

To: Infrastructure, Land and Environment Policy Board

On: 24 January 2024

Report by: Director of Environment, Housing, and Infrastructure

Heading: Renfrewshire's Local Heat and Energy Efficiency Strategy

1. Summary

- 1.1 Reducing Carbon Emissions is one of the principle measures to address climate change and is a key priority for all Local Authorities. Renfrewshire Council recognises that climate change will have far reaching effects on Renfrewshire's economy, its people and its environment and is determined to lead by example in tackling the causes of climate change.
- 1.2 Renfrewshire Council declared a climate emergency in June 2019 and approved the Plan for Net Zero in August 2022, which committed to working towards net zero by 2030 for both the Renfrewshire area as a whole and Renfrewshire Council as an organisation. This challenging target covers all aspects of energy use within the Renfrewshire wide area. Homeowners can help achieve these targets by ensuring their home is energy efficient. In doing so, there are many long-term benefits, such as carbon savings, reducing energy bills and by supporting the local economy.
- 1.3 In 2022, the Scottish Parliament passed The Local Heat and Energy Efficiencies (Scotland) Order 2022. This places a statutory duty on Local authorities to publish a Local Heat and Energy Efficiency Strategy (LHEES) and Delivery Plan, and for these to be updated at intervals of no more than 5 years.
- 1.4 LHEES are designed to be local authority-led, however stakeholder engagement and partnership working are key as the Strategy addresses all building stock at a local authority wide level (Council, public, private, 3rd sector and all tenures of residents).
- 1.5 Renfrewshire's LHEES designates the most appropriate energy efficiency and heat decarbonisation options on an authority-wide basis, broken down into area-based schemes (or zones) with a focus on two key priorities of reducing carbon emissions and alleviation of fuel poverty.

- 1.6 Renfrewshire's LHEES is evidence-driven, based on local data and local knowledge and takes into account assets and infrastructure within each local area to ensure potential solutions are tailored to the different issues, opportunities and needs across Renfrewshire's communities.
 - 1.7 It is hoped that LHEES will also act as a prospectus for government funding and external investment using a robust evidence base and place-based approach.
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2. Recommendations

It is recommended that members of the Infrastructure, Land and Environment Policy Board:

- 2.1 approves the proposed Local Heat and Energy Efficiency Strategy,
 - 2.2 note the high-level information available at this time on Renfrewshire's Local Heat and Energy Efficiency Strategy; and
 - 2.3 note that updates will be provided to the relevant Policy Boards on the further development of the Delivery Plans, outlining potential opportunities and proposed projects, activities, and interventions.
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3. Background

- 3.1 In addition to Scotland's net zero targets, there are strategic national targets relating to lowering emissions from our buildings through the decarbonisation of heat.

These targets are:

- improving energy efficiency in domestic and non-domestic building stock;
- removing poor energy efficiency as a driver for fuel poverty; and
- in 2040, as far as reasonably practicable, no household is in fuel poverty.

Clean Energy is one of the 5 focus areas as approved within Renfrewshire's Plan for Net Zero which aligns with these targets at a local level.

- 3.2 LHEES are designed to be local authority-led – and buildings and assets owned by the Council are key - but stakeholder engagement and partnership working are critical as the Strategy addresses all building stock at a local authority wide level (Council, public, private, 3rd sector and all tenures of residents). Engagement has been undertaken throughout the development of Renfrewshire's LHEES, as part of the wider Plan for Net Zero engagement due to the links between the two key strategies.

- 3.3 'Place' is a key aspect of LHEES. Renfrewshire's LHEES designates the most appropriate energy efficiency and heat decarbonisation options on an authority-wide basis, broken down sufficiently into appropriate area-based schemes (or zones) with a focus on two key priorities of reducing carbon emissions and alleviation of fuel poverty.
- 3.4 The LHEES is evidence-driven, based on local data and local knowledge and takes into account assets and infrastructure within each local area, to ensure potential solutions are tailored to reflect each local area and address the different issues, opportunities and needs across Renfrewshire's communities (eg urban and rural; gas grid and off gas grid).
- 3.5 Development of Renfrewshire's LHEES (and the subsequent Delivery Plans) includes identifying:
- a range of projects and actions to be developed, with outline costs and carbon savings associated with the proposed interventions.
 - the different drivers for fuel poverty across different local areas and within communities.
 - key anchor loads for potential district heating networks (including public buildings and buildings with a high heat demand).
 - an assessment of potential large-scale heat supply – not just looking at new infrastructure but also using existing infrastructure and assets (such as water sources) and innovative methods of waste heat recovery, such as those used in the Advanced Manufacturing Innovation District Scotland (AMIDS) district heating network in Renfrewshire.
 - opportunities for partnership working and engaging with all key stakeholders throughout the process.
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4. LHEES Outcomes

- 4.1 The development of Local Heat and Energy Efficiency Strategies aims to:
- ensure a clear and enhanced role for local authorities in shaping local energy systems, highlighting the long-term direction of travel with a short-term focus,
 - bring together stakeholders to identify opportunities based on targeted local needs and potential for economies of scale – this includes identification and optimisation of cross-border opportunities with neighbouring local authorities,
 - develop a data-driven foundation for delivery programmes to meet fuel poverty, energy efficiency and heat decarbonisation targets,
 - focus on socio-economic benefits of solutions as well as project-specific financial cases, and
 - send clear investment signals to develop strong and sustainable supply chain opportunities for local businesses, through a pipeline of infrastructure projects.

- 4.2 In addition, it is hoped that as well as helping to phase the area-based delivery programmes, LHEES will act as a prospectus for government funding and external investment using a robust evidence base and place-based approach.
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5. Next Steps

- 5.1 Following approval of the LHEES, progression of the Delivery Plan can be made. This will allow feasibility studies of potential delivery areas to be carried out. This is in line with section 1.3 of this report where the strategy is required to be updated at intervals of no more than 5 years.
- 5.2 Further engagement with the key stakeholders is also critical for the Delivery Plan as noted in section 3.4 of this report.
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Implications of the Report

1. **Financial** – No current implications. The Scottish Government committed to a funding package of £75,000 per annum for each Local Authority from 2023 to 2027. At present, we are nearing the end of the 2nd year of funding.

Delivery of the LHEES will have resource implications for the Council and includes a commitment to working collaboratively to ensure best value for our approach. As noted in 2.1, as the full extent of the resource implications for Renfrewshire Council emerge, reports will be brought to the relevant future Policy Boards.

2. **HR & Organisational Development** – No current implications.
3. **Community/Council Planning** – No current implications. However, delivery of Renfrewshire's LHEES will require engagement and collaboration with local residents, businesses, partners and communities on the climate emergency agenda. The Delivery Plan will highlight the continued activities which support the key priorities set out in the Council and Community Plans to tackle inequality and widen opportunity.
4. **Legal** - No current implications. However, future actions may have some level of implication.
5. **Property/Assets** - No current implications. However, delivery of Renfrewshire's LHEES may have significant implications for property and assets given the nature of the work involved.
6. **Information Technology** – No implications.
7. **Equality and Human Rights** - The Recommendations contained within this report have been assessed in relation to their impact on equalities and human rights. No negative impacts on equality groups or potential for infringement of individuals' human rights have been identified arising from the recommendations contained in the report because it is for noting only. If required following implementation, the actual impact of the recommendations

and the mitigating actions will be reviewed and monitored, and the results of the assessment will be published on the Council's website.

8. **Health and Safety** – No implications.
9. **Procurement** – No current implications. However, delivery of Renfrewshire's LHEES will have significant procurement implications given the nature of the work involved.
10. **Risk** – No current implications.
11. **Privacy Impact** – No current implications.
12. **COSLA Policy Position** – Renfrewshire's LHEES aligns with COSLA's current work alongside the Scottish Government in response to the climate emergency.
13. **Climate Risk** – as noted in para 3.2, Renfrewshire's LHEES aligns with Renfrewshire's Plan for Net Zero, specifically the Clean Energy theme.

List of Background Papers: None

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RENFREWSHIRE'S

LOCAL HEAT & ENERGY EFFICIENCY STRATEGY (LHEES)

Environment, Housing & Infrastructure

www.renfrewshire.gov.uk



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Executive Summary

From evidence and research, we know that human activities are the main cause of climate change. Many of our actions produce greenhouse gas emissions, raising the planet's temperature and causing our climate to change. Greenhouse gas emissions from burning fossil fuels to heat homes and buildings are a key contributor to global warming. In Renfrewshire, fuels for heating homes and businesses make up 38% of the area's total emissions. Decarbonisation of heat means reducing the carbon emissions associated with our heating systems and switching to cleaner, more efficient methods. Combined with improving energy efficiency to reduce energy demand, this will reduce our emissions, ensure affordable warmth and help to alleviate fuel poverty.

Scotland has ambitious plans to transform its buildings to ensure that by 2045 our homes and buildings no longer contribute to climate change while also tackling fuel poverty. In 2022, the Scottish Parliament passed The Local Heat and Energy Efficiencies (Scotland) Order 2022. This places a statutory duty on local authorities to publish a Local Heat and Energy Efficiency Strategy and Delivery Plan, to be updated at intervals of no more than 5 years.

The Local Heat and Energy Efficiency Strategies (Scotland) Order 2022 defines that LHEES is a long-term strategic framework for:

- the improvement of the energy efficiency of buildings in the local authority's area, and
- the reduction of greenhouse gas emissions resulting from the heating of such buildings.

Renfrewshire Council has shown leadership at both strategic level and operational levels to be a driver of change - declaring a climate emergency in June 2019 and committing to work towards net zero by 2030.

Our response to the climate emergency and a stable, managed energy transition alongside improving energy efficiency to reduce demand, brings opportunities to transform our local communities and economy. It also brings opportunities to identify solutions to tackle inequalities including those exacerbated by the current cost of living crisis, with 22% of households in Renfrewshire currently in fuel poverty.



Renfrewshire's LHEES is ambitious and will require drive and collective local action. The Strategy is Council-led but is for the whole Renfrewshire area and has been developed with local people and key local, regional and national organisations, aligning with local and national policies as well as targets within Renfrewshire's Plan for Net Zero.

Renfrewshire's LHEES is built upon a robust evidence base of data and stakeholder engagement and takes a place-based, locally led and tailored approach to set out a vision for improving energy efficiency and heat decarbonisation. It breaks Renfrewshire down sufficiently into appropriate areas (or zones) in order to consider local assets and issues and recognise local differences to identify where projects can be delivered to make the biggest impact in our communities, making the best use of assets and infrastructure to deliver net zero targets and affordable warmth.

This strategic, area-based approach will ensure proposed solutions that reflect each local area and take into account local distinctive needs, opportunities and priorities to encourage collaboration and partnership working with all stakeholders within those areas:

- **People:** engagement with all stakeholders at all stages to ensure the needs of all groups are considered, with a focus on addressing inequalities, alleviating fuel poverty and ensuring affordable warmth for all
- **Places:** solutions which reflect the local areas and take into account local assets and infrastructure, developed with collaboration and partnership working so systems are developed and tailored to local needs
- **Infrastructure:** ensuring resilient systems and security of supply, optimising existing infrastructure and assets as well as new development, with a 'whole system' approach that matches local demand with local supply where possible, taking an iterative approach to capture new technologies and innovative solutions as well as scaling and replicating successful projects
- **Investment:** prioritising viable and replicable projects and identifying low regret options to optimise low carbon investment opportunities - attracting private sector-led projects, public sector exemplar opportunities, and external funding; coordinating and collaborating on joint ventures; and identifying innovative delivery models to turn sectoral ambitions into investable projects
- **Opportunities:** inclusive growth with a role for community-led activity with all the local benefits that brings, including regeneration of local areas; local job creation, upskilling and reskilling of local workforce; and creating and developing local manufacturing and supply chains



The development of Renfrewshire's LHEES followed the national methodology, firstly reviewing national and local policies, targets and strategies that are linked to, impact or could be impacted by LHEES. A Data Library was then created, collating and verifying the most appropriate data to support analysis for each stage of the LHEES process.

Looking across buildings at a local authority wide level (Council, public, private and 3rd sector buildings and all tenures of residents) enabled the development of strategic zones. These zones are designed to set out the most appropriate energy efficiency and heat decarbonisation option, including potential zones for heat networks, taking local priorities into account and framed around the LHEES Considerations:

- **heat decarbonisation:** heat decarbonisation of on-gas and off-gas buildings, including district heating networks.
- **energy efficiency:** improving energy efficiency; removing poor energy efficiency as a driver for fuel poverty; and mixed-tenure, mixed-use and historic buildings.

Baselining the data looking at fuel poverty, energy efficiency and heat provided clarity on the challenges; the key issues and activities to focus on; and the scale of action needed. Using mapping with layers of data stacked spatially areas of focus were identified to be taken forward to the Delivery Plan. High level findings showed:

- **Fuel Poverty:** 12 of the 38 zones in Renfrewshire were above the national average fuel poverty of 24%, with the highest fuel poverty zone having 38% of households in fuel poverty. The 10 most impacted areas are Paisley Ferguslie, Paisley Northwest, Linwood South, Paisley Gallowhill and Hillington, Paisley North, Paisley Central, Paisley East, Johnstone Northwest, Paisley Foxbar and Johnstone Northeast.

The different factors that are driving fuel poverty – generally cost of energy; income; poor energy efficiency; and/or use of energy will be analysed in greater detail in the Delivery Plans to ensure tailored and targeted solutions.

