The Renewables People Who Give You Power

Feasibility of Connecting Existing Housing to the Bristol Heat Network

For Somewhere Cooperative Housing Association Ltd

Funded by Bristol City Leap – Community Energy Fund

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Contents

Glossary

- **ASHP (Air Source Heat Pump)** – Uses outside air to heat homes and water, reducing carbon emissions compared with gas boilers.
- **Building Fabric** – Walls, roof, floors, windows, and doors; improvements reduce heat loss.
- **Community Energy Cooperative** – Group of residents/landlords collectively owning and managing local energy infrastructure.
- **District Heating / Heat Network** – Centralised heat supply delivered via pipes to multiple properties.
- **EPC (Energy Performance Certificate)** – Rating of a building's energy efficiency from A (best) to G (worst).
- **Fabric Improvements** – Insulation or window upgrades that reduce energy use.
- **HIU (Heat Interface Unit)** – Connects a property to a heat network, controlling flow, temperature, and billing.
- **Low-Carbon Heating** – Systems that reduce carbon emissions, e.g., heat pumps or low-carbon heat networks.
- **Retrofit** – Upgrading an existing property to improve efficiency or switch to low-carbon heating.
- **Standing Charges** – Fixed payments covering network access or loan repayment.
- **Substation** – Local facility connecting homes to a heat network, allowing maintenance and pressure control.
- **Tariff** – Price structure for heat supply, including consumption and standing charges.
- **Thermostat / Flow Temperature Compatibility** – Ensures radiators work efficiently with lower heat network temperatures.
- **Vattenfall Heat UK** – Developer/operator of the Bristol District Heating Network.

Executive Summary

This assessment demonstrates that connecting Somewhere Cooperative Housing Association's (SHCA) residential properties to Bristol's district heating network through a community-owned model represents the most affordable and strategically advantageous pathway for decarbonising the housing stock while protecting members on low incomes.

A community-owned heat network connection is likely to be significantly more affordable than individual air source heat pumps (ASHP). ASHPs offer no grant funding for social housing and provide minimal running cost savings despite substantial energy reductions, due to the transition from gas to higher electricity prices. The community network model combines lower capital costs, shared infrastructure investment, and partnership with established cooperatives such as Bristol Energy Cooperative—keeping benefits within the community.

Connection is not currently feasible as a standalone SCHA initiative. SCHA's 14 dwellings are geographically dispersed and cannot all contribute to the participation threshold requirement for substation construction consideration. Viable properties require partnership with neighbouring property owners, landlords, or anchor institutions to achieve the necessary scale. However, this presents a strategic opportunity for SCHA to lead coalition-building across the Bristol Heat Network.

Critical Next Steps

1. **Secure feasibility funding** for detailed technical modelling, financial structures, and partnership development.
2. **Build participation coalition** with neighbouring property owners, institutions, and established cooperatives including Bristol Energy Cooperative.
3. **Prioritise fabric retrofits** immediately to reduce demand and improve member comfort.

Recommendation

SCHA should pursue the community-owned heat network as its primary decarbonisation strategy. This pathway offers superior affordability, collective empowerment, and long-term resilience compared to individual solutions. The next phase of feasibility work will resolve current uncertainties and position SCHA to lead a transformative, member-focused energy transition in Bristol—delivering sustainable heating that serves the community, not shareholders.

Success requires immediate action on feasibility funding and coalition-building. With these foundations in place, SCHA can secure affordable, locally controlled low-carbon heating that protects members' interests while advancing citywide climate goals.

Introduction

Scope

This study assesses the feasibility of connecting residential properties to district heating networks, compared with installing air source heat pumps. It aims to provide landlords, tenants, and policymakers with a clear understanding of the technical, financial, and environmental implications of each option.

The analysis covers retrofit opportunities in building fabric and ventilation, drawing on third-party data to illustrate potential reductions in energy demand. It then examines two heat source options: air source heat pumps, with indicative costs from a third-party quotation; and connecting to the developing Bristol heat network, using broad capital expenditure estimates from developer, Vattenfall. Costs, operational implications, and carbon savings are compared to identify the most viable solutions for residential properties.

This phased approach follows the logical chronology of tackling inefficiencies in existing buildings (reducing the energy demand), before turning to the supply of heat, the focus of this study.

Data Acquisition

Data for this study is drawn from public datasets, supplier quotations and estimates, and UK case studies of operational district heating networks. This evidence allows a practical, early-stage assessment of both cost and accessibility, helping to inform decisions on low-carbon and economically viable heating options for households with varying financial means and ownership type.

Property surveys, EPC assessments and retrofit recommendations were undertaken by Building Energy Experts Ltd. Bristol Heat Network connection costs were provided by the developers, Vattenfall.

Study Focus and Context

Vattenfall Heat UK is the developer of the Bristol District Heating Network, one of the pilot zones established under the Energy Act 2023. They are currently focused on connecting new-build developments to the network while exploring pilot projects such as this for linking existing housing. Vattenfall provides system design, construction, operation, and maintenance of the network, and their activities in Bristol will form the primary real-world example for this study.

The focus of this study is a group of four residential properties in Bristol, BS3 4DR, which are situated along a planned route for the district heating network pipework. SCHA provides homes at low rents for its members, many of whom are on low incomes. The properties are similar in size and construction type, representative of typical urban housing in the area, and are currently reliant on conventional heating methods. Understanding the feasibility, costs, and accessibility of connecting these homes to the district heating network is particularly important given the low incomes of many of the residents and the broader aim of reducing energy bills and carbon emissions.

