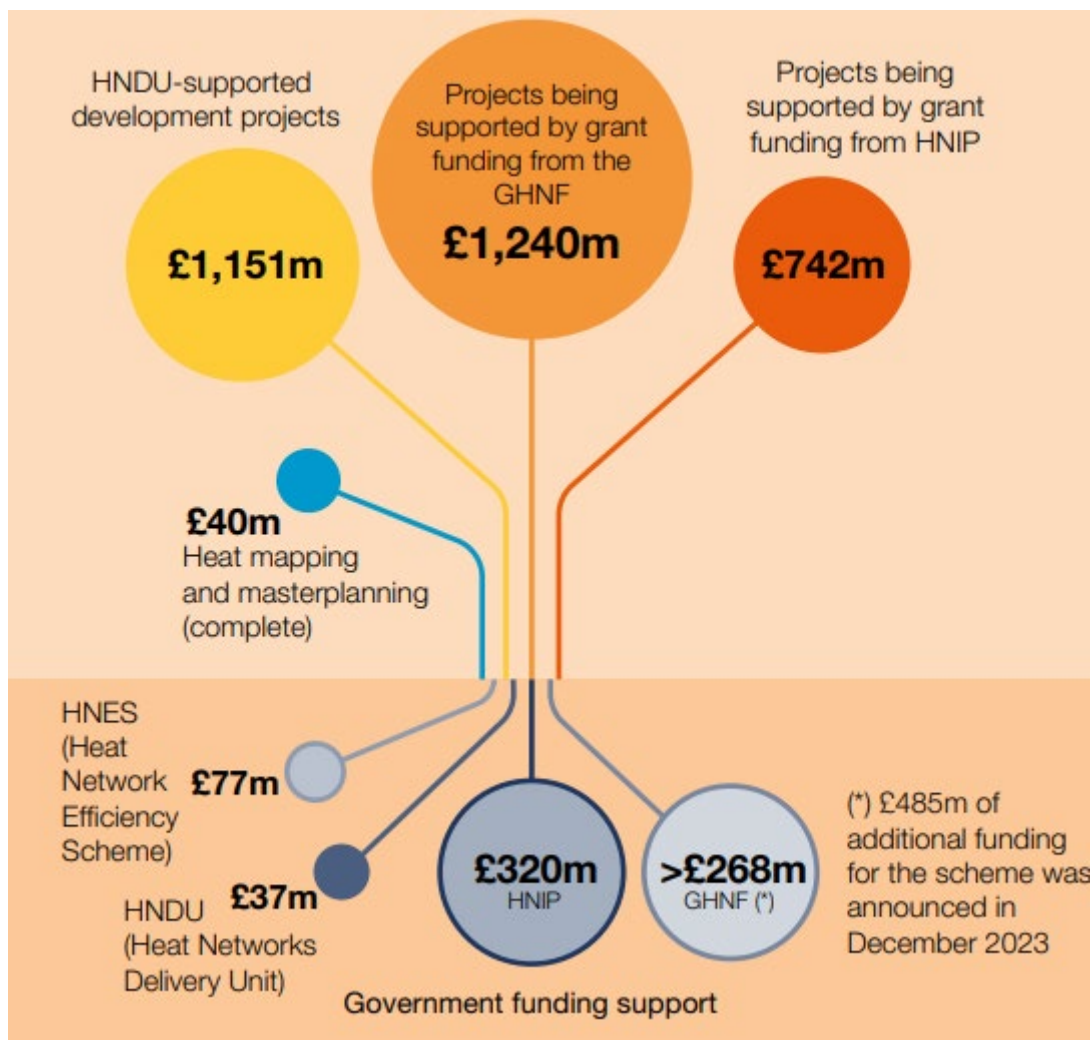
²⁴ The Department for Energy Security and Net Zero. (2023). Heat network zoning: consultation summary from <https://www.gov.uk/government/consultations/proposals-for-heat-network-zoning-2023/heat-network-zoning-consultation-summary>

²⁵ Department for Levelling Up, Housing and Communities. (2023). The Future Homes Standard 2023 consultation on the energy efficiency requirements of the Building Regulations affecting new and existing dwellings. Consultation-Stage Impact Assessment from https://assets.publishing.service.gov.uk/media/65773033095987000d95de09/Future_Homes_Standard_consultation_stage_impact_assessment.pdf

projects. Since its inception in 2013, HNDU has run twelve funding rounds that have awarded £30m in total and is running a thirteenth at present. Also, the (then) BEIS Heat Investment Vehicle (BHIVE) assists public sector heat network owners and developers in procuring funding and related services.

Overall, investment potential in the UK heat network sector is estimated to be between £60 billion and £80 billion²⁶. A key objective of both government financial and regulatory support to the sector is to create market conditions that encourage private investment. Figure 1 presents estimates of the UK heat network sector's near-term investment pipeline, by projects' stage of development. This includes the over half a billion pounds of existing government investment through the programmes detailed above.

Figure 1: Near-term investment pipeline of heat network projects and their current stages of development, 2024



²⁶ The Department for Energy Security and Net Zero. (2024). UK heat networks: market overview from <https://www.gov.uk/government/publications/uk-heat-networks-market-overview/uk-heat-networks-market-overview-html>

However, despite the sector's potential, challenges remain, including in relation to operational inefficiencies in some heat networks, causing customer detriment. Cost-of-living pressures have also impacted customer experience, particularly those connected to less efficient networks with high fuel usage, where rising fuel prices can particularly impact consumer tariffs. As described above, the HNTF aims to address these challenges and develop new heat networks, enhance existing ones, and support the sector's growth with a focus on net-zero targets, consumer protection, emissions reduction, and market expansion. HNES is a key part of this.

Heat Network Efficiency Scheme

HNES was launched to enhance existing heat networks that are experiencing sub-optimal outcomes. It provides funding for optimisation studies to help identify actions that operators can take to improve the operation of their networks and for the delivery of eligible intervention / improvement measures. It also seeks to address wider barriers such as funding gaps, lack of specialist knowledge and poor targeting of improvements²⁸. These improvements are intended to improve outcomes for both network customers (addressing areas of detriment) and owners/operators (through improved heat generation/delivery efficiency). Ultimately, the scheme aims to support short-term and sustained savings in fuel consumption and reductions in carbon emissions, focusing where customer need is greatest and laying the groundwork for projects to optimise performance, enabling more efficient and effective further decarbonisation in the future (for example, through separate applications to the GHNF).

At the time of writing, HNES is a £32 million grant support programme, spanning financial years 2023/24 and 2024/25²⁹. It is open to public, private, and third sector applicants in relation to district heating or communal heating projects in England and Wales. It follows on from the HNES Demonstrator, which ran from October 2021 to March 2022. HNES is specifically targeted at addressing rising costs for heat network consumers and places a significant emphasis on projects that reduce detriment for residential “customers in need”. This group encompasses *“Dwellings supplied heat/energy by a heat network, in which a resident or residents are considered financially vulnerable and will therefore benefit significantly from reduced costs for heating or service improvements through HNES support. This includes any of the following categories (or equivalent) of status or accommodation type: social housing;*

²⁷ The Department for Energy Security and Net Zero. (2023). UK Heat Networks Market Overview from <https://assets.publishing.service.gov.uk/media/64f1b180fdc5d1000d28498a/uk-heat-networks-market-overview.pdf>

²⁸ The Department for Energy Security and Net Zero. (2023). Heat Network Efficiency Scheme Guidance for applicants from <https://assets.publishing.service.gov.uk/media/64be92e39c2df0000d94030d/heat-network-efficiency-scheme-guidance.pdf>

²⁹ Since this report was written, HNES has been allocated extra funding. More information can be found here: [Apply for the Heat Network Efficiency Scheme \(HNES\) - GOV.UK](https://www.gov.uk/government/consultations/apply-for-the-heat-network-efficiency-scheme-hnes)

*low-income housing; customers in fuel poverty; extra care housing; low-income care homes and supported housing*³⁰.

The scheme also aims to address market failures, such as information gaps and investment barriers, by facilitating targeted project assessments and evidence/data gathering and sharing, thereby leading to initial efficiency gains and facilitating long-term decarbonisation.

HNES offers two types of funding:

- **Revenue grants (HNES budget of up to £2m across FY23/24 and FY24/25):** Funding for procurement or mobilisation of external third-party support to carry out Optimisation Studies. These studies will assess heat network projects to identify causes of sub-optimal performance and recommend costed intervention or improvement measures. The optimisation studies consist of two works packages: assessment of network operational performance, including reporting³¹; and development of network optimisation opportunities, including reporting and recommendations³².
- **Capital grants (HNES budget of up to £30m across FY23/24 and FY24/25):** Funding of up to (but not including) 50% of capital costs for the delivery and installation of eligible intervention or improvement measures. Capital grants will fund investment in four aspects of heat networks: energy centre/plant rooms, primary/secondary distribution networks, tertiary networks, and metering³³.

The objectives and expected benefits of HNES are outlined in Table 1. These include primary fuel savings, carbon emissions reductions, improved network efficiency, reduced heat costs, and fewer service interruptions:

Table 1: HNES objectives, expectations and benefits

Objective	Associated Benefits
Reduce carbon emissions by making heat networks more efficient	1) Primary fuel savings 2) Carbon emissions reductions 3) Improved network efficiency
Reduce customer	4) Reduced cost of delivered heat 5) Reduced service interruptions

³⁰ The Department for Energy Security and Net Zero. (2023). Heat Network Efficiency Scheme Guidance for applicants from <https://assets.publishing.service.gov.uk/media/64be92e39c2df0000d94030d/heat-network-efficiency-scheme-guidance.pdf>

³¹ To investigate the current operation and condition of the network in order to develop a baseline against which optimisation measures can be developed and their impact quantified.

³² To identify potential optimisation measures and quantify the costs and impacts that implementing these could have on network performance.

³³ The Department for Energy Security and Net Zero. (2023). Heat Network Efficiency Scheme Guidance for applicants from <https://assets.publishing.service.gov.uk/media/64be92e39c2df0000d94030d/heat-network-efficiency-scheme-guidance.pdf>

Objective	Associated Benefits
detriment to improve consumer confidence	
Help prepare the heat network market for sector regulation and standards	6) Performance indicator data for HNTAS development – HNES application baselining data 7) CP1 compliance estimates for HNTAS development 8) Installation impact and cost data 9) User testing of draft compliance tool

The scheme prioritises projects that are likely to maximise benefits, offer value for money, and significantly address customer detriment, focusing especially on "*customers in need*." Interested projects are expected to demonstrate their eligibility for funding in their application by evidencing how they plan to meet scheme's primary objectives. The scheme is expected to attract around 550 applications over eight funding rounds, across capital and revenue projects. Genserv is the delivery partner, and the programme involves continuous monitoring and reporting on benefits delivered, including operational efficiencies and carbon abatement. In the first two funding rounds, £17.26m was awarded to 100 projects: £15.75m across 27 capital projects, and £1.51m across 73 revenue projects.

Heat Network Efficiency Demonstrator Scheme

The HNES Demonstrator, run from 2021 to 2022, was a £4.175 million initiative that provided a single-round of revenue and capital grant funding. It functioned as a trial preceding the main scheme and provided groundwork for projects to optimise performance.

Similar to the main scheme, it sought to reduce carbon emissions and customer detriment and to help prepare the heat network market for future regulation and standards. Its objectives were to:

- Achieve fuel and carbon savings in existing projects;
- Improve customer outcomes in existing projects;
- Increase the transparency and visibility of heat network performance;
- Build an evidence base to inform heat network policy.

The scheme was open to public, private and third-sector applicants in England and Wales, providing capital grants of up to (but not including) 50% of eligible project costs for

improvements to existing heat networks and 100% revenue grants for optimisation studies. It provided capital funding to 37 networks and revenue funding to 73 networks.

Purpose of this Report

In this report we evaluate the processes of the first and second rounds of HNES and assess the impact of the revenue support provided under the HNES Demonstrator.

The process evaluation explores the effectiveness of the delivery of the scheme from launch through to funding drawdown. Interim findings, along with lessons learned exercises conducted by Gemserv, are intended to contribute to the ongoing evolution of the scheme, aiding continuous improvement and helping it to deliver on its objectives. These findings will also help guide the scope of our work later in the evaluation to assess impact, by facilitating updates to the Theory of Change (outlined in Annex 3) and contribution stories (refer to Annex 4) which will underpin that work.

The impact evaluation assesses whether and to what extent HNES Demonstrator revenue support has delivered the outcomes and benefits anticipated for it. In doing so, it takes into account participants' perceptions of the value of the scheme as well as anticipated impact and next steps for revenue Demonstrator projects, including whether they plan to apply for HNES capital funding.

This phase of evaluation represents the second of five³⁴. The next phase will provide a follow-up process evaluation of the HNES. The fourth phase will comprise a final process evaluation, covering post-upgrade processes for most capital projects supported in funding rounds one to two (one year on from funding delivery) and post-optimisation processes for revenue projects. Additionally, it will include an interim impact evaluation of the HNES capital projects and the final impact evaluation of the HNES Demonstrator capital projects. The final phase will encompass a final impact evaluation of HNES across all funding rounds and the value-for-money evaluation of the capital projects funded in the demonstrator scheme and Main scheme.

³⁴ Since this report was written, we have added an additional phase to the evaluation, which is currently being scoped.

Evaluation Methodology

This chapter outlines the approach taken in the evaluation, including key evaluation questions and a summary of the data collection and analysis methods used. Fuller details of our methodology can be found in the Annex 2.

Overview of Methodology

Taken as a whole, the evaluation of HNES is adopting a theory-based approach structured around the HNES Theory of Change (outlined in Annex 3) and incorporating Contribution Analysis (refer to Annex 4). This will synthesise evidence from qualitative and quantitative sources to examine what works, how, for whom, and what underpins different types of outcomes at each stage across the typology of funded projects. Evidence sources include interviews conducted across three process and four impact evaluation workstreams, beneficiary and customer surveys, analysis of monitoring and baseline data, Value for Money (VfM) modelling, and quasi-experimental analysis using Interrupted Time Series Analysis (ITSA).

In the current phase of the evaluation, our analysis of processes has drawn particularly on interviews with applicants and stakeholders and on surveys with applicants. The impact evaluation for HNES Demonstrator revenue funding has included an extensive review of optimisation studies, interviews with stakeholders and applicants, and (to help assess the role of the demonstrator scheme in building a pipeline of applicants for capital funding scheme) an in-depth data analysis of HNES applications.

The key objectives at this stage of the evaluation include:

- **Impact of the HNES Demonstrator (revenue projects):** to understand and quantify impact in relation to key metrics;
- **Interim process evaluation of the HNES (capital and revenue projects):** to understand how the HNES application and project initiation stages are working, what emerging impacts HNES is having, and what improvements can be made for projects in later funding rounds.

Key Evaluation Questions

The HNES evaluation is structured around a set of process, impact, and value for money evaluation questions. These are listed in **Annex 1** for the full five phases of the evaluation.

The key evaluation questions for Phase 2 of the evaluation are summarised below.

Table 2: Key Evaluation Questions for Phase 2

Phase	EQ	Evidence collection / research activities	Analysis
2a: Main scheme Process Evaluation	PEQ1-9	Interviews; Application survey	Thematic analysis; survey analysis
2b: Demonstrator Impact Evaluation (Revenue)	IEQ6-9	Interviews; desk review; monitoring data review;	Thematic analysis; content analysis; descriptive/statistical analysis; Contribution Analysis

The Phase 2 **process evaluation questions** seek to understand what has worked for different HNES projects pre-initiation, and why. This includes an assessment of the application process, the funding and drawdown experience, and project set up. The questions are designed to feed into ongoing evolution of the scheme and help ensure that the HNES is continuously improving and adapting. They also aim to help the scheme deliver its anticipated benefits.

The Phase 2 **impact evaluation questions** seek to assess the impact that optimisation studies have had for HNES Demonstrator revenue projects. This includes an assessment of the improvement measures that have been recommended to heat networks and their cost, alongside their impact on decision-making, and potential construction procurement. Impacts have been examined for different types of projects and stakeholders.

Approach to Data Collection and Analysis

This phase of the evaluation has sought to gather data in the following ways:

- **Process and Impact interviews:** These were conducted online via Microsoft Teams. The interviews were carried out virtually to encourage participation, lasted 45 minutes to balance depth with respondent fatigue, and were semi-structured to capture a broad range of perspectives, including any unexpected ones. Interviews were recorded and transcribed with each respondent's permission. The process interviews were conducted with applicants to the scheme, delivery partners, assessors and stakeholders, and the impact interviews with demonstrator scheme revenue projects.
- **Applicant Surveys:** To minimise respondent burden these were conducted online through an interface. Both successful and unsuccessful applicants were surveyed to obtain feedback on the application process. Two surveys were conducted with these groups, one enquiring about the application processes and the other focussing on the funding award processes.
- **Optimisation Reports:** Final reports from optimisation studies were reviewed. The review focused on identifying areas of sub-optimal network performance and

recommended interventions that applied across multiple projects, the extent to which reports considered the technical and wider context of networks in their recommendations, the level of detail and market-grounding of any costings provided, the degree of identification and recommended mitigation of any barriers to intervention (e.g., supply chain, skills, or procurement), and the strength of any case made for intervention.