- **Energy Efficiency:** When looking at poor energy efficiency as a driver for fuel poverty, the top 10 most impacted areas was slightly different to the top 10 areas for fuel poverty. Paisley Central, Paisley East, Paisley Northwest, Johnstone Northwest and Paisley North were in the top 10 for both fuel poverty and for poor energy efficiency, suggesting that poor energy efficiency is one of the key drivers for fuel poverty in these areas.



More broadly, there were differences in energy efficiency across tenures (social housing, owner occupier and private rented), with social housing having higher percentages of housing in the higher bands of energy efficiency and the lowest percentages of housing in the lower bands of energy efficiency. This highlighted areas and sectors where advice and support may be helpful.

Properties that have poor energy efficiency are more likely to be eligible for targeted funding and Delivery Plans will include an area-based energy efficiency focus outlining patterns and clusters to assist funding bids.

- **Potential Heat Network Zones:** district heating uses a single heat source to supply heating and hot water to multiple buildings via a system of insulated, buried pipes. It is more efficient than individual heating systems within each property and is likely to play a key role, including enabling developers to capitalise on abundant sources of waste heat and divert to where it is required.

Based on levels of heat demand, proximity to a heat source and presence of public buildings as potential anchor loads for a network, 6 first phase heat network zones were identified in Central Paisley, Shortroods and Lighthpark, Lochfield and Charleston, Ferguslie Park, North Renfrew and Moorpark and Newmains. A further 11 second phase heat network zones were also identified. All 17 will be explored further and details outlined in the Delivery Plans as well as additional opportunities for areas with lower heat densities, including rural and smaller urban settlements in order to identify the most beneficial heat solution for all our communities.

Zoning across the area for viable large-scale and small-scale district heating and communal heating networks will enable us to understand the scale and potential of these opportunities as part of the Delivery Plans.

- **Additional Considerations:** alternative heat solutions, including heat pumps, electricity and biomass will be explored as well as impacts of conservation areas on energy efficiency measures to ensure Delivery Plans include solutions for all residents and businesses, and all building types.

The Delivery Plans will be developed in collaboration with residents, communities and all key organisations to highlight opportunities for action for local communities, residents, businesses, developers and wider stakeholders.



There are challenges to be overcome, including financial; capacity; and skills gaps. However, by identifying these challenges and setting out a pipeline of projects working alongside our communities and partners we can link with skills transition and local employment opportunities and identify skills gaps, shortages and requirements ahead of time to optimise local opportunities as well as linking with funding opportunities and financial support schemes.

It is hoped that, as well as zoning helping to phase the area-based delivery programmes, LHEES will act as a prospectus for government funding and external investment and where these should be targeted.



Introduction To Local Heat & Energy Efficiency Strategies (LHEES)

LHEES sets out a long-term plan with an initial near-term focus looking at area-based interventions for energy efficiency and decarbonisation of heat on a local authority-wide basis.

In 2022, the Scottish Parliament passed [The Local Heat and Energy Efficiencies \(Scotland\) Order 2022](#). This places a statutory duty on Local authorities to publish a Local Heat and Energy Efficiency Strategy and Delivery Plan, and for these to be updated at intervals of no more than 5 years.

The Local Heat and Energy Efficiency Strategies (Scotland) Order 2022 defines that a LHEES is a long-term strategic framework for:

- the improvement of the energy efficiency of buildings in the local authority's area, and
- the reduction of greenhouse gas emissions resulting from the heating of such buildings.

A Local Heat and Energy Efficiency Delivery Plan sets out how Renfrewshire proposes to support implementation of its strategy.

The guidance requires Local Heat and Energy Efficiency Strategies (LHEES) to be evidence based and cover a local authority's full building stock as far as reasonably possible. They should be developed in collaboration with stakeholders and use extensive consultation and future updates should be linked to any previous iteration to show progress achieved against outcomes and to carry forward outstanding actions. In addition, the LHEES should demonstrate how it supports equality and addresses inequality; be forward looking and delivery focused, working towards local and national targets; and be open and transparent regarding data used, its associated limitations in terms of scope, accuracy, and coverage, and be continuously reviewed with progress monitored.

LHEES are at the heart of a place based, locally led and tailored approach to energy efficiency and the heat transition. These local Strategies will underpin an area-based approach to heat and energy efficiency planning and delivery. LHEES Strategies will set out the long-term plan for decarbonising heat in all buildings and improving their energy efficiency across the Renfrewshire area.



Local Heat and Energy Efficiency Strategies are primarily driven by Scotland's statutory targets for greenhouse gas emissions reduction and fuel poverty, but at a local level it is key Renfrewshire's LHEES to align with targets within Renfrewshire's Plan for Net Zero as the strategy will play a crucial role in working towards net zero by 2030 for the Renfrewshire area:

Key national targets include:

- Net zero emissions by 2045, 90% reduction by 2040 and 75% reduction by 2030
- In 2040, as far as reasonably possible, no household in Scotland is in fuel poverty

Key local targets within Renfrewshire's Plan for Net Zero which link with LHEES include:

- ensuring 100% of Council buildings heating requirements are carbon neutral by 2030.
- implementing measures in Council housing stock aiming to reduce carbon emissions by 68% (from 2020 levels) and working towards ensuring all Council housing stock has an EPC of B by 2030 where feasible.

The primary purpose of LHEES is to address energy and heat-related challenges while promoting sustainability and reducing environmental impacts.

LHEES sets out a long term (20 year) with an initial near term (5 year) focus. For Renfrewshire, the plan will:

- set out how each segment of the building stock needs to change to meet national and local objectives, including achieving zero greenhouse gas emissions in the building sector, and the removal of poor energy efficiency as a driver of fuel poverty;
- identify strategic heat decarbonisation zones, and set out the principal measures for reducing buildings emissions within each zone; and
- prioritise areas for delivery, against national and local priorities.

LHEES will break the local authority area down sufficiently into appropriate local areas (or zones) in order to consider local assets and issues and recognise the local differences (i.e., between rural vs urban; gas grid vs off gas grid) so that proposed solutions reflect each local area and take into account local distinctive needs, opportunities and priorities. This will also encourage collaboration and partnership working with all stakeholders within those areas so that solutions can be community led.

LHEES are framed around six ‘Considerations’ outlined in Table 1, below. For each Consideration, spatial zones are to be generated to identify potential pathways to decarbonise the building stock at local authority level (Strategic Zones) and then at delivery level (Delivery Areas). This will help to guide the design of policy levers, such as advice, funding programmes and regulation, which will give further direction and clarity to delivery routes and timescales.

	No.	LHEES Consideration	Description
Heat decarbonisation	1	Off-gas grid buildings	Transitioning from heating oil and LPG in off-gas areas
	2	On-gas grid buildings	On-gas grid heat decarbonisation
	3	Heat networks	Decarbonisation with heat networks
Energy efficiency and other outcomes	4	Poor building energy efficiency	Poor building energy efficiency
	5	Poor building energy efficiency as a driver for fuel poverty	Poor building energy efficiency as a driver for fuel poverty
	6	Mixed-tenure, mixed-use and historic buildings	Mixed-tenure, mixed-use buildings, listed buildings, and buildings in conservation areas

Table 1: LHEES Considerations

Benefits and opportunities of Local Heat and Energy Efficiency Strategies include:

- ensuring a clear and enhanced role for local authorities and local stakeholders in shaping local energy systems.
- bringing together all stakeholders to optimise opportunities based on targeted local needs, potential for economies of scale.
- highlighting the long term direction of travel with a short term focus.

- sending clear investment signals to develop strong and sustainable supply chain opportunities for Scottish businesses.
- focusing on socio-economic benefits of solutions and prioritises investment based on weightings as well as project-specific financial cases.
- the potential to assist with large-scale funding bids, as well as to signpost residents and businesses to impartial advice and support, including financial support schemes.
- a solid foundation for delivery programmes to meet fuel poverty, energy efficiency and heat decarbonisation targets.

A 5-year LHEES Delivery Plan, sufficiently broken down into specific areas, will be developed in Phase 2 in partnership with key stakeholders to outline how the key outputs of the LHEES will be achieved and to highlight opportunities for action for local communities, residents, businesses, developers and wider stakeholders on an area-by-area basis and targeted interventions, projects and early, low-regrets measures.



Renfrewshire's Approach

A robust evidence base looking on an area-by-area basis across Renfrewshire, combined with engagement with key stakeholders formed the foundation of the LHEES development.

Developing Renfrewshire's LHEES required a robust evidence base combining relevant data and technical modelling and enhancing with local knowledge and engagement and input from local stakeholders to optimise the strategy and ensure local needs are being met. There is a dual focus on energy efficiency and heat decarbonisation – to make our homes and buildings warmer, greener and more efficient – and recognition that it is key to remove poor energy efficiency as a driver for fuel poverty.

Renfrewshire Council worked in collaboration with external technical consultants Sweco UK Ltd as well as our key stakeholders to ensure a structured approach that considers the unique characteristics and needs of each of our communities in order to identify and tailor area-based building energy efficiencies and low or zero carbon heating schemes (including potential heat networks) across the Local Authority area. Due to the close links and crossovers between the two key strategies, the engagement and consultations for Renfrewshire's LHEES was carried out jointly with engagement for [Renfrewshire's Plan for Net Zero](#) and this joint approach will continue as the strategies progress into the action and delivery phase.

An internal Officers Working Group from across all key Service areas met regularly to discuss each stage of the LHEES and ensure that policies, strategies, projects and programmes from across the Council were being considered at each stage and opportunities to link, optimise or coordinate work programmes were identified.

Initial Stakeholder Engagement:

- **Community Climate Conversation:** the engagement process was designed for the community voices to be heard first – listening to community priorities and project ideas, what people would like to see in their local areas and barriers and challenges in order to find solutions. This included the Clean Energy theme of the Plan for Net Zero and discussions linked to LHEES, including decarbonisation of heat; improving energy efficiency; alleviation of fuel poverty and removing poor energy efficiency as a driver for fuel poverty. A key theme that came through in community engagement was that people were unsure where to start, help that is available and what makes the biggest impact. Reducing the cost of energy, alleviating fuel poverty and identifying community energy opportunities scored highly for energy priorities.

- **Key Stakeholder Organisation Event:** with key local, regional and national organisations including community planning partners; local housing associations; Scottish Power; Scottish Gas; Scottish Water; and all 8 neighbouring authorities (57 attendees in total). This event built on the community priorities and was designed to understand the key stakeholders' influence and their role in progressing to net zero as well as partnership working opportunities, including potential for links across LHEES. This event helped us to:
 - gain an understanding of high-level projects being progressed across Renfrewshire and wider Glasgow City Region
 - bring partners together to identify and scope out new actions to move towards net zero.
 - identify and target the challenges/problems collectively that we are all trying to solve.
- **Internal workshop:** 70 Officers from across all Council Services looking at theme-specific project examples, based on ideas from the community and stakeholder organisation events; and projects from across Scotland. Groups scored against strategic fit, based on key outcomes (e.g., alleviation of fuel poverty; improving energy efficiency; reducing energy demand; renewable energy generation, etc.); deliverability – incl. resources (pounds and people) and revenue generating or cost saving potential; and additional opportunities looking at economic, environmental and social impacts. Thinking not just of the carbon benefits of projects but all the social benefits and opportunities as well as identifying challenges such as resources, risk and skills gaps.

Additional engagement includes with Scottish Government on LHEES development; engagement with all 32 Local Authorities via a fortnightly LHEES Forum; and working with strategic partners such as Scottish Futures Trust, Energy Savings Trust and Zero Waste Scotland to enhance each stage of the process as the strategy was being developed.

Engagement is an iterative process and will continue into the next phase of LHEES to build on existing activities and identify new opportunities to accelerate change. Two-way communication channels will remain in place as projects and activities are implemented to ensure everyone is informed of progress and can provide feedback on our collective journey, with tailored engagement and consultation at a local level on the proposed LHEES delivery plans.



National and Local Policy Drivers

The overarching legislation nationally is the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 which amended the Climate Change (Scotland) Act 2009.

The overarching legislation nationally is the [Climate Change \(Emissions Reduction Targets\) \(Scotland\) Act 2019](#), which amended the Climate Change (Scotland) Act 2009. This increased the ambition to commit to net zero by 2045, with updated annual emissions targets and embeds the principles of a just transition.

Key national and local policies, targets and strategies that are linked to, impact, or could be impacted by LHEES were identified and will be kept updated as legislation, policies, strategies and/or targets emerge. The full list can be found in Appendix 2 but includes:

Key National Policies:

[Fuel Poverty \(Targets, Definition and Strategy\) \(Scotland\) Act 2019](#)

Sets targets relating to the eradication of fuel poverty; to define fuel poverty; to require the production of a fuel poverty strategy.

[Climate Change \(Emissions Reduction Targets\) \(Scotland\) Act 2019](#)

Sets a 2045 net zero emissions target and interim targets: 75% by 2030; and 90% by 2040.

[Heat Networks \(Scotland\) Act 2021](#)

Regulates heat networks, supporting objectives in the Heat in Building Strategy to grow heat network opportunities.

[Housing to 2040](#)

Sets out a vision for housing in Scotland to 2040 and a route map to get there.



What is fuel poverty? In the [Fuel Poverty \(Targets, Definition and Strategy\) \(Scotland\) Act 2019](#) a household is in fuel poverty if **more than 10%** of the household's net income is required to pay for their reasonable fuel needs to maintain an acceptable standard of living after housing costs have been deducted.

