East Lothian Council

REPORT TO: East Lothian Council

MEETING DATE: 31 October 2023

BY: Executive Director of Place

SUBJECT: Draft Local Heat & Energy Efficiency Strategy

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1 PURPOSE

1.1 To present the draft Local Heat & Energy Efficiency Strategy (LHEES) to Council for approval, prior to a further phase of stakeholder consultation. The final strategy will be presented to Members in February 2024.

2 RECOMMENDATIONS

2.1 It is recommended that Members:

- Approve the draft Local Heat & Energy Efficiency Strategy; and
- Note that the 5-year LHEES Delivery Plan is under development and will be presented together with the final Local Heat & Energy Efficiency Strategy to Members in February 2024.

3 BACKGROUND

3.1 Local authorities under The Local Heat and Energy Efficiency Strategies (Order) 2022 are required to prepare a Local Heat & Energy Efficiency Strategy (LHEES) with an accompanied 5-year Delivery Plan. These should set out a long-term plan for improving energy efficiency and decarbonising heat in all domestic and non-domestic buildings across East Lothian. LHEES is primarily driven by Scotland's statutory targets for greenhouse gas emissions reduction and fuel poverty:

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

3.2 The heat and energy efficiency environment in which this report has been prepared is rapidly moving in terms of policy, legislation and technology.

3.3 East Lothian Council commenced its work on LHEES in 2019 as part of the Scottish Government's piloting programme. ChangeWorks were appointed to carry out the first piloting stages of LHEES and an LHEES Project Officer was employed in May 2023 to produce the Strategy and Delivery Plan.

3.4 The LHEES draft presented today is focused around the achieving seven outcomes:

- East Lothian's communities and property decision makers are engaged to deliver Net Zero heating targets.
- Every property owner will be supported to find a more resilient heating solution.
- Heat solutions delivered to meet 2045 net zero target and tackle fuel poverty.
- East Lothian's homes and buildings are as energy efficient as possible.
- Investment and grant funding secured to deliver Net Zero projects.
- A significant proportion of the benefits of Net Zero investment remain within the East Lothian economy.
- Additional legislative changes and support required from Scottish and UK Governments.

See Appendix 1 for the full report - East Lothian Council's draft Local Heat & Energy Efficiency Strategy.

3.5 LHEES will be a key strategic document for East Lothian Council. It will impact on all three overarching objectives in the East Lothian Council Plan (2022-2027): recovering with future sustainability, reducing fuel poverty, and most significantly delivering the actions required to make East Lothian reach its net zero targets.

3.6 Because of the scope of LHEES, the LHEES Project Officer has engaged significantly with internal and external stakeholders. Internal engagement has been focused via the Council's Cross-Party Sustainability Forum and the membership of the Energy Transformation Board. The following external stakeholder groups have been consulted:

- Delivery Partners - Scottish Government, Energy Saving Trust, Zero Waste Scotland, Home Energy Scotland
- Utilities
- Waste heat providers

- Public sector estates
- Registered social landlords
- Landowners
- Energy suppliers
- Technology providers
- Historic buildings
- Community groups – a wide range of groups across all communities via the East Lothian Climate Action Network (ELCAN)
- Cross-boundary local authorities
- Non-Domestic anchor loads
- Investors / finance

3.7 Further stakeholder engagement on the draft will take place with the audiences outlined above during November and early December 2023.

3.8 The delivery of this strategy will involve a significant need to secure funding and attract external investments.

3.9 East Lothian Council has been accepted on to the Scottish Government's District Heating Mentoring Programme for 2023/24 that involves receiving support from Danish companies and communities that already operate district heat networks.

4 POLICY IMPLICATIONS

4.1 The national policies influencing LHEES are:

- Climate Change (Emissions Reduction Targets) (Scotland) Act 2019
- Securing A Green Recovery on a Path to Net Zero: Climate Change Plan 2018–32
- Heat in Buildings Strategy (2021)
- Energy Efficiency Standard for Social Housing 2
- Heat Networks (Scotland) Act 2021
- Fuel Poverty (Targets, Definition and Strategy) (Scotland) Act 2019
- National Planning Framework 4

4.2 It is anticipated that the final LHEES will provide a strategic context with implications on the following East Lothian Council strategies and policies:

- East Lothian Council Plan (2022-2027)
- Climate Change Strategy (2020-2025)
- [In preparation] Local Development Plan 2
- [In preparation] Local Housing Strategy (2023-2027)
- [In preparation] East Lothian Poverty Plan

5 INTEGRATED IMPACT ASSESSMENT

5.1 The subject of this report has been through the Integrated Impact Assessment process and no negative impacts have been identified.

6 RESOURCE IMPLICATIONS

6.1 Financial – The delivery of LHEES cannot have any cost implications for East Lothian Council. To successfully deliver the vision set out in the draft LHEES, significant amounts of funding and investments will have to be secured from external sources.

The Scottish Government's Heat Network Support Unit can provide 100% funding for feasibility studies and up to 50% for business case development.

6.2 Personnel – East Lothian Council currently has one LHEES Project Officer working full-time to ensure delivery, with support from the Council's Sustainability & Climate Change Officer. The broad scope of LHEES means that it overlaps with the responsibilities of other teams in Housing, Infrastructure, Communities, Economic Development and Transformation.

The staff capacity to successfully realise LHEES is considered limited.

6.3 Legal - The Local Heat and Energy Efficiency Strategies (Order) 2022 places a legal duty on all local authorities across Scotland to prepare a LHEES by the end of December 2023. The LHEES Project Officer has negotiated an extension on the basis that the draft strategy will be in the public domain by that date. The Scottish Government has agreed to receive the final version of East Lothian's LHEES in March 2024.