- **Application data review:** A review of HNES application data was undertaken to determine the extent to which revenue projects from the Demonstrator scheme converted into applications for HNES capital funding.

The **recruitment of interviewees** took place between October and December 2023. It was carried out via email. Table 3 details the target number of interviewees for each stakeholder type and the number of respondents who agreed to be interviewed.

Table 3: Interview Respondents

Type	Target	Respondents
Policy Stakeholders	4	4
Assessors	3	3
Delivery Partners	3	3
Successful Applicants (revenue, capital)	6	7
Unsuccessful Applicants	6	4 ³⁵
Non-Applicants	4	4
Demonstrator Revenue Projects	10	10 ³⁶

The **surveys** were rolled out in stages, with the receipt of each survey triggered for each applicant when they reached the specific relevant stage of their HNES journey. This ensured that the surveys issued aligned with applicants' current stage of work, enabling them to provide richer detail on their experience.

Both surveys (one on application processes and one on funding award processes) were designed to elicit the experiences of capital and revenue projects. The proposed topics were reviewed by the Department and inputted to online survey software, before being issued to survey populations. Applicants first received a communication from Gemserv, alerting them to the upcoming survey, and then an email invitation from the research team to participate. The team allowed for follow-up contact attempts over email and telephone.

³⁵ The consortium attempted to contact all unsuccessful applicants. However, after multiple requests to contact through various different avenues, only four interviews were achieved.

³⁶ 10 projects, 9 interviews

The evaluation team received contact information for all 82 applicants to rounds 1-3 of the scheme. This corresponds to 162 projects³⁷ with unique application reference numbers, as 39 organisations submitted multiple bids across multiple heat networks, with some making up to 10 applications. Tables 4 and 5 detail the successful and unsuccessful applicants who responded to the online surveys, and the successful and unsuccessful applications covered by these responses against target response numbers based on an estimated response rate of 25%.

Table 4: Application Survey Responses by Number of Applicants and Number of Applications

Type	Target	Respondents	Population
Successful Applicants (revenue, capital)	21³⁸	40	70
Unsuccessful Applicants		4	7
Both successful and unsuccessful applicants		2	5
Total number of respondents		46	82
Successful Applications	41³⁹	82	138
Unsuccessful Applications		7	15
Number of applications which were unsuccessful in one round, but were successful in a subsequent round after reassessment		3	3
Total number of applications		92	162⁴⁰

The application survey received **46 responses⁴¹**, corresponding to 92 projects. Of the total number of applicants from rounds 1-3 (82) this represents a 56% response rate, covering 57% of the total number of projects (162). Two applicants declined to participate and gave no reason. Of the 46 respondents, 28 (61%) had made at least one revenue application and 22

³⁷ Across funding rounds 1-3

³⁸ Response numbers had been predicted based on an assumed 20-25% response rate from the 82 applicants to rounds 1-3 of HNES.

³⁹ Response numbers had been predicted based on an assumed 20-25% response rate from the 162 individual applications made in rounds 1-3 of HNES.

⁴⁰ This value includes applications which were withdrawn; however, these projects were not included in the scope of this survey.

⁴¹ Based on 6 contact attempts – 3 emails and 3 telephone calls

(48%) had made at least one capital application, with 4 of these having made both revenue and capital applications.

Table 5: Funding Award Survey Responses by Number of Applicants and Number of Applications

Type	Target	Respondents	Population
Successful Applicants (revenue, capital)	21⁴²	25	70
Unsuccessful Applicants		3	7
Both successful and unsuccessful applicants		2	5
Total number of applicants		30	82
Successful Applications	41⁴³	54	138
Unsuccessful Applications		5	15
Number of applications which were unsuccessful in one round, but were successful in a subsequent round after reassessment		1	3
Total number of applications		60	162⁴⁴

The funding award survey received **30 responses⁴⁵**, corresponding to 60 projects. Of the 82 applicants from funding rounds 1-3, this represents a 36% response rate, covering 37% of the total number of projects (60 out of 162). It is assumed that response rate is lower here than the application survey due to the tight timeframe between the implementation of the application and funding award surveys, which may have caused survey fatigue. Although this isn't anticipated to be an issue for the upcoming surveys, mitigations will be put in place to boost the response rate where possible. There were nine applicants who explicitly declined to participate, citing reasons including: wrong number, belief they had recently completed/been contacted for the same/a similar survey, and lack of availability for the remainder of the calendar year. Of the 30 survey respondents, a total of 19 (63%) had made at least one revenue application and 14 (47%) had made at least one capital application, with 3 of these

⁴² Ibid

⁴³ Response numbers had been predicted based on an assumed 20-25% response rate from the 162 individual applications made in rounds 1-3 of HNES

⁴⁴ This value includes applications which were withdrawn, however these projects were not included in the scope of this survey.

⁴⁵ Based on 5 contact attempts – 2 emails and 3 telephone calls

respondents having made both revenue and capital applications, either for the same or multiple heat networks.

Our analysis of the evaluation data included the following elements:

- **Thematic analysis of interviews data:** This was carried out using a spreadsheet to collate responses. Responses were segmented initially by stakeholder group and topic guide question and subsequently by overarching evaluation question. Response text was coded, and these codes were used to develop 'themes' relevant to each evaluation question. Both inter-group and inter-theme links were explored. Thematic findings were presented along with an explanation and supporting quotes.
- **Analysis of survey data:** Following completion of fieldwork for the applicant surveys, the data collected was anonymised and recoded to ensure respondents' confidentiality. Descriptive analysis of key process outcomes was then conducted to understand levels of satisfaction with the HNES application process, overall and by the type of grant (revenue or capital).
- **Review of optimisation study reports:** Each of the 73 optimisation study reports funded by the demonstrator scheme was reviewed, focusing on the above themes. Insights were extracted and grouped thematically in a spreadsheet and synthesised.
- **Quantitative analysis:** Capital project application data was collated into a detailed spreadsheet for all successful capital applications to the scheme, including information on factors such as applicant type and funding amounts. This included for projects that had previously received HNES Demonstrator revenue support. The spreadsheet was cleaned to ensure data alignment and a comprehensive set of descriptive statistics was produced. Analysis was then carried out comparing descriptive statistics between HNES capital applicants who had received Demonstrator revenue funding and those projects that had not. This was complemented by data visualisation.

Further details of our methodology are provided in Annex 2.

Caveats

A number of caveats should be considered when interpreting Phase 2 evaluation findings.

As the number of projects funded by the HNES Demonstrator and in rounds 1 and 2 of the HNES is relatively small, the population sizes of participants, unsuccessful applicants, and non-applicants were also relatively limited. This in turn impacted available sample sizes for Phase 2 research. A number of respondents also declined to be interviewed, although the sample sizes secured were in line with expectations as at the scoping phase of the evaluation. Findings should be interpreted with this data constraint in mind, which could in particular impact the representativeness and the robustness of the findings presented.

Additionally, as with any study that draws on interview or survey data, it is important to note the possibility of measurement error in data that respondents provide, as well as the potential for

factors such as social desirability bias where respondents may tend to give answers that they feel interested parties wish to receive, rather than fuller or different recollections.

Future phases of HNES process evaluation work will likely be able to draw on larger population and sample sizes, ensuring that findings from Phase 2 can be further triangulated in due course. Equally, further triangulation may be possible between respondent data on the one hand and performance data on the other, aiding additional assessment of robustness.

Main Scheme - Process Evaluation Findings

This chapter synthesises findings from qualitative analysis to provide a narrative of findings relating to the processes of the first and second rounds of HNES. The chapter will cover the pre-application, application, funding award and post-application process for capital and revenue projects. The findings are presented thematically, referencing the relevant evaluation questions, using the evaluation number that corresponds to the list of questions in Annex 1.

Scheme Launch, Promotion and Awareness

Relevant Process Evaluation Questions:

1. How do potential applicants hear about the scheme and what model is HNES being applied through? What is the market appetite for the HNES offer? What is the spread of applicants applying for funding relative to all those who could apply?

To support the HNES launch, Gemserv undertook several initiatives, namely: they established a mailing list, engaged with key industry influencers and gatekeepers⁴⁶, hosted a launch event and stakeholder workshop, prepared and published essential documentation, developed a dedicated landing page on their website, hosted an application webinar, sent out initial communications via the mailing list, created social media posts, publicised successful HNES Demonstrator projects, developed press releases for the scheme's launch, and sought speaking opportunities at industry events. These efforts played a crucial role in informing potential applicants about HNES.

Table 6 highlights the purpose of various communication channels used by Gemserv and applicants.

Table 6: Programme communication channels

Platform	Purpose
Gov.UK HNES application website ⁴⁷	Information provision (predominantly aimed at applicants)

⁴⁶ E.g. ADE, UKDEA, Triple Point Heat Networks, District Heating Vanguard, Heat Network Industry Council, the Heat Trust, District Heating Divas, G15, and SHRA events, and Regional LEPs

⁴⁷ GOV.UK and DESNZ (2023). Apply for the Heat Network Efficiency Scheme (HNES) from <https://www.gov.uk/government/publications/heat-network-efficiency-scheme-hnes>

Platform	Purpose
Gemserv websites	Redirection to gov.uk and mailing list sign up
Other Delivery Partner websites	Redirection to gov.uk
Linkedin and Twitter (Gemserv)	Share news, announcements and showcase projects (wide stakeholder list – generic communications needed)
YouTube	Host event videos (predominantly aimed at applicants). Likely to be linked in event follow up emails or accessed via website.
Mailing list	Share HNES announcements, funding awards and event invites (wide stakeholder list – generic communications needed)
Hosted events	Topical events linked to HNES e.g. application focused or themed to discuss important issues (wide attendance but specific to the event theme)
External events	In-person or online presence at third party events to share HNES updates, showcase funded projects and raise awareness of the support available.

Applicants **learned about HNES** through a mix of channels, including social media (notably LinkedIn), consultants, and organisational contacts. Applicant survey respondents were asked how they heard about HNES. They were provided with a range of multiple choice options, of which they could select as many as were applicable in their case:

- **Department Communications:** 41% of applicant survey respondents (55% of capital applicants and 36% of revenue applicants), learned about the HNES through communications from the Department.
- **Industry Bodies:** The second most common source, cited by 37% of survey respondents (41% of capital applicants and 32% of revenue applicants), was through communications from an industry body.
- **Professional Contacts:** 26% of applicant survey respondents (27% of capital applicants and 21% of revenue applicants), mentioned learning about HNES through word of mouth, including from other applicants indicating the importance of these networks in spreading awareness.

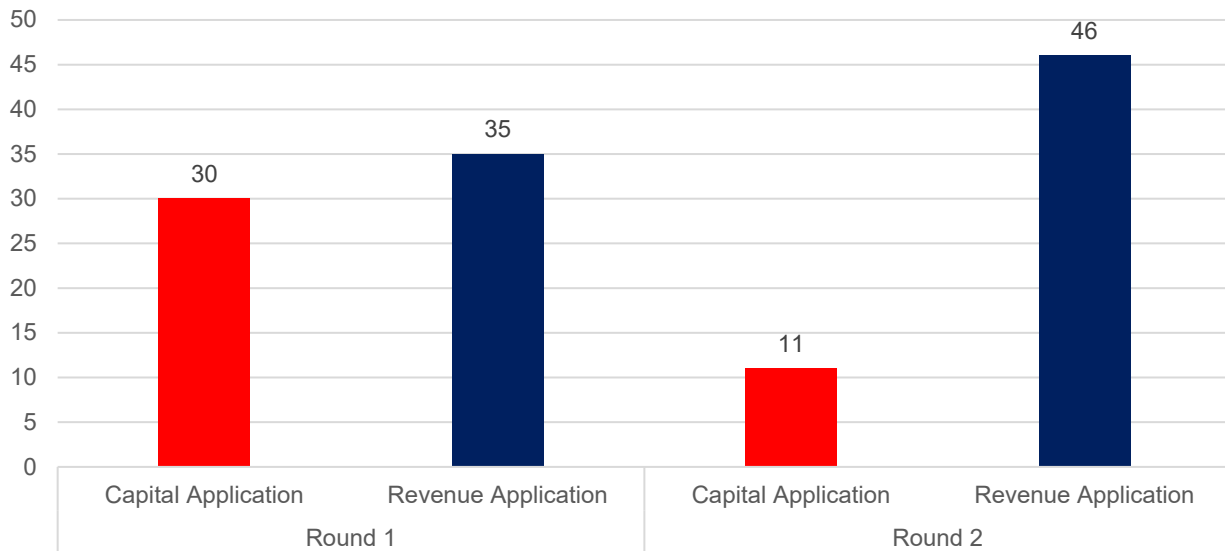
- **Delivery partners:** Gemserv played a crucial role in market-building activities. Their efforts in conducting seminars, managing online platforms, and engaging directly with potential applicants were pivotal in promoting HNES. Consequently, 22% of survey respondents (18% of capital applicants and 29% of revenue applicants) reported that they heard about HNES through communications from Gemserv.
- **Social Media:** 17% of survey respondents (14% of capital applicants and 18% of revenue applicants) learned about HNES from social media platforms or news articles. Interviews revealed that applicants also frequently checked the government website for updates and engaged in heat network forums.
- **The HNES Demonstrator:** The HNES Demonstrator played a key role in strengthening HNES market awareness, which garnered strong interest ahead of the launch of the main scheme. An interview with a member of the Department stated that “*the Demonstrator [scheme] was responsible for building up HNES in the market.*”
- **Consultants:** Half of the successful applicants interviewed reported learning about the scheme through consultants, such as Chirpy Heat and Switch2. By contrast, only 9% of survey respondents (9% of capital applicants and 11% of revenue applicants) stated that they heard about HNES through communication by a consultant or contractor. Their role was not only in raising awareness but also in guiding applicants through the complexities of the funding landscape.

Interviews explored the **market appetite and response** to HNES. The interviews highlighted that:

- The demand for HNES **exceeded expectation**, particularly when compared to the HNES Demonstrator. HNES, with its greater number of rounds, allowed more time for applicants to prepare thoroughly. Early rounds saw a higher-than-expected demand, with the scheme extending to “*smaller, less recognised heat networks,*” thereby reaching a broader range of applicants.
- There is **widespread enthusiasm** for HNES, particularly among smaller-scale independent developers. This enthusiasm is attributed to the scheme's alignment with evolving heat network technologies, and is driven by the potential benefits, including upgrades for better efficiency, emissions reductions, and cost savings. The growing market and increasing case studies are likely to encourage more organisations to come forward.
- Policy stakeholders affirmed the scheme's effectiveness in **targeting the appropriate audience**. The scheme witnessed high levels of engagement from applicants with existing issues in their heat network systems. Additionally, the context of rising energy prices and cost of living pressures also created an increased focus on the scheme.
- Contrary to initial expectations that a high number of capital project applications would be received, the scheme received and continues to receive **higher numbers of revenue applications**. Figure 2 highlights that almost an equal number of capital and revenue applications were received in round one, but that there was a significant increase in revenue applications, constituting 81% of submissions, in round two.

- Policy stakeholders stated that the spread of applicants was **in line with their expectations**. While HNES was open to a wide range of applicants, its design and focus, particularly on supporting customers in need, influenced the types of organisations that applied. The shift from private sector applicants in the HNES Demonstrator, to more local authorities and housing associations in HNES, reflects the main scheme's focus on customers in need, *“which is in line with what they (the Department) intended the scheme to do.”*

Figure 2: HNES Capital and Revenue applications



Source: RSM UK, based on HNES capital and revenue application data

Application Process

Relevant Process Evaluation Questions:

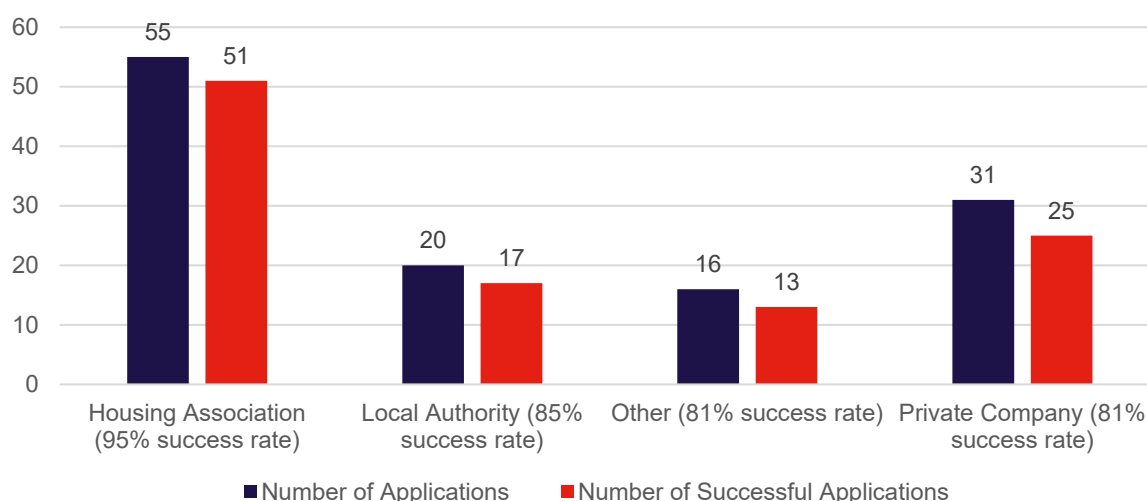
- What types of projects are successful/unsuccessful at the application stage, and why? At what points are applicants dropping out and why?
- Are the eligibility and scoring criteria suitable, is there any evidence of gaming, and if so, how does this impact the delivery of HNES?
- Have the baseline requirements for capital projects created any difficulties for projects, or changed the type of projects that are successfully applying?
- What types of measures/interventions are applied for and supported?
- What are applicants' experiences of the overall application process and of providing baseline and target data, and how does this vary by applicant (i.e., revenue or capital) or project type and why?