What is extreme fuel poverty? Where more than 20% of the income after housing costs is spent on required fuel costs and there is insufficient residual income to maintain an acceptable standard of living.

The Scottish Government recognises **4 main drivers of fuel poverty**:

- energy prices
- income
- energy efficiency of the home
- how energy is used in the home

The overarching target in Scotland is that in the year 2040, as far as reasonably practicable, no household is in fuel poverty.

Key Local Policies:

[Council Plan – 2022-2027](#)

The Council Plan sets out how the Council will collaborate with partners, communities, and business to progress our five strategic outcomes.

[Renfrewshire's Plan for Net Zero](#)

Developed in collaboration with all our stakeholders, we are committed to working towards net zero by 2030.

[Renfrewshire Local Housing Strategy 2023-2028](#)

Sets out the strategic approach of the Council and its partners to delivering high quality housing and housing related services.

[Renfrewshire Local Development Plan](#)

Sets out the spatial strategy and proposals for Renfrewshire over the next 10 years.



Where are we now? Energy Information & Statistics for Renfrewshire

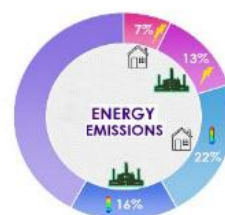
In order to work collectively to achieve the ambitions within Renfrewshire's LHEES, it is important to know where we are starting from as an evidence base.

The majority of Renfrewshire's homes and businesses, including the Council estate and Council housing stock, are currently heated and powered by fossil fuels which contribute to climate change. Many homes and buildings are also older and/or less well insulated, making them harder and more expensive to heat, which increases carbon emissions and exacerbates issues with fuel poverty.

It is vital that we cut emissions from Renfrewshire's homes and businesses, in a way that ends fuel poverty, ensures warm homes and buildings and develops a thriving, wellbeing economy.

Renfrewshire's energy consumption makes up more than half (**58%**) of the area's total emissions:

- electricity to power homes and businesses totals **20%** of our total emissions (7% residential and 13% commercial and industry)
- gas and other fuels for heating homes and businesses total **38%** of our total emissions (22% residential and 16% commercial and industry)
- Latest figures show that **22%** of households in Renfrewshire are in fuel poverty¹
- **89%** of Renfrewshire's homes use mains gas as their primary source of heat (higher than the Scottish average of 79%)
- Council housing stock currently makes up nearly **15%** of the overall housing in Renfrewshire
- the average carbon emissions per household in Renfrewshire is 3.6tCO₂e per year (below the Scottish average Scottish average of 4.3tCO₂e per year)
- the average energy usage per household per year in Renfrewshire is 19,485kWh (below the Scottish average Scottish average of 22,751kWh per year)



¹ Fuel poverty is defined as any household spending more than 10% of their income on energy after housing costs have been deducted. The Scottish average is 24%.

When developing Renfrewshire's LHEES and the Delivery Plans which will be outlined in Phase 2, the energy hierarchy has been taken into consideration and will be followed where possible. The first step is to reduce energy waste, followed by improving poor energy efficiency and removing poor energy efficiency as a driver for fuel poverty. This is followed by identifying renewable, sustainable and low carbon sources of heat supply to meet the demand where possible. However, the scale and pace of change required may mean that in some instances a low carbon heat supply is identified and implemented which benefits residents, communities or businesses ahead of all suitable energy efficiency measures being installed.

It will not be technically or financially feasible in every instance to make the changes required to all building stock for net zero emissions, whether that be energy efficiency measures or decarbonisation of heat supply. In some instances, conventional sources may require to be used as a last resort, with local carbon offsetting to compensate.

This approach links with the Clean Energy theme in Renfrewshire's Plan for Net Zero, which aims to minimise energy demand, maximise energy efficiency and transform our energy systems to deliver clean, affordable energy for all.

PRIORITY AREAS FOR CLEAN ENERGY

- 1: minimising energy demand:** reduce energy waste to reduce demand at source
- 2: maximising energy efficiency:** improved energy efficiency across all homes and buildings to reduce consumption and remove poor energy efficiency as a driver for fuel poverty
- 3: maximising sustainable energy generation:** decarbonise the energy we use for heating, power and transport - matching local demand and local supply with community involvement and using energy storage to optimise the amount of locally generated energy able to be used locally
- 4: alleviating fuel poverty:** through improved energy efficiency and the provision of affordable, low carbon heat and power, ensuring warm homes to improve wellbeing and reduce health inequalities
- 5: energy security and resilience:** a managed energy transition to ensure resilient communities, with secure and affordable energy supplies for everyone
- 6: offsetting:** conventional sources of energy as a last resort, with local carbon offsetting to compensate

Renfrewshire's Plan for Net Zero Clean Energy Priority Areas

Mapping strategically across Renfrewshire to identify tailored, local energy efficiency and decarbonised local heat solutions, will reduce reliance on fossil fuels; accelerate deployment of local energy systems where local supply meets local demand; support the growth of net zero local economies and quality, sustainable jobs; and tackle climate change while addressing specific energy issues faced locally within our communities, including alleviation of fuel poverty. This will ensure energy security, affordability and resilience while keeping the benefits of local energy systems within our communities.



The 6 LHEES Stages

Renfrewshire's LHEES is evidence-driven - using a wide range of data at each stage, combined with stakeholder engagement, in order to develop the strategy and take into account a range of key priorities to tailor local solutions specific to local areas.

Stage 1: Review - involved a review of national and local policies, targets and strategies that are linked to, impact, or could be impacted by LHEES. This stage provided the opportunity to consider how national policy can be linked to local circumstances and strategies, helping to identify the key priorities for LHEES and also relevant local targets and indicators.

Stage 2: Data Collation and Verification – creating a Data and Tools Library to identify the most appropriate data and information to support analysis in the subsequent stages of the LHEES process.

Based upon the national and local key policies and discussions regarding the key challenges in Renfrewshire, two key priorities were set for Renfrewshire's LHEES, both of which align with key drivers at a national and local level: fuel poverty alleviation; and carbon emissions reduction.

In addition to these key priorities, it was agreed that we would also consider other indicators set out in the LHEES criteria as the policy review indicated that these would be relevant to the Renfrewshire area:

Indicator	What does this illustrate?
1. Households in fuel poverty	Homes that may need prioritised to alleviate fuel poverty
2. Local Development Plan (LDP)	Strategic areas to include for future heat demands/heat loads
3. Potential anchor load buildings (public buildings, high heat demands, hotels, etc.)	Potential heat demands to make a heat network viable
4. Existing Heat Networks	Potential for expansion to existing heat networks
5. On gas /off gas grid	Ease of transferring to a low carbon technology
6. Waste heat/energy	Potential existing heat sources
7. Poor Energy Performance Certificates (EPCs)	Buildings likely to need energy efficiency improvements

Table 2: LHEES Indicators

These indicators were considered at each stage of the LHEES to provide a high-level understanding of the current fuel poverty and building performance across Renfrewshire's 38 intermediate zones.

Data zones are stable, small geographical areas that do not often change. Intermediate zones are made up of aggregated data zones (2,500-6,000 residents) and sit between data zones and Council areas for granularity, or detail, of data.

Stage 3: Strategic Zones and Pathways – using the information from Stages 1 and 2 to understand the current energy efficiency and heat decarbonisation performance of all building stock at a local authority wide level (Council, public, private, 3rd sector and all tenures of residents) and designates zones setting out the most appropriate energy efficiency and heat decarbonisation options for the area.

Stage 4: Generation of Initial Delivery Areas and Potential Zones for Heat Networks - place-based analysis at a higher level of detail, identifying specific locations/clusters for potential Delivery Areas within a Strategic Zone.

Stage 5: Energy Efficiency and Heat Decarbonisation Pathways - establishing in more detail the types of interventions required to decarbonise buildings and identified opportunities and challenges for heat decarbonisation, including outline costs and carbon savings.

Stage 6: Finalisation of Delivery Areas – identifying a range of projects and actions to be developed in the LHEES Delivery Plan, highlighting the long-term direction of travel as well as near term opportunities.



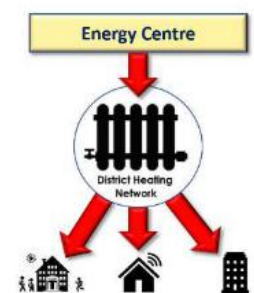
LHEES Terminology – District Heating

A district heating network is the distribution of heat from a central energy source to multiple customers through a system of insulated pipes.

District heating uses a central heat source to supply heating and hot water to multiple residential and/or commercial buildings via a system of insulated pipes that are generally buried underground. Although referred to as district ‘heating’, these networks can provide both heating and cooling demand.

Communal heating is similar to district heating, but in this case, the central heat source supplies heating and hot water to multiple users within one building, e.g., blocks of flats.

A central source for heat is more efficient than each building having its own individual, carbon intense system and brings significant opportunities for this heat to be delivered using low carbon sources direct to radiators. This reduces our reliance on fossil fuels, reduces heat losses from inefficient boiler systems and brings savings on service and maintenance.



District heating systems using low carbon and renewable heat sources can help to alleviate fuel poverty, increase energy security and resilience, reduce energy demand and can protect users from energy market volatility and spikes in prices.


There are examples of both communal heating and district heating networks in Renfrewshire, including [the first of a kind in Scotland](#) AMIDS District Heating Network - provides low carbon heating, cooling and hot water via a district heating network to businesses at the Advanced Manufacturing Innovation District site in Paisley, with a carbon reduction of over 95% over the 40 years lifecycle of the project and potential to connect other buildings locally.

When identifying potential district heating networks, the most common approach is to identify anchor loads for the network, assess the heat density (or heat demand) of the area and to identify a heat source.

- **anchor loads - are buildings with significant heat demands in an area which help increase network viability and are often the first buildings to be connected to a network:**
 - public buildings are generally good anchor loads, providing higher levels of certainty for developers due to predictability and consistency of building use
 - buildings with high heat demand and/or diversity of use are key, e.g. hotels/leisure centres have significant heating and hot water demand 24/7, 365 days a year; a school will require heat during the day, whereas homes generally require their heating at night. These ranges of heat demand help to balance a network.

 - **assessing the heat demand of the area - this determines the size of energy centre required to provide heat for buildings on a network, as well as the length and diameter of pipes required to supply the heat:**
 - public buildings can again be key when assessing heat demand as this data is generally reliable and easily accessible in order for analysis in the first instance.

 - **identifying a heat source - the heat source which will supply all the buildings on a network is key:**
 - developing a district heating network does not necessarily mean using only new infrastructure. In the development of Renfrewshire's LHEES, opportunities to use existing infrastructure and assets are also being explored. This includes opportunities to use waste heat recovery, i.e., existing potential heat sources such as our rivers which in the past powered mills; reservoirs; factories and manufacturing processes which produce high levels of waste heat; and waste heat recovery from the wastewater treatment process.

 - **minimising heat losses – increases viability of network:**
 - heat networks are generally more efficient than individual heating systems within each property but the further the heat has to travel, the higher the likelihood that heat may be lost.
 - a measurement called linear heat density is used to identify where networks may be more viable, based on heat demand and the length of the network to calculate and minimise potential heat losses. The accepted industry standard linear heat density for a viable network is 4MWh/metre. However, all options will be explored, in order to include areas within Renfrewshire which have lower heat densities, including rural areas and smaller urban settlements in order to identify the most beneficial heat solution for communities.
- 

Additional duties came into force in May 2023 requiring owners of public sector non-domestic buildings to submit a [Buildings Assessment Report](#) to their local authority. These public sector buildings have the potential to be key anchor loads, and this will help assess potential anchor load suitability and/or network connection opportunities.

Zoning across Renfrewshire for viable large-scale and small scale district heating and communal heating networks will enable us to understand the scale and potential of these opportunities.



LHEES Terminology - Energy Efficiency Measures

Energy efficiency means using less energy to get the same job done. Energy efficient homes and buildings use less energy to heat and cool, which leads to cutting energy bills and reducing carbon emissions.

The first steps in the energy hierarchy are to reduce energy waste and improve energy efficiency, including removing poor energy efficiency as a driver for fuel poverty. Most homes and buildings lose heat through walls, roof, windows and doors due to warm air travelling to cold spaces. Improving energy efficiency is one of the main ways to reduce draughts, heat loss and carbon emissions. This leads to lower energy bills, warmer homes and buildings and improved mental health and wellbeing. It also improves the fabric of homes and buildings by reducing potential for damp and mould, which can also affect the health of building occupants.

Many homes and buildings in Renfrewshire are older and/or less well insulated, making them harder and more expensive to heat, which increases carbon emissions and exacerbates issues with fuel poverty.

There are a number of measures that can be taken to improve energy efficiency, which have been explored in the development of Renfrewshire's LHEES and which will be further developed in the Phase 2 area-based Delivery Plans.

Draught Proofing: draught proofing is one of the cheapest and most effective ways to stop heat loss, helping to keep homes and buildings warm and reducing energy bills. This involves blocking unwanted spaces and gaps that let cold air in and let heat escape out and there are simple ways that this can be done without the need to call in professionals, but care must be taken not to seal off ventilation which is specifically designed for air flow. Simple DIY methods include draught-proofing strips for windows; draught excluders; keeping doors closed leading to rooms that you don't normally heat, e.g., spare room; and using a letterbox flap or brush. Warm air rises and so blocking off draughts around loft hatches and attic doors can also reduce the amount of heat needed to keep warm.