7 BACKGROUND PAPERS

7.1 ChangeWorks LHEES Technical Report (2019)

7.2 ChangeWorks LHEES Methodology Evaluation (2022)

7.3 Synergie / Townrock – Minewater Sourced Options at Cockenzie

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DATE	13th October 2023

East Lothian Council

East Lothian Council's

Local Heat and Energy Efficiency Strategy

22

years to Net Zero

October 2023

Executive Summary

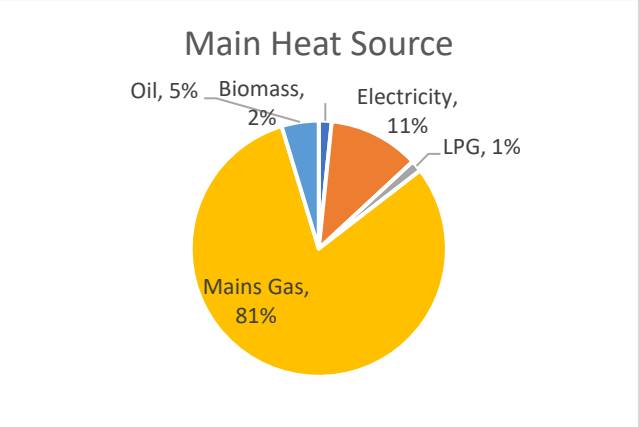
This Local Heat and Energy Efficiency Strategy (LHEES) sets out East Lothian Council's long-term vision for improving energy efficiency and decarbonising heat in both domestic and non-domestic buildings. This is primarily driven by Scotland's statutory targets for greenhouse gas emissions reduction and fuel poverty:

- 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

Our vision is for every property in East Lothian to have access to affordable, reliable and net zero heat. This in an ambitious vision with numerous technical, financial and capacity challenges to overcome. Our aim is to do the best we can with the resources we have to meet the Government's targets. A 5-year LHEES Delivery Plan will accompany the final version of this report.

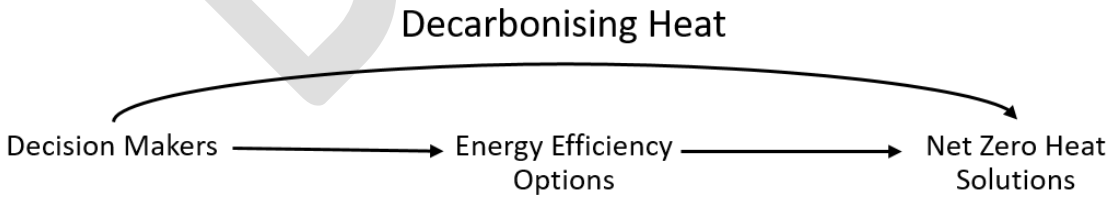
The LHEES will impact on all three overarching objectives in the 2022-2027 Council Plan – recovering with future sustainability, reducing fuel poverty and most significantly delivering the actions and change that will help East Lothian meet the net zero and climate resilience targets. It impacts on the future direction of a wide range of activities and organisations. Its preparation has involved significant internal and external stakeholder engagement.

To highlight the scale of the challenge, this chart shows the baseline main heating sources for domestic properties. 87% of homes are currently heated by fossil fuels – mains gas, oil or LPG. These all need a Net Zero heat solution.



For the remaining properties, their priority should be to ensure their property is as energy efficient as possible.

The journey to decarbonise heating is not a simple one. There are tens of thousands of individuals responsible for building level decisions who need to be engaged and empowered to make changes. We need to build a good understanding of the options available. Everyone will require reliable support to help make the most appropriate decisions. This journey is summarised below:



The analysis of data on properties and energy use has resulted in the designation of two main zones:

- **Heat Network Zone** – categorised by on-gas properties in the main towns and villages. These may be suitable to connect to a District Heat Network, where hot water would be provided by a heat centre and piped to every home and business.
- **Heat Pump Zone** – categorised by predominantly off-gas properties or those that are a significant distance from neighbours or the street. These may require an individual or communal heat solution, with the majority choosing either air source or ground source.

There are unique opportunities within East Lothian and the potential to support the delivery of large-scale district heat networks, reducing initial capital costs and the cost of ongoing operation, including:

- Council ownership and ongoing development of the former Cockenzie Power Station site with access to the sea
- The potential to access cheaper electricity via a Power Purchase Agreement due to the offshore wind farm cables coming ashore in East Lothian
- Significant mine water outflow at the northern edge of the Blindwells site
- A significant source of waste heat from the Viridor Dunbar Waste plant that has an existing commitment to provide heat for local use
- The opportunity to align major heat pipe routes with the Musselburgh Flood Prevention Scheme
- The plans for an Active Travel Corridor running along the A199 from Dunbar to Tranent that could provide a major route for heat pipes through East Lothian
- Future sources of waste heat linked with economic development, such as green hydrogen production, data centre operation or other industrial processes
- The location of a major heat centre at Millerhill in Midlothian, providing a future opportunity to connect with heat network infrastructure supplying heat to Edinburgh and Midlothian

The heat network proposals that may be considered for potential development across East Lothian are:

1. **Mine Water Heat Network** – located at Blindwells, using a mine water source heat pump to meet the needs of all future development on that site. This would be progressed by Hargreaves, the land agent for the site.
2. **Coastal Heat Network** – powered by a sea source heat pump located on the wider former Cockenzie Power Station site, with a pipe network delivering low-cost hot water initially to Prestonpans, Cockenzie/Port Seton and Tranent. Extensions might in future link to Musselburgh, Wallyford and along the coast to North Berwick.
3. **Waste Heat Network** – making use of heat from Viridor's plant outside Dunbar delivering low-cost hot water to Dunbar and then via a pipeline along the A199 to East Linton, Haddington and connecting into the wider heat network at Tranent.

The immediate priority is to ensure that all domestic and non-domestic properties are as energy efficient as possible. For homes, this would help reduce the risk of fuel poverty, and bring social, economic and public health benefits.

For properties in the Heat Network Zone, getting 'Heat Network Ready' would involve a focus on insulation and 'fabric first' in readiness to connect when the pipe network arrives. Smaller scale renovations, such as kitchen changes, could consider electric stoves over gas cookers.

For properties in the Heat Pump Zone, getting 'Heat Pump Ready' would also focus on insulation to improve energy efficiency plus exploring fitting solar PV and a battery to reduce reliance on more expensive grid electricity supplies.