8. Was the process easier for Main scheme applicants who had been part of the HNES Demonstrator versus those who had not?

The following highlights **key characteristics of successful and unsuccessful applicants and applications**:

- Policy stakeholders report that the majority of projects funded under HNES are **gas boiler projects**. This includes some biomass projects and gas boiler projects associated with existing but unused combined heat and power (CHP) systems. The scheme's broad eligibility criteria allows for a focus on performance rather than specific project characteristics.
- Figure 3 indicates that **public sector organisations were particularly successful**. Housing associations were the most common and successful applicants in the first two rounds with a 95% success rate, followed by local authorities, with an 85% success rate. Private companies and 'other' applicants exhibited a lower success rate of 81%.
- Interviews highlighted that the high number of applications from local authorities and housing associations, **reflects the scheme focus on 'customers in need' and customer detriment**. These organisations, especially those involved in social housing and hard-to-heat homes, are proactive in addressing heat network performance issues and submit well-supported applications.
- Projects that had conducted optimisation studies prior to application, and applicants who engaged with relationship managers, and received guidance through the application process were typically more successful.

Figure 3: Applicant organisation type (Revenue and capital, Round 1 and 2)



Source: RSM UK, based on HNES capital and revenue application data

- Applicants are required to describe the works being applied for and provide budget costs for these works, as well as specify their chosen funding amounts in their application forms. Table 7 presents the average amounts of capital and revenue funding applied for and awarded to applicants over rounds 1 and 2. The average amount of

capital funding applied for and awarded to housing associations and local authorities is considerably higher than that awarded to private organisations. Housing associations received an average of £754.1k, while local authorities were awarded an average of £642.6k. These figures are notably higher than the overall capital application average of £525k. In contrast, private companies received a substantially lower average capital funding amount of £270.3k. For revenue projects, local authorities received an average funding amount of £18k⁴⁸. By contrast, housing associations received the lowest average funding amount of £17.7k.

Table 7: Average funding amounts for successful projects, rounds 1 and 2

Applicant Type	Capital Applications		Revenue Applications	
	Number of Applications	Average Value of Award	Number of Applications	Average Value of Award
Housing Association	10	£754,177.78	41	£17,686.98
Local Authority	9	£642,624.92	7	£17,965.71 ⁴⁹
Other	3	£87,756.76	5	£20,784.60
Other NHS	0	0	5	£24,000.00
Private Company	8	£270,324.29	17	£19,953.71
All	30	£525,042.23	76	£19,869.24

Source: RSM UK, based on HNES capital and revenue application data

Interviews explored at **what points applicants were dropping out** and why:

- The perceived complexity by some applicants of the HNES application form, coupled with the necessity of external expertise and organisational internal challenges, were key factors leading to applicants dropping out. This usually occurred at the beginning of the application process once applicants had evaluated data access or the application criteria. Interviewees cited the requirement for empirical evidence of poor heat network performance as a significant barrier to applying, once they realised *“there just wasn’t the availability of the information to proceed with the application,”* or they *“didn’t think their projects would meet the criteria,”* they abandoned the application.
- Considerations regarding resident experiences also influenced applicants to withdraw. Applicants reviewed the potential impact of network improvements on residents, leading some to decide to not proceed with their application.

⁴⁸ As per [HNES application guidance](#), the expected budget range for revenue grants is between £15,000 and £24,000 (inclusive of non-recoverable VAT if requested in the application form). However, applicants may request a higher amount, provided a clear justification is given. One project was awarded a grant funding amount outside of this range, and as such has been removed from the average calculation due to being an outlier.

⁴⁹ See previous footnote.

Interviews and surveys explored the impacts and suitability of the **eligibility and scoring criteria**:

- The agnostic nature of the scheme allowed for a broad eligibility criterion, which prioritised performance rather than the type or size of heat networks. Most survey **respondents (90%) perceived the eligibility criteria to be “clear,”** however, a small number experienced ambiguity, indicating a need for greater clarity and pre-application support from Relationship Managers.
- **Gemserv managed eligibility criteria and fund allocation in an effective manner,** incorporating comprehensive evaluations, including asset appraisals and conflict of interest checks. This multi-layered review process aimed to reduce funding risk and enhance project feasibility. Post-approval monitoring is used to assess progress against the agreed plan, and “*clear guidelines and evaluations*” prevent unfit projects from being funded.
- The robust assessment processes seems to have mitigated the risk of gaming. According to the Delivery Partner, the initial project designs remained largely unchanged irrespective of the eligibility criteria; there was “**no evidence of gaming**”.
- A minority of applicants called for **more comprehensive assessment criteria** to strengthen applications. Feedback indicated a perception that HNES was primarily oriented towards commercial heat networks, with a lack of understanding of the complexities related to leaseholders and residential heat networks. Further, a respondent from the Department stated that at times, there was a **misconception** that the scheme was solely for networks whose customers were from a low-income background. This feedback highlights the potential for more clarity to be provided around eligibility criteria.

Interviews and surveys explored **application form complexities and baseline requirements**⁵⁰ and their impact on project types, assessment processes, and applicant experiences:

- Many applicants, particularly those lacking technical expertise, reported that they encountered **complexities with the application form**. The most frequently reported issue faced by applicant survey respondents, affecting 45% (21 out of 43), was the challenge of **supplying or identifying the requested information**. For example, applicants found it difficult to determine what data was needed and some found the volume of information needed overwhelming. These issues often necessitated the help of external consultants, without which, applicants indicated they would not have applied, stating that “*if it wasn’t for [consultant], we probably wouldn’t have done it because there was a lot of information and it looked quite overwhelming to be honest.*” Additionally, applicants found it difficult to “*determine*” what data had to be supplied due to “*uncertainty as to what was required and what was additional.*”

⁵⁰ Applicants must provide quantified information outlining current network performance against several performance indicators or KPIs.

- Applicants frequently faced challenges due to the lack of detailed information and data available to them. For example, some applicants **did not have empirical data** on which to base calculations, and others struggled with the baseline data calculations themselves. One unsuccessful applicant said that they did not *“think even our M&E (Mechanical and Electrical) team would have been able to do the calculations... they [DESNZ] want that empirical evidence that shows that the heat network is performing poorly and that's where we didn't have the internal expertise.”*
- A significant portion of applicant survey respondents, 30.4%, encountered **technical difficulties with the application forms in round 1**. This issue was more pronounced among capital applicants, with 55% reporting technical problems. Common issues included **locked sections of the form**, difficulties in *“copying and pasting cells over to a Word document”*, and insufficient explanations for complex calculations.
- Applicant surveys, as indicated in table 8, explored applicants' experience in providing baseline data: 24% found it easy, 35% found it somewhat easy, 26% found it difficult and 9% found it very difficult. For example, 18% found **providing supporting information**, such as confirmation of sign-off by senior project sponsor, difficult and 14% stated that supplying **evidence on targeted benefits of improvement** was difficult.
- According to some capital project applicants, their limited technical knowledge posed as a challenge in meeting the detailed data requirements. Similarly, revenue applicants generally understood the baseline requirements but faced difficulties in identifying additional necessary information. However, the narrative component of the application aided in explaining data limitations.

Table 8: Survey applicants experience in providing baseline data

		Very easy	Easy	Neither easy nor difficult	Difficult	Very Difficult	Not applicable	Unsure
Baseline data (n=46)	%	0%	23.91%	34.78%	26.09%	8.70%	2.17%	4.35%
	No.	0	11	16	12	4	1	2
Supporting information, for example confirmation of support by senior project sponsor (n=46)	%	2.17%	45.65%	28.26%	17.39%	0%	2.17%	4.35%
	No.	1	21	13	8	0	1	2
Evidence on targeted benefits of improvement (for applications made for the Capital fund) (n=22)	%	0%	27.27%	45.45%	13.64%	13.64%	0%	0%
	No.	0	6	10	3	3	0	0

Source: Consortium, HNES Application Survey Analysis

- Nearly half of the respondents (45%) identified areas for improvement in the application process. These suggestions included enhancing the form's formatting, adapting it for different types of heat networks, providing more comprehensive assistance, clarifying financial aspects such as VAT, and introducing features such as online chat for quicker query resolution.

Interviews explored the **types of interventions applied for and supported**:

- The main scheme has also observed a **shift in application trends compared to the Demonstrator scheme**. The focus on customers in need has “*suppressed the appetite from the private sector*” **compared to the Demonstrator scheme** and there has been a shift towards fewer applications with higher funding values. This indicates a focus on more complex and impactful interventions aimed at achieving longer-term and more sustained benefits.

Interviews and surveys explored applicants’ **experiences of the overall application process**:

- The application process was **viewed positively by most applicants**, with applicants noting the professionalism and responsiveness of the HNES team. Many found the process straightforward due to their existing knowledge and organisational support.
- The majority of survey respondents (54%) rated their overall experience with HNES as **four out of five** and 30% rated their overall experience **five out of five**. This is

contrasted to 15% of respondents who rated their overall experience one or three out of five⁵¹.

- Survey respondents were asked to select areas of the application that they were particularly satisfied with. 63% highlighted **responses to enquiries**, 61% selected the **helpfulness and knowledge of staff**, 57% selected the **HNES application process**, 52% selected **application support**, and 48% selected events and communications.

Applicant support, provided by Gemserv, external consultants, external partners, and the Department, was generally well-received:

Gemserv and Partner's Role:

- **Gemserv Relationship Managers** received high ratings for responsiveness, with 49% of applicants assigning the highest rating and 36% rating them 4 out of 5. Despite 61% of respondents not identifying any need for improvements, there were suggestions for a single point of contact and more direct communication, such as increased telephone interactions.
- The **Gemserv Account Managers** were widely regarded as valuable throughout the application process. Their prompt and supportive approach was appreciated, as it helped foster constructive relationships. For example, an unsuccessful applicant appreciated having *“had somebody to bounce ideas off during the application process, which made the application more valuable”*.
- The majority of applicants, including 41% of applicant survey respondents, **attended Gemserv webinars**. These webinars effectively clarified assessors' expectations and helped applicants understand application requirements. However, a small minority of unsuccessful applicants felt the webinars were too general or lacked specific detail, leading them to rely more on consultants and utilise the Gemserv Relationship Managers, especially when they had a *“lack of technical understanding.”*
- The majority of applicants cited that **external partners**, including Ramboll, Lux Nova, and Turner and Townsend, were perceived as valuable in ensuring that *“baseline requirements are met and understood”*, and to better understand *“what improvements could be made to the efficiency of the heat network within the scheme.”* Unsuccessful applicants shared similar views, highlighting a reliance on external partners to *“tell us what we need to do and how we should run these things properly and tell us if we’re just right”*.

External Consultants:

- Applicant survey respondents were asked⁵² if they involved anyone else, internally or externally (they were also able to select both) in the process of completing their application. A significant majority (74%) **sought external support with their HNES**

⁵¹ No survey respondents chose two out of five

⁵² The survey question was multiple choice.

application, with 94% finding this assistance useful; 48% of applicants relied on wider internal resources.

- By those who utilised their services, **external consultants were regarded to be highly valued**. They provided essential expertise, particularly beneficial for applicants lacking in-house technical expertise. The support from consultants was seen as a key enabler for a successful application, with respondents involved in the fact-finding exercises finding it especially useful in understanding data requirements.
- While many applicants found external support beneficial, a segment of respondents preferred to handle queries independently. These applicants felt confident in their ability to meet application requirements without external assistance.

Departmental Guidance and Tools:

- Applicant surveys indicated that the most utilised information source for capital grant applicants was the **HNES webpage on the GOV.uk website**, with all respondents finding Department staff helpful. Additionally, 75% of revenue applicants referred to the heat network optimisation guidance⁵³, with 57% rating it as very helpful. Some feedback suggested that there was a lot of information, highlighting the need for more *“streamlined information specific to individual needs.”*
- The majority of applications reported that the **written guidance and webinars** provided by the Department, including how to complete the monitoring and reporting form, was perceived as *“very helpful – very supportive”*. Nearly half (47%) of survey respondents attended **HNES-organised events**, with the application webinar being the most popular as *“you could ask questions”* and they helped to understand what was *“needed in terms of providing updates,”* perceived to be useful in informing all applicants about the eligibility criteria, potential of funding awarded, and reasons for applying. The majority of attendees (69%) found these events very informative, offering valuable opportunities for direct queries and understanding application updates. However, suggestions were made for more detailed guidance on the specific data requirements.
- The Department’s **guidance videos** were positively received by 57% of survey respondent viewers for offering *“more detail”* and *“accessible insights”*, yet only 8% watched all the videos, indicating potential underutilisation. Among revenue applicants, 43% did not watch any guidance videos, while 45% of capital applicants watched some, highlighting a disparity in engagement with these resources. Survey respondents highlighted that some videos provided *“information they already knew,”* suggesting that tailored video content by applicant type may help to encourage engagement.
- The **SharePoint** was recognised as a useful tool by many, particularly for tracking the review process and engagement with submitted information, effectively serving as an audit tool for supporting documents and applications.

⁵³ The Department for Energy Security and Net Zero. (2023). Heat Network Optimisation Guide from <https://assets.publishing.service.gov.uk/media/649567a0831311000c296255/heat-network-optimisation-guide.pdf>

Interviews highlighted several **barriers and enablers** affecting the application process:

- Many applicants face significant **challenges due to match funding requirements**, particularly large-scale projects given their higher levels of need for funding. Additionally, some successful applicants struggle to spend funding within the financial year timeframe, pointing out that *“tight timescales and turnaround”* have likely *“put bidders off.”*
- A **lack of technical expertise or resources**, especially for local authorities, is a common barrier to the application process, however applicants frequently use third-party experts to overcome this issue. Some applicants also struggle with data collection and lack awareness of qualified installers, which adds complexity to the application process.
- The **requirement to disclose underperforming networks** can be a deterrent due to concerns about public reputation and the perception of inefficiency. However, with increasing awareness of sector regulation, some organisations are motivated to apply for funding before stricter regulations come into effect.
- Survey responses **highlighted key motivations for applying to the HNES capital projects**. These included enhancing service quality, boosting customer satisfaction, improving heat network efficiency, and contributing to the government’s net zero goal by 2050. For revenue grant applications, the main objectives were identifying service improvements and gaining operational knowledge for broader application.
- Applicants are primarily driven to apply for HNES by the **opportunity for grant funding** and the potential to **improve their energy systems**. Revenue grants, which can cover up to 100% of costs, are particularly attractive to local authorities and social housing providers. Environmental consciousness and a commitment to improving existing network efficiency were also significant motivators, aligning with national and organisational net-zero aspirations.
- Applicants already considering upgrades or refurbishments saw HNES as an opportunity to integrate sustainable solutions and enhance efficiency. Projects often targeted upgrading ageing infrastructure, such as Heating Interface Units (HIUs), and incorporating new technologies including ground systems, solar panels, and heat pumps into existing operations.
- **Rising fuel prices and inflationary pressures have a dual impact**. While they increase operational costs, they also strengthen the financial case for energy efficiency improvements. The availability of resources, such as Heat Interface Units (HIUs), can delay project initiation and progress.

Tight deadlines and the process for responding to clarification queries presented challenges for some HNES applicants:

- A small minority of successful applicants reported challenges in the timeframe of the application process. Interviewees cited uncertainties about the specific information required for submission were a common issue, compounded by delays in receiving

guidance. Although 78% of survey respondents felt the time allocated for submission was sufficient, complexities arose, particularly for projects involving social housing Private Finance Initiatives. This led to some applicants providing more information than necessary, thereby increasing the resources expended on the application.