Insulation: in an uninsulated home roughly a third of heat loss is through the walls and around 25% of heat is lost through the roof, attic or loft spaces. Generally, homes built from 1990 onwards have good levels of wall insulation, but older homes may require action to properly insulate.



- **Cavity Wall Insulation:** Cavity walls are made of 2 layers, with a small gap between them. Insulation involves injecting insulation material into this gap (or cavity) and requires a professional, but generally has minimal disruption as it can often be done in a couple of hours.
- **Solid Wall Insulation:** homes which were built before the 1920s general have solid external walls with no cavity but can be insulated from either the inside or the outside. This is more costly than cavity wall insulation but can also bring greater savings in bills.
- **Loft and Roof Insulation:** if your loft is easily accessed then loft insulation is often easy to carry out, and it is possible to do yourself. Harder to access loft spaces require a professional to complete the required works.

Windows and Doors: energy efficiency can be improved by upgrading to double or triple glazing glass or applying secondary glazing. Not only does this keep heat in, but it can also reduce noise from the outside. Another effective way to keep heat in and reduce noise travelling is through heavy lined curtains and closing curtains and blinds at night. If you live in a conservation area or a listed building then you should check with Renfrewshire Council's planning team as there may be restrictions on work that is allowed, or special permissions may need to be obtained.

Hot Water Tanks and Radiators: insulating behind radiators on external walls using radiator reflector panels is an effective, low cost option to reduce heat loss. They act by reflecting the heat from the radiator back into the room instead of letting the heat escape through the external wall. Insulating your water tank using a hot water cylinder jacket or lagging is also a quick and easy way to keep water hotter for longer and reduce energy bills.

For free, impartial advice on energy efficiency for your home as well as financial support schemes, grants and loans visit [Home Energy Scotland](#). Interest free loans for small and medium sized businesses, not-for-profit organisations and charities are also available through [Business Energy Scotland](#).

One of the ways Renfrewshire Council is helping our tenants is through our [Housing Regeneration & Renewal Programme](#): a £100M ten year programme delivering high quality and energy efficient Council housing throughout Renfrewshire - creating nicer places to live, bringing down energy bills and alleviating fuel poverty, with associated health and wellbeing benefits.



Overview of Renfrewshire as a Whole: Fuel Poverty & Energy Efficiency

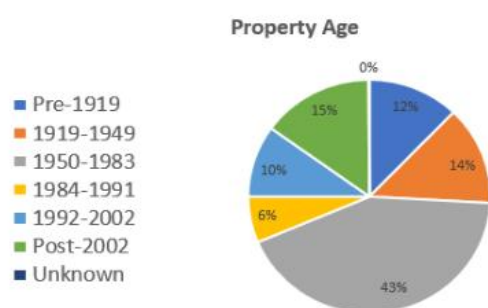
This section of Renfrewshire's looks at the area-wide picture relating to fuel poverty and energy efficiency for Renfrewshire, setting out the challenges and opportunities and potential areas of focus.

All potential proposals will then be further developed and enhanced during Phase 2, the action and delivery phase, when detailed Delivery Plans, broken down sufficiently by area will be co-developed with our local communities and other key stakeholders.

Key Fuel Poverty and Energy Efficiency Stats for Renfrewshire

- % of homes in fuel poverty: **22%**
- % of homes in extreme fuel poverty: **7.4%**
- % of homes on gas grid: **94%**
- % of homes with single/partial glazing: **5%**
- % of homes with double glazing: **92%**
- % of homes with triple glazing: **3%**
- % of homes with wall insulation: **42%**

The census high level results for Renfrewshire released by the National Records of Scotland showed that Renfrewshire's population has increased again and now stands at 183,800 - an increase of 8,892 (5%) from 2011. This links with a 7.2% increase in the number of households between 2011 and 2022, with 91,685 domestic properties being analysed as part of Renfrewshire's LHEES.



Renfrewshire Domestic Properties by Age

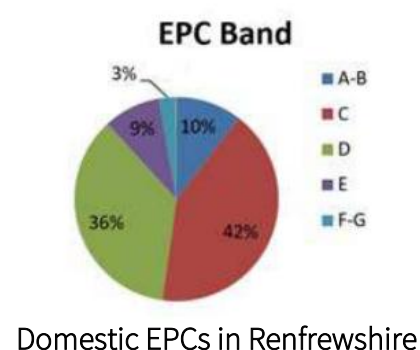
Where new homes and buildings have to meet certain standards of energy efficiency, those older homes and buildings need work to bring up to standard. Undertaking energy efficiency measures such as insulation in existing properties is called retrofitting. Improving energy efficiency reduces the amount of heat needed to keep homes and buildings warm and so leads to reduced energy bills.

Generally, houses built from the 1990s onwards have good levels of insulation. Analysis of Renfrewshire households found that **75% of households in Renfrewshire were built pre-1992**, but many have since been retrofitted with insulation improvements such as insulation and double glazing.

An Energy Performance Certificate (EPC) gives information on how energy efficient a building is and how it could be improved. EPCs are valid for 10 years and need updated on expiry and also at all points when a building is sold or let to a new tenant. EPCs can also be updated following improvements to a building.

An EPC's energy efficiency rating estimates how much fuel bills may be and also the environmental impact rating in terms of estimated carbon emissions. EPC ratings are banded on a scale from A to G, with A being the best. A recommendations report is included which outlines improvements and what the potential EPC rating could be if these were carried out.

Analysis of Domestic EPCs in Renfrewshire found that 10% were in the top bands of A-B; 42% were in Band C; 36% were in Band D; 9% were in Band E; and 3% were in the lowest bands F-G. However, EPCs were often found to vary by tenure as outlined in the 'Fuel Poverty' section which follows. You can find out the EPC for your property on the [Scottish EPC register](#).



To remove poor energy efficiency as a driver for fuel poverty, targets at a national level have been set to improve the energy efficiency standards to the equivalent of EPC Band B for households in fuel poverty.

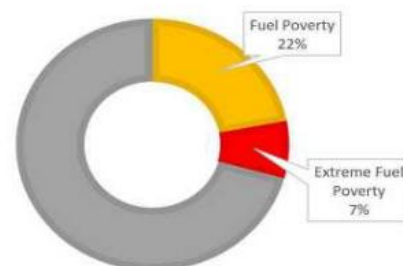
Through Scotland's Heat in Buildings Strategy, regulations requiring that all residential properties achieve the equivalent to EPC Band C by 2033 where technically and legally feasible and cost-effective is to be introduced.

The social housing sector is expected to go further, with all social housing meeting EPC Band B or as energy efficient as practically possible by the end of 2032 (within the limits of cost, technology and necessary consent).

Standards for the private rented sector are also being introduced to ensure measures are implemented to prevent private tenants from being at increased risk from fuel poverty.

Fuel Poverty in Renfrewshire

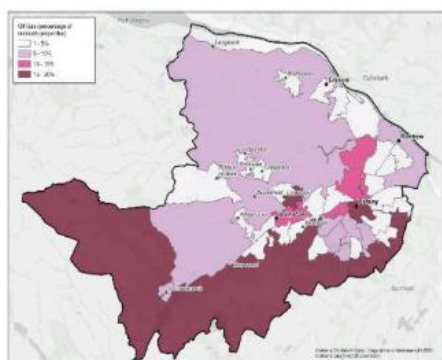
A household is defined as in fuel poverty if **more than 10%** of the household's net income is required to pay for reasonable fuel needs to maintain an acceptable standard of living after housing costs have been deducted. Extreme fuel poverty is where more than 20% of the household's net income is required for reasonable fuel costs after housing costs have been deducted.



Fuel Poverty in Renfrewshire

There are four main drivers of fuel poverty: energy prices; income; energy efficiency of the home; and how energy is used in the home.

Recent market volatility and spikes in energy prices have had severe impacts on households and contributed to the cost-of-living crisis, including rising levels of all forms of poverty and people having to choose between heating their homes and eating. This has led to many not using heating at all or



% of off gas grid levels in Renfrewshire: where darker shades indicate higher levels of off gas grid

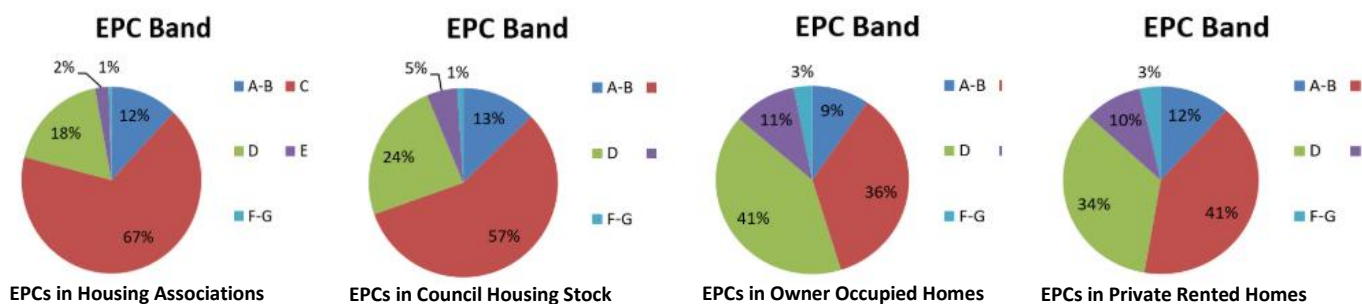
severely reducing their heating to reduce energy bills to as low a level as possible. This has knock on effects on mental health and wellbeing as well as having negative impacts on building fabric such as increased damp and mould, bringing further potential negative health impacts. Those who are in off gas grid areas can often face higher energy prices and so higher levels of fuel poverty due to a lack of fuel choice. Generally, off gas grid areas are more commonly found in rural locations, but in Renfrewshire there are also concentrated clusters of off gas grid properties in urban areas.

Household income is also a contributor to fuel poverty – particularly if household incomes are not increasing at the same rate as energy and other household costs. Residents on a fixed income, such as those who are unable to work and those over pensionable age are at particular risk of income not keeping up with inflation of other requirements. Residents in Renfrewshire who are aged 65 or over make up 19.5% of the total population.

Poor energy efficiency is another key driver of fuel poverty – poorly insulated homes are difficult to heat and keep warm, with heat loss through various areas of the home. This leads to the household needing to use increased levels of heat to keep the home to a reasonable standard of warmth, and so increases energy bills.

The need to remove poor energy efficiency as a driver for fuel poverty is a focus area for Renfrewshire’s LHEES. A way to identify poor energy efficiency can be through the household Energy Performance Certificate (EPC). EPCs outline the energy efficiency of a building, and so are indicative of potential energy costs, and are scaled from Band A to Band G, with A being the highest.

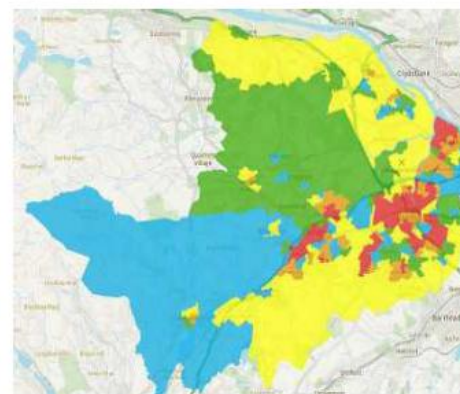
Analysis of Domestic EPCs in Renfrewshire found that 10% were in the top bands of A-B; 42% were in Band C; 36% were in Band D; 9% were in Band E; and 3% were in the lowest bands F-G. However, EPCs were found to vary widely by tenure as can be seen below:



The social housing sector has lower levels of EPC Bands D, E and F-G; and higher levels of properties in Band C. EPC Bands A-B were fairly similar across all housing tenures. So, in cases where the houses were energy efficient, then it appears that other factors are driving fuel poverty. In developing the LHEES, EPCs were also mapped across the area to identify areas of focus for energy efficiency interventions for LHEES Delivery Plans – this map can be found in Appendix 3. This data confirmed areas which ranked as a low priority for energy efficiency measures, but which had high fuel poverty, indicating that poor energy efficiency was not the driver for fuel poverty in these areas.



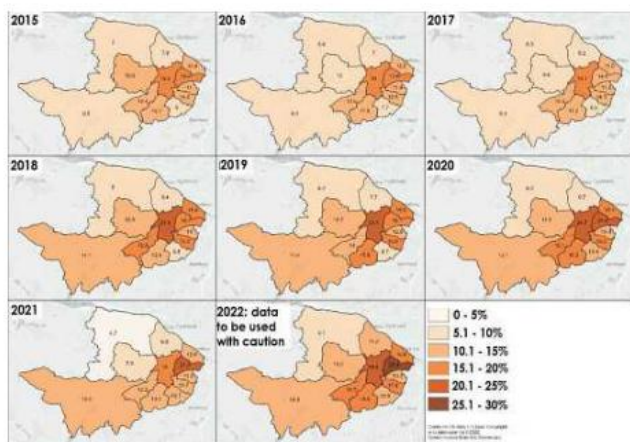
Scottish Index of Multiple Deprivation (SIMD) is a tool used to identify areas where people are experiencing disadvantage across different aspects of their lives. Renfrewshire’s SIMD profile is on a scale, with SIMD 1 areas in red (most deprived) through to SIMD 5 in green (least deprived), with 2 being orange, 3 being yellow and 4 being blue.