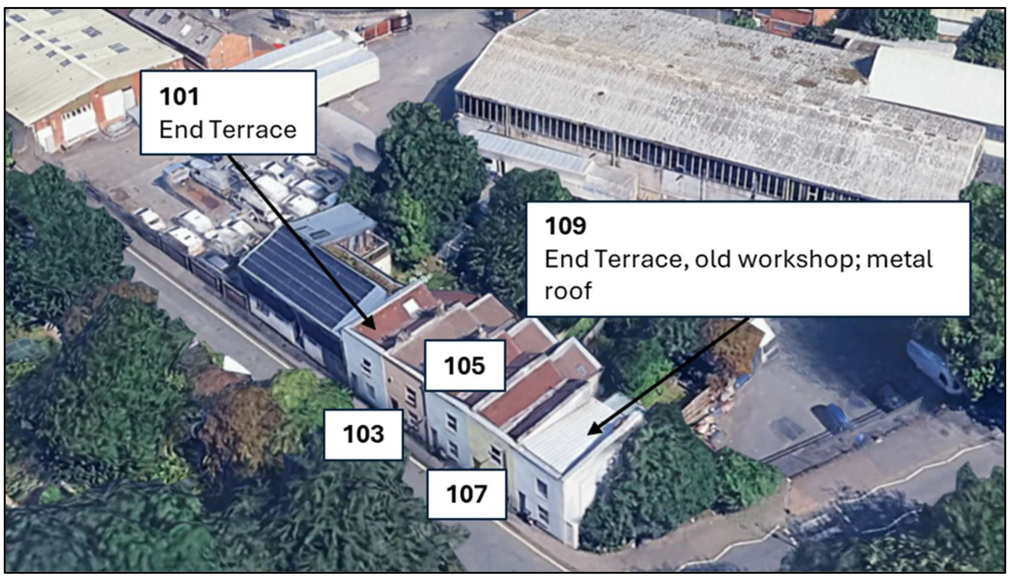

Figure 1: SCHA properties under assessment within this report

Case Studies of District Heating in the UK

To provide context for the feasibility assessment, three examples of district heating projects in the UK are reviewed. These case studies illustrate different approaches to retrofitting existing homes, hybrid network designs, and community engagement, highlighting practical lessons relevant to connecting the properties in Bristol. Key lessons learned follow this initial overview of each.

Three Studies Overview

Swaffham Prior, Cambridgeshire (Village-Scale Rural Retrofit)

Timeline & Scale:

- Project launched 2017; planning in 2020; first connections spring/summer 2022
- Serving ~300 homes plus community buildings; 1.7 MW capacity

Key Features & Technical Details:

- Hybrid network: GSHP + ASHP + electrode boilers; four large thermal stores for buffering[1]
- 72 °C delivery compatible with existing radiators
- Borehole count optimised via thermal testing, reducing number by over 50%

Funding & Contracts:

- £11.9 m capital: £2.9 m grant from Heat Networks Investment Project (HNIP) plus a Commodity Credit Corporation (CCC) loan[2]
- Revenue via heat charges, RHI/renewable incentives; tariff linked to oil price
- Scheme registered with Heat Trust for consumer protection

Community & Operational Learnings:

- Intensive engagement critical to secure >50% pre-construction sign-up
- Awarded Edie Renewable Energy Project of the Year, Nov 2023
- Unlikely to be replicated at a smaller scale

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[1] Cambridgeshire County Council. *About Swaffham Prior's Heat Network*. Available at: https://www.cambridgeshire.gov.uk/residents/climate-change-energy-and-environment/climate-change-action/low-carbon-energy/community-heating/swaffham-prior-heat-network/about-swaffham-priors-heat-network/how-the-heat-network-works

[2] CIBSE Journal. *Swaffham Prior Tariff and Revenue*. Available at: https://www.cibsejournal.com/case-studies/digging-for-britain-swaffham-priors-heat-network

Enfield Council District Heating – Ground-Source Micro-Districts

Timeline & Scale:

- Delivered 2019–2020; eight tower blocks with 400 flats
- 100 boreholes (~200 m depth); 16 micro-district loops serving 50 flats each[3]

Key Features & Results:

- Shared loops with individual heat pumps avoid the need for a central plant
- Tenants' heat costs reduced by ~50% (£800–1100 to £200–450/year)
- Annual CO_2 reduction ~773 t; EPC uplift of 8 points
- £30 million capital costs, made up of £15 million from The Mayor of London's Energy Efficiency Fund (MEEF) and match funding from HNIP.[4]

Outcomes:

- Provides choice, control, and fuel poverty reduction
- Awards: 2019 District Heating Project of the Year; 2020 Retrofit Award

Ponders End, Enfield (London)

Timeline & Scale:

- Retrofit pilot for two housing blocks (terraced houses, maisonettes, flats) on South Street from 2022

Key Features:

1. Underground insulated pipework connecting homes to the network, replacing gas boilers with heat interface units (HIUs)[5] and smart meters.
2. Upgrades to radiators, controls, and cookers where necessary for system compatibility
3. Modular substations with hot-tap connections and internal plant skids

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[3] Kensa. *Enfield: Largest Heat Pump Project by Kensa & ENGIE*. Available at: https://www.kensaheatpumps.com/projects/enfield/
[4] *Enfield and Energetik Journal Report.* Available at: https://energetik.london/2020/06/another-first-for-enfield-and-energetik/
[5] *Energetik*. *Heat Interface Unit*. Available at: https://energetik.london/wp-content/uploads/2021/07/cut_out-5-scaled-e1626856622914.jpg

Figure 2: Inside the substation at Ponders End

Outcomes:

- Demonstrated retrofit feasibility across multiple housing types
- Council-led community engagement facilitated household uptake
- A stated savings figure of ‘up to 92.3% reduction to carbon emissions’ was made, whilst no specific measure of financial savings was found[6].