- Some applicants highlighted the fixed nature of the government-mandated capital expenditure timelines as challenging and out of kilter with market realities. For example, applicants cited that the funding timeframes have made it challenging to secure contractors within the allocated funding timeframe. Delivery partners also noted that *“financial rigidity can lead to challenges”*, particularly when *“unforeseen costs arise or technical delays occur”* potentially impacting the *“project’s scope and viability”*.
- Applicants found the process for addressing clarification queries generally straightforward, though turnaround times for responses was sometimes challenging due to internal processes within applicants’ organisations. Some unsuccessful applicants cited **communication issues with the HNES team**, including a lack of clarity and feedback during clarification rounds, a lack of verbal contact, and unexpected changes in the timeline for questions, which made it difficult to provide information promptly. For example, one unsuccessful applicant cited a two-week delay between raising clarification questions and receiving the relevant responses. Another unsuccessful applicant highlighted the **importance of clearer expectations**, regarding the documentation required between rounds, highlighting that the detail required in round 2 is *“nothing like”* the *“very detailed, very specific”* detail required for round 5.
- To improve service levels, a few respondents suggested assigning a **dedicated HNES point of contact** at the application’s onset, providing a contact number for urgent queries, offering more detailed guidance and explanations during the application process, and enhancing the administration’s responsiveness to queries and application processing.

The **HNES Demonstrator prepared applicants for HNES**, enhancing their understanding of its requirements and expectations:

- A large majority of both successful applicants and policy and delivery partners (specifically Genserv and Ramboll) cited that prior experience of the HNES Demonstrator helped applicants to navigate HNES more efficiently. This prior experience meant participants, often recipients of revenue funding, already possessed essential information, making the transition to capital projects smoother.
- The transition from revenue focused HNES Demonstrator projects to capital projects in HNES was easier due to the availability of optimisation studies and essential documentation, offering a clearer understanding of requirements.
- Applicants without HNES Demonstrator experience often encountered a steeper learning curve. This included understanding the technical requirements and the need for detailed baseline data, which some found challenging.

- Even for applicants with previous experience, the HNES application process had its unique challenges e.g. the application form for HNES differed from the HNES Demonstrator's, requiring a highly tailored response.

Post-Application Experience

Relevant Process Evaluation Questions:

9. How did the funding and drawdown process work in practice?

The post-application experience of HNES funding recipients varied based on organisational structures, internal processes, and clarity in communication from the funding bodies. While the process was generally efficient, certain procedural challenges and delays impacted the speed of project mobilisation and progression. Continuous evaluation and feedback mechanisms are crucial for addressing these issues and improving the overall effectiveness of the scheme.

The majority of applicants found the **funding and drawdown process to be straightforward**, and the monitoring and reporting process was generally simple to follow:

- Analysis of survey responses indicated that 70% of funding award survey respondents (67% revenue and 73% capital) stated that the funding offer received met their expectations, and 19% stated that it exceeded their expectations.
- The process for drawing funds, was generally considered **straightforward**, especially for local authorities, who can claim their grant for a given financial year in advance of spend. The Department also cited positive elements of the drawdown process, such as swift approvals, smooth progress on grant agreements, and award letters being promptly sent. However, there were instances where the specifics of the process were not clearly communicated initially, such as *“where it's [the funds] are coming from – Gemserv or the Department”*, leading to some confusion amongst successful applicants.
- A minority of successful applicants **faced technical challenges** during the drawdown process, where there was confusion as to who invoices should be sent to (the Department or Gemserv). Conversely, for most, the **press embargo** did not pose a major challenge as projects used this period for internal preparation; only one applicant stated that it caused a delay to project mobilisation.
- Most applicants reported that following funding approval, they **received considerable ongoing support**, including assistance with monitoring and reporting templates. This support, featuring monthly monitoring and reporting, was well-received by many successful participants. An interviewee from the Department highlighted “diligent” communication throughout this process. While the monitoring and reporting procedure was generally straightforward, some applicants encountered challenges such as corrupted documents and delays in obtaining required data from suppliers. Additionally, concerns were raised about the relevance of reporting targets, particularly in cases where significant project activities had not yet commenced.

Interviews identified several factors that **contributed to delays in project implementation** following award confirmation:

- The majority of implementation delays were attributed to **applicant's internal governance issues** and **bureaucratic procedures**. Local authorities highlighted lengthy bureaucratic procurement processes and the need for bid evaluation, reporting that internal administrative procedures delayed the ability to engage with contractors and start projects. These delays were compounded by the need for report writing, securing authority approvals, and the *"financial year constraint"* namely managing council funding to be spent within the fiscal year.
- Successful applicants and policy stakeholders **emphasised administrative and communication issues**. Delays in the procurement process, sometimes extending up to four months, were seen to be due to lengthy negotiations with contractors and potential overcommitments by consultants. Slow processes in setting up purchase orders, exacerbated by *"data issues"* and organisational changes (DESNZ changing from BEIS), led to delays in *"finance teams issuing purchase orders to successful applicants."* Despite these setbacks, most applicant interviewees believed that they would still be able to spend their annual funding allocation.
- Applicants faced difficulties with **the time lag between the submission of applications and the notification of outcomes**. This gap caused challenges in planning and utilising budgets efficiently within the scheme's required timeframe. For instance, one respondent mentioned an application made in June/July 2023 but only became aware of their successful award in September 2023, with the stipulation that the funding had to be used by March 2024. To improve the process, respondents suggested that earlier notification of funding awards would be beneficial, and increased flexibility in these timelines would alleviate difficulties ineffectively utilising the funds.
- 23% of survey respondents indicated that all assessment outcome notifications were delayed, 60% said they were on time, and 17% were unsure. Of the 30 funding award survey respondents, 19 organisations confirmed at least one delayed application, however acknowledged that they were kept informed by HNES about these delay(s).
- Several interviewees indicated **a need for more precise timelines on when projects under the scheme could commence**. This information would enable better preparation and planning for the networks involved. Additionally, while some respondents appreciated the regularity of the funding rounds and the advance notification of dates, which facilitated planning, others suggested that the process could be streamlined by staggering the revenue and capital funding streams to allow for the submission of capital applications immediately following the completion of revenue projects, ensuring a more seamless transition and continuity in project development. A small number of successful applicants mentioned that there were *"slight issues in waiting for section 20s"*.

Applicant feedback suggests that:

- Overall, the **experience with HNES funding and project initiation was positive**. However, the need for more flexibility in funding and timescales was cited, which in turn would help attract more applicants and ease operational pressures.
- The importance of **ongoing evaluation, stakeholder engagement, and a continuous improvement loop** in the process was emphasised. This approach aims to refine the programme based on feedback and real-world experiences.
- Of the 30 funding award survey respondents, **73% stated that they were intending to reapply for a future HNES funding round**. Those considering reapplying believe that the feedback received from Gemserv may enhance their chances of success in future applications.
- Interviews with unsuccessful applicants identified a high proportion that intended to reapply, but this was dependent on the specific feedback given in relation to improving applications. Potential issues negatively impacting their desire for reapplication include high **consultancy costs** and a **lack of internal understanding of assessment criteria**.

HNES Demonstrator Revenue Projects - Impact Evaluation Findings

This chapter synthesises insights from qualitative and quantitative analysis to provide findings on the impact of the HNES Demonstrator. It covers the perceived value and anticipated impact and next steps for the revenue projects, including whether they plan to apply for HNES funding. Findings are presented thematically, referencing the relevant evaluation questions, using the evaluation number that corresponds to the list of questions in Annex 1.

Overview of the HNES Demonstrator

The HNES Demonstrator aimed to trial and refine approaches to optimising existing heat networks. Specifically, the revenue projects conducted optimisation studies to identify and recommend measures for enhancing the efficiency and effectiveness of these networks.

Impacts on Beneficiary Decision Making and Effectiveness of Optimisation Study Recommendations

Relevant Impact Evaluation Questions:

6. Did the optimisation study allow operators to make an informed decision on whether they should improve the heat network?
7. What improvements can operators make to improve their networks?

Optimisation reports identify areas of sub-optimal network performance and propose measures for enhancing the efficiency and effectiveness of these networks. Analysis of the 73 HNES Demonstrator optimisation reports **highlight a number of recurring areas of sub-optimal network performance**. Key issues include inefficient plant room operations, poor temperature control and heat distribution, substandard HIU performance, poor insulation and pipework issues, water quality and system maintenance concerns, control and monitoring deficiencies (e.g., outdated Building Management Systems), safety and regulatory non-compliance, operational issues (e.g., lack of storage, incorrect valve settings), and aging infrastructure. Further detail is provided in Annex 6.

Each optimisation study included thorough cost appraisals for proposed improvement measures. Wherever possible, costs were based on supplier quotes or on previous similar works delivered by the consultant. Almost all of the studies provided a strong case for intervention by detailing the impacts of the suggested optimisation measures on the heat network baseline.

The cost benefit analysis within the optimisation studies included all of the minimum requirements that had been specified under HNES:

- Capital costs of proposed measures
- Operational costs of proposed measures
- Replacement costs of proposed measures
- Indirect/social cost savings (such as carbon)
- Possible funding support mechanisms for the proposed measures (e.g., HNES/GHNF/Public Sector Decarbonisation Scheme (PSDS))

The optimisation reports also calculated financial metrics such as simple payback, Net Present Value (NPV), and Internal Rate of Return (IRR) for each proposed work package. This provided a foundation for assessing the financial viability of the suggested interventions.

However, of the 73 project optimisation reports, only a small number identified barriers to the implementation of their recommendations. Identified barriers included the level of disruption to customers and operators associated with each intervention, inaccessible risers⁵⁴, a lack of drawings showing the extent of insulation across risers, a lack of information (including a comprehensive view of in-built information, missing meter readings and logbooks), and the offline status of the Combined Heat and Power (CHP).

Interviews explored the **effectiveness of optimisation studies** in guiding decision-making.

- Heat network operators reported that the optimisation studies tended to be well-tailored, identifying challenges unique to the heat networks concerned. The recommendations were seen as instrumental in helping operators understand what specific actions were needed.
- Operators generally praised the “*in-depth*” nature and detail provided in the studies, providing more insights than the operators had anticipated. However, their technical complexity sometimes led to difficulties for operators, particularly where respondents reported that recommendations had not been presented in “*plain English*” or that “*some aspects of the reports were ‘too technical’*.”
- The studies use of robust data was highlighted as a key strength in formulating precise recommendations. Reports were perceived to be “*full and thorough*” underpinned by detailed data, which was felt to be indicative of the depth overall of analysis undertaken in these studies. However, challenges were noted in cases of older networks, where limited data availability led to reliance on “*expertise to determine what was wrong instead of relying on data*”.
- In the vast majority of instances where operators decided to proceed with the recommended upgrades, they often encountered challenges in adjusting their budgets

⁵⁴ Risers are the vertical pipes that transport hot water or steam from a central heating source to individual units within a building, typically in multi-storey residential or commercial buildings.

to align with the scope of the projects. This required a re-evaluation of financial priorities and resources.

- One operator raised concerns about potential bias in optimisation reports. There was apprehension that the consultancies conducting these studies might have vested interests, leading to recommendations that could overlook critical contextual factors such as the age of networks and constraints they face.
- Overall, while most (80%) operators reported that they found the recommendations they received to be helpful and actionable, effectively guiding their decision-making processes, 20% questioned the practicability of them implementing the proposed upgrades. In many cases, their concerns related to the perceived technical complexity of the proposals they had received.

Operators also provided insight into key **factors influencing their decision to progress with the recommended upgrades**:

- These factors included the likely cost of the upgrades, the potential return on investment, the risk of upgrade failure, as well as the level of anticipated long-term carbon savings, energy efficiencies, the impact on customer experience, and the predicted impact on customer vulnerability. These elements were typically well documented and easily accessible in the optimisation reports, allowing for operators to make informed decisions.
- The main factor influencing operator decision making was cost, with operators weighing the potential financial investment against the expected benefits, including environmental benefits.

“We will look at the ROI (positive payback, triple bottom line approach and so carbon savings will come in that). Carbon savings will be important.” – Operator, HNES Demonstrator

“A key driver for us as well is reducing our emissions- we want to be at net zero. We saw a good chunk of saving in tons of CO2 as part of that work. It’s really a key driver for us. – Operator, HNES Demonstrator

- The decision-making process often involved multiple stakeholders, each with differing interests and resources, needing to secure *“multilateral agreement as to what measures to take forward”* as *“someone has to pay the balance for these measures.”*

Our analysis sought to identify the main types of potential network improvements identified by the optimisation reports. These are summarised in Table 9. Common areas for upgrade include optimising plant room operations, hydraulic improvements, control and monitoring upgrades, enhancing insulation and pipework, optimising HIUs, renewable energy integration, safety and regulatory compliance and metering and data analysis.

Table 9: Summary of optimisation study recommendations

Theme	Recommendations
System Control and Efficiency	- Enhance performance analysis, control capabilities, and continuous monitoring. - Conduct basic and routine maintenance. - Integrate renewable energy sources where possible, including the use of air source heat pumps with buffer storage.
Heat Interface Units (HIUs) and Controls	- Fit and recalibrate pre-settable thermostatic radiator valves (TRVs) for correct flow. - Move thermostats for better heat regulation and set HIUs to provide optimal hot water temperatures and flow rates. - Recommission or replace HIUs as necessary.
Pipework and Insulation	- Insulate exposed pipework within properties, terminal runs, risers, and laterals to prevent heat loss. - Modify pipework configurations, such as riser bypasses, for improved system flow. - Replace outdated pipework with modern pre-insulated alternatives.
Pump and Valve Modifications	- Implement demand-based pump control and recalibrate shunt pump circuits. - Install and adjust differential pressure sensors for better flow regulation. - Replace fixed-speed pumps with inverter-driven pumps for energy savings.
Building Management System (BMS) Optimisation	- Recommission the BMS for enhanced plant control. - Implement new control strategies and sensors for precise system management. - Upgrade the BMS to open protocols for wider compatibility and control.
Water Quality and Treatment	- Address water quality issues with appropriate treatment regimens to prevent corrosion and enhance system longevity. - Install Y-strainers, side stream filters, and consider appropriate rinse and treatment for plant room equipment efficiency.
Metering and Monitoring	- Upgrade metering for detailed data analysis and system diagnostics. - Install heat meters for accurate measurement of heat delivery and consumption.
Energy Centre and Boiler Optimisation	- Perform repair works on CHP units and boilers. - Adjust boiler operations to optimised temperatures for different seasons and sequence boilers with proper controls. - Consider the need for modifications such as changing heating, ventilation and air conditioning (HVAC) components for efficiency.
Leak Protection and Asset Management	- Implement leak protection measures and link pressurisation unit fill to BMS alarms. - Conduct deep refurbishment and improvements in asset envelopes, including upgrades to thermal insulation.

Theme	Recommendations
Network and Temperature Optimisation	• Optimise network flow temperatures and backend valve set points. • Implement weather compensation strategies for network efficiency. • Set boilers and HIUs to operate at optimal temperatures for different seasons.
Other Specific Actions for Improvement	• Implement specific actions such as fitting pre-settable TRVs, moving thermostats, recommissioning HIUs, using differential pressure sensors, and installing insulation.
Network Diversification and System Upgrades	• Consider direct connection of space heating and improved water treatment. • Resolve dwelling and network bypasses, recommission equipment, and introduce new plant components for improved performance. • Replace hot water cylinders with HIUs where beneficial, and reconfigure plant room arrangements to support efficiency increases

Source: Consortium, Demonstrator Scheme Optimisation Study Reports

Proposed Next Steps and Future Funding Arrangements

Relevant Impact Evaluation Questions:

8. How do operators intend to fund identified improvements? Will this be done through HNES funding?

9. If operators have decided not to go ahead with improvements, why? What were the barriers to implementing changes and how can these be overcome?

Interviews explored operators' future plans. Five out of ten of the interview respondents stated that they are currently in discussion with decision makers and await approval, key financial estimates, or a final decision. For example, one heat network stated that their next step is to present a business case to senior leadership before approval can be given. Four heat network operators stated that they have either begun installing some of the technology into buildings or are about to do so, and one was *"untangling the red tape"* (referring to the cabinet approval needed for large-scale projects) to then create a specification of the works.

Funding is an important factor influencing operator's intentions to pursue identified improvements, however, there are other considerations including **the views of planning authorities on the proposed works** and **their organisation's Net Zero ambitions**.

"A key driver for us as well is reducing our emissions- we want to be at net zero. We saw a good chunk of saving in tons of CO2 as part of that work. It's really a key driver for us. – Operator, HNES Demonstrator"

Most operators stated that they will or have already applied for HNES funding to fund the suggested recommendations:

- 88% of operators interviewed stated that they would be applying or have already applied to HNES to fund identified improvements. This funding is particularly valued as it was viewed to make upgrading the heat network “*easier because it provides material contribution towards the cost*”, mitigate financial risk and is perceived as essential.
- The necessity of HNES funding in decision-making is underscored by its role in enabling operators to commence commercialisation work earlier than anticipated, especially where projects lack immediate access to other forms of funding. This acceleration indicates the funding's critical role in supporting the viability of implementation.
- Operators, mainly council representatives, considering HNES capital funding face significant challenges in sourcing the remaining 50% of capital costs. Common issues include difficulties in securing private investment and a lack of awareness of relevant funding bodies. This challenge is further compounded by internal governance complexities.