Renfrewshire’s SIMD Profile

SIMD data is at data zone level, looking at small geographical populations (500 to 1,000 residents). Aspects used to calculate SIMD ratings are income; employment; health; education and skills; housing; geographic access; and crime. Not all of these factors directly contribute to fuel poverty and so additional datasets were combined to identify fuel poverty focus areas.

Engaging with the most vulnerable members of our society whose voices are key to ensure social justice is delivered. Innovative engagement methods and targeted engagement with traditionally under-represented groups will be used to ensure all demographics are reached.



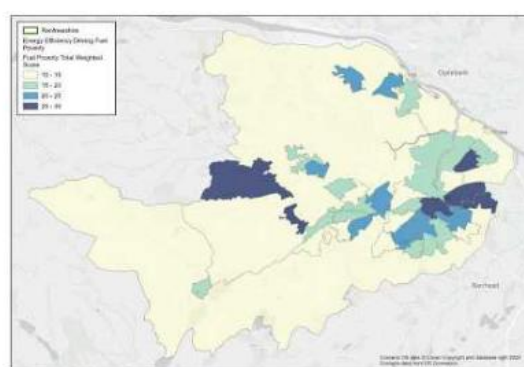
Children living in relative and absolute low income households before housing costs

Children Living in Low Income Families data focuses on child poverty (and does not include households with no children) but is another indicator of households potentially at increased risk of fuel poverty. This data shows significant increases in child poverty from 2015 to 2022 and sharp rises over the last few years, likely related to the pandemic and the cost-of-living crisis. This highlights vulnerable sections of our society that may not be captured, or may be masked, in other dataset’s factors. For example, because SIMD includes a scoring for geographical access, urban areas with good access to services and transport may receive a better overall scoring, masking other issues within the community.

Data indicates the highest concentration of child poverty is within urban areas in Paisley, but is also found in significant levels in other areas, highlighting further areas, in addition to those highlighted using SIMD, for in-depth analysis and focus.

Home Analytics data looks at key housing stock characteristics such as levels of insulation and glazing. When cross-referencing Home Analytics energy efficiency data with fuel poverty, the 10 intermediate zones with the highest probability of fuel poverty being driven by poor energy efficiency were different to the top 10 SIMD areas. In this analysis, areas most at risk of fuel poverty being driven by poor energy efficiency were:

- Paisley Central.
- Paisley North East.
- Bridge of Weir.
- Kilbarchan.
- Paisley East.
- Paisley North West.
- Johnstone North West.
- Erskine West.
- Paisley North; and
- Renfrew South.



Poor energy efficiency as a driver for fuel poverty

In Phase 2 Delivery Plans, there will be a specific focus on these areas to look at interventions and work programmes that will help to remove poor energy efficiency as a driver for fuel poverty, as well as a focus on what interventions can help with fuel poverty and extreme fuel poverty which are being driven by other factors. The Children in Low Income Family and the Poor Energy Efficiency as a Driver for Fuel Poverty maps are set out at intermediate zone level (2,500-6,000 residents) and so the areas are not broken down as much as SIMD data mapping.

Delivery Plans will further analyse all of these datasets and break down sufficiently to enable identification of appropriate interventions and work programmes and to identify where support and advice may be needed most.

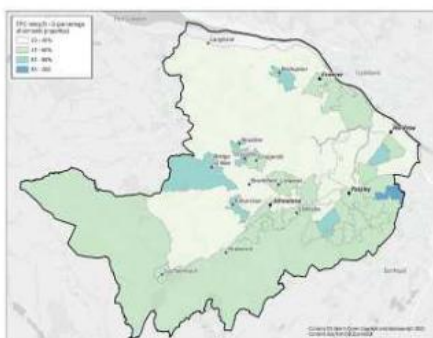
Poor Building Energy Efficiency: What is Driving Poor Energy Efficiency?

Larger versions of all maps from this section can be found in Appendix 3

Data analysed during the development of Renfrewshire's LHEES included 6,641 non-domestic properties but due to the limitations of energy efficiency data for non-public sector non-domestic buildings, this section concentrates on domestic properties only. However, there will be many non-domestic buildings that will require interventions, such as wall and roof insulation, and replacement glazing. Strategies for these will be explored in future updates of the LHEES as more data is gathered for non-domestic buildings.

There is more certainty with the non-domestic data when looking at potential for anchor loads and/or heat demand for connecting to a district heating network as these benchmark calculations take into account floor area, fuel type and use of building. As such, for non-domestic properties the focus was on analysing potential as anchor loads and/or for connection to district heating networks (covered in more detail in the 'Heat Networks' section later in the document).

The energy efficiency performance of domestic properties across Renfrewshire is a mixed picture, with 48% of properties estimated to have an EPC in the lowest bands of D-G. The EPC ratings are slightly better than the national average, with Renfrewshire having an estimated 12% of properties with an EPC of E-G (compared to a national average of 13%, according to the Scottish House Condition Survey 2021).

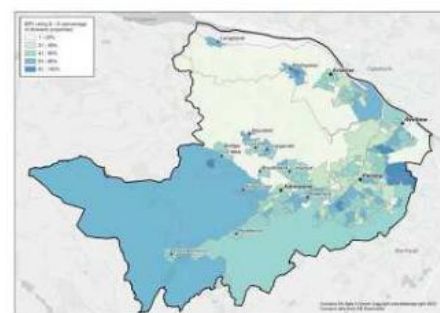


Map EE1: EPC D-G at intermediate zone level

Properties that have a lower EPC rating are more likely to be eligible for targeted funding to improve energy efficiency. When analysing the EPCs at an intermediate zone level (2,500 to 6,000 residents), it appears that there are several zones that have a higher percentage of domestic properties with poor energy efficiency performance.

Paisley Ralston has the highest percentage of poor energy efficiency, with 87% of domestic homes having an EPC of D to G, followed by Bishopton (77%) and Paisley South West (71%). 31% of properties in Paisley Ralston have an EPC E-G which is significantly higher than the next intermediate zone, Bridge of Weir (20%).

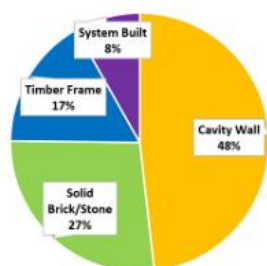
Intermediate zones (IZ) provide a score over a larger area to give an overall view of poor EPCs across Renfrewshire. By considering data at a more detailed data zone level (500 to 1,000 residents), we gain a better understanding of more detailed patterns where clusters of properties with poor energy efficiency are found. Analysis showed that there were some areas that have low EPC scores but, because IZ levels are large, they were averaged out and are not so obvious until analysed at data zone level, for example Langbank. The focus for energy efficiency in the area-based Delivery Plans will be at data zone level for this reason.



Map EE2: EPC D-G at data zone level

What are the main factors for Renfrewshire relating to poor energy efficiency?

Analysis was carried out on the 91,685 domestic properties across Renfrewshire to identify patterns in poor energy efficiency in order to tailor interventions in the Delivery Plans and ensure targeted advice where needed.



Wall Insulation (All Properties)

Wall Insulation: 44,235 of 91,685 domestic properties in Renfrewshire have cavity wall construction (48.2%); 24,721 have solid brick or stone wall construction (27.0%); 15,238 timber frame wall construction (16.6%); and 7,491 system-built wall construction (8.2%). Overall, **58%** of all homes are estimated to have some form of wall insulation.

Timber frames are the most likely wall construction to have insulation, with only 17.7% of these properties being uninsulated, but this also links with property age – with 81% of these properties being constructed post 1992 when higher levels of insulation are more common.

When looking across different tenures we can see that **74%** of all social housing properties (Council housing stock and Housing Association) have wall insulation; compared with **55%** wall insulation for owner occupiers and **42%** wall insulation for private rented properties.

Taking the most common wall construction in Renfrewshire (cavity wall), 35% of these types of homes are uninsulated (15,839 properties). Broken down by tenure:

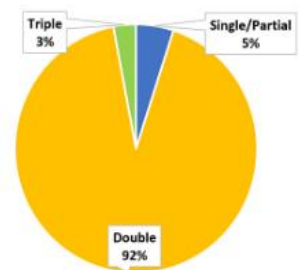
- social housing makes up 17.9% of all cavity wall construction domestic properties in Renfrewshire (but 9% of the uninsulated cavity wall properties)

- 73.5% of cavity wall domestic properties are owner occupied (but these properties make up 79.9% of uninsulated cavity wall properties)
- private rented properties make up 8.6% of cavity wall domestic properties (but 11.1% of uninsulated cavity wall properties)

Glazing: Differences between different tenures can also be seen in glazing types. Overall, in Renfrewshire, 92% of all domestic properties have double glazing; 3% have triple glazing; and 5% have single or partial glazing. Broken down by tenure:

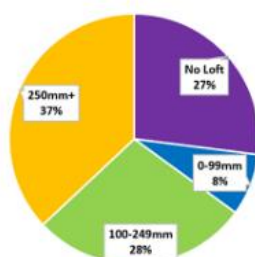
- social housing and owner occupiers have higher levels of double glazing (94% and 93% respectively) and triple glazing (3% and 2% respectively) than private rented properties (89% double glazing and 1% triple glazing)

- 3% of social housing properties have single or partial glazing. This rises to 5% for owner occupiers and rises again to 10% for private rented properties.



Glazing Type (All Properties)

Private rented properties make up 11% of all homes in Renfrewshire but make up 21% of properties with single or partial glazing; and 15% of all uninsulated properties. This highlights an area where advice and support for this sector, including signposting to financial support schemes and upcoming changes to legislation, may be helpful. This would help to alleviate fuel poverty and reduce bills while improving warmth for tenants and would also help with the fabric of the building and maintenance, decreasing the likelihood of problems such as damp and mould.



Loft Insulation (All Properties)

Not all homes have lofts but, for those that do, this is another area where energy efficiency improvements have significant impacts. Owner occupier properties have the highest percentage of lofts at 72% (this drops to 53% and 52% for social housing and private rented respectively). The depth of loft insulation recommended by Energy Saving Trust Scotland and current buildings regulations is 270mm, with most new build homes having between 270-300mm insulation. As well as higher likelihood of a loft, owner occupiers had the highest levels of 250mm+ insulation at 42%, with social housing having 27% and private rented 21% at this level.

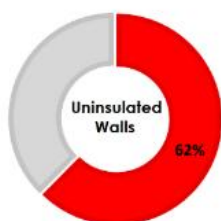
Next Steps - Energy Efficiency Focus for Delivery Plans:



EPC D-G: Single Glazing

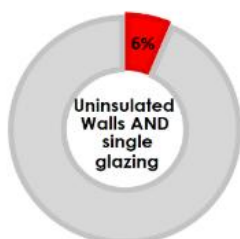
Of the 43,754 domestic properties with an EPC in the lowest bands (D-G), and therefore more likely to be eligible for targeted funding:

- 3,500 properties (8%) had single glazing
- 27,306 properties (62.4%) had uninsulated walls, and
- 2,792 properties (6.4%) had both single glazing and uninsulated walls



EPC D-G: Uninsulated Walls

This poor energy efficiency is likely to be an exacerbating factor in fuel poverty for these households. The area-based Delivery Plans will have a focus on these properties to identify clusters where targeted support and interventions can help to remove poor energy efficiency as a driver for fuel poverty and provide support across all tenures, including signposting for landlords where relevant.



EPC D-G: Uninsulated Walls AND single glazing

Support and advice for those properties in fuel poverty where poor energy efficiency is not the key driver will also be developed in collaboration with partner organisations to ensure that all households who may be vulnerable to fuel poverty are reached and supported.

Links to impartial advice and support will also be promoted for those looking to make energy efficiency improvements who have higher band EPCs. And for all households, opportunities for the decarbonisation of heat and supply of efficient, low carbon heat will be explored to deliver clean, affordable warmth to all.

Renfrewshire Council are implementing energy efficiency improvements in housing stock and, where possible, will work with homeowners within mixed tenure blocks to help them to participate, as well as working with the private rented sector to share learnings and identify opportunities to reduce costs through economies of scale.

Overview of the Opportunities for the Decarbonisation of Heat across Renfrewshire: Potential for Heat Networks

Larger versions of all maps from this section can be found in Appendix 4

In addition to improving energy efficiency, another key driver in affordable warmth is the provision of heat and how that is supplied. This section looks at the area-wide picture relating to the decarbonisation of heat for Renfrewshire, setting out the challenges and opportunities and potential areas of focus.

All potential proposals will then be further developed and enhanced during Phase 2, the action and delivery phase, when detailed Delivery Plans, broken down sufficiently by area will be co-developed with our local communities and other key stakeholders.

Key Heat Stats for Renfrewshire

Size of Area: **262sq. kilometre**
Population density: **703 residents/sq. km**
(Scottish average: 70; Glasgow has 3,555)
% of homes in fuel poverty: **22%**
% of homes in extreme fuel poverty: **7.4%**
Average heat demand per household: **11,521kWh per year**
% of homes on gas grid: **94%**
homes with mains gas as main source of heat: **82,667 (90.2%)**
homes with electricity as main source of heat: **7,017 (7.7%)**
homes with heat pumps as main heating system: **499 (0.5%)**
homes with communal heating: **1,093 (1.2%)**

Decarbonisation of heat means reducing the carbon emissions associated with our heating systems and switching to cleaner and more efficient systems to heat our homes and buildings.