Lessons from UK District Heating Projects

The three UK case studies provide practical insights for the feasibility of connecting the properties in Bristol to a district heating network. These lessons cover technical, financial, and social considerations:

Key Insights:

1. **Retrofit feasibility:** Heat interface units (HIUs) and smart metering enable the integration of existing homes into district heating networks with minimal internal disruption provided the system supplies 70°C flow temperature to meet traditional radiator requirements. Small clusters or terraced streets can be retrofitted successfully, as demonstrated in Ponders End.
2. **Community engagement drives uptake:** Early and intensive engagement, including pre-commitment of residents, is critical to ensure participation and optimise operational performance and cost efficiency, particularly in retrofit projects.
3. **Flexible network design:** Shared ground loops, modular substations, and hybrid high-temperature delivery systems allow networks to adapt to different building types and existing heating infrastructure, as seen in Enfield and Swaffham Prior. *Note: for Bristol Heat*

[6] *Retrofit Pilot Project in Ponders End*. Available at: https://energetik.london/how-it-works/customers-in-new-homes/

Network Vattenfall confirm only substations or direct connections to the spine are considered, omitting the hybrid considerations.

4. **Financial support mechanisms reduce barriers:** Leveraging grants, and incentive programmes helped lower both development and capital expenditure for network operators and ensures that costs remain affordable for customers.
5. **Fair billing and tariff design:** Transparent metering, tariff benchmarking against alternative heating options, and consumer protections help ensure equitable costs for households and maintain confidence in the system. Without this information, true and exact feasibility cannot be certain or measured.

These lessons inform the foundation for evaluating the technical, financial, and social viability of connecting the properties to the Bristol district heating network, helping to ensure that any proposed scheme is both practical and accessible to residents.

Retrofitting Residential Properties

This section examines the condition and retrofits potential of the existing housing stock under the ownership of SCHA. Two representative properties were surveyed to provide a realistic understanding of the physical condition, thermal performance, and upgrade opportunities. These homes are owned by a cooperative housing association, construction dating from around 1860, and are considered broadly reflective of much of the Victorian terraced housing across the Bristol area in terms of age, construction type, and energy performance. The assessment therefore aims to identify practical and cost-effective improvement measures that can enhance energy efficiency, reduce running costs, and improve compatibility with low-carbon heating systems.

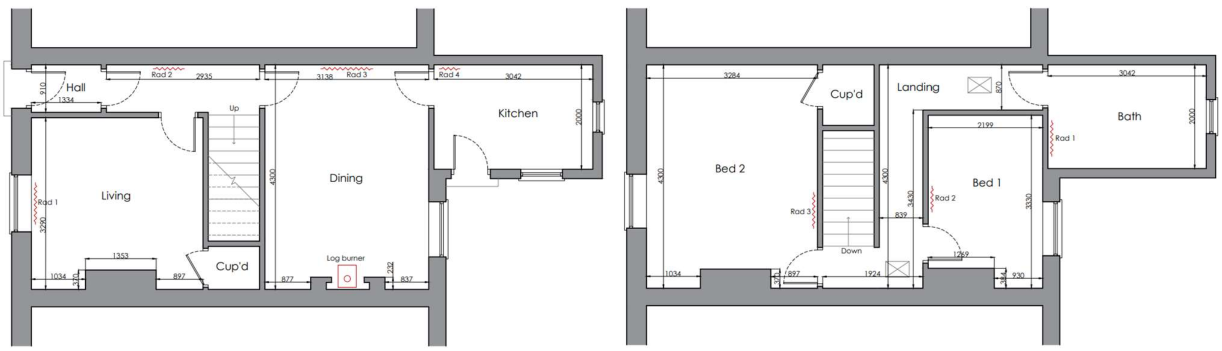

Figure 3: Floor layouts of the assessed properties, typical of the local area

Current Building Condition

The surveyed properties are terraced houses of modest scale. The existing building fabric is generally in fair to average condition, with several features already providing a basic level of thermal performance. Both houses have double-glazed windows and a cold roof construction containing approximately 100 mm of loft insulation. The external walls are solid brick with a rendered finish with recently installed external wall insulation on the frontages. Together, these measures offer partial improvement to the building envelope, though further enhancement would be required to achieve modern thermal performance standards and building regulations.

This property is equipped with a smart electrical meter and a combi boiler. Space heating is predominantly served via a wet radiator system, though some underfloor heating is present in some of the ground floors of other SCHA properties. A wood burner serves as a secondary heat source in the main area, providing occasional supplementary heating but with limited efficiency benefits. Mechanical ventilation is limited to a single extract fan in the bathroom.

Lighting within the property remains conventional, with no use of LED fittings observed. This presents a straightforward opportunity for energy reduction at minimal cost, complementing more extensive retrofit works such as insulation upgrades or heating system replacement.