An analysis of HNES capital applications, focusing on HNES Demonstrator revenue projects applying for HNES capital funding, reveals that at the time of writing, of the 73 Demonstrator revenue projects, **17 have successfully transitioned to secure HNES capital funding in the first three rounds**. This represents a substantial proportion (47%) of the 36 successful HNES capital applicants to date.

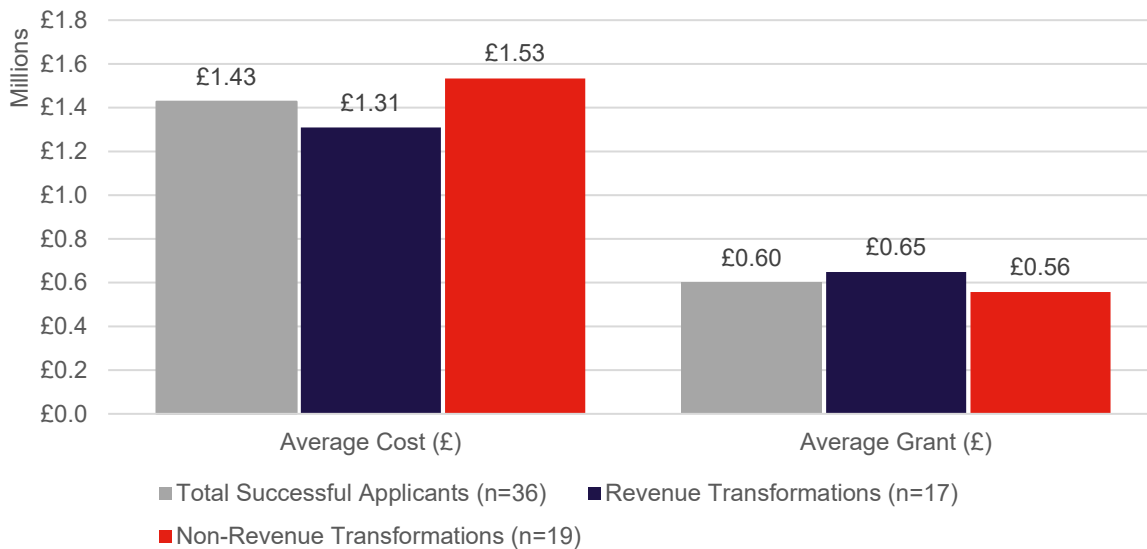
- Figure 4 presents average costs and grant amounts for all HNES capital applicants compared to capital applicants who *had* previously received revenue funding through the HNES Demonstrator (referred to below as ‘revenue transformations’⁵⁵) and those capital applicants who *had not* previously received revenue funding. Figure 4 highlights that projects that received HNES Demonstrator funding typically have lower average project costs and higher average grant amounts than those that did not received HNES Demonstrator funding⁵⁶. Overall, applicants from the Demonstrator revenue projects applied for a similar proportion (49.41%) of grant funding compared to non-Revenue applicants (49.12%).
- Furthermore, while 48% of the successful capital applicants not originating from the HNES Demonstrator had submitted a notification under the Heat Network Metering and Billing Regulations, some 52% of revenue transformations had. The purpose of the Heat Network (Metering and Billing) Regulations 2014 is to drive energy efficiency and reduce carbon emissions from heating, by placing various responsibilities on anyone supplying and charging for heating, cooling or hot water⁵⁷.

⁵⁵ Refers to the revenue Demonstrator projects who have successfully applied for HNES capital funding

⁵⁶ Over funding rounds 1-3, there were 36 successful capital applicants, 17 of these were from the revenue Demonstrator scheme.

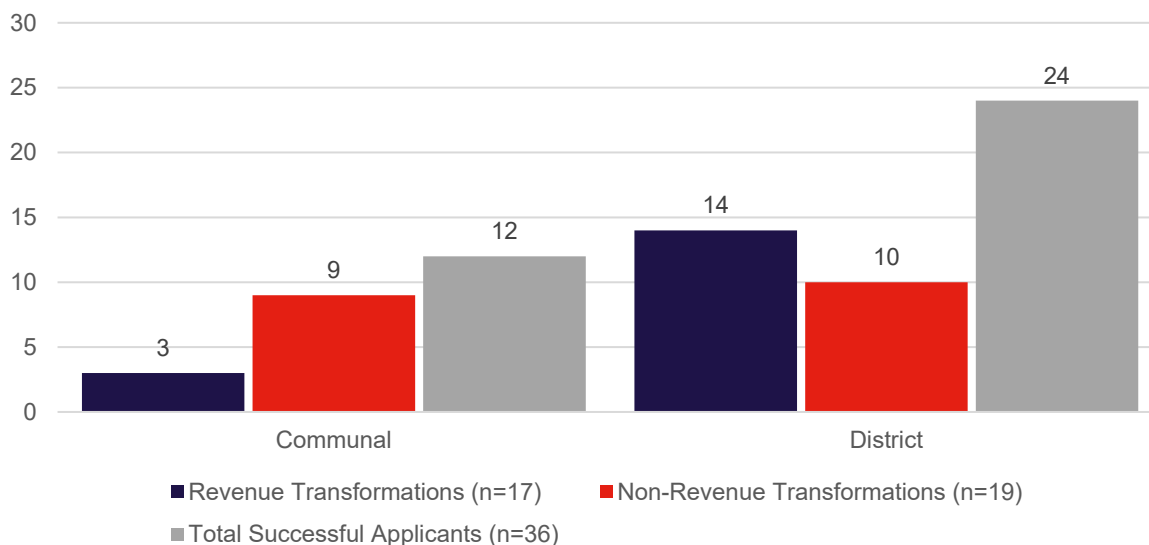
⁵⁷ GOV.UK. (2020) Heat Network (Metering and Billing) Regulations 2014 (As amended in 2015 and 2020) from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/941673/heat-networks-guidance-on-metering-and-billing-regulations-2014.pdf

Figure 4: Average costs and grant amounts



Source: Consortium, HNES capital project applications

Figure 5: Average number of communal and district heat networks



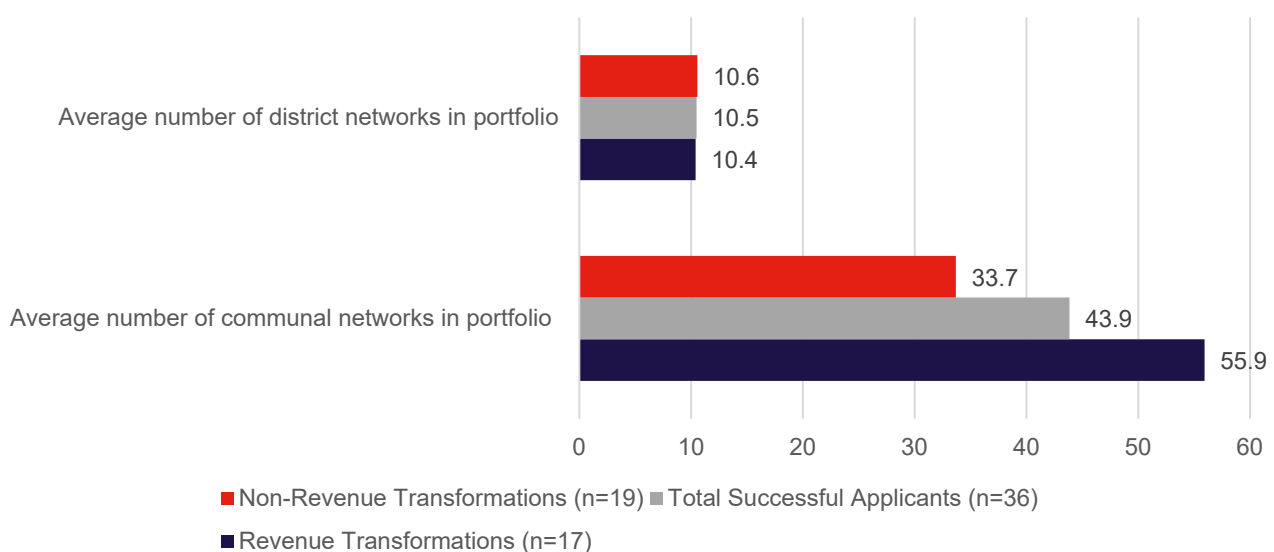
Source: Consortium, HNES capital project applications

- The successful 'revenue transformation' applicants tend to be on larger district heat networks and smaller communal heat networks compared to the average HNES capital project applicant, indicating that the successful transformations operate on both smaller-scale and larger-scale heat networks.
- On average, revenue transformations included a lower number of residential dwellings within the applicant networks (193.5) than non-revenue transformations (240.9). This suggests that 'revenue transformation' projects typically involve smaller residential communities. On the other hand, revenue transformations had a higher number (13.3)

of non-domestic and commercial connections than non-revenue applications (9.3). This indicates significant energy demand from businesses and industrial facilities, enhancing revenue potential and opportunities for network optimisation and expansion.

- Also, as highlighted in Figure 6, successful ‘revenue transformations’ had (on average) a larger number of communal networks in their portfolio (55.9) compared to non-revenue transformations (33.7). This implies that revenue transformation projects are more likely to engage with and impact a wider community.
- On average, revenue transformations also represented a similar number of district networks in their portfolio (10.4), when compared to non-revenue transformations (10.6).

Figure 6: Average numbers of district and communal networks in applicant portfolios.



Source: Consortium, HNES capital project applications

Interviews with stakeholders highlighted several **factors influencing the decision-making of those operators’ who opted against proceeding with improvements.** The interviews identified that:

- The substantial financial investment required for some measures was often a significant barrier. Operators often found the costs of proposed changes daunting, with one stating, *“the scale of the problem seems just insurmountable...we’re not going to spend millions of pounds.”* These financial considerations were oftentimes exacerbated by concerns about potential regulatory changes requiring future modifications.
- Related to this, securing necessary funding was cited as a challenge. The dependence on government funding and the need for stakeholder contribution added complexity to funding decisions, particularly in multi-owner scenarios. For example, one operator mentioned difficulty in aligning contributions from multiple apartment owners, noting the risk of a funding gap if some parties refuse to contribute.

“Securing significant amounts of government funding and then getting the owners of the buildings to pay the rest, which is the really big issue, because you’ve got to get all of the 140 apartment owners to put their proportion in to make it happen, because if ten of them say no, then someone’s got a funding gap somewhere” – Operator, HNES Demonstrator

- Operators reported that technical complexities and maintenance provider changes impeded their ability to implement improvements effectively.
- The complexity of internal decision-making processes and the need for consensus among diverse stakeholders was also cited as often resulting in delays or reluctance to implement recommendations.
- One operator described adjusting heating systems in a 25-storey building posed significant risks of disruption and cost implications.

“We’ve got two [large, residential] buildings – so having to interrupt this, this will create a major problem. This is the only part of the recommendation we have identified [as potentially not implementing] because of the costs and the chance of interruption to customers” – Operator, HNES Demonstrator

- The need to understand and adhere to regulatory standards, such as Section 20, and contractual obligations in relation to any improvements was felt to introduce additional complexity and delays to implementation.
- Overall, the findings indicate that, where operators decided not to proceed with certain improvements, these decisions were influenced by a combination of financial, technical, practical, and regulatory factors.

Implications

This chapter presents the findings of both the process and impact evaluation, detailing what areas worked well and what did not work so well. It also outlines the key lessons learned for potential future rounds of HNES and emerging findings of the HNES Demonstrator revenue projects. These findings are then translated into a review of, and update to, the HNES contribution claims.

Key Impacts and Findings

HNES (Funding Rounds 1 and 2)

The HNES process evaluation offers valuable insights into the delivery, application process, and market response to the scheme. The following tables identify key positives, challenges, and areas for future improvements by theme.

Table 10: Scheme Launch, Promotion and Awareness

What Worked Well	
- Gemserv's efforts, alongside those of other partners, proved successful in promoting HNES. The use of a variety of channels including industry events, social media, and collaborations with industry bodies significantly enhanced awareness across a broad spectrum of potential applicants. - HNES appeal exceeded expectations, particularly in attracting smaller-scale and independent developers. This response highlights the scheme's effective alignment with evolving heat network technologies and the tangible benefits perceived by these developers. - Communications from the Department and industry bodies were instrumental in raising scheme awareness. Their involvement played a crucial role in informing a wide range of potential applicants about the opportunities offered by HNES. - The webinars conducted as part of the scheme's promotion were generally well-received by most, providing valuable insights into the application process.	
What could be improved	Lessons
Uptake of the scheme was affected by resource limitations in applicant organisations, particularly those in the social housing sector. For some, this included a lack of appropriate expertise or time to complete the application process.	Focus on making the information more accessible and understandable to a wider audience, including those without industry connections.

Table 11: Application Process and Support

What Worked Well		
• Applicants with experience of the HNES Demonstrator reported navigating the HNES as being more straightforward. • A majority of applicants expressed high levels of satisfaction with the HNES application process. Engagement with relationship managers, delivery partners, and external consultants played a critical role in aiding applicants through the application process. • HNES successfully funded projects that aligned with its focus of addressing customers in need and delivering social impacts. The scheme observed higher application success rates among public sector entities, especially housing associations and local authorities.		
What could be improved	Lessons	
• Many applicants reported that delays in receiving funding decisions adversely affected their budget planning and utilisation. • Some applicants, especially private companies, found the eligibility and scoring criteria unclear. Applicants believed that having clearer expectations from the Department's HNES team would have allowed them to craft a proposal with a higher likelihood of success. • Completion of specific technical aspects of the application form were noted as being challenging, particularly for those lacking in-house expertise. This was especially pronounced among capital applications, with 55% of applicants surveyed reporting technical problems. • Numerous capital project applicants encountered difficulties in meeting and reporting baseline requirements. They also found it challenging to determine the required level of detail for specific calculations like early-stage energy efficiency figures. • The high resource cost of application relative to the potential funding was reported as a barrier to application for some, particularly for smaller projects.	• Nearly half of survey respondents (45%) identified areas for improvement in the application process. These suggestions included enhancing the form's formatting, adapting it for different types of heat networks, providing more comprehensive assistance, clarifying financial aspects such as VAT, and introducing features such as online chat for quicker query resolution. • Providing more comprehensive support and clearer guidelines for the application forms may assist applicants throughout the application process. This may include establishing a single point of contact and more direct communication from Gemserv. • Offering more detailed information on data and social impact requirements may help applicants to meet the requirements. • Providing tailored support to applicants that did not engage with the HNES Demonstrator would facilitate their understanding of technical aspects and baseline requirements.	

Applicants without prior experience of the HNES Demonstrator often faced a more significant learning curve.	
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Table 12: Post-Application Experiences and Outcomes

What Worked Well	
- The majority of applicants, particularly local authorities, found the funding and drawdown process to be straightforward and effective. Policy stakeholders involved in the drawdown process cited positive elements such as swift approvals, smooth progress on grant agreements, and award letters being promptly sent. - In general, respondents felt that substantial ongoing support was available once funding had been approved. This included assistance with monitoring and reporting templates, which was appreciated widely by participants. - Regular and diligent communication from the Department was particularly appreciated by successful participants.	
What could be improved	Lessons
- Delays in project implementation following award confirmation were noted by both successful applicants and policy stakeholders, mainly due to internal governance issues, bureaucratic delays (e.g. delays in setting up purchase orders and lengthy procurement processes), and technical issues. These problems were exacerbated by organisational changes and data issues. - For one applicant, the press embargo created communication challenges with stakeholders and delayed project mobilisation. - The financial year constraint - managing funding to be spent within the fiscal year - and rigid funding timelines were reported as being challenging for successful applicants, especially for large-scale projects and local authorities. Applicants highlighted that the potential for fund forfeiture due to unspent budgets within the fiscal year also added to the financial strain and the potential for inefficient resource allocation.	- Streamlined internal governance processes may reduce delays in project initiation and implementation, particularly for local authorities. This may include enhancing the process for setting up purchase orders and addressing technical and data-related issues to ensure smoother project commencements. - Applicants suggest more flexibility in fund expenditure and project timelines. Consideration should be given to options for rollover of unspent funds to the next fiscal year, to help to accommodate diverse project needs and constraints. - Providing clearer guidelines on the funding and drawdown process may help to address communication challenges. Several interviews also suggested more precise timelines on when projects under the scheme could commence which would help

• At times, the specifics around the drawdown process lacked clarity and was not clearly communicated initially, leading to lack of clarity amongst successful applicants. • Some applicants expressed concerns regarding the relevance of reporting targets, particularly in cases where significant project activities had not yet commenced.	to enable better preparation and planning for the networks involved.
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The impact evaluation has considered what benefits and outcomes can be directly attributed to the HNES Demonstrator. In particular, it has assessed whether **optimisation studies allowed operators to make informed decisions on:** whether they should improve their heat network; what improvements they should make; **the cost and best means of funding** required to implement improvements; whether **HNES funding should be sought; and, why improvements have or have not proceeded.**

Table 13: Impact Evaluation Findings

Effectiveness of Optimisation Study Recommendations
• Optimisation Studies were reported to be highly effective. They enabled operators to make informed decisions regarding improvements to their heat networks. The majority of operators reported that the recommendations were specific and instrumental in identifying previously unknown issues and the scale of existing ones. • Optimisation studies were praised by most respondents for their in-depth nature and the level of detail provided. The cost-benefit analysis, including capital and operational costs, indirect/social costs, and potential funding support mechanisms, provided a solid foundation for assessing financial viability of optimisation study recommendations. • Clear, understandable recommendations facilitated effective decision-making. Project viability, potential return on investment, and technical feasibility were reported to be the key factors behind whether projects aim to implement the suggested improvements. • Some operators found the technical aspects of the studies to be challenging to comprehend, especially when not presented in plain language.
Decision-Making Factors
• Cost emerged as a crucial factor in deciding whether to implement the recommendations provided, with many operators weighing the financial investment required against anticipated benefits, including environmental impact. Some operators encountered challenges in aligning their budgets with the scope of proposed projects, indicating a need for re-evaluation of financial priorities. • Some operators intending to implement the optimisation study recommendations highlighted difficulties in sourcing the remaining 50% of capital costs required to match HNES funding, pointing to the need for more accessible funding sources and clarity in timelines and budget forecasts.