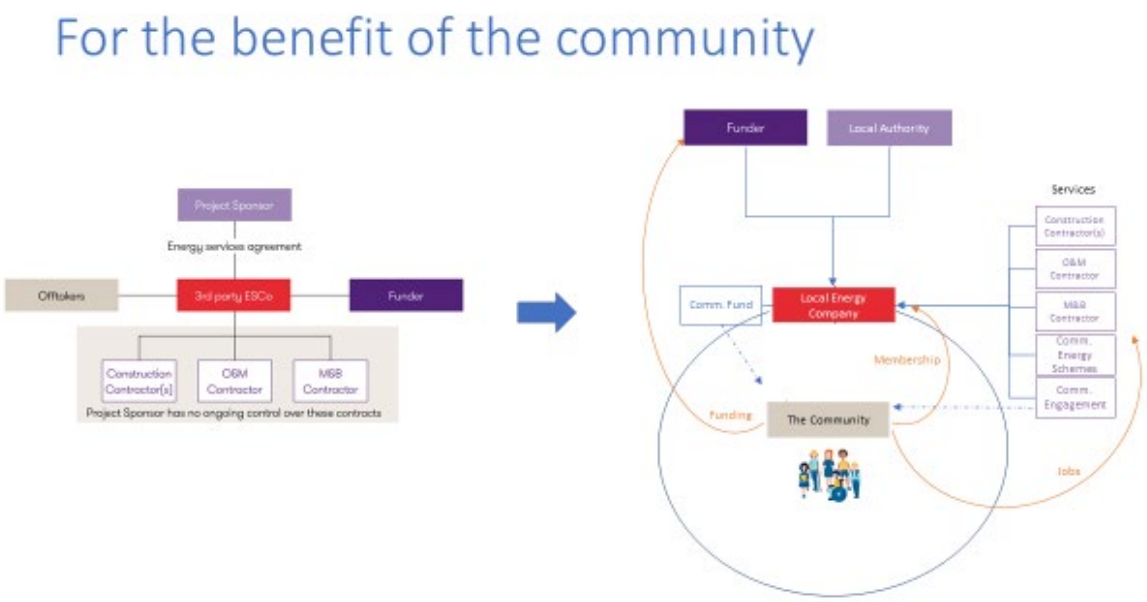
This strategy and the delivery plan focus on seven main outcomes:

1. East Lothian's communities and property decision makers are engaged and empowered to deliver Net Zero heating targets
2. Property owners will be supported to find a more resilient heating solution
3. Heat solutions delivered to meet 2045 net zero target and tackle fuel poverty

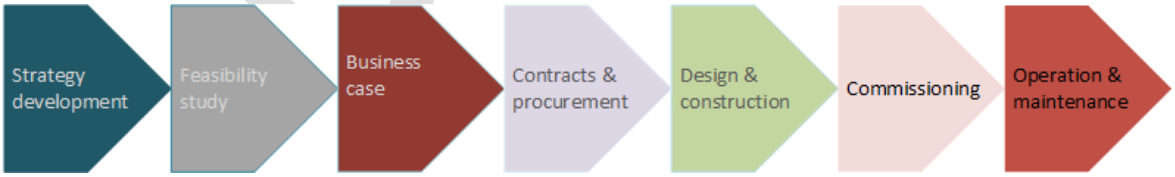
4. East Lothian's homes and buildings are as energy efficient as possible
5. Investment and grant funding is secured to deliver Net Zero projects
6. A significant proportion of the benefits of Net Zero investment remain within the East Lothian economy
7. Additional legislative changes and support required from Scottish and UK Governments

The development of heat network infrastructure has the potential to deliver significant long-term benefits to East Lothian's communities. It brings the opportunity for well planned community wealth building, creating jobs alongside the potential for the supply of cheap and reliable heat.

Decisions will be required on the governance and operation of future heat networks, taking into account the risks involved and potential to secure capital investment. This may involve establishing a local Energy Supply Company and a range of options would need to be explored and considered. The diagram below summaries the difference between a third-party energy supply company and one where the community has a central role to play.



The delivery of East Lothian's heat network infrastructure will follow the process developed by the Heat Network Support Unit as shown below. The early phases of development will rely heavily on public support from the Scottish Government's Heat Network Support Fund.



Developing district heat networks requires significant capital investment. An element of further public subsidy from the Scottish Government would definitely be required to help attract the scale of long-term investment needed. This would be determined during the Business Case development process as the overall capital requirements are calculated.

Work is already underway to engage with major potential investors. The Scottish National Investment Bank could play a crucial role in bringing together the investors. An ambitious heat network plan for East Lothian is more likely to attract investors, which couldenable significant growth potential and the ability to deliver a long-term return.

Contents

	Page
1. Introduction	6
2. Policy and Strategy Review	8
3. Stakeholders	10
4. Data and Preparatory Studies	12
5. Pathways to Heat Decarbonisation	18
6. Heat Network Zone	28
7. Heat Pump Zone	35
8. Energy Efficiency	37
9. Community Wealth Building	41
10. Investment and Funding	47
11. Government Action	50

1. Introduction

1.1 Local Heat and Energy Efficiency Strategies and Delivery Plans

Local Heat and Energy Efficiency Strategies (LHEES) and Delivery Plans are at the heart of a place based, locally led and tailored approach to the heat transition. These documents set out the long-term plan for decarbonising heat in both domestic and non-domestic buildings and improving their energy efficiency. This is primarily driven by Scotland's statutory targets for greenhouse gas emissions reduction and fuel poverty:

- 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.

1.2 East Lothian's LHEES Vision

Our vision is for every property in East Lothian to have access to affordable, reliable and net zero heat. To achieve this would require reducing the demand for heat by ensuring properties are as energy efficient as possible and progressively replacing fossil fuels as a primary source of heat.

The East Lothian LHEES sets out the pathways to zero greenhouse gas emissions in the building sector, and the removal of poor energy efficiency as a driver of fuel poverty. It identifies the range of decision makers associated with homes, workplaces and community buildings. It explains the range of energy efficiency and decarbonisation opportunities and technologies available to all decision makers to reduce building emissions and ultimately reach a position of net zero.

1.3 East Lothian Council's LHEES journey

East Lothian Council participated in the second round of LHEES pilot projects in 2019. Changeworks were commissioned to carry out this work and produced a shortlist of potentially suitable energy efficiency and heat decarbonisation measures based on the baseline data analysis. More detailed investigation of the implications on the private rental sector was undertaken in recognition that this sector represents 10% of the domestic housing stock. This was completed in October 2019.

In 2021 Changeworks were commissioned to undertake additional work to apply Stages 1-4 of the Scottish Government's LHEES Methodology. The results were presented to East Lothian Council in February 2023 and provide the underlining research for this document.