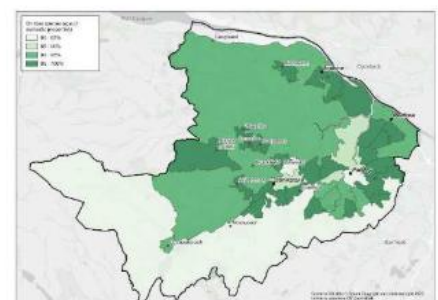
Key Factors in the Potential Decarbonisation of Heat through District Heating Networks:

Data across the whole of Renfrewshire was analysed in order to identify potential opportunities for district heating networks, to enable the provision of efficient, low carbon heat to homes and businesses. A number of factors were taken into account to identify the first phase of potential opportunities. Population density links with heat demand and linear heat density (and the length of pipework that would be required for a network).

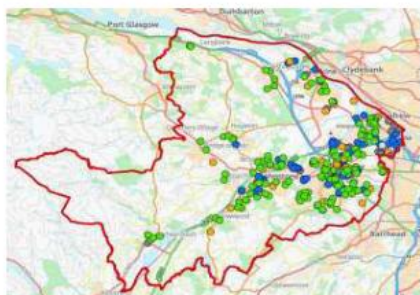
Overall, Renfrewshire has a population density of 703 residents per square kilometre (10% more dense than the national average of 70, but significantly less densely populated than Glasgow at 3,555 residents per square kilometre). This population density varies significantly in different areas of Renfrewshire and the potential for communal or district heating will be explored further for all areas, not just those with the highest population densities. There are many small-scale operational examples of district heating across Scotland in areas of low population densities which have the potential to be scaled and replicated – and which have had significant impacts on both carbon emissions and fuel poverty following implementation. Other factors include:

1. On Gas and Off Gas Grid Locations (Map H1):

The majority of homes and businesses in Renfrewshire are on gas grid, but those in off gas grid areas often face higher instances of fuel poverty due to a lack of fuel choice and higher bills. This has been particularly true in recent years with high electricity prices per kWh compared with that of gas. Higher fuel costs can also impact viability of businesses in these areas. Even with lower population and heat densities in some off gas grid areas, heat networks can be viable on a smaller scale as heat can often be supplied at lower costs to the consumer than the traditional source of heating (electricity, oil, LPG), so helping to alleviate fuel poverty.



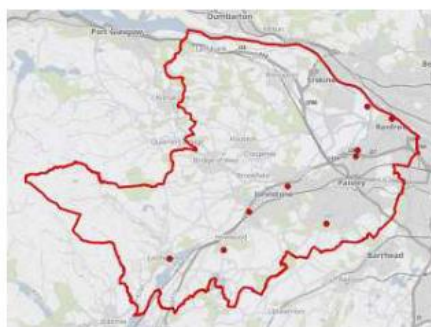
Map H1: % on gas grid in Renfrewshire



Map H2: Potential anchor loads in Renfrewshire

2. Potential Anchor Loads for District Heating Networks (Map H2): Anchor loads are buildings with significant heat, cooling and hot water demand, helping network viability. Potential anchor loads were identified across Renfrewshire. Green dots signify Council buildings, with orange dots signifying other public buildings. Blue dots signify additional potential anchor loads with high heat demands and a range of uses to diversify and balance heat demand across seasons and throughout the day and night, to optimise any potential networks. Cross-border opportunities with neighbouring local authorities will also be explored further in Delivery Plans – including any potential partnership projects or potential for cross-border heat supply.

Potential Heat Sources for District Heating Networks: Heat Networks generally have a purpose-built energy centre to supply heat to all the buildings connected to the network. However, the heat source for the energy centre can take different forms and does not always require new infrastructure and assets. Analysis for Renfrewshire’s LHEES included identifying existing infrastructure and assets that can be harnessed to supply heat. There are many existing potential large-scale heat sources, such as rivers and aquifers, green spaces and geothermal opportunities.



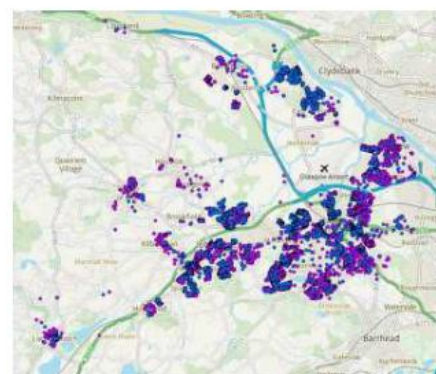
Wastewater Treatment Opportunities

Opportunities to capture waste heat – similar to the waste heat recovery used in the AMIDS district heating network will be further developed in the Delivery Plans. Potential waste heat sources include wastewater treatment plants; data centres; factories, industry and manufacturing processes; hospitals; supermarkets; leisure centres; and energy from waste. All of these provide opportunities for low regret heat decarbonisation, using existing infrastructure.

There will also be a need for new development and purpose-built energy centres with low carbon heat supply, and opportunities to site energy centres on Council-owned land will be identified, in addition to extending and expanding existing heat networks.

Housing Tenure (Map H3):

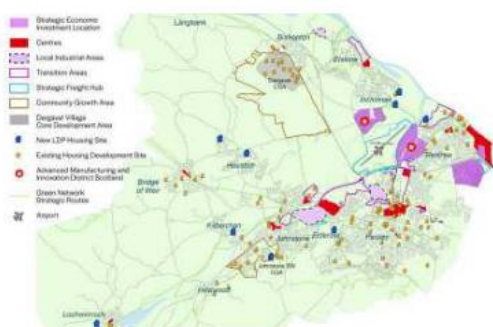
Renfrewshire Council has a target of implementing measures in housing stock to reduce carbon emissions by 68% (from 2020 levels). Provision of low carbon heat in addition to energy efficiency improvements will play a key role in this. Clusters of social housing (both Council and Housing Association) provide opportunities for both the tenants and for the viability of district heating networks as a whole, due to work programmes such as boiler replacements which are programmed and known in advance. Engagement with tenants is also ongoing and so any potential heating schemes can be set out and discussed fully in advance, with benefits including affordable warmth being outlined and the opportunities for tenants' questions to be asked. This then also builds a solid base for the scheme to connect surrounding properties, whether owner occupier, private rented or commercial.



Map H3: Social housing clusters in Renfrewshire

Existing Heat Networks:

Existing large heat networks in Renfrewshire include the AMIDS district heating network and the University of the West of Scotland's Paisley Campus. It is hoped collaboration and partnership working will lead to the identification of opportunities for the potential for expansion and extension of existing networks (again optimising these existing assets) and also a chance for knowledge gained being applied to scale and replicate projects in other areas.



Map H4: Renfrewshire Local Development Plan areas

Local Development Plan (Map H4):

Renfrewshire's Local Development Plan (LDP) sets out the spatial strategy over the next 10 years and aligns with National Planning Framework 4, outlining development and infrastructure in line with national principles, priorities and policies.

Knowing where potential developments are taking place, and what these developments entail (e.g., housing or industrial) helps to future-proof Delivery Plans when looking at potential heat networks and any future connections. Horizon scanning also enables early discussions to take place with developers and mitigate against potential heat network opportunities being missed; connections to be optimised; energy centres and pipe networks to be suitably sized and future-proofed, as well as potential for cost savings for heat network development by installing pipe network at times when other civils works are being carried out (civils being one of the main costs in installing a district heating network).

All of these considerations were analysed and taken into account when looking at heat decarbonisation opportunities across Renfrewshire, and the potential for supply of heat through district heating networks.



Overview of the Potential First Phase Priority Heat Network Zones

The initial areas for exploration were identified through having high heat demand, being close to an energy source and the presence of public buildings as potential anchor loads.

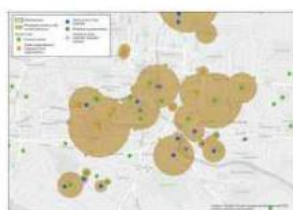
Larger versions of all maps from this section can be found in Appendix 5.

In order to prioritise the initial priority heat networks for further exploration, heat clusters were identified across Renfrewshire. 12 heat clusters were identified in Paisley, with 33 heat clusters identified in the rest of Renfrewshire.



Renfrewshire Heat Clusters

The heat clusters are mainly in urban and more densely populated areas, but heat networks can also work on a smaller scale for rural areas. All options will be explored on an area-by-area basis in the development of Delivery Plans and in future iterations, based on scalability and replicability of projects that can be tailored to these areas, and exploring operational projects that have worked in similar areas across Scotland.



Anchor Loads in high linear heat density clusters

Linear heat density is a measure of heat load per metre of district heating pipework and identifies if a heat network is likely to be financially viable based on likely revenue generation for a given capital cost of installation of infrastructure:

- **Higher heat density** (16,000kWh/year/metre) was used in Paisley centre as laying pipework in town centres and under busy roads is more costly and disruptive. These clusters needed 5 or more anchor loads.
- **Lower heat density** (4,000kWh/year/metre) was used in more suburban and rural areas, where anchor loads may be more dispersed but where there may be more opportunities to install pipework in soft-dig areas, which lowers pipework costs per metre to ensure lower heat density networks are still viable. These clusters needed 2 or more anchor loads.

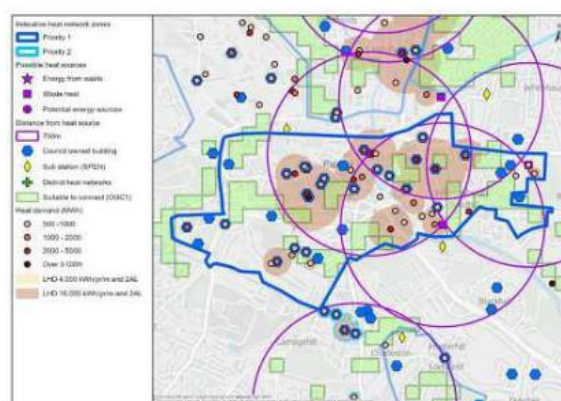
The anchor loads and linear heat densities were then plotted to highlight clusters viable. To further enhance the mapping analysis, heat sources, opportunities and constraints (such as railway tracks) were added alongside looking at areas of Council land ownership, development sites in the Local Development Plan and areas of concentrated social housing, as well as existing heat networks. This helped to finalise the initial proposed heat network zones, e.g., zones were split where railway tracks would need to be crossed; and zones were extended to capture additional opportunities identified as part of the internal Officers Working Group. Input was received from across all key Service areas as well as identification of opportunities to link, optimise or coordinate work programmes.

Although the standard linear heat density for a network to be viable is 4MWh/metre, all options will be explored in order to include those areas with lower heat densities, including rural and smaller urban settlements in order to identify the most beneficial heat solution for all our communities.

First Phase Potential Heat Network Zones:

1. Central Paisley Potential Heat Network Zone:

- an area of 212 hectares
- an estimated heat demand of 167GWh²/year
- 49 identified potential anchor loads (30+ public buildings), 40 with a predicted heat demand above 500 MWh³/year.
- 2,552 domestic properties that could potentially connect to a network.



Map DHN1: Central Paisley

Potential local energy sources include the White Cart Water, an aquifer and areas of open space. There are also multiple sources of potential waste heat as well as the existing district heating network at the University of the West of Scotland campus, all of which fall within a 750 m radius.

In addition to the potential for expansion of the existing UWS district heating network, there are opportunities to add resilience through linking existing and new networks, with multiple energy centres bringing security of supply at times of planned and unplanned maintenance.

² A gigawatt hour (GWh) is equivalent to 1 million kilowatt hours (kWh)

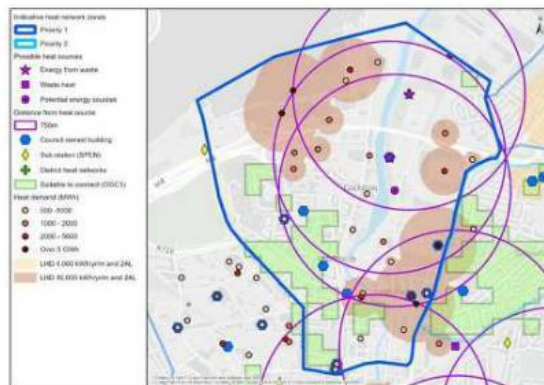
³ A megawatt hour (MWh) is equivalent to 1 thousand kilowatt hours (kWh)

This zone has areas of densely populated flatted properties, and large clusters of social housing to the east and west. There are also large numbers of public buildings which could potentially connect to a network. When looking at potential solutions, consideration must be taken of the large portion of this zone which is a conservation area, with a number of listed buildings.

2. Shortroods and Laighpark Potential Heat Network

Zone:

- an area of 284 hectares
- an estimated heat demand of 124GWh/year
- 22 identified anchor loads (10 public buildings), with 17 having a predicted heat demand above 500MWh/year.
- 1,553 domestic properties within the zone that could have the potential to connect to a network.



Map DHN2: Shortroods and Laighpark

Potential local energy sources include the White Cart Water as well as two wastewater treatment sites. The AMIDS district heating network, which has capacity for extension and expansion also falls within this zone, to the north. This also brings opportunities to link networks to increase resilience. These are all within a 750 m radius.

This zone includes an economic investment zone within the Local Development Plan, and there are several sites earmarked for housing supply. There are large clusters of social housing to the south and west of the zone, with public building potential anchor loads distributed throughout the zone (as well as potential for linking with a Phase 2 zone in Gallowhill to the east, which has significant social housing and some public building anchor loads.

3. Lochfield and Charleston Potential Heat Network Zone:

- an area of 33 hectares
- an estimated heat demand of 12GWh/year
- 5 identified anchor loads (4 public buildings), 2 of which have a predicted heat demand above 500 MWh/year.
- 533 domestic properties within the zone that could have the potential to connect to a network.