Retrofit Impact Assessment

To inform the next stage of analysis, detailed Energy Performance Certificate (EPC) reports, were prepared by Building Energy Experts Ltd. These reports identify a range of improvement measures across building fabric, ventilation, and heating services (including removal of existing systems), alongside opportunities for integrating renewable energy technologies. The following table summarises the key findings and proposed upgrades from these EPC assessments, which form the basis for evaluating the scale of improvement required to align the properties with low-carbon heating solutions. Results of the property 105 Phillip Road were used as this was deemed to mostly align with the typical housing stock in question, that being a combi boiler and no underfloor heating.

Further, the results contain figures for ASHP and Heat Network Connection costs, which were provided by third party supplier quotation and developer estimations, respectively. The energy figures were calculated by EPC Assessment models using informed input data for such technologies.

Assumptions

The below figures were assumptions used within these calculations:

- £/kWh(electric) = 0.34
- £/kWh(gas) = 0.0925
- EPC Assessment CO_2 kg/kWh = 0.191
- Bristol Heat Network (2027 Fuel Mix) CO_2 kg/kWh = 0.081

Carbon emission figures are derived from the EPC reports themselves. The heat network carbon emission figure is derived from the Part L 2021 Guidance Note[7] that Vattenfall issued and available on their website through request.

[7] Bristol Heat Networks. *Part L 2021 Guidance Note*. Bristol: Bristol Heat Networks, 2021. PDF file.

105 Phillip Street	Upgrade Cost	EPC Rank	EPC Rating	Annual Consumption (kWh)	Annual Cost (£)	Carbon Emissions (kgCO2/year)	Space Heating (kWh)	Water Heating (kWh)	Other Consumption (kWh)
Property As Assessed									
	£0	D	67	11,913	£989	2,248	7,623	2,661	1,629
Fabric Improvements									
External Wall Insulation	£11,200	C	74	9,564	£815	1,815	5,604	2,664	1,629
Loft Insulation	£850	D	68	10,833	£898	2,049	6,695	2,662	1,629
Sub-Total	**£12,050**	**C**	**75**	**8,697**	**£740**	**1,654**	**4,922**	**2,665**	**1,629**
Savings	-	-	-	*3,216*	*£249*	*594*	*2,701*	*-4*	*0*
Service Measures									
DMEV[8]	£930	-	-	-	-	-	-	-	-
ASHP	£15,600	C	69	3,558	£1,012	536	2,506	841	1,629
ASHP Savings[9]	-	-	-	*8,355*	*-£23*	*1,712*	*5,117*	*1,820*	*0*
Heat Network Connection[10]	£7,000	D	64	12,889	£995	974	9,287	2,289	1,629
Heat Network Savings	-	-	-	*-976*	*-£6*	*1,274*	*-1,664*	*372*	*0*
Renewables									
Solar PV	£4,000	C	77	10,911	£684	2,112	7,923	2,661	1,629
Savings	-	-	-	*1,002*	*£305*	*136*	*-300*	*0*	*0*

Table 1: A summary of the third-party EPC assessments, showing incremental improvements to the baseline property

[8] Improvements are not direct, will decrease losses and improve thermal envelope.
[9] Note the low annual cost savings figure to consumption, comparatively, due to conversion to electrical tariffs from gas.
[10] Cost caveats mentioned later in the report and is a very high-level indicative figure.

Retrofit Assessment Analysis

The EPC modelling provides a useful baseline for comparing the impact of fabric improvements, service upgrades, and renewable energy technologies. As assessed, the property currently holds a 67D rating, with an estimated annual energy use of 11,913 kWh, costing approximately £990 per year and generating 2,248 kg CO_2.

Fabric improvements alone—comprising external wall and loft insulation—yield the most cost-effective uplift in performance. Spending approximately £12,000 would improve the EPC rating to 74C and cut annual consumption by just over 25%. It continues that improving the thermal envelope is an essential foundation for any heating system upgrade, ensuring that the building demand is as low as reasonably practicable.

The modelling indicates distinct differences between the low-carbon options. The ASHP installation reduces annual energy use to 3,558 kWh, representing a reduction of nearly 70% from the current baseline. Although the upfront cost of approximately £15,600 is significant, the operational savings and emissions performance highlight its potential as a strong decarbonisation route for individual properties. However, the running costs decrease minimally, and this is due to ASHPs use of electricity: whilst the ASHP is three times more efficient, the unit cost is approximately three times more expensive.

By comparison, the district heat network connection, modelled at a notional £7,000, offers only moderate improvement in consumption, with annual energy reduced by less than 10%, though running costs are slightly better than the baseline.

The integration of solar PV offers additional savings, particularly when combined with the ASHP scenario, where self-consumed generation offsets part of the electricity demand. The full package options—including fabric, service, and solar PV upgrades—could elevate the property to EPC C, with total annual costs reduced to roughly £1,012 or £995 for ASHP and Heat Network, respectively, though not accounting for solar generation export income.

Taken together, the EPC findings suggest that a staged retrofit beginning with building fabric upgrades and ventilation improvements provides the most reliable pathway toward low-carbon heating readiness. Between the two heat source options, the ASHP delivers greater energy efficiency benefits on a single-property basis, while the heat network remains a potentially viable option in terms of capital expenditure.