In May 2023 East Lothian Council appointed an LHEES Project Officer to undertake stakeholder engagement and produce the LHEES strategy and delivery plan.

1.4 LHEES Delivery Plan

The LHEES Delivery Plan is being prepared as a separate document and will prioritise areas for delivery over the next 5 years, against national and local priorities. This Delivery Plan will be published alongside the final version of the LHEES in March 2024. This is being developed in partnership with key stakeholders and will provide a strong basis for action for local communities, government, investors, developers and wider stakeholders. It will prioritise the progression of the main heat network opportunities alongside early, low-regrets measures linked with energy efficiency improvements.

1.5 The National Context - Heat in Buildings Strategy

The Heat in Buildings Strategy outlines the targets that the Scottish Government has set to reduce greenhouse gas emissions from Scotland's homes, workplaces and community buildings and to ensure that poor energy performance is removed as a driver of fuel poverty. The focus of the Strategy is on energy demand for space and water heating in homes, workplaces and community buildings. This Strategy is focused on a series of time-limited national targets that are outlined below:

- By 2025 all private rented sector homes to reach a minimum standard equivalent to EPC C, where technically feasible and cost-effective, at change of tenancy, with a backstop of 2028 for all remaining existing properties.
- By 2030 the large majority of buildings achieve a good standard of energy efficiency.
- By 2030 emissions from buildings have to be 68% lower than 2020 levels
- By 2032 the Social Housing Sector must meet the standard of EPC B
- By 2033 all homes have the equivalent of EPC C where technically and legally feasible and cost effective.
- By 2040 all fuel poor homes to be EPC B
- By 2045 our homes and buildings are no longer contributing to climate change, as part of the wider just transition to net zero.

2. Policy and Strategy Review

East Lothian Council has completed a review of the national and local policies, targets and strategies that are linked to, impact, or could be impacted by LHEES. This provided an opportunity to consider how the national policy landscape can be linked to local drivers, where LHEES is concerned, as well as setting out what the Council should prioritise strategically.

2.1 East Lothian Policy Context

The specific strategies that have shaped this document include:

- East Lothian Council Plan 2022-2027
- Climate Change Strategy and Action Plan 2020-2025
- Local Housing Strategy – 2023-28 currently being developed
- Local Development Plan – currently being developed
- East Lothian Poverty Plan 2023-2028

2.2 National Policy Context

The national and regional strategies taken into consideration are:

- Climate Change Plan 2018-2032 - Update
- The Heat in Buildings Strategy 2021
- Heat Networks (Scotland) Act / Heat Networks Delivery Plan
- The Fuel Poverty (Targets, Definition and Strategy) (Scotland) Act 2019
- Programme for Government
- The National Planning Framework (NPF4)
- Hydrogen Policy Statement 2020
- Housing to 2040 (2021)
- Tenements (Scotland) Act 2004
- Historic Environment Policy for Scotland 2019
- The Planning (Listed Building Consent and Conservation Area Consent Procedure) (Scotland) Regulations 2015
- The Edinburgh and South East City Region Deal and Regional Prosperity Framework

2.3 East Lothian Council Plan 2022-2027

The 2022-2027 Council Plan is based around three overarching objectives that have been set in response to the three fundamental challenges faced by the community.

1. Recovery and Renewal – recovering from the COVID pandemic by investing in regeneration and a sustainable future
2. Reduce poverty and Inequality – supporting our communities to deal with the growing levels of poverty and inequality
3. Respond to the Climate Emergency – meeting our net zero climate change targets

The LHEES will impact on all three challenges – recovering with future sustainability, reducing fuel poverty and most significantly delivering the actions and change that will help East Lothian meet the Net Zero climate resilience targets.

2.4 Tackling Fuel Poverty

The Scottish Government's target that in 2040, as far as reasonably possible, no household in Scotland is in fuel poverty underpins much of the actions that stem from this report.

With the recent rapid increase in energy costs, it is estimated that over 40% of households in East Lothian are in fuel poverty. Despite modest decreases in energy prices from the peaks of the start of 2023, the problem remains severe. Current industry projections indicate that energy prices are expected to remain high for some considerable time.

It is essential that any change away from fossil fuels for heating, particularly mains gas, does not increase heating costs as this would only add pressure on household finances and push even more into fuel poverty. There must be a just transition where the burden of paying for changes does not fall on those least able to pay. Considerable uncertainties remain on the use of hydrogen to partially or fully de-carbonise the gas network. The use of blue hydrogen, derived from natural gas would continue the risk of high and volatile market prices. The following core principles underpin the heat strategy:

- Delivery of heat to homes has to be at the same or lower than existing mains gas price
- Any connection cost should never be a barrier to joining a heat network
- For owner occupiers, any energy efficiency measures carried out could be incorporated into the long-term energy price for that property
- These would then remain linked to the property.

2.5 Climate Change Strategy and Action Plan – 2020-2025

This core strategy brings together elements of a wide range of Council strategies that were live in 2020 in relation to climate change, that impact on heat and energy efficiency. This Strategy has been updated as new priorities have been agreed by the Council.

The LHEES brief directly impacts on 4 Outcomes, 10 Key Priority Areas and a total of the 36 Actions from the Climate Change Strategy.

Each of these Actions was reviewed in consultation with the relevant internal teams, to assess whether the actions proposed in relation to heat and energy efficiency were robust enough to achieve the changes required to realistically meet Net Zero targets.

2.6 Council Strategies Under Development

The latest versions of East Lothian Council's Local Development Plan, Local Housing Plan, and East Lothian Poverty Plan are all currently been prepared. Consultation on these strategies was ongoing through 2023 in parallel with the LHEES preparation. As elements of each overlap with the LHEES, the decision was taken to work in partnership during the public consultation phase to maximise community input.

The priorities identified in LHEES will help shape each of these strategies.

2.7 Impact Assessments

Strategic Environmental Assessment (SEA) – other councils including Fife and Perth & Kinross screened out LHEES from the SEA process. On that basis, due to time constraints, East Lothian has proceeded with the strategy development without undertaking a separate screening process on the basis that the detailed proposals will be assessed as part of the Local Area Plan development.

3. Stakeholders

A heat and energy efficiency strategy impacts on a wide range of activities and organisations. Therefore, the preparation of East Lothian's LHEES has involved significant stakeholder engagement.