- For some, internal decision-making structures and the need for stakeholder consensus proved to be a barrier to implementing optimisation study recommendations. Regulatory requirements and changes in maintenance providers further complicated the implementation.
- A small number of studies identified barriers to implementing recommendations (e.g. high levels of disruption, access difficulties, and information gaps) that negatively impacted on the feasibility of implementing recommendations.

Next Steps for HNES Demonstrator Projects

- A significant portion of the HNES Demonstrator projects are currently in discussions regarding the implementation of measures and are awaiting decisions on additional funding.
- HNES funding was seen as a key driver for a majority of operators to consider extensive improvements to their heat networks. From the 73 HNES Demonstrator revenue projects, 17 successfully applied for HNES capital funding. This represents about 47% of the total number of successful capital participants in HNES.
- A major concern for operators considering an application for HNES capital funding was the challenge of sourcing 50% match funding.

Interim Contribution Claims

Contribution analysis⁵⁸ aims to establish the validity of a programme's logic model by testing the theories underpinning each causal link; the assumptions that are made that imply that the funded activities will bring about the desired impacts. Contribution analysis is particularly useful to understand how projects and businesses function in complex environments where sole attribution of impact is difficult.

This approach rests on the creation of a 'contribution story', providing an initial narrative of what it is reasonable to expect that HNES will contribute toward the intended goals, relative to other inputs and activities and contextual factors. A series of sequential steps are required aiming to build the 'contribution story' that is then verified through primary quantitative and qualitative research and secondary data. Through collecting evidence to either prove or disprove the established contribution story, this approach enables evidence-based judgements to be made.

As part of the contribution analysis and process tracing approach, an initial assessment of the contribution of the HNES Revenue Demonstrator scheme has been carried out based on data obtained during this phase of the evaluation. This is structured around the Theory of Change, capturing hypotheses of how causal pathways outlined in the Theory of Change (Annex 3) delivered intended outcomes. These claims are based on the ToC, HNES outcomes and desk-based evidence review. Contribution claims were composed of:

⁵⁸ See J. Mayne (2001), Addressing Attribution Through Contribution Analysis: Using Performance Measures Sensibly. *Canadian Journal of Program Evaluation*, 16(1), 1-24.

1. A causal hypothesis (to be tested);
2. An alternative hypothesis (which provides an alternative explanation of outcomes);
3. The evidence expected (if the hypothesis is true);
4. And the link to the evaluation question these will address.

Through evidence gathering as part of the evaluation, the plausibility of each hypothesis, or contribution claim, is assessed to determine if outcomes are best explained by the given hypothesis, the evidence available is weak or needs supplemented, or if alternative explanations of the outcome better explain causality. **This assessment is being carried out at a very early-stage and therefore, data and supporting evidence is very light.** These claims, along with supporting evidence will be presented in more detail in the forthcoming phases of the evaluation.

The following assesses the casual hypothesis for the key themes and looks at the counterhypothesis:

CC1: HNES revenue funding provides a pipeline of projects for HNES capital scheme.

Causal hypothesis: HNES revenue funding optimisation reports provide compelling evidence to operator decision makers to make the case for investment in identified improvements. As a result, internal stakeholders are willing to make an application for HNES capital funding (up to but not including 50% of capital costs) for delivery of works.

Counterhypothesis: Operators are already aware of network performance issues and see HNES capital funding as an important opportunity to receive grant funding for upgrades or suggested improvements are too costly and therefore operators decide against making changes to their networks.

Expected Evidence: Revenue applications and conversions to capital applications; qualitative evidence from operators on decision making; review of optimisation reports, survey evidence.

Initial assessment:

There is some evidence to support the causal hypothesis, however at this early stage it is **inconclusive**.

- Current HNES capital application data suggests that over half of the successful HNES capital applications came from Demonstrator scheme revenue projects.
- The Demonstrator scheme indicates that revenue-funded optimisation studies provided actionable recommendations. Interviews highlighted that the optimisation studies aided the decision-making process for subsequent capital funding applications.

- Interviews and data revealed that in many cases, prior participation in the Demonstrator phase facilitated the application process for the Main scheme.
- However, the counterhypothesis also holds weight, as financial incentives and pre-existing awareness of the capital scheme from non-Demonstrator scheme applicants plays a role in motivating applications.
- Therefore, while evidence suggests that HNES Demonstrator revenue funding contributes to the pipeline of projects for the HNES capital scheme, it is not the sole factor. Existing operator knowledge and the grant provision is also pivotal in driving applications.

Plan for collating further evidence:

- Further interviews, surveys and capital application data analysis will be conducted in the forthcoming phases to assess the impacts of the Main scheme revenue projects.

CC2: HNES revenue funding enables most impactful improvements to be identified.

Causal hypothesis: HNES optimisation reports give operators a holistic view of network performance issues across the network infrastructure from one single contractor, allowing specific targeted interventions to be identified which are the most impactful and cost effective.

Counterhypothesis: Operators are already aware of critical network deficiencies and can therefore make assumptions as to the most impactful and cost-effective improvements.

Expected Evidence: Review of optimisation reports; qualitative evidence from operators on decision making and from Gemserv on conversion of revenue to capital projects.

Initial assessment:

There is some evidence to support the causal hypothesis, however at this early stage it is **inconclusive**.

- The findings from the initial impact evaluation of the Demonstrator scheme suggest that the revenue-funded optimisation studies produced detailed and actionable recommendations for network improvements.
- Operators perceived optimisation reports to be tailored to specific heat networks, highlighting areas of sub-optimal performance, such as inefficient plant room operations, poor temperature control, and aging infrastructure, and suggesting clear and actionable interventions.
- Operators acknowledged the depth and thoroughness of the optimisation reports. The use of detailed data and cost appraisals for proposed measures, including calculations of financial metrics, underpinned the robustness of the recommendations.
- Operators' decisions to implement upgrades were based on a variety of factors, including cost, potential ROI, and long-term benefits including carbon savings.

- However, the counterhypothesis also holds merit. Operators' pre-existing knowledge and the nature of improvements sought in applications suggest an awareness of network deficiencies and potential interventions.

Plan for collating further evidence:

- Further interviews, surveys, optimisation reports and capital application data analysis will be conducted in the forthcoming phases to assess this contribution claim.

CC3: HNES enables reduction of carbon emissions

Causal hypothesis: HNES capital funding enables works to address network inefficiencies that lead to distribution losses. Networks can meet the same heat demand from less fuel, meaning the carbon emissions that would have resulted from the unused fuel are saved.

Counterhypothesis: Current high fuel prices will by itself drive network operators to make efficiency improvements and upgrades.

Expected Evidence: Quantitative evidence on fuel savings, carbon emissions reductions and efficiency improvement metrics; qualitative evidence from operators and consultants on network efficiencies, heat demand, fuel use and carbon emissions.

Initial assessment:

Inconclusive as there is no evidence to support the causal hypothesis at this early stage of the scheme.

Further evidence required:

- The impact of HNES on carbon emissions reductions will be assessed through quantitative data on fuel savings, carbon emissions reductions, and efficiency improvement metrics from funded projects, as well as interview consultations in the forthcoming phases of the evaluation.

CC4: Experience of HNES encourages future network improvements and decarbonisation

Causal hypothesis: Works funded by HNES on upgrading network efficiency mean that networks that are of a sufficient efficiency standard to utilise low-carbon heating sources, are working as per their design intent, and some networks will meet GHNF application requirements. Experience and skills gained from applying for and managing HNES upgrades gives operator confidence and resources to apply to GHNF (or self-fund) for further network improvements and decarbonisation.

Counterhypothesis: Organisational low-carbon ambitions and the opportunity of grant funding means that organisations will make network improvements to meet GHNF eligibility criteria (i.e., working as per design intent) regardless of HNES funding. However, given cost of network improvements, applicants might also choose not to improve their heat networks.

Expected Evidence: Applications to GHNF from HNES operators; qualitative evidence on future network intentions.

Initial assessment:

Inconclusive as there is no evidence to support the causal hypothesis at this stage.

Further evidence required:

- To provide evidence on whether the experience of HNES encourages future network improvements and decarbonisation, a comparative analysis of GHNF applications from HNES and non-HNES operators will be undertaken. This will be analysed alongside qualitative insights from operators on the influence of HNES on their future plans and insights from applicants on their next steps, to allow for a definitive assessment of contribution claim 4 in subsequent phases of the evaluation.

CC5: Improved customer confidence in heat networks.

Causal hypothesis: HNES capital works offset network performance issues that negatively impact customers, and efficiency upgrades lead to reductions in the cost of heat. Improved network reliability and potential reductions in cost to customers reduce negative perceptions of heat networks to improve customer confidence in heat networks as a heat source.

Counterhypothesis: Communications relating to upcoming heat network regulations provide assurance to customers that networks must meet a certain standard of performance and cost, giving confidence in the reliability and price of heat networks as a heat source.

Expected Evidence: Findings from customer survey and interviews; metrics on reduction in performance deficiencies and cost of heat.

Initial assessment:

Inconclusive as there is no evidence to support the causal hypothesis at this stage.

Further evidence required:

- To assess this contribution claim, analysis of surveys and interviews, including with residential customers, as well as performance metrics and cost of heat will be analysed in future phases of the evaluation.

CC6: Improved public perception of heat networks.

Causal hypothesis: Reduction in heat network issues (and/or potential cost reductions) and resultant improved consumer experience and confidence leads to a reduction in negative media / social media reports on heat networks, improving general perceptions and beginning to remove reputational barriers.

Counterhypothesis: The shift in public perception (i.e., towards recognising the advantages of heat networks) is primarily driven by factors over and above direct experience with heat networks, such as media coverage and public discourse. This includes ongoing discussion of climate change, rising awareness of sustainable living practices, government information campaigns, and the broader trend towards eco-friendly heating solutions (e.g. UK heat decarbonisation policy). These broader factors, rather than specific improvements to heat network operations or cost reductions, are the main catalysis for the change in public perception of heat networks.

Expected Evidence: Findings from customer survey and interviews; metrics on reduction in performance deficiencies; qualitative evidence from interviews with policy officials.

Initial assessment:

Inconclusive as there is no evidence to support the causal hypothesis at this stage.

Further evidence required:

- Future phases of the evaluation will focus on gathering and analysing specific metrics related to heat network performance deficiencies. Additionally, customer surveys and interviews with applicants and policy officials will be conducted to gain insights into changing public perceptions. We will also consider using media analysis to evaluate the change in public perceptions of heat networks since HNES was launched. This data will enable an assessment of the impact of heat networks on public perception and the validity of the causal hypothesis.

Next Steps

This chapter summarises the next step of the evaluation of HNES, setting this report in its wider context.

The next (and third phase) of the evaluation will encompass the second process evaluation of HNES, focusing on learnings from its delivery and how these can enhance this and future schemes. It will also include an interim impact assessment of the HNES revenue projects. For these projects, the evaluation will primarily be qualitative, investigating whether the optimisation study enables operators to make informed decisions about potential improvements to the heat network, the nature of these improvements, and the potential savings across the proposed measures. It will also explore whether operators are implementing similar works across their portfolios outside of HNES funding, and whether the optimisation studies are supporting any internal business cases or investment decisions for improvements.

Annex 1: Evaluation Questions

The following evaluation questions have been agreed with the Department at the evaluation planning stage.

Process Evaluation Questions

Pre-Award Stage

1. How do potential applicants hear about the scheme and what model is HNES being applied through⁵⁹? What is the market appetite for the HNES offer? What is the spread of applicants applying for funding relative to all those who could apply?
2. What are the barriers/enablers that determine whether applications are made, and whether they are successful in achieving support?
3. What types of projects are successful/unsuccessful at the application stage, and why? At what points are applicants dropping out and why?
4. Are the eligibility and scoring criteria suitable, is there any evidence of gaming, and if so, how does this impact the delivery of HNES?
5. Have the baseline requirements for capital projects created any difficulties for projects, or changed the type of projects that are successfully applying?
6. What types of measures/interventions are applied for and supported?
7. What are applicants' experiences of the overall application process and of providing baseline and target data, and how does this vary by applicant (i.e., revenue or capital) or project type and why?
8. Was the process easier for Main scheme applicants who had been part of the HNES Demonstrator versus those who had not?
9. How did the funding and drawdown process work in practice?

Post Award Stages

10. What happens between application success and project set up, and are there any recurrent procedural blocks or delays?

⁵⁹ Potential typologies include: operators hear about the opportunity and apply; operators bring in a consultancy to help them apply and manage that process; consultancies approach existing operators to present them with the opportunity and manage it for them.

11. How effectively is the scheme being delivered and what improvements can be made?
12. How do projects manage to bring together the funding, expertise, workforce, resources, and wider stakeholder buy-in to make them a success? What were the barriers and enablers?
13. What are the experiences of projects of providing monthly monitoring data? Has the monitoring created any difficulties for projects during the procurement and upgrade phases? What learnings can be applied to ensure robust and proportionate data is collected?
14. What has the overall experience of HNES been for projects and decision makers, and how does this vary by project type and why?
15. How do outcomes differ between projects and what are the causes of those outcomes?
16. Are there any procedural or process problems inhibiting delivery of benefits?
17. How effective have the post-award communications, guidance and support for operators been in ensuring projects efficiently move through Optimisation Study delivery (revenue grants) or procurement, build, and initial operation stages (capital projects)?
18. How can project-level learning from HNES be applied to other projects within an operator portfolio, and coherently communicated/applied to the wider heat network sector?
19. Are projects intending to apply to GHNF either individually or as part of an aggregated application? Can the outputs of HNES be better designed to facilitate/encourage this?

Impact Evaluation Questions

Overarching Questions

1. To what extent did the HNES scheme deliver against its objectives?
2. How do scheme impacts vary by different types of projects and stakeholders?
3. Which improvements have greatest impact, taking account of cost?

Impacts on Specific Benefits

4. What benefits can be attributed to HNES, and did they occur as initially intended?
 - 4a. Primary fuel savings
 - 4b. Carbon emissions reductions
 - 4c. Network efficiency
 - 4d. Cost of heat

4e. Service interruptions

5. Where and how are benefits passed through to network customers? (Considering: Improved accuracy of billing, improved provision of information, impacts on tariffs, reduced overheating.)

Impacts to Revenue Schemes

6. Did the optimisation study allow operators to make an informed decision on whether they should improve the heat network?

7. What improvements can operators make to improve their networks?

8. How do operators intend to fund identified improvements? Will this be done through HNES funding?

9. If operators have decided not to go ahead with improvements, why? What were the barriers to implementing changes and how can these be overcome?

Economic (VfM) Questions

1. What is the emerging cost-benefit analysis position of the scheme ex-post?

2. What are the quantifiable costs and benefits that have been realised that are attributable to the scheme?

3. How does this compare to the ex-ante view of the cost-benefit analysis of the project?

4. Are supported projects providing good value for money?

5. Can we say anything ex-post about whether alternative support models would have delivered better value for money?

Annex 2: Evaluation Methodology

The following chapter presents the methodology for the HNES evaluation.

The evaluation of HNES has adopted a theory-based approach, structured around the HNES's Theory of Change (outlined in Annex 3) and incorporating Contribution Analysis (refer to Annex 4). This methodology will synthesise evidence from various sources to examine what works, how, for whom, and crucially, what underpins different types of outcomes at different stages across the typology of funded projects.

Evidence sources include interviews conducted across three process and four impact evaluation workstreams, beneficiary and customer surveys, analysis of monitoring and baseline data, Value for Money (VfM) modelling, and quasi-experimental analysis using Interrupted Time Series Analysis (ITSA).