Map DHN3: Lochfield and Charleston

Potential local energy sources include open space which may have potential for ground source heat pumps, or to site an energy centre. The 4 anchor loads are at the 4 corners of the zone, with significant clusters of social housing in the centre.

There are also 3 sites earmarked for housing supply within the Local Development Plan within or bordering this zone, enhancing future opportunities.

4. Ferguslie Park Potential Heat Network Zone:

- an area of 52 hectares
- an estimated heat demand of 14GWh/year
- 7 identified anchor loads (all public buildings), 2 of which have a predicted heat demand above 500MWh/year.
- 500 domestic properties within the zone that could have the potential to connect to a network.



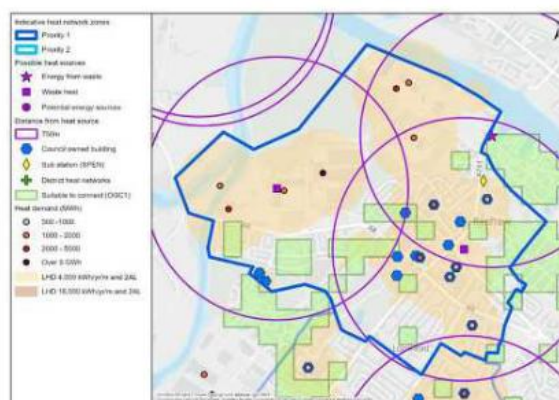
Map DHN4: Ferguslie Park

Potential local energy sources include an aquifer as well as open spaces which may have potential for ground source heat pumps, or as a site for an energy centre. The anchor loads are all in the centre of the zone, surrounded by significant clusters of social housing on all sides.

There are also Local Development Plan sites marked for housing supply as well as development opportunity sites within and on the border of this potential heat zone, and potential to extend into further areas of social housing.

5. North Renfrew Potential Heat Network Zone:

- an area of 223 hectares
- an estimated heat demand of 79GWh/year
- 16 anchor loads (13 public buildings), 8 of which have a predicted heat demand above 500 MWh/year.
- 1,694 domestic properties within the zone that could have the potential to connect to a network.



Map DHN5: North Renfrew

Potential local energy sources include the River Clyde or White Cart Water for water source heat pumps, similar to the Queens Quay heat network opposite. This also brings opportunities to explore cross-border collaborations and partnership working through discussions with operators on future plans to extend or expand to supply heat to this network zone, or to link networks to increase resilience.

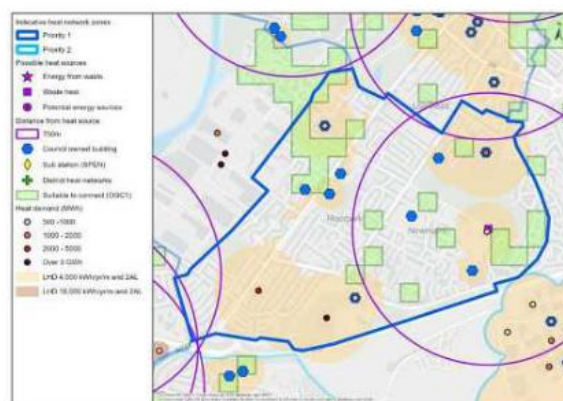
There is also a moderately productive aquifer in this zone which could be used as a heat source, as well as large areas of open space which may have potential for ground source heat pumps, or as a site for an energy centre.

Within the Local Development Plan, this zone contains a core town centre, as well as a large transition area; development opportunity sites; and a number of sites earmarked for housing supply throughout the zone. There are large clusters of social housing throughout the centre and lower half of the zone from west to east, with the anchor loads also forming a belt across the middle of the zone.

6. Moorpark and Newmains Potential Heat Network

Zone:

- an area of 198 hectares
- an estimated heat demand of 73GWh/year
- 12 anchor loads (9 public buildings), 6 of which have a predicted heat demand above 500MWh/year.
- 1,892 domestic properties within the zone that could have the potential to connect to a network.



Map DHN6: Moorpark and Newmains

Potential local energy sources include the White Cart Water.

There is a moderately productive aquifer in this area which could be used as a heat source, as well as significant areas of open space which may have potential for ground source heat pumps, or as a site for an energy centre.

Within the Local Development Plan, this zone contains a strategic economic investment location, as well as transition areas development opportunity sites; and 2 sites earmarked for housing supply. There are large clusters of social housing throughout the centre and the north of the zone, with the anchor loads dispersed throughout the zone.

Next Steps – Heat Network Zones Focus for Delivery Plans:

When developing the Delivery Plans, each of these 6 first phase heat network zones will be explored further, including verifying heat demand data; exploring the potential heat sources; engaging with the potential non-Council anchor loads; and investigating the outline costs of installation and potential savings (carbon and cost savings) associated with a potential heat network.

This engagement will include discussions with relevant Housing Associations to look at potential for coordination of capital replacement work programmes, such as boiler replacements to identify key timescales to improve viability of a heat network. Community engagement will also be key across all tenures and property ownership, including local businesses and 3rd sector organisations, in order to build knowledge and understanding of district heating and the benefits it can bring if implemented locally.

Those areas not currently within a first or second phase heat network zone will be looked at in closer detail to identify opportunities for smaller scale networks or communal heat sources.



Overview of the Potential Second Phase Heat Network Zones

These second phase areas have lower heat demand and fewer potential anchor loads within each zone.

7. Hawkhead and Dykebar Potential Heat Network Zone:

- an area of 57 hectares
- estimated heat demand of 11GWh/year
- 3 anchor loads (all public buildings), all of which are estimated to have a heat demand above 500MWh/year.
- very low levels of social housing, but Local Development Plan has 2 housing sites within and bordering this zone.
- 299 domestic properties within the zone that could have the potential to connect to a network.
- potential local energy sources: the White Cart Water; a productive aquifer; or open space which may have potential for ground source heat pumps, or as a site for an energy centre.



Map DHN7: Hawkhead and Dykebar

8. Millarston Potential Heat Network Zone:

- an area of 24 hectares
- estimated heat demand of 6.4GWh/year
- 3 anchor loads (no public buildings), 2 of which are estimated to have a heat demand above 500MWh/year.
- low levels of social housing, but Local Development Plan has 2 housing sites bordering this zone.
- 125 domestic properties within the zone that could have the potential to connect to a network.
- potential local energy sources: a productive aquifer or open space which may have potential for ground source heat pumps, or as a site for an energy centre.



Map DHN8: Millarston

9. East Ferguslie Heat Network Zone:

- an area of 151 hectares
- estimated heat demand of 60 GWh/year
- 6 anchor loads (no public buildings), 5 of which are estimated to have a heat demand above 500MWh/year.
- mainly commercial and industrial - low levels of social housing, but Local Development Plan has 5 housing sites bordering this zone.
- 208 domestic properties within the zone that could have the potential to connect to a network.
- potential local energy sources: wastewater treatment works or open space which may have potential for ground source heat pumps, or as a site for an energy centre.



Map DHN9: East Ferguslie Park

10. Linwood Heat Network Zone:

- an area of 270 hectares
- estimated heat demand of 70 GWh/year
- 15 anchor loads (2 public buildings), 10 of which are estimated to have a heat demand above 500MWh/year.
- high levels of social housing, and Local Development Plan has 6 housing sites within this zone.
- 2,110 domestic properties within the zone that could have the potential to connect to a network.
- potential local energy sources: the Black Cart Water; Linwood Moss former landfill site; Household Waste Recycling Centre; Scottish Water pumping station; or open space which may have potential for ground source heat pumps, or as a site for an energy centre.



Map DHN10: Linwood

11. Gallowhill Heat Network Zone:

- an area of 98 hectares
- estimated heat demand of 34 GWh/year
- 7 anchor loads (no public buildings), 1 of which are estimated to have a heat demand above 500MWh/year.
- high levels of social housing, but Local Development Plan has 2 housing sites within this zone.
- 1,832 domestic properties within the zone that could have the potential to connect to a network.



Map DHN11: Gallowhill

- potential energy sources: open space which may have potential for ground source heat pumps, or as a site for an energy centre; potential to link networks with Shortroods and Laighpark heat network zone to the west.

12. Johnstone South Heat Network Zone:

- an area of 82 hectares
- estimated heat demand of 19 GWh/year
- 4 anchor loads (no public buildings), 2 of which are estimated to have a heat demand above 500MWh/year.
- high levels of social housing, but Local Development Plan has 2 housing sites within this zone and 2 housing sites bordering this zone.
- 853 domestic properties within the zone that could have the potential to connect to a network.
- potential local energy sources: open space which may have potential for ground source heat pumps, or as a site for an energy centre.



**Map DHN12:
Johnstone South**

13. Johnstone North Heat Network Zone:

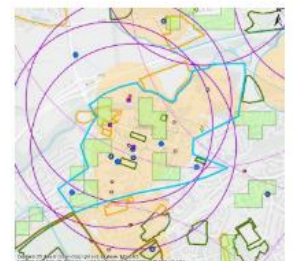
- an area of 30 hectares
- estimated heat demand of 10 GWh/year
- 2 anchor loads (1 public building), 1 of which are estimated to have a heat demand above 500MWh/year.
- low levels of social housing, but Local Development Plan has 1 housing sites within this zone.
- 380 domestic properties within the zone that could have the potential to connect to a network.
- potential local energy sources: the Black Cart Water; wastewater treatment works; or open space which may have potential for ground source heat pumps, or as a site for an energy centre.



**Map DHN13: Johnstone
North**

14. Johnstone East Heat Network Zone:

- an area of 80 hectares
- estimated heat demand of 39 GWh/year
- 16 anchor loads (4 public buildings), 8 of which are estimated to have a heat demand above 500MWh/year.
- high levels of social housing, but Local Development Plan has 3 housing sites within this zone and 5 housing sites bordering this zone.

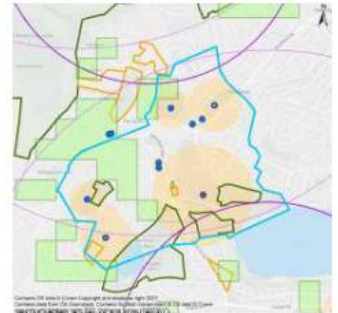


**Map DHN14: Johnstone
East**

- 816 domestic properties within the zone that could have the potential to connect to a network.
- potential local energy sources: the Black Cart Water or open space which may have potential for ground source heat pumps, or as a site for an energy centre.

15. Brediland Heat Network Zone:

- an area of 67 hectares
- estimated heat demand of 15 GWh/year
- 9 anchor loads (1 public building), 3 of which are estimated to have a heat demand above 500MWh/year.
- clusters of social housing, but Local Development Plan has 2 housing sites within this zone and 4 housing sites bordering this zone.
- 637 domestic properties within the zone that could have the potential to connect to a network.
- potential local energy sources: Staneley reservoir or open space which may have potential for ground source heat pumps, or as a site for an energy centre.



Map DHN15: Brediland

16. Glenburn Heat Network Zone:

- an area of 29 hectares
- estimated heat demand of 11 GWh/year
- 5 anchor loads (1 public building), 3 of which are estimated to have a heat demand above 500MWh/year.
- clusters of social housing, and Local Development Plan has 1 housing site within this zone and 1 housing site bordering this zone.
- 321 domestic properties within the zone that could have the potential to connect to a network.
- potential local energy sources: Staneley reservoir or open space which may have potential for ground source heat pumps, or as a site for an energy centre.



Map DHN16: Glenburn

17. Hillington West Heat Network Zone:

- an area of 192 hectares
- estimated heat demand of 93 GWh/year
- 18 anchor loads (1 public building), 17 of which are estimated to have a heat demand above 500MWh/year.
- no social housing – commercial and industrial area.
- 7 domestic properties within the zone that could have the potential to connect to a network.
- local energy sources include waste heat recovery from industrial processes.



Map DHN17: Hillington West

Additional Heat Decarbonisation Opportunities:

For on-gas and off-gas grid properties, a variety of indicators were used to assess the most appropriate heat decarbonisation pathway for each property across Renfrewshire.

Not all buildings may be suitable to connect to a district heating network; not all owners may wish to connect to a network; and not all areas may be suitable to implement a district heating network. Alternatives were explored to identify alternative suitable options for low carbon heat, in particular heat pumps, biomass and electrical heating.

Heat pumps are suitable for most buildings – capturing heat from outside and moving it into the building using electricity. The heat energy delivered is more than the electrical energy used to power the system.

A standard heat pump doesn't provide hot water on demand - storage is required for hot water, and so space is needed for a hot water cylinder which may not be available in all properties.

Air Source Heat Pumps (ASHPs): the most common type of domestic heat pump which transfers heat from the outside air to water and then heats rooms via radiators or underfloor heating. Hot water is stored in a cylinder for hot taps, showers, etc. Space is required outside the property for the unit.

Ground Source Heat Pumps (GSHPs): transfer heat from the ground outside the building to water to heat your radiators or underfloor heating. Hot water is stored in a cylinder for hot taps, showers, etc. Land near the building which is suitable for digging boreholes is required as well as space inside your home for the indoor heat pump unit.

Scottish homeowners can [apply for a grant of between £7,500 and £9,000 towards installing a heat pump](#).