3.1 Internal Engagement

The internal engagement during the preparatory work on the LHEES has focused on regular reporting to the Council's Energy Transformation Board. This group has been overseeing the Council's energy strategy since 2016 and brings together senior officers from the following areas of operation:

- Sustainability and Climate Change
- Planning Delivery and Development
- Housing Strategy
- Property Maintenance
- New Build Housing
- Housing Energy Efficiency
- Infrastructure
- Engineering Building Services
- Energy Services
- Connected Communities
- Economic Development
- Legal Services
- Financial Services
- Procurement Services

3.2 Elected Representatives

Engagement with Councillors has been via the Cross-Party Climate Change and Sustainability Forum with additional briefings provided to Members on a collective and individual basis.

Regular briefings and meetings have been held with local MSPs during the LHEES preparation.

3.3 External Engagement

Heat and energy efficiency cut across so many aspects of society, business and our communities. The following organisations have been involved in the preparatory work, supplying data, providing advice and presenting opportunities:

- Delivery Partners - Scottish Government, Energy Saving Trust, Zero Waste Scotland, Home Energy Scotland and Changeworks
- Utilities - Scottish Power Energy Networks (SPEN), Scottish Gas Networks (SGN), Scottish Water Horizons
- Waste heat providers - The Coal Authority, Viridor (Dunbar), Millerhill / Vattenfall, and Bairds Maltings, Pencaitland
- Public Sector Estates – NHS Lothian, Enjoy Leisure
- Registered Social Landlords – East Lothian Housing Association
- Landowners – Hargreaves (Blindwells)
- Energy Suppliers – Community Windpower, Inchcape, Sea Green/SSE and Scottish Renewables
- Technology providers – Star Renewables and Sunamp

- Historic Buildings – Historic Environment Scotland
- Community Groups – a wide range of groups across all communities via the East Lothian Climate Action Network (ELCAN), plus those met via public consultation events
- Cross-boundary Local Authorities – Midlothian Council, City of Edinburgh Council and members of the City Region Deal
- Non-Domestic Anchor Loads – Queen Margaret University, Charles River and Bairds Maltings
- Investors / Finance – Scottish National Investment Bank, Scottish Futures Trust and 3Ci.

4. Data and Preparatory Studies

In the preparation of this report a range of data sources were used. In addition, early reports that were commissioned prior to 2023 have been reviewed and the data, analyses and outcomes from these have been used to support the strategy development process.

4.1 Core Datasets

The following form the main sources for the modelling and analysis that underpins this LHEES:

- Home Analytics – including locations of 30 conservation areas
- Non-domestic Analytics
- Scotland Heat Map
- EPC register for domestic and non-domestic properties
- SIMD data zones

The Portfolio Energy Analysis Tool (PEAT) was made available but due to the inadequacies in the input data available and also limitations on the scenarios it was able to assess, it was decided not to undertake this element of the LHEES Methodology.

4.2 Supplementary Datasets

- East Lothian Council housing database
- Register of Social Landlords property data
- Council owned assets – non-domestic properties
- Private landlords register data for private tenure data
- District Heating Scotland database
- Non-domestic heat demand – provided by Scottish Gas Networks

4.3 Preliminary Reports

1. Local Heat and Energy Efficiency Strategy (LHEES): Technical Report – completed out by Changeworks and concluded in October 2019.

This report identified the tools, data, skills and resources required to develop and deliver an LHEES for East Lothian. It involved baseline data analysis on the domestic housing stock, their energy efficiency and insulation status, fuel types, present renewable heating used and the heat demand of the area. This identified produce a shortlist of potentially suitable energy efficiency and heat decarbonisation measures that could feed into the later LHEES process.

It also identified that the Private Rental sector makes up nearly 10% of East Lothian's housing stock. Thus, engagement with both landlords and tenants are vital to understand their challenges and prepare a successful LHEES that takes all relevant perspectives into account, including short term lets.

2. The First National Assessment of Potential Heat Network Zones – published by the Scottish Government in April 2022

The Assessment carried out an analysis to identify and characterise potential zones for heat networks in Scotland. The potential zone were identified through assessing heat demand density, providing an initial, automated assessment using national datasets of the areas that are most suited to heat networks from a demand density perspective.

The Baseline screening criteria (a linear heat density of 4,000 kWh/m/yr and at least two anchor loads) identified a small number of heat network opportunities that aligned with the modelling carried out by Changeworks in the Methodology Evaluation as outlined below.

The subsequent Stringent screening criteria (a linear heat density of 8,000 kWh/m/yr and at least five anchor loads) resulted in all of these earlier options being filtered out. This is due a limited number of anchor loads in any of East Lothian's towns.

The conclusion from this approach to heat network modelling was that East Lothian had very limited scope for heat network development.

3. Local Heat and Energy Efficiency Strategy (LHEES): Methodology evaluation - carried out by Changeworks and concluded in May 2022.

The recommended LHEES methodology involves eight stages. This report involved completing the first four of these stages relating to East Lothian.

Stage 1: Policy and strategy review – This set out the national and local policies relevant to LHEES, providing an opportunity to consider how the national policy landscape can be linked to local drivers. For each priority it set out indicators and weightings that underpin analysis across the other stages. It enabled the mapping of key internal and external stakeholders, as well as funding resources that could support future Delivery Plan actions.

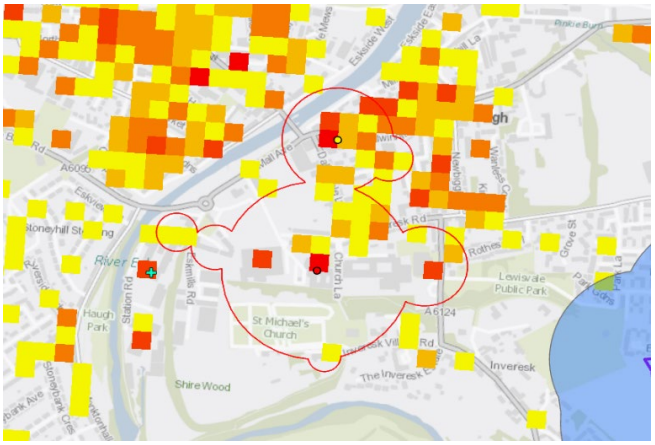
Stage 2: Data and tools library – This Identified the most appropriate data and information needed to support analysis in subsequent stages. The library captured data requirements for the priorities, acting as a record of data sets used and capturing associated detail on ownership, data sharing, key contacts etc.