Heat Source Options

Air Source Heat Pump

A quotation was provided for the installation of an air source heat pump to replace the existing gas heating system across the properties. The cost presented for a single property was £15,625, which covers the removal of the existing gas boiler, decommissioning and disposal of radiators, and the full installation of a new ASHP system with replacement radiators throughout the property.

This scope represents a complete heating system upgrade, ensuring that the new emitters are appropriately sized for the lower flow temperatures associated with ASHP operation. The quoted cost therefore reflects both the technical requirements of low-carbon heating and the practical considerations of transitioning away from legacy gas systems.

Notably, ASHPs typically operate at lower flow temperatures—around 35–50 °C—compared with traditional gas boilers, which run at approximately 70 °C. This difference can make existing radiators incompatible, often necessitating a retrofit of the entire heating system when converting to an ASHP. While high-temperature ASHPs are becoming commercially available, they operate at significantly lower efficiencies, and residential-scale units tend to perform even less efficiently.

ASHPs typically achieve performance factors in the range of 2.5–3.5 under UK conditions. This translates to two to three units of heat delivered for every unit of electricity consumed, meaning that running costs are closely tied to the relative price of electricity versus gas. While electricity remains more expensive per unit than gas, ASHP efficiency offsets this difference to a degree, and the technology is expected to become increasingly competitive as the grid continues to decarbonise, and policy incentives support electrified heating. Furthermore, moving to an electric source for heating presents the opportunity to benefit from any renewable energy generation technologies that may become associated with SCHA.

From an environmental perspective, ASHPs offer substantial carbon savings compared to gas boilers. Grid carbon intensity has fallen significantly in recent years and is projected to reduce further as renewable technology adoption increases. An ASHP would provide a marked reduction in annual carbon emissions for the properties, directly supporting housing association and policy targets for net-zero alignment.

Overall, the single quotation serves as a useful illustration of the cost for individual property retrofit. The ASHP option offers certainty on cost, installation timescales, and emissions savings at the household level, without reliance on collective neighbourhood participation. Provided the space is available for a property to install an ASHP externally, this positions it as a technically robust and readily deliverable alternative to district heating, albeit with running costs that remain dependent on electricity pricing trends and the efficiency achieved in day-to-day operation.

ASHP Grant Funding

Through the government initiative, Boiler Upgrade Scheme (BUS), a user can usually apply for up to £7,500 towards the total cost for ASHP. However, according to the eligibility criteria[11], social housing properties are not eligible for this grant. This minimises the opportunities available for improving the feasibility of ASHP as a solution.

[11] *UK GOV BUS Grant Eligibility*. Available at https://www.gov.uk/apply-boiler-upgrade-scheme/check-if-youre-eligible

District Heat Network Connection

From an environmental perspective, district heating operates on similar principles to ground- or air-source heat pumps, using a low-carbon and sustainable heat source. In this sense, it can be considered broadly equivalent in environmental performance, though the cost-effectiveness and practicality of connection depend heavily on connection routes, participation levels, and ownership structure.

The figures used in this report are carbon emissions expected when the network transitions from a regular gas supply (which it is currently on) to a fully functioning and connected system, anticipated 2027. The 2027 fuel mix is expected to consist of waste heat from the floating harbour, data centres and potentially abandoned mines[12].

Connection Routes

For existing properties currently heated by gas boilers, Vattenfall has indicated two broad connection routes:

- **Direct connection to the network spine, without a substation.** This option is estimated at £15,000–£22,000 per dwelling and would involve extending the network and installing a HIU in each property. Steel pipework would be required from the main roadway or pipe location up to the HIU, and there would be no isolation between the property and the upstream network, meaning maintenance activities could interrupt supply.
- **Connection via a local substation.** A substation moderates flow pressure, allows for plastic distribution pipework, and provides isolation points for maintenance. The estimated cost reduces to £7,000–£10,000 per dwelling, excluding any internal alterations, due to the required "economy of scale." A single substation can typically serve more than 50 properties (SCHA has 14 dwellings though they are spread too far apart for consideration) so this option only becomes viable where a group of properties—such as a full street or estate—commit collectively to connect.

Substation Viability

The upstream costs of a substation and associated network infrastructure are typically borne by the developer. For small-scale examples, the direct-connection option appears prohibitively expensive, while the substation route becomes practical only when participation reaches a sufficient threshold. Vattenfall would therefore require a significant proportion of properties in a geographically constrained area to confirm their commitment before progressing with a substation installation. It should be noted that a mixed range of end users would suffice and is not limited to residential properties only.

[12] Vattenfall. (n.d.) *Heat networks – sources and decarbonisation*. Available at: https://heat.vattenfall.co.uk/what-we-do/who-we-help/heat-sources

Technical Considerations

Beyond participation thresholds, technical considerations also influence feasibility. One key factor is the target supply temperature of 65°C for Vattenfall's network, which affects compatibility with existing radiator systems and may necessitate upgrades or retrofits to maintain heating efficiency. Traditional radiators are typically designed for higher flow temperatures of around 70°C. While many may function with new HIU units at the lower temperature, most properties are likely to require radiator upgrades or full system retrofits to maintain effective heat output. Retaining existing radiators may reduce upfront costs but would likely compromise efficiency, as thermostats may need to be set higher to achieve equivalent comfort levels, increasing both energy use and running costs compared with systems purpose-designed for lower-temperature operation.