When looking at potential for heat pumps across Renfrewshire, categories were used to indicate the most straightforward or already in place (Category 0) up to the most challenging properties, where significant alterations would be required to be heat pump ready (Category 3):



Category	Description
Category 0	Already have low or zero emissions heating systems, e.g. heat pumps, biomass or connected to communal or district heating
Category 1	Considered highly suitable for heat pump retrofit, i.e. well insulated properties with a wet central heating system
Category 2	Would require moderate fabric and/or heating system upgrades to be heat pump retrofit ready
Category 3	Would require significant fabric and/or heating system upgrades to be heat pump retrofit ready or properties that are not suitable for heat pump retrofit

Table 3: Heat Pump Ready Categories of Domestic Properties

There were no large hot spot clusters of Category 1 and 2 properties identified at intermediate zone level for off-gas grid properties - most Category 1 and 2 were found in Lochwinnoch, Renfrew, Castlehead and Johnstone with most properties sparsely distributed across Renfrewshire. In on-gas grid areas, there were clusters of Category 1 properties in Gallowhill, Shortroods, Renfrew, Loanhead, Ferguslie, Brediland, Howwood, and Spateston.

Some of these clusters overlap with areas which were identified as having potential for heat network zones. Delivery Plans will explore and prioritise the most suitable, cost effective and efficient heat solution opportunities in each area, ensuring solutions are tailored to each community to bring the greatest benefits.

For Category 3 properties which are not suitable for heat pump retrofit, electrical heating (storage or direct) or biomass heating are likely to be the most viable decarbonisation technologies. In off-gas grid areas, the large numbers of Category 3 homes deemed suitable for electric heating suggests that these properties do not currently have wet heating systems (e.g. oil-fired or LPG heating) or that energy efficiency improvements required would be too costly to install, meaning that heat pump operation would be too expensive.

Considerations as part of the Delivery Plans:

- heat pumps use electricity and are more efficient than gas boilers, but good insulation levels are required to ensure warm homes that don't unnecessarily increase electricity costs beyond what is affordable.
- initial analysis does not include consideration of electricity grid impacts or costs of grid upgrades to accommodate heat pumps. Engagement with SPEN on grid constraints across all solutions is ongoing.



- electrical and biomass were included in the analysis for alternative heat solutions in order to not restrict fuel choice further for those areas at higher risk of fuel poverty (i.e., those in off-gas grid areas).



Additional Considerations:

Many areas in Renfrewshire face additional challenges, including mixed use; mixed tenure; and conservation areas and listed buildings.

Renfrewshire, as with many areas across Scotland, has large concentrations and clusters of buildings which bring additional challenges when identifying solutions for energy efficiency and decarbonisation of heat. Mixed-tenure and mixed-use buildings can include a mixture of owner occupied, private rented and social housing, and non-domestic uses, or simply multiple ownership within the same tenure. Historic buildings include the buildings that are within conservation areas or those that are listed buildings.

These categories can be more challenging and may require established alternative approaches and regulation for the installation of low carbon heat and energy efficiency solutions alongside specific advice and support relating to the installation of these solutions. This cross-referencing of data will help to inform the Delivery Plans in Phase 2, taken in consideration of the wider strategy context.

Mixed Tenure: residential development which has a range of tenures, including owner occupier; private rented; and social housing.

Mixed Use: a building that has residential, commercial, industrial and/or entertainment uses in one space. This includes buildings with commercial premises on the ground floor and residential properties above.

Conservation Areas: areas of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance.

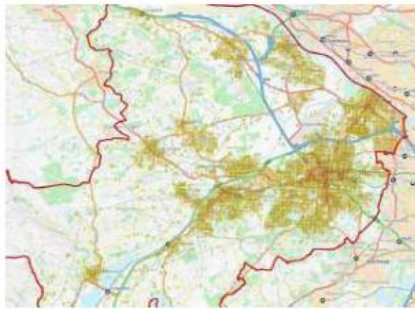
Listed Building: listing is the process by which buildings of special architectural or historic interest are protected.

The data was analysed initially at Ward level and will be explored in more detail in the Delivery Plans, with the following results for consideration⁴:

⁴ Some clusters cross Ward boundaries and have been counted in each Ward

Category	Wards in which category is Found	No. of Clusters
Domestic Properties in Conservation Areas	Johnstone North, Kilbarchan, Howwood and Lochwinnoch	3 small
	Paisley Northeast and Ralston	2 small
	Paisley East and Central	3 small
	Paisley Northwest	1 small
Domestic Listed Property Areas	Bishopton, Bridge of Weir and Langbank	1 small
	Paisley East and Central	7 small
	Paisley Northwest	5 small
	Paisley Southeast	2 small

Table 4: Domestic Conservation and Listed Properties



Domestic & Non-Domestic Mixed Use

Domestic and Non-Domestic Mixed-Use Areas are found in all Wards, with Renfrew North and Braehead; Renfrew South and Gallowhill; Paisley Southeast; Paisley East and Central; and Paisley Northwest having the highest levels (all with 10+ small/medium clusters). This is followed by Johnstone North, Kilbarchan, Howwood and Lochwinnoch and Paisley Southwest with 10 small clusters and Houston, Crosslee and Linwood with 6 small clusters.

There are also clusters of non-domestic properties in conservation areas in Paisley East and Central; Lochwinnoch; Kilbarchan; Houston and Bridge of Weir.

Further considerations:

As well as strategic consideration of these more challenging aspects of energy efficiency improvements and potential for connection to district heating networks, the Delivery Plans will focus on gathering information on public buildings and other stakeholders on areas such as capital replacement programmes for boilers and radiators in order to coordinate and future proof potential networks and ensuring low temperature networks where viable.

Next Steps:

We will continue to engage with all stakeholders in Phase 2 of Renfrewshire's LHEES, building on existing activities and identifying new opportunities collectively to accelerate change.

Delivery of Renfrewshire's LHEES will be a result of collaborative work - led by the Council, but co-designed with residents, public, private and community organisations and with all stakeholders working together on an area-wide effort to bring about the pace and scale of change required for area-wide energy efficiency improvements and decarbonisation of heat, leading to affordable warmth, increased energy security and resilient communities, alleviation of fuel poverty and reducing carbon emissions through reducing our reliance on fossil fuels.

The good news is that we're not starting from scratch – a solid foundation has been created and we're building on existing activities, expertise and knowledge across all partners in order to ensure we'll have cleaner air; warm homes; and be supporting sustainable jobs, with a managed stable energy transition that that creates resilient communities and a better place for us all to live, work and spend time in.

Given the significant impact on emissions of energy use within Renfrewshire area, developing projects with our communities and partners that have a public engagement focus, will be vital if we are to work towards net zero by 2030.

Our 5 key focus areas for Phase 2 are:

1. Development of Costed Area-Based Delivery Plans: we will look strategically and holistically across the whole Renfrewshire area to identify and explore strategically important (large-scale) as well as local (small scale) opportunities. These projects, interventions and activities will be outlined over 20 years, but with an initial 5 year focus - aligning with Renfrewshire's Plan for Net Zero and prioritised based on agreed weightings in line with national and local priorities and targets.

2. Stakeholder Engagement and Consultation: this is essential across all phases in the design and delivery of Renfrewshire's LHEES. Two-way communication channels will remain in place as projects and activities are implemented to ensure everyone is informed of progress and can provide feedback on opportunities in their local areas and on our collective journey to net zero, and the managed energy transition that will play a key role in this. This engagement will ensure that areas of focus respond to and are tailored to meet the specific local needs of different communities' social and environmental issues.

3. Socio-economic Assessments: implementing Renfrewshire’s LHEES will deliver multiple outcomes simultaneously. Not all impacts and outcomes can be monetised (e.g., fuel poverty alleviation, local job creation or carbon emissions reduction). When quantifying projects within the Delivery Plans, we will undertake area-based socio-economic impact assessments to identify and evaluate direct and indirect impacts and benefits of the proposed interventions and projects to be implemented through Renfrewshire’s LHEES. Viable and replicable projects and low regret options will be prioritised, and appropriate zones for priority area-based delivery programmes will be designated across the Renfrewshire area.

4. Development of Strategically Important Energy Opportunities with Partners: collaboration and partnership working are key to deliver change at the pace and scale required. Using an area-based data approach to identify potential large-scale energy projects and engaging all stakeholders to maximise these opportunities, we will ensure economies of scale and best value. This includes exploring a range of delivery models, including joint ventures, community ownership and public-private collaborations to develop solutions and play to the strengths and knowledge of all stakeholders.

5. A Stable, Managed Energy Transition: ensuring an integrated ‘whole system’ view. Equal consideration of supply and demand and promoting local energy solutions planned with community involvement will ensure investment in infrastructure that brings direct benefits to all our communities, including energy cost savings; resilience and security of supply; and positive impacts on fuel poverty (including removal of energy efficiency as a driver for fuel poverty). Producing pipeline of major infrastructure projects will link with skills transition and local employment opportunities and identify skills gaps, shortages and requirements ahead of time and will encourage investment in local areas; enable local supply chain and manufacturing opportunities to be identified; de-risk private sector investment; and assist the regeneration of local areas.

It is recognised that support and advice will be key through the implementation of Renfrewshire’s LHEES and at all stages we will signpost to funding and ensure that impartial advice and support is in place in advance of change.



Challenges and Opportunities:

The challenge to improve energy efficiency and decarbonise heat on an area-wide basis cannot be underestimated – but a stable, managed energy transition brings significant opportunities to design better systems to distribute benefits fairly.

The journey to net zero and the energy transition will transform our communities. Significant progress has been made, providing a solid foundation but change at the scale and pace required brings challenges. These challenges also present huge opportunities – growing our economy, community wealth building and local job creation, improving health and wellbeing while reducing fuel poverty and ensuring resilient, sustainable communities:

CHALLENGES & ISSUES	OPPORTUNITIES & BENEFITS
High levels of fuel poverty - across Renfrewshire Council, 22% of households are in fuel poverty, and 7.4% are in extreme fuel poverty)	Improved energy efficiency will remove poor energy efficiency as a driver for fuel poverty as well as reducing energy demand and reducing energy costs and improving health and wellbeing, incl. mental health through targeted, large-scale energy efficiency programmes and the provision of affordable warmth via low carbon energy to all communities
High levels of pre-1990s housing stock (~75%) which generally has lower levels of energy efficiency and the challenges associated with retrofitting energy efficiency measures and renewable technologies onto existing buildings, particularly listed and historic buildings, with not all buildings being suitable for retrofitting due to cost and/or viability	Local job creation and upskilling of local workers in energy transition industry, incl. supply chain and manufacturing opportunities with the pipeline of projects and work programmes giving confidence to these industries, enabling investment and funding to be aligned with programmes of work
Grid constraints and/or geographical constraints making energy projects difficult to install. Areas with lower population density to make district heating networks viable - a mix of urban and rural, with clusters of off gas grid and population	Community benefits with local energy generation infrastructure solutions tailored to fit distinct local areas and needs alongside opportunities to decentralise energy will end reliance on fossil fuels, reducing carbon emissions and building resilience

density of 702.9 residents per square kilometre (Glasgow: 3,555/sq. kilometre)	and security of supply while piloting innovative technology and solutions to solve common barriers
Population and housing growth infrastructure impacting on carbon emissions – 7.2% increase in the number of households in 11 years (2011-2022 census data)	Matching local demand with local supply - opportunities for local low carbon and renewable energy generation to meet the increased heat demands, with new developments having significant potential for infrastructure to be implemented bringing opportunities for sustainable, resilient communities
Gaps in data: traditionally issues around commercial data being shared, leaving gaps in baselines, monitoring and progress and leading to potential missed project opportunities	Low cost, low carbon energy will assist businesses in all areas but in particular rural areas, where higher energy costs can prevent them setting up/remaining viable – this also has a positive impact on local employment

The delivery and implementation of Renfrewshire’s LHEES also has some specific challenges, namely:

1. Finance and Funding: significant capital investment at a time of constraints for many

Challenge: The Council would be unable to solely deliver or fund all of the projects and interventions required, and collaboration and commitment from all stakeholders alongside long-term financial resources and large-scale investment are needed. It will require government at all levels to redirect and, in some cases, reprioritise finance to support the scale of change required. Lower carbon options are often less expensive long term, but upfront costs can be a barrier and tenants often have a lack of control over measures to reduce energy costs.

Opportunity: The transition brings opportunities to identify more innovative and collaborative ways to finance action across stakeholders, including new business models; joint ventures and partnership projects. There are also opportunities for knowledge sharing and collaboration across stakeholders, to understand different approaches, solutions and best practice. This increased partnership working at all levels of government will help to signpost residents and businesses to advice, grants and financial support and maximise opportunities for programmes that prioritise those least able to pay who would benefit most from interventions.



2. Resources and Skills:

Challenge: The scale of transformation may result in bottlenecks in delivery due to skills gaps/shortages and supply chain issues in key areas.

Opportunity: Setting out pipelines of projects enables manufacturers and supply chain businesses to identify opportunities and potential for local businesses to exploit gaps. For local workforce and training providers, investment in the upskilling of our citizens in areas of skills gaps or demand offers sustainable career paths and ensures local communities' benefit from infrastructure delivery. This approach will ensure community wealth buildings and local job creation across all aspects – installation, manufacturing, construction, maintenance, repairs and circular economy waste reprocessing.

Throughout stakeholder engagement, challenges were identified which must be addressed to mitigate the impact on the successful delivery of Renfrewshire's LHEES. Short term actions include working collaboratively to find solutions to these challenges.





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