Stage 3: Baseline strategic zoning and pathways – This involved analysis and understanding of the current energy efficiency and heat decarbonisation performance of the building stock at a local authority wide level. This performance was based on assessing the building stock against the indicators from Stages 1- 2.

Stage 4: Generation of initial delivery-level areas – This phase used GIS techniques to generate initial delivery-level areas for each of the priorities.

It used a linear heat density technique recommended in the LHEES methodology to generate potential heat network zones. In total, seven very localised heat network opportunities were identified through this process. Details of these clusters are provided below:

Figure 1 – Musselburgh



This is a cluster centred around the Musselburgh, to the east of the River Esk. The main heat loads would be the Health Centre, Grammar School and Leisure Centre, extending towards the High Street. Due to errors in the background data that were not identified at the time, the heat load from Musselburgh Grammar was not included in the data used by Changeworks. Its inclusion would have impacted on the size of the cluster, but not significantly.

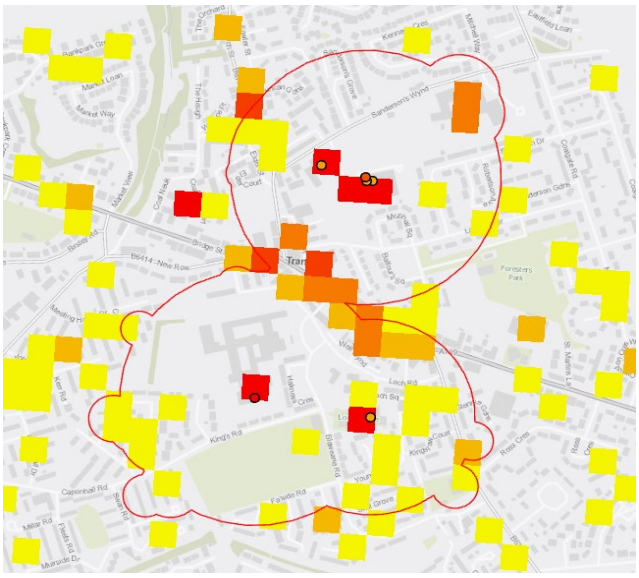


Figure 2 - Tranent

This is based around the heat loads at Ross High School, the Loch Centre and Tranent Medical Practice to the south of the High Street and Day Centre, Crookston Care Home and former Primary school site to the north of the High Street. This shows that there is a core heat demand in the centre of Tranent that could be a possible core for a heat network.

Figure 3 - Meadowmill

This was identified as the leisure centre and the attached indoor bowling centre were both attributed separate heat loads. There is clearly a significant demand on this site but not one where a heat network would be required due to the lack of surrounding properties. Other anchor loads in Prestonpans including Preston Lodge High School and the Mercat Centre were too far away, based on the linear heat density applied.

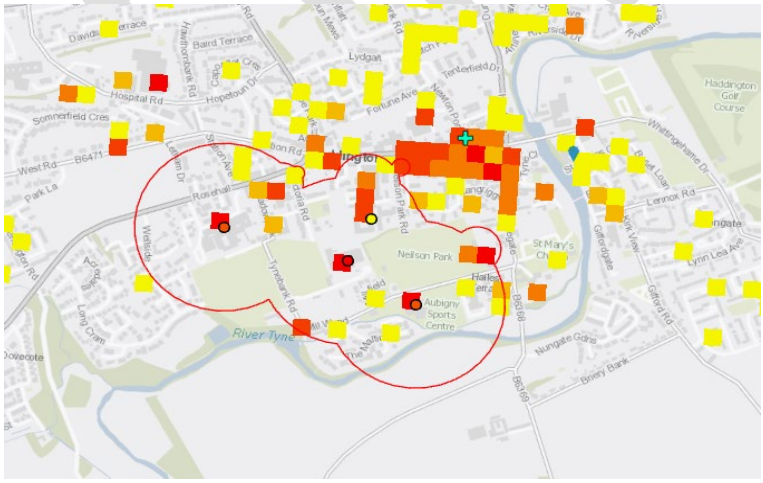
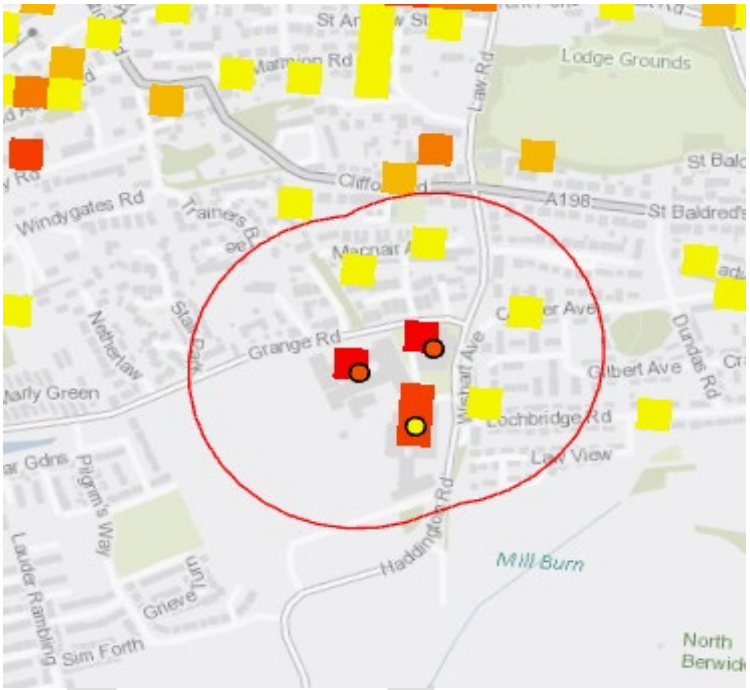


Figure 4: Haddington

This is based around Knox Academy, the two sites of Haddington Primary School and the Aubigny Sports Centre. These are of sufficient heat demand to merit combining into a network. The implications for the heat load of the town centre were not considered due the number of individual properties involved and mixed tenures.

Figure 5 – North Berwick

This is based around three sites in close proximity, the High School, Law Primary School and the Sports Centre. The combined heat demand might make this a possible local opportunity. However, the domestic heat load nearby was dispersed with the main load in the town centre some distance away.