Grant Funding Opportunities for Heat Network Developments

Given these technical and cost challenges, external funding can play a critical role in making a network connection financially viable. Several UK grant programmes exist that can support both development and construction phases of heat networks, potentially reducing financial barriers for this project. Three key programmes are particularly relevant:

Heat Networks Delivery Unit (HNDU)

This scheme provides funding and guidance for heat network project development, including feasibility studies, design, and stakeholder engagement. HNDU grants are typically aimed at development-stage costs rather than full construction. Eligible applicants include local authorities, registered social landlords, and other public or private sector bodies. For this project, HNDU could support early-stage technical and community feasibility work.

Heat Network Efficiency Scheme (HNES)

HNES focuses on improving the performance of existing or operational heat networks but also supports development activities in certain cases. It provides grants for optimisation studies and capital improvements up to a capped percentage. While primarily aimed at operational networks, HNES could help fund efficiency studies or minor upgrades to make the network connection more cost-effective.

Green Heat Network Fund (GHNF)

GHNF provides capital cost grant funding for the construction of new low- and zero-carbon heat networks and for retrofitting or expanding existing networks. Grants can cover up to, but not including, 50% of total project costs, including both capital and some linked development costs. This scheme is directly applicable to projects seeking to establish a substation and connect multiple properties, particularly under a community-owned model.

Collectively, these schemes offer a pathway to mitigate upfront costs, with HNDU and HNES supporting development feasibility and GHNF enabling substantial capital investment for construction and network expansion. Early engagement with these programmes will be critical to align the project's technical scope, participation levels, and financial planning with funding eligibility.

While grant funding can offset some capital and development costs, implementing a viable connection still depends on property participation. One approach to address this is a community-owned model, where residents jointly invest in and manage network infrastructure, combining financial support with local engagement. This will create longer-term local benefits through shared ownership of the network infrastructure.

Community Owned Heat Network Opportunity

A promising avenue to explore is community ownership of the local substation or parts of the wider network. Residents and landlords could form a Community Energy Cooperative to jointly invest in, manage, and benefit from the substation's operation. Alternatively, joining an already established cooperative, such as Bristol Energy Cooperative, may prove a viable opportunity and save on upfront costs and risk.

This model could unlock access to funding streams targeted at locally led energy projects, improve long-term engagement, and distribute both risks and rewards across participants. Establishing such a cooperative would require a structured outreach campaign to secure sufficient participation for a viable connection. Indicative costs for this activity are £10,000–£15,000.

Early-stage financial advice for prospective members could clarify participation implications, while legal agreements and governance documents—covering ownership, liabilities, and revenue-sharing—could cost around £25,000. Further technical and business modelling would be needed to understand network integration and financial performance, at £20,000–£30,000, and cooperative formation and administrative setup could cost £5,000–£10,000.

Once established, the cooperative could consider financing the capital investment through a loan repaid over time via standing charges, aligned with the expected life of key infrastructure, such as pipework—typically around 40 years—ensuring gradual cost recovery while maintaining affordability for members.

These steps would provide the foundation for a more detailed funding proposal, assessing the practical, financial, and social feasibility of community ownership, and potentially enhancing both the long-term viability and local value of the substation connection option.

Cost Item	Indicative Range (£)	Notes
Community outreach & engagement	10,000–15,000	To secure participation from 50+ households
Legal agreements & governance	25,000	Template contracts covering ownership, liabilities, revenue-sharing
Technical & business modelling	20,000–30,000	Feasibility, integration, and financial performance modelling
Cooperative formation & administration	5,000–10,000	Registration, governance setup, initial compliance
Estimated Total	**£60,000-80,000**	

Table 2: Indicative costs of community participation and cooperative formation

Comparative Analysis

The table below summarises the relative merits of three heating solutions for the property: an individual Air Source Heat Pump (ASHP), a direct connection to the district heat network, and a community-owned network connection via a local substation. All three assume prior fabric improvements and internal modifications where required.

On a single-property basis, the ASHP provides the greatest reduction in energy consumption, with significant carbon savings but the most expensive solution on an individual household basis. The direct heat network connection offers moderate reductions in energy and emissions, but performance depends on the carbon intensity of the central supply and participation thresholds for substation viability. Both ASHP and Heat Network options see very similar annual running costs.

Table 2 shows that while a community-owned network model introduces additional upfront costs for cooperative setup, the following Table 3 introduces indicative costs when considering the available grants. The resulting Net Install Cost for a community owned heat network, at this high level of feasibility, are cheaper than the ASHP on an individual property basis.

It is important to note that Table 3 illustrates indicative costs on an individual property basis. No inclusion of the construction of the substation or development costs, for instance, is included. The purpose of this is to present a high-level indication of the costs each individual property might undergo for each of the solution scenarios.