The Contribution Analysis (CA) allows the evaluation to synthesise, test, and weigh up quantitative evidence (e.g., ITSA results, survey findings, pre/post comparisons) with qualitative evidence (interviews) to provide an overall view of impact and attribution, understanding how HNES has led to observed outcomes. The CA framework will also establish the validity of the refined Theory of Change by testing a series of contribution claims linked to HNES outcomes and impacts. CA will examine whether and how the activities in HNES can be seen as bringing about desired outcomes and impacts.

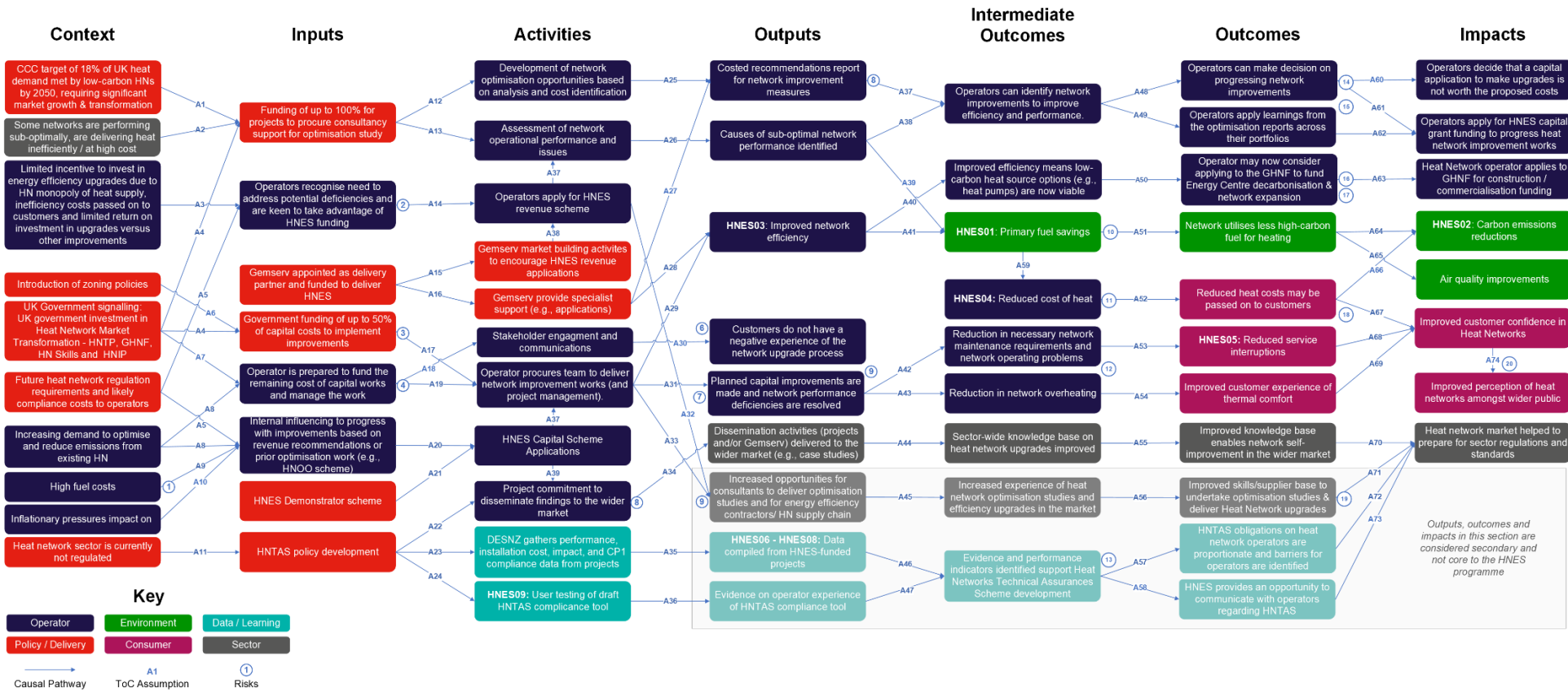
The key components of the evaluation include:

- **Impact of the HNES Demonstrator scheme (capital and revenue projects):** to understand and quantify the impact in relation to key metrics.
- **Interim and final process evaluation (capital and revenue projects):** to understand how the HNES application and project initiation stages are working, what emerging impacts HNES is having, and what improvements can be made for projects in later funding rounds.
- **Interim and final impact evaluation (capital and revenue projects) and value for money evaluation for HNES and HNES Demonstrator (capital projects):** to assess the impact of HNES and the extent to which it contributed to the targeted outcomes. To quantify the economic benefits and outcomes based on final application data and emerging monitoring data – focused primarily on the benefits given below.

Annex 3: Theory of Change

This Annex includes the HNES Theory of Change (ToC) that was tested as part of the Contribution Analysis.

Figure A3.1: HNES Theory of Change



Annex 4: Contribution Analysis

We have adopted a **theory-based approach** to the evaluation of HNES, using **Contribution Analysis** as a framework, structured around a Theory of Change (ToC) and responding to the evaluation questions and objectives. Contribution Analysis (CA) is the most appropriate method for this evaluation, given that it affords the evaluation team the ability to synthesise, test and weigh up quantitative evidence (e.g., ITSA results, survey findings, pre/post comparisons) with qualitative evidence (interviews) to provide an overall view of impact and attribution, understanding how HNES led to observed outcomes. Our CA will synthesise evidence from: interviews conducted in three process and four impact evaluation workstreams; beneficiary and customer surveys; analysis of monitoring/baseline data, and quasi-experimental analysis using Interrupted Time Series Analysis (ITSA).

Contribution analysis⁶⁰ aims to establish the validity of a programme's logic model by testing the theories underpinning each causal link; the assumptions that are made that imply that the funded activities will bring about the desired impacts. The approach rests on the creation of a 'contribution story', providing an initial narrative of what it is reasonable to expect that HNES itself will contribute toward the intended goals, relative to other inputs and activities and contextual factors. A series of sequential steps are required aiming to build the 'contribution story' that is then verified through primary quantitative and qualitative research and secondary data. Through collecting evidence to either prove or disprove the established contribution story, this approach enables evidence-based judgements to be made on the impact of HNES.

Contribution Analysis for HNES will allow the evaluation team to establish the validity of the refined ToC by testing a series of contribution claims linked to HNES outcomes and impacts. CA will do this by examining whether and how the activities in HNES can be seen as bringing about desired outcomes and impacts. CA helps mitigate the problem of attributing impacts in complex settings by identifying other plausible explanations of outcomes and assessing evidence to discount these (or not). Through the CA framework, we will be able to strengthen the argument for HNES' impact as captured in our causal hypotheses and ToC or, alternatively, to update these materials to reflect the mechanisms by which impact has occurred in practice.

Contribution Analysis Methodology

- **Testing Contribution Claims:** CA enables testing of contribution claims linked to HNES outcomes. It examines the role of HNES activities in achieving desired outcomes and mitigates attribution problems in complex settings by considering alternative explanations.

⁶⁰ See J. Mayne. (2001). Addressing Attribution Through Contribution Analysis: Using Performance Measures Sensibly. *Canadian Journal of Program Evaluation*, 16 (1), 1-24.

- **Synthesising Evidence:** The CA will integrate evidence from multiple sources: interviews, beneficiary/customer surveys, monitoring data, and ITSA. This synthesis helps to construct an economic impact assessment, including Cost-Benefit Analysis (CBA) and value-for-money assessments.
- **Developing the Contribution Story:** CA iteratively builds a narrative about HNES's contribution relative to other factors. This includes defining a theory, testing it through fieldwork, and collecting evidence to validate or revise the initial contribution story.
- **Assessing Impact and Evidence Strength:** We will aggregate evidence across evaluation activities, assessing the strength of each contribution claim. This process will occur throughout the evaluation, with more in-depth assessment in later phases.
- **Framework Steps:**
 - Populating the framework with quantitative and qualitative data.
 - Critically assessing causal hypotheses, considering the plausibility of alternative explanations.
 - Evaluating the strength of causal pathways and the credibility of the overall story.
 - Revising the contribution story based on evidence and stakeholder agreement.
- **Refining Contribution Claims:** Initial contribution claims, derived from the scheme's ToC, include causal hypotheses, counter-hypotheses, expected evidence, and related ToC aspects. These claims will be refined as evidence is gathered, and new claims may be added.
- **Iterative Assessment:** The CA will be conducted across all evaluation phases, with a focus on refining the contribution story. This includes an initial assessment of causal hypotheses, identifying areas for focused data collection in subsequent rounds.
- **Developing a Live Framework:** As the evaluation progresses, additional contribution claims may be added to reflect new insights and understanding of the programme's practical impact.

#	Causal Hypothesis	Counterhypothesis	Expected Evidence	Links to ToC
Revenue Funding				
CC1: HNES revenue funding provides a pipeline of projects for HNES capital scheme.	HNES revenue funding optimisation reports provide compelling evidence to operator decision makers to make the case for investment in identified improvements. As a result, internal stakeholders are willing to make an application for HNES capital funding (up to but not including 50% of capital costs) for delivery of works.	Operators are already aware of network performance issues and see HNES capital funding as an important opportunity to receive grant funding for upgrades or suggested improvements are too costly and therefore operators decide against making changes to their networks.	Revenue applications and conversions to capital applications; qualitative evidence from operators on decision making; review of optimisation reports, survey evidence.	Impact node: <i>“Operators apply for HNES capital grant funding to progress heat network improvement works”.</i>
CC2: HNES revenue funding enables most impactful improvements to be identified.	HNES optimisation reports give operators a holistic view of network performance issues from one single contractor across the network infrastructure, allowing specific targeted interventions to be identified which are the most impactful and cost effective.	Operators are already aware of critical network deficiencies and can therefore make assumptions as to the most impactful and cost-effective improvements.	Review of optimisation reports; qualitative evidence from operators on decision making and from Gemserv on conversion of revenue to capital projects.	Intermediate outcome node <i>“Operators can identify network improvements to improve efficiency and performance.”</i>
Carbon Emissions Reductions				
CC3: HNES enables carbon emissions reductions.	HNES capital funding enables works to address network inefficiencies that lead to distribution losses. Networks can meet the same heat demand from less fuel, meaning the carbon emissions that would have resulted from the unused fuel are saved.	Current high fuel prices will in and of themselves drive network operators to make efficiency improvements and upgrades.	Quantitative evidence on fuel savings, carbon emissions reductions and efficiency improvement metrics.	Impact node <i>“Carbon Emissions Reductions”</i>

#	Causal Hypothesis	Counterhypothesis	Expected Evidence	Links to ToC
CC4: Experience of HNES encourages future network improvements and decarbonisation.	Works funded by HNES on upgrading network efficiency mean that networks are of a sufficient efficiency standard to utilise low-carbon heating sources, are working as per their design intent, and some networks will meet GHNF application requirements. Experience and skills gained from applying for and managing HNES upgrades gives operator confidence and resources to apply to GHNF for further network improvements and decarbonisation.	Organisational low-carbon ambitions and opportunity of grant funding, mean organisations will make network improvements to meet GHNF eligibility criteria (i.e., working as per design intent) regardless of HNES funding. However, given cost of network improvements, applicants might also choose not to improve their heat networks.	Applications to GHNF from HNES operators; qualitative evidence on future network intentions.	Impact node <i>“Operator applies to GHNF for construction or commercialisation funding”</i>
Customer Perceptions / Experience				
CC5: Improved Customer Confidence in Heat Networks.	HNES capital works offset network performance issues that negatively impact customers, and efficiency upgrades lead to reductions in the cost of heat. Improved network reliability and potential reductions in cost to customers reduce any negative perceptions of heat networks to improve customer confidence in heat networks as a heat source.	Communications relating to upcoming heat network regulations provide assurance to customers that networks must meet a certain standard of performance and cost, giving confidence in the reliability and price of heat networks as a heat source.	Findings from customer survey and interviews; metrics on reduction in performance deficiencies and cost of heat.	Impact node <i>“improved customer confidence in heat networks”.</i>
CC6: Improved Public Perception of Heat Networks.	Reduction in heat network issues (and/or potential cost reductions) and resulting improved consumer experience and confidence lead to a reduction in negative media / social media reports on heat networks, improving general perceptions and	Upcoming regulations, high gas-prices and increasing awareness of need to decarbonise heat encourage more	Findings from customer survey and interviews; metrics on reduction in performance deficiencies; qualitative	Outcome node <i>“Improved perception of heat networks</i>

#	Causal Hypothesis	Counterhypothesis	Expected Evidence	Links to ToC
	beginning to remove reputational barriers. As a result, more of the general public will consider living in a house that is connected to a heat network.	individuals to consider the benefits of heat networks and consider connection.	evidence from interviews with policy officials.	<i>amongst wider public”.</i>
Preparing the Market for Heat Network Regulations				
CC7: Preparation of Heat Network sector for upcoming regulations	Evidence from HNES-funded projects (e.g., on costs, improvements, quick wins) is used by wider networks which did not receive HNES funding (either other networks within a supported operators portfolio, or non-supported operators) to identify and make improvements that will improve standards across the market, in preparation for heat network regulations or to make general network improvements.	Due to HNTAS, operators will look at undertaking network improvements anyway to prepare for the new standards, outside of HNES lessons learned.	Qualitative evidence from applicants and non-applicants on application of HNES lessons. Evidence from optimisation reports showing improvement measures that are non-specific and could be applied more widely.	Impact node <i>“heat network market helped to prepare for sector regulations and standards”.</i>
CC8: Improved Evidence for Heat Network Regulations	HNES provides policymakers with evidence from optimisation reports and data collected from HNES capital projects on performance, cost and impact, which will be used to ensure that HNTAS regulations are proportionate and fair in the requirements they place on operators.	HNTAS regulations and standards will be introduced anyway, and policymakers will seek to ensure they are appropriate, including through consultation with operators.	Qualitative evidence from policymakers of HNTAS policy development.	Outcome node <i>“HNTAS obligations on heat network operators are proportionate and barriers for networks are identified.”</i>

Annex 5: Quantitative Analysis

This Annex presents the quantitative analysis of application data for the Demonstrator Scheme revenue projects who have successfully applied for Main scheme capital funding.