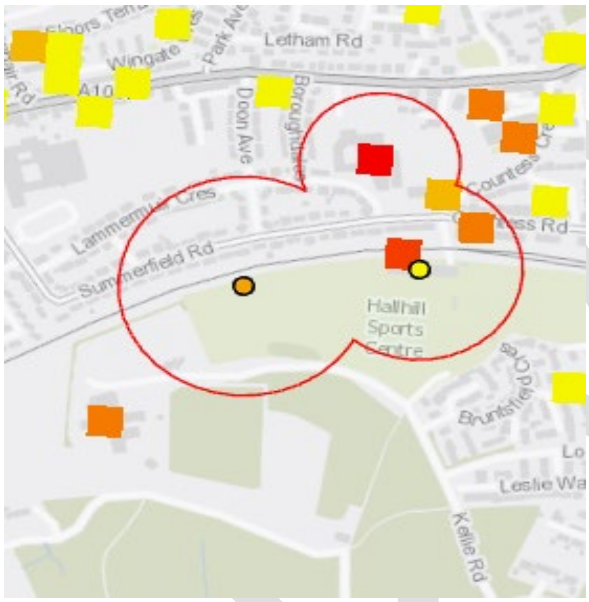


Figure 6 – Dunbar part 1

Two main heat demands of the Hallhill Sports Centre and the Primary School for the basis of this cluster. The railway between these two sites is likely to be a barrier to any opportunity to establish a link between the two. The heat data from Dunbar Grammar School was not included and only identified later. This would have added an extra anchor load and extended the scale of the cluster.

Figure 7 – Dunbar 2

This brings together the heat demands of Lammermuir House and the Dunbar Health Centre. Both are modest demands and not assessed as large enough to create an overlap with the Dunbar 1 cluster.

When the linear heat density used in the modelling was increased and the number of heat loads required for a network also increased from two to five, then all seven of these clusters were ruled out. This was due to all having fewer than five significant heat demands in close proximity.

The overall conclusion from this preliminary study was that based on the methodology recommended by the Scottish Government, East Lothian's handful of potential heat clusters are too small and too dispersed across the area to be considered as viable for heat network development.

4.4 Data Shortcomings

These early studies all relied on Home Analytics as the primary source of household data. This remains the only comprehensive household data set. However, Home Analytics has some very significant shortcomings that need to be acknowledged. These considerably limit the value of elements of the GIS based modelling work that is recommended in the LHEES methodology.

The primary source is via EPC surveys and certificates. This covers 58% of domestic properties in East Lothian. The remaining 42% are extrapolated from neighbours and subsequently given a lower confidence estimate of around 90%. Close examination of individual surveys shows inconsistencies in the surveys themselves.

Rural areas tend to have lower rates of EPCs as the turnover of sales there tends to be lower. Properties are more likely to be unique in build style and energy efficiency, so the extrapolation process is likely to result in greater errors. The confidence level of 90% that is used in the modelling seems to be too high based on the level of uncertainty.

Of EPC surveys, 18% were carried out over 10 years ago. These are still given a confidence level of 100% despite the very high probability that changes may have been made in the intervening period.

Any homeowner applying for grant or loan funding for home improvements is required to get an EPC survey done before work is carried out. In many cases they then go ahead and make changes to their property but do not get a new EPC survey afterwards. As a result, we can assume that nearly all of these EPC results will show a significantly lower performance than reality, yet still carry a 100% confidence rating.

EPC surveys are required to be carried out ahead of property sales. Any changes and improvements made by the new owners, a time when most major changes are undertaken, will not be represented in the EPC rating. This again leads to an underestimate of energy efficiency.

The number of properties listed on Home Economics as East Lothian Council owned is around 25% higher than the actual figure. This is a direct result of the extrapolation process. Future releases of Home Analytics will have this list corrected but this was not the case for the data used in all the preliminary studies.

Home Analytics (EPC) data will not necessarily reflect all energy efficiency improvements measures across all housing tenures. For example, in a social housing context, East Lothian Council have made considerable investment in recent years, which they track and calculate but do not commission a new EPC on completion of each retrofit measure.

If the base data carries considerable error margins linked with all the above, then any extrapolations from this will almost certainly carry even higher error risks. If this is then used to calculate potential cost of energy efficiency interventions then the margin for error is huge, making the results very rough estimates at best.

The use of Data Zones for special representation is inappropriate throughout most of East Lothian due to the significant level of new development since the zones were set in 2006. These originally contain between 500 and 1000 homes. Most of the new building has taken place on the outskirts of towns and villages, meaning that the originally rural data zones than ran up to the boundaries of settlements are now skewed by new-build properties. At the most extreme, the data zone that encompasses West Barns and rural area to the south of Dunbar now has in excess of 2000 properties. Zones around Haddington, North Berwick, Longniddry, Tranent, Wallyford, Prestonpans and Musselburgh all show a similar trend with new-build potentially outnumbering the rural property count. This was not corrected in any of the preliminary studies and as a result many of the maps produced in these contain inaccuracies.

The presence of thousands of modern homes suppresses the proportion of truly rural properties and hides real issues. As a result, any use of data zones to visually represent is fundamentally flawed and has not been used as a technique in this report.

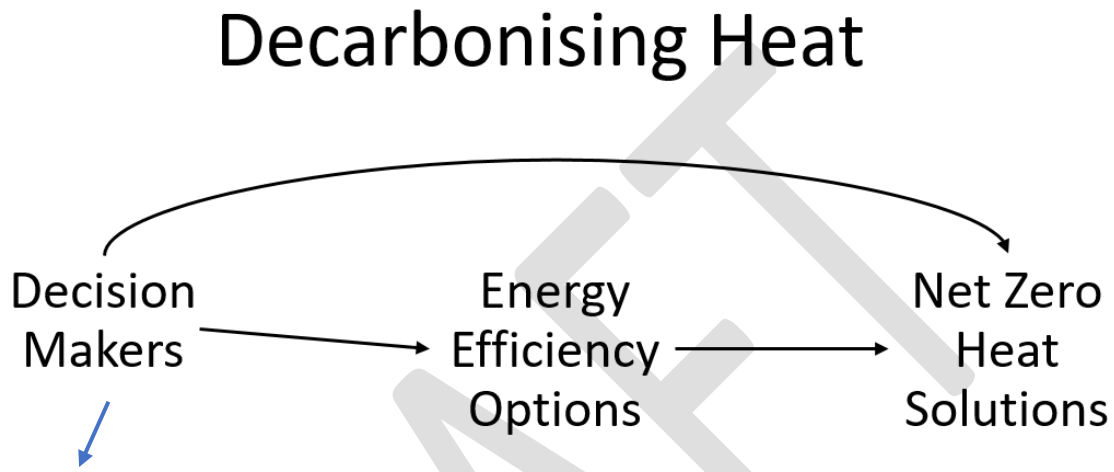
The divide between on-gas and off-gas is a far more effective demarcation between rural and non-rural areas in East Lothian. This divide has therefore been used as the basis for zoning in this report.