Category	ASHP	Direct Heat Network Connection	Community-Owned Heat Network (per property)
Base Installation	£14,260	£15,000	£7,000
Radiator Upgrade	£1,365[13]	£1,365[11]	£1,365[11]
Establishing Energy Cooperative Costs	N/A	N/A	£1,200 (share of £60,000 community capital costs)
Gross Install Cost	£15,625	*£16,365*	*£9,565*
Development Costs Grant Funding	N/A	Available (HNDU/HNES)	Available (HNDU/HNES)
Capital Costs Grant Funding	£0	Up to 50% (GNHF)	Up to 50% (GNHF)
Net Install Cost	£15,625	*<£8,250*	*<£4,800*
Annual Energy Use (kWh)	3,455	12,504	12,504
Annual Energy Cost (£)	*£786*	*£771*	*£771 (not including loan repayment)*
Energy Saving (kWh)	~75%	~15%	~15%
Annual Running Cost Saving vs Baseline (£)	*£414*	*£429*	*£429 (adjusted for loan repayment)*
Expected System Lifespan	15–20 years	25+ years	25+ years
Maintenance Responsibility	Property owner	Shared / operator managed	Cooperative-managed, shared responsibility
Unknown / Unquantified Risks	Performance Estimate	Performance Estimate. Future tariff uncertainty	Performance Estimate. Participation threshold; legal/operational risks; loan repayment obligations

Table 3: Indicative cost elements associated with the three explored low-carbon heat solutions

This table highlights that while the ASHP provides a well-established low-carbon solution for a single property, the community-owned network offers the greater potential for wider benefits, individual cost and collective impact.

By pooling resources, participating property owners can spread the cost of substation and network infrastructure across multiple end users, reducing the per-property financial burden while enabling broader participation.

Beyond financial advantages, the cooperative model allows the community to influence network management, future tariffs, and integration with low-carbon supply, creating a locally controlled and more resilient energy system. Individual connection costs combined with shared cooperative investment and the option to repay through long-term standing charges, this pathway provides a scalable, sustainable, and socially engaged approach to low-carbon heating, making it the most promising candidate for further detailed feasibility assessment from community energy bodies.

[13] Derived from the ASHP installation quotation and used for illustrative purposes in this context.

Consumer Protection, Policy, and Regulation

District heating networks in the UK are undergoing a transition from largely unregulated systems to a statutory, OFGEM-regulated regime designed to provide robust consumer protections. Historically, protection for consumers relied on the voluntary Heat Trust scheme, which not all operators participated in, though Vattenfall have done so in Bristol. The Energy Act 2023 established powers for the government to regulate heat networks, with phased implementation starting in 2025 and full regulatory requirements expected by 2027.

The new framework introduces Standards of Conduct, price guidance, and measures to safeguard vulnerable customers. Consumers on heat networks are considered captive, meaning they cannot easily switch suppliers, which elevates the importance of protections around pricing, billing, and reliability. Vulnerable residents—including the elderly, very young, chronically ill, or those struggling to pay—will be protected from disconnection and may be supported through Priority Services Registers. Security of supply will be enforced, with large networks like Bristol expected to have highly reliable systems with multiple heat sources to minimise interruptions.

For new customers in existing housing, contractual arrangements and billing are key considerations. Tenants may have contracts directly with operators or through landlords under bulk supply arrangements, which raises questions over responsibility for maintenance, billing, and potential arrears. OFGEM is consulting on fair pricing metrics, including comparisons with alternative heating options such as gas or heat pumps. The aim is to ensure costs are reasonable while recognising that operators are monopolies within their zones. New regulations will also require effective metering and billing, moving away from bundled heating charges to transparent, meter-based billing.

While the regulatory framework is still developing—particularly around pricing enforcement and individual household connections—the overarching picture suggests that, once fully implemented, consumer protections for heat network users should be equivalent to those in gas and electricity markets. This will be especially important for enabling low-income or financially supported residents to access district heating safely and affordably.

Stakeholder Implications

Connecting residential properties to a district heating network or retrofitting with alternative low-carbon heating systems carries distinct implications for landlords and tenants.

Following on from the previous section, it is important to highlight that the topic of this section is under significant review and transformation at a policy maker level. Therefore, the uncertainty and risk that occurs because of it, generates cause for scrutiny and further research when considering the below elements at the appropriate stage of the detailed design and development of the project.

Landlords

Financial Considerations: Grants and incentive schemes (HNDU, HNES, GHNF) can offset some development and capital costs, though it remains unclear where the point of responsibility lies. Vattenfall would likely front the entirety of the development cost. It is yet to be determined whether Vattenfall, as network developer, would secure and apply grant funding to cover the capital expenditure on connection costs on behalf of individual properties, or whether each property owner would need to pursue eligibility independently. Point of connection and point of responsibility between developer and individual in this case, must be defined.

Operational Responsibilities: Landlords remain responsible for ongoing operation, maintenance, and compliance with regulatory obligations. This includes ensuring HIUs, meters, and network connections are functioning correctly. The new regulatory framework under OFGEM, along with registration and consumer protection requirements, increases transparency but also imposes administrative duties.

Strategic Opportunities: Connecting to a heat network can enhance the sustainability profile of housing stock, improve energy efficiency ratings, and reduce carbon emissions. These benefits may support compliance with planning policies or future regulatory requirements. Retrofit options will also future-proof homes against changes in heating policy and efficiency standards.

Risks: Delays in network development, uncertainty over pricing mechanisms, and potential limitations in connecting individual households may affect the cost-benefit balance. Landlords must weigh the financial and logistical risks against long-term operational and environmental benefits.

Tenants

Affordability and Bill Predictability: Tenants, particularly those on lower incomes, benefit from transparent, metered billing and fair pricing mechanisms. Lessons from case studies show that linking tariffs to alternative heating costs (e.g. gas or heat pumps) and applying consumer protections reduces the risk of fuel poverty. Bulk supply contracts may influence billing responsibility, making it essential that tenants understand who to contact for queries or faults. Incoming policy is likely to provide more clarify and ease of interaction in this regard.