Figure A5.1: Revenue transformations

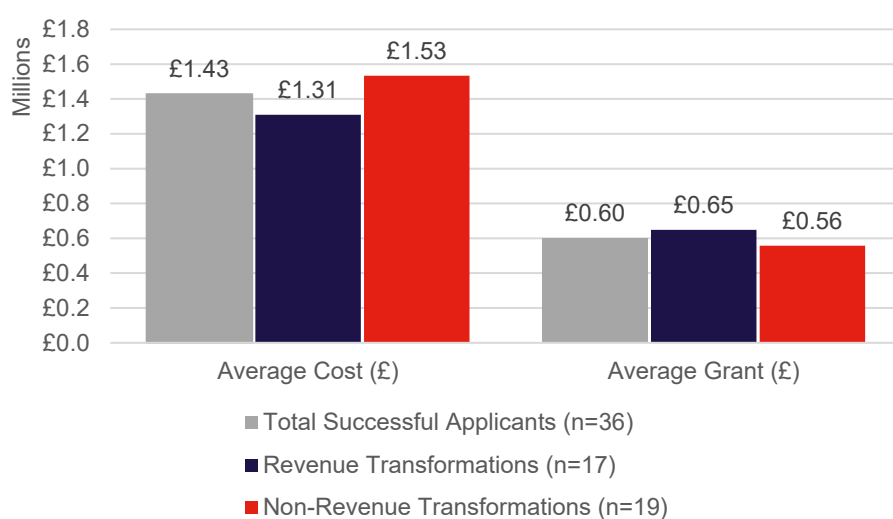


Figure A5.2: Number of residential and commercial dwellings in the network

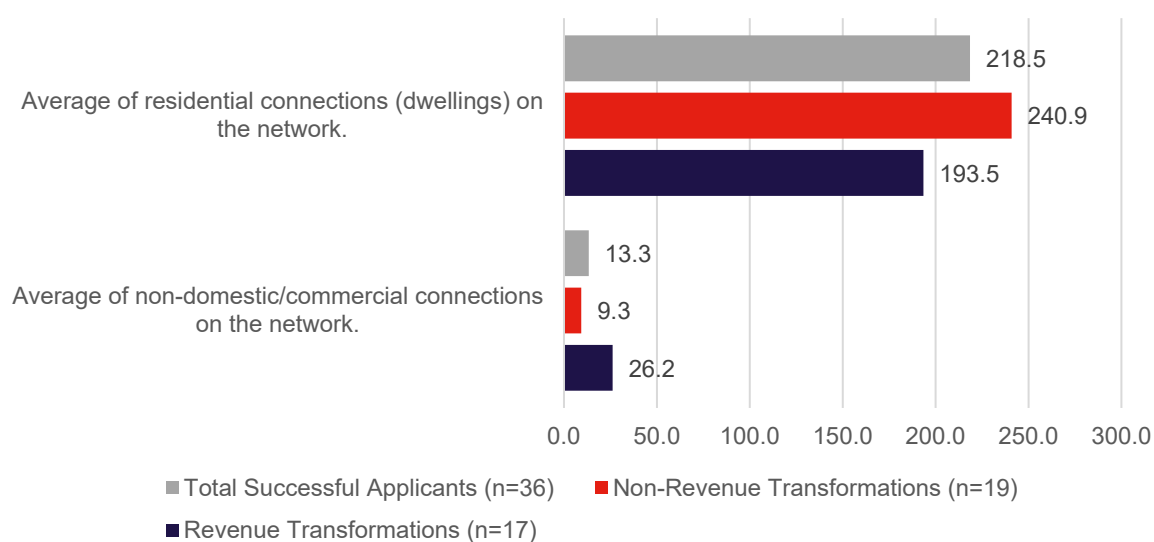


Figure A5.3: Number of residential and commercial networks portfolios

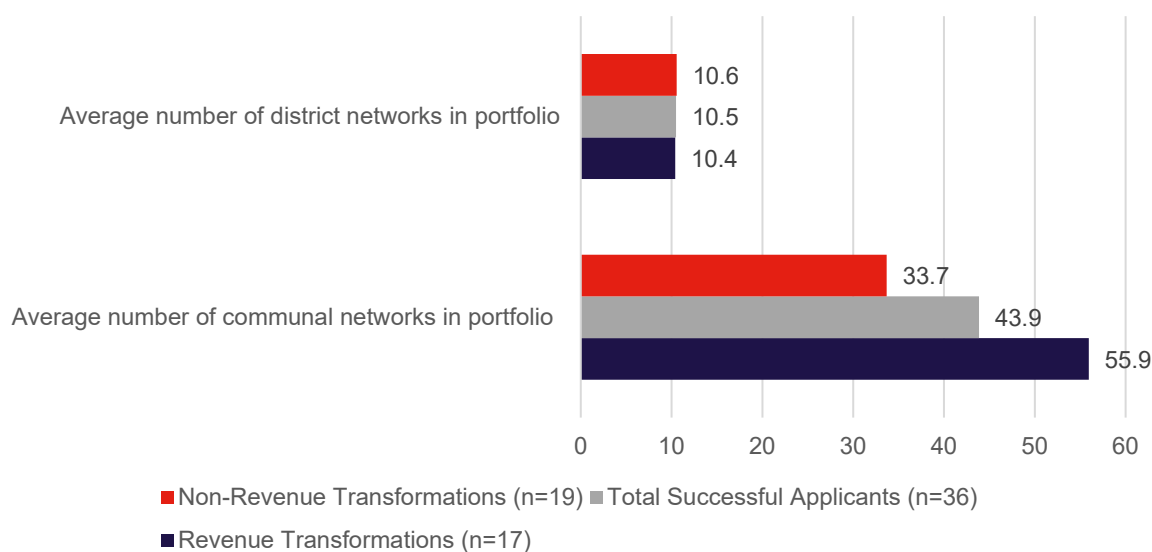


Figure A5.4: Number of communal and district networks

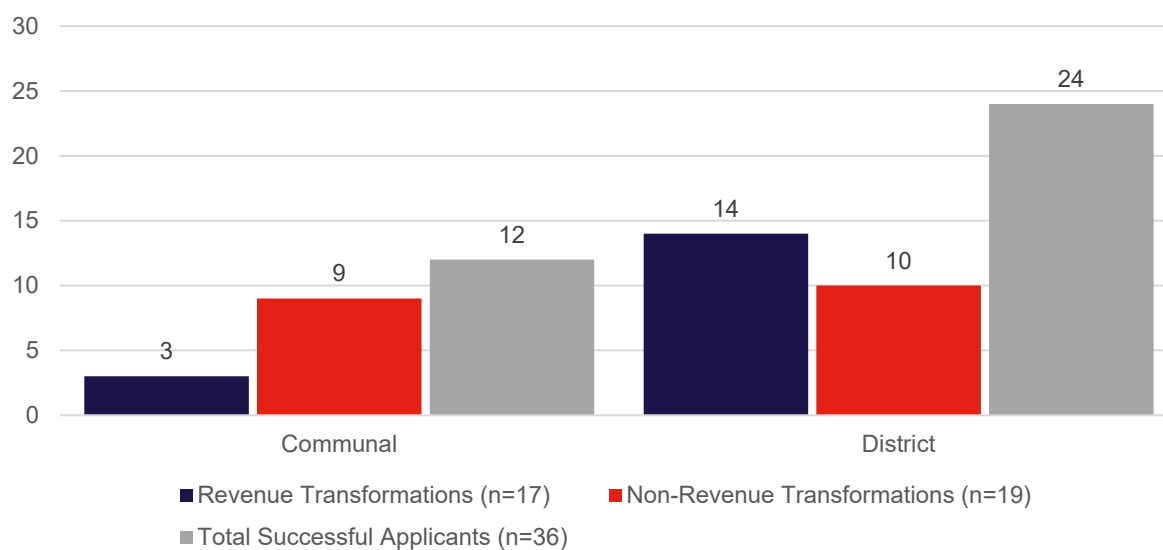
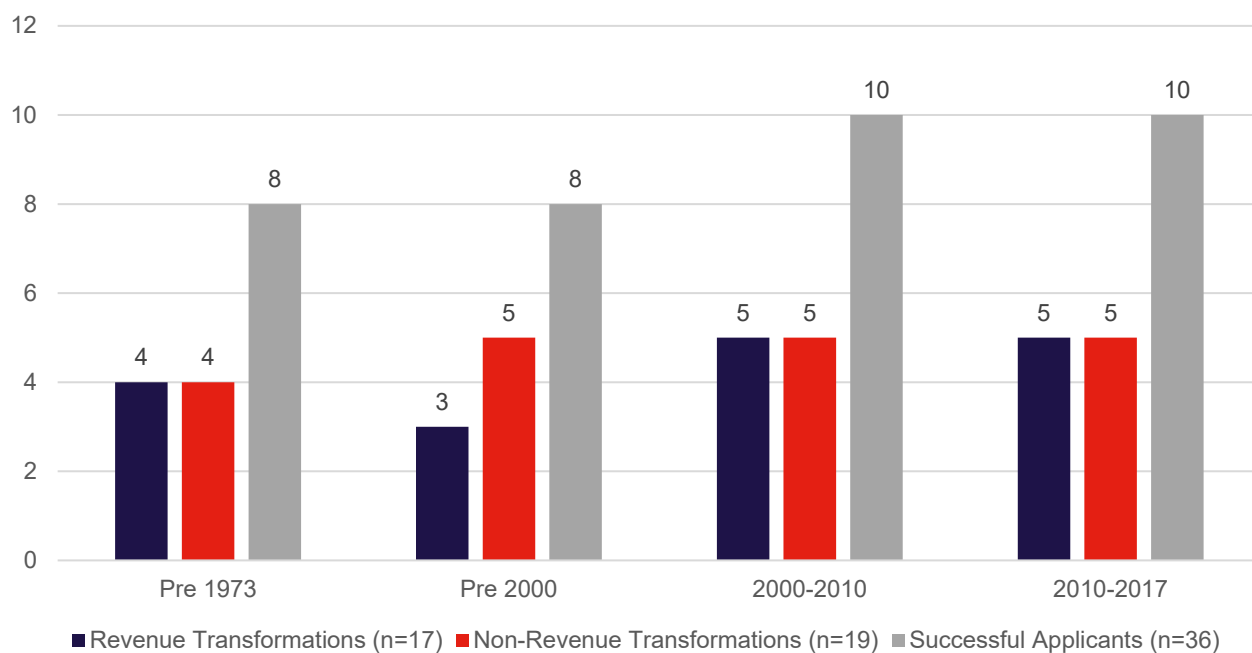


Figure A5.5: Age of Networks



Annex 6: Optimisation Study Analysis – Sub-Optimal Network Performance

This Annex highlights the key themes of recurring areas of sub-optimal network performance as outlined in the 73 Demonstrator scheme revenue study optimisation reports.

The 73 revenue projects **highlighted key themes of recurring areas of sub-optimal network performance**. These themes encompass a comprehensive spectrum of issues, ranging from heat loss and efficiency challenges to specific equipment problems and compliance issues.

- **Boiler Management Issues:** Challenges with boilers not firing in sequence, being oversized, and not modulating properly, hindering efficient operation and condensing mode due to high return temperatures.
- **Control System Deficiencies:** Inadequate control mechanisms in plant rooms, including ineffective Building Management Systems (BMS), which fail to properly regulate network conditions.
- **Insulation and Pipework Inefficiencies:** Widespread issues with missing or poor insulation leading to heat losses, along with oversized pipework that exacerbates inefficiency.
- **Pump and Valve Control Problems:** Pumps often run at full speed unnecessarily due to manual or faulty settings, with inefficient pressure bypass installation and a lack of differential pressure sensors to regulate flow.
- **Heat Interface Unit (HIU) Challenges:** Recurring problems with HIUs, including bypassing, faulty valves, and poor commissioning, leading to high return temperatures and diminished network efficiency.
- **Network Temperature and Flow Regulation:** Sub-optimal heat transfer indicated by low temperature differentials, unregulated flow rates, and excessive water circulation.
- **Water Quality Issues:** Problems with water quality control are affecting equipment such as boilers and heat exchangers. The lack of side stream filtration units is identified as a contributing factor to compromised water quality.
- **Metering Shortfalls:** Insufficient metering infrastructure and failures that obstruct detailed performance analysis and identification of inefficiencies.
- **Domestic Hot Water System Inefficiencies:** Issues with hot water recirculation systems not functioning optimally, contributing to potential Legionella risks and inefficient hot water delivery.
- **Renewable Energy Integration Barriers:** Limited incorporation of renewable energy solutions due to existing network inefficiencies and design constraints.

- **System Design and Configuration Limitations:** Inefficient network designs, particularly the use of low loss headers that mix flow and return temperatures, resulting in lower overall system efficiency.
- **Network Design and Balancing:** Issues in network design, including oversized boilers, pumps, and pipework, have been observed. Poor system balancing, circulation problems, and narrow temperature differentials are also recurring challenges.
- **Plant Room Conditions:** Conditions in plant rooms are identified as contributors to inefficiencies and equipment malfunction. Non-compliance with British Standards and ventilation issues in plant rooms are noted concerns.
- **Specific Equipment Issues:** Problems with specific equipment such as boilers, Combined Heat and Power (CHP) units, and circulation pumps are noted. Issues with boiler modulation, condensing operation, and rapid cycling are identified challenges.
- **DHW System Challenges:** Domestic Hot Water (DHW) system issues, including poor control, uninsulated pipework, valve problems, and response times below expectations, have been identified.
- **Resident Knowledge and System Control:** A lack of resident understanding on efficient system use, compounded by inadequate control mechanisms within dwellings.
- **Compliance with Standards and Best Practices:** Non-compliance with industry standards such as CIBSE CP1 and BS 6644, suggesting a need for network upgrades and adherence to best practices.
- **Potential for System Optimisation:** Opportunities identified for network improvements, including retrofitting air source heat pumps and revising system configurations for better efficiency.

Annex 7: Policy response following HNES Phase 2 evaluation

Introduction: Heat Network Efficiency Scheme

The Heat Network Efficiency Scheme (HNES) is a £77m grant support programme that opened to applicants in February 2023. It provides funding to public, private and third sector applicants in England and Wales, to support improvements to existing district heating or communal heating projects for customers and operators. HNES follows on from the HNES Demonstrator which ran from October 2021 to March 2022. The aim of the HNES is to improve heat network performance in existing/operational projects where customers and/or operators are experiencing sub-optimal outcomes. In particular, the HNES focuses on addressing customer detriment as a way of supporting heat network consumers impacted by cost-of-living and cost-of-energy pressures, with focus on where customer need is greatest.

The HNES objectives are to:

- Reduce carbon emissions by making heat networks more efficient.
- Reduce customer detriment to improve consumer confidence.
- Help prepare the heat network market for sector regulation and technical standards.

This policy response follows the publication of the Phase 2 report of the independent evaluation of HNES. It is important to note that the figures included in those reports represent the period of time corresponding to the Phase 2 evaluation, i.e. October 2023 to January 2024. Therefore, figures do not represent the current status of HNES, which has had additional funding allocated and further funding rounds since the report was written.

Policy response to key evaluation findings

Phase 2: Process Evaluation of the HNES (Funding Rounds 1 and 2)

Finding

Some applicants perceived the HNES application form as too complex, and the necessity of external expertise and organisational internal challenges were key factors that led to applicants dropping out. Applicants encountered technical difficulties with the application forms in Round 1 “copying and pasting cells over to a Word document”, and some considered there to be insufficient explanations for complex calculations. Interviewees also cited the requirement for empirical evidence of poor heat network performance as a significant barrier to applying, once they realised “there just wasn’t the availability of the information to proceed with the

application,” or they “didn’t think their projects would meet the criteria,” – in these cases they often abandoned their application.

Policy response

- The application form has been regularly iterated/updated over the lifetime of HNES to provide additional guidance and clarity to applicants. This feedback has also been incorporated into application seminars that are run by the HNES Delivery Partner (Talan, previously Gemserv) as well as in pre-application guidance provided to applicants by Talan Relationship Managers. From Round 2 onwards, application form technical issues were addressed e.g. allowing copying, pasting into cells, and addressing locked sections of the form. More recently, the application process and application forms have been migrated to an online application portal, for which a dedicated guidance document has been published. This is intended to further improve the applicant experience in terms of both functionality of the application form and the ease of applying.

Finding

Applicants suggest a need for more flexibility in fund expenditure and project timelines, including options for rollover of unspent funds to the next fiscal year to accommodate diverse project needs.

Policy response

- HNES establishes funding deadlines aligned with each financial year, and projects are expected to indicate their intended claim schedule from the start. While the scheme maintains clear timelines, it allows for some flexibility - if delays are communicated in advance, funding can potentially be rescheduled through a formal project change request (subject to budget availability and review/assessment of the impacts of the change).

Finding

Applicant consideration of the potential impact of network improvements on resident experiences led to some deciding not to proceed with their application.

Policy response

- While it is acknowledged that efforts to enhance heat network efficiency may affect residents' experiences in the short term (e.g. through some disruption to heating provision while improvement works are delivered and commissioned), the decision to proceed with the application, and the measures put in place to minimise impact on resident experience during delivery, ultimately rest with the applicant. HNES is primarily aimed at reducing customer detriment, and the proposed efficiency improvements are expected to deliver long-term benefits for residents and the wider network e.g. lower energy bill costs.

Finding

Overall, the flexible nature of the scheme allowed for broad eligibility criteria; however, a small number of applicants experienced ambiguity regarding eligibility criteria, indicating a need for

greater clarity on which projects are eligible, including through better access to pre-application support from Relationship Managers.

Policy response

- The HNES Delivery Partner continues to offer and encourage applicants to access their dedicated Relationship Manager service. Through this applicants are provided with bespoke guidance regarding their project and application, and this engagement is strongly encouraged in order for applicants to submit a high-quality and robust application and supporting evidence. Access to Relationship Managers has been enhanced through availability of one-to-one sessions to discuss project eligibility and readiness to apply.

Finding

A minority of applicants called for more comprehensive assessment criteria to strengthen applications. Feedback indicated a perception that HNES was primarily oriented towards commercial heat networks, with a lack of understanding of the complexities related to leaseholders and residential heat networks. There was a misconception that the scheme was solely for networks whose customers were from a low-income background. This feedback highlights the potential for more clarity to be provided around eligibility criteria.

Policy response

- Although these issues were raised by a minority of applicants, the HNES [Guidance for Applicants document](#) has been regularly updated throughout the scheme lifetime including in response to this feedback. Updates include additional detail on the eligibility criteria for applying to HNES, including who can apply, the types of projects funded, funding exclusions and an explanation of capital and revenue grant funding. More detail on these updates is provided in the *Guidance for Applicants* version control.

Finding

A minority of unsuccessful applicants cited communication issues with the HNES team, including a lack of clarity and feedback during clarification rounds, a lack of verbal contact, and unexpected changes in the timeline for questions, which made it difficult to provide information promptly.

Policy response

- Since receiving this feedback and during the scheme lifetime more generally, continuous improvements have been made to the pre-application and application processes over time. This includes strengthening access of potential applicants to Relationship Managers, how funding decisions are communicated to applicants, and how the clarification process is managed as part of application assessment.

Phase 2: Impact Evaluation of the HNES Demonstrator (revenue funding)

Finding

The substantial financial investment required for some heat network improvement measures was often a significant barrier to applying for HNES funding. Operators often found the costs of proposed changes daunting.

Policy response

- The HNES Optimisation Study scope has been designed to require assessment of a range of different interventions and/or intervention packages, including technical, cost and cost-effectiveness appraisal. This approach gives applicants/operators a rounded assessment of low/medium/high interventions and costs, allowing an informed decision on potential investment that aligns with budgetary and other considerations, preventing situations where no viable improvement action is possible. This approach also aligns with the published [Heat Network Optimisation Guidance \(HNOG\) guidance](#), which was published in June 2023 to give applicants/operators additional guidance on how to scope, procure and deliver high-quality Optimisation Studies through HNES.

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