Access and Reliability: The new OFGEM framework and Standards of Conduct are designed to safeguard tenants, including those in vulnerable situations. Protections include preventing disconnections in winter, supporting those at risk of self-disconnection, and ensuring security of supply. Large-scale networks, like Bristol, are likely to have robust infrastructure with multiple heat sources, reducing the likelihood of interruptions.

Choice and Control: Tenants may have limited control over the type of heat system installed, particularly if connection to the network is mandated or incentivised through landlord bulk supply agreements. Case studies highlight the importance of community engagement and pre-commitment processes in giving residents some influence over participation and network design.

Health and Comfort: Retrofitted HIUs, smart meters, and hybrid heating systems improve temperature control, enhance comfort, and support energy efficiency. These improvements can directly impact wellbeing, particularly in properties where residents are more vulnerable to cold or financial pressures.

Risks: Tenants may face uncertainty regarding the cost of connection, ongoing tariffs, and potential changes to the regulatory framework. Clear communication from landlords and operators is critical to avoid disputes and ensure uptake. Community engagement at a very early stage in development and throughout is key to transparency and quantitative expectation.

Conclusions

What This Report Means for SCHA

This feasibility assessment provides SCHA with a clear strategic pathway for decarbonising its housing stock while managing costs for members on low incomes. The findings demonstrate that while multiple low-carbon heating options exist, a community-owned heat network connection offers the most promising route forward—combining lower individual capital costs, collective governance, and alignment with Bristol's wider energy transition.

Key Discoveries

Financial Viability: Individual ASHPs while delivering the greatest energy savings per property (approximately 75% reduction in kWh), offer minimal reduction in running costs due to higher electricity prices than the existing gas supply associated tariffs. Capital costs of £15,625 per property, with no grant funding available for social housing under the Boiler Upgrade Scheme, make this option challenging for SCHA's membership base.

Community Network Advantage: A community-owned heat network connection via local substation could present net installation costs below £5,000 per property. This represents a significantly more accessible financial model for members on low incomes. However, a detailed feasibility assessment to ascertain viable financial models and participation figures is required to pursue this option further.

Collective Benefits: Beyond individual cost savings, the cooperative ownership model offers:

- Shared infrastructure investment across multiple end users
- Local governance and control over tariffs and operation
- Potential for revenue retention within the community
- Reduced per-property financial burden through economies of scale

Retrofit First: Fabric improvements (external wall and loft insulation) deliver cost-effective performance gains (25% consumption reduction for £12,050), establishing an essential foundation regardless of which heating system is ultimately adopted.

Is Connection Feasible at This Stage?

Not yet. Current feasibility depends on several critical factors:

Participation Threshold: A local substation requires commitment from a mixed range of end users (typically 50+ properties or equivalent heat demand). SCHA's 14 dwellings alone are insufficient and too geographically dispersed. Feasibility requires either:

- Partnership with other property owners/landlords in proximity to SCHA properties
- Identification of anchor loads (commercial, institutional) to achieve viable scale

Technical Uncertainties:

- Vattenfall's 65°C supply temperature will likely require radiator upgrades across properties (additional £1,365 per dwelling)
- Point of connection and responsibility boundaries between Vattenfall and individual properties remain undefined
- Internal pipework and HIU installation requirements need detailed assessment

Financial Clarity Needed:

- Whether Vattenfall or individual property owners would pursue and apply grant funding
- Exact connection costs
- Long-term tariff structures and standing charges for loan repayment
- Energy Cooperative establishment or collaboration decisions to inform financial expectations

What Is Needed to Move Forward

1. **Secure Feasibility Funding**: Apply for Green Britain Community Energy Fund or Bristol City Leap Funding to support:
    - Detailed technical and financial modelling
    - Community engagement and participation recruitment
    - Legal and governance framework development
    - Integration assessment with Vattenfall's network plans
2. **Map Participation Opportunities**: Identify and engage with:
    - Neighbouring property owners and landlords along proposed network routes
    - Local anchor loads and commercial users
    - Potential partnership with established cooperatives (e.g., Bristol Energy Cooperative)
3. **Prioritise Retrofit Measures**: Independently pursue fabric improvements and ventilation upgrades to reduce energy demand, improve member comfort, and ensure properties are heat-network-ready regardless of connection timing.

Critical Uncertainties and Considerations

Policy and Regulatory Evolution: Heat network regulation is in transition, with full OFGEM framework expected by 2027. Current uncertainty includes:

- Final consumer protection standards and pricing controls

- Billing arrangements for social housing tenants
- Grant funding landscape beyond current programmes

Network Development Timeline: Vattenfall's rollout schedule and prioritisation of existing housing retrofits vs. new-build connections will significantly impact when (or if) connection becomes available to SCHA properties.

Community Appetite and Capacity: Success depends on:

- SCHA members' willingness and ability to pursue feasibility and participate in cooperative ownership
- Broader community engagement beyond SCHA's immediate portfolio
- Availability of skilled support for cooperative development and operation

Recommendation

Pursue the community-owned heat network pathway as the primary strategy, given its superior cost-effectiveness for members and broader social benefits. However, maintain ASHP as a contingency option for properties where network connection proves impractical or where immediate heating system replacement is required.

The critical next step is securing feasibility grant funding to de-risk the community network proposal through detailed technical, financial, and engagement work. This will provide SCHA with the evidence base needed to make a fully informed decision and, if viable, position the organisation and its members to participate in Bristol's heat network development on favourable terms.