In the remainder of this report, any figures used that have been derived from the Home Analytics dataset will be italicised to draw attention to the risks associated.

5. Pathways to Heat Decarbonisation

This section draws on the earlier data analysis and feedback from stakeholder engagement to focus in on the possible priorities for the effective decarbonisation of heat across East Lothian.

The diagram below summarises the pathway that every decision maker for every property needs to follow to reach a net zero solution. The decisions they need to make may not be clear-cut, may involve complex analysis and could involve significant expense or investment. Understanding their perspective will shape the financing options and communications needed to help them make crucial decisions.



5.1 Decision Makers

The starting point for East Lothian's LHEES has been to identify the individuals linked with every property who ultimately have to make a decision on the future heating for their property. Properties are either domestic or non-domestic and the decision makers fall into the following categories:

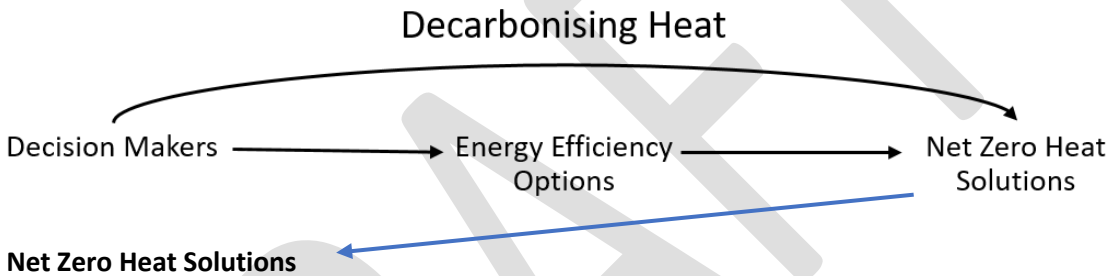
Categories	Engagement Tactics
Domestic properties:	
Individual Homeowners	Will require national multi-media campaigns combined with community-led activities
East Lothian Council – council housing	Already engaged and viewed as a priority
Private Landlords – rented accommodation and short-term lets	Some participated in the pilot project – new legislation adds urgency and should aid future engagement
Other Social Landlords – housing associations	Already engaged and viewed as a priority
Non-domestic properties:	
East Lothian Council – for council services and also properties rented to businesses	Already engaged and viewed as a priority
Other public sector buildings – NHS	Partially engaged and the requirement to complete BAR reports will assist
Business owner occupiers	Work with Economic Development, building on the existing Net Zero Carbon pilot Community-led activities
Private landlords	Will need to work through their tenants so most challenging group to reach

There are varying levels of engagement for decision makers on the needs and urgency to decarbonise their heating. Those responsible for multiple properties are considerably more engaged with the need for action on heating. For the majority of decision makers any urgency is linked with reducing overall energy costs rather than a motivation to reduce their carbon footprint. The perceived costs and uncertainty over the technology involved and the possibility of future grants schemes are a very significant barrier to making progress on decarbonising heat.

The main responsibility for raising awareness will lie with the Scottish Government via the Net Zero Nation Public Engagement Strategy. However, this will need to be enhanced at a local level, with considerable reliance on community-led activities coordinated by East Lothian Council in partnership with the East Lothian Climate Action Network.

Outcome 1: East Lothian's communities and property decision makers are engaged to deliver Net Zero heating targets

- Key Priority Area 1: Raising Awareness
- Key Priority Area 2: Building Community Teams



5.2 Net Zero Heat Solutions

Each property normally requires heat for two purposes – space heating and hot water. The following explains that main solutions for each of these to aid the decision-making process.

- District Heat Networks
- Individual Heat Pumps
- Communal Heat Networks
- Other electric heating solutions

The early study by Changeworks concluded that heat networks might only play a minor and very localised role on decarbonising heat across East Lothian. Rather than heat networks, the study pointed towards a very heavy reliance on individual heat pumps. As explained the following sections, the approach of solely relying on heat pumps brings real practical challenges across the whole domestic and non-domestic estate and is not realistic to deliver change on the scale required and within the timescale to meet Net Zero and fuel poverty targets. As a result, a more ambitious examination of district heat networks is proposed. These would aim to provide clarity for majority of decision makers.

5.2.1 District Heat Networks

The proposed solution that is being considered for East Lothian's district heat networks involves delivery of hot water at 65-70C via an extensive retrofitted pipe network to as many domestic and non-domestic properties as possible. The extent that such a pipe network might be financially viable will depend very heavily on the cost of producing that heat and in particular the cost of the electricity required. The initial capital cost of constructing a pipe network of highly insulated pipes would be considerable. However, this could be spread over the full lifetime of the heating system

and individual bill payers would not need to be charged any connection fee. It is proposed that the financial feasibility of this approach to district heating should be tested and refined during the preparation of the Business Case.

This proposed solution could bring significant benefits for individual bill payers over other potential heat network and heat pump options.

- Each property would require a new heat exchanger to be fitted. In most cases this can fit in the space that is currently occupied by a gas boiler and could require less space.
- There would be no up-front cost of connecting to the heat network. All connection costs would be included in the unit price charged for heat
- The heat provided should be cheaper than existing gas prices and provided on a long-term rate to avoid price fluctuation
- The electricity requirement to run the system in individual properties would be small so there would be not significant increase in electricity demand to put additional pressure on local grid capacity
- The water supplied by the district heat network would be at roughly the same temperature as produced by most existing gas boilers, so would simply replace one source of heat for another with minimal internal changes required
- There could be no need to replace internal pipework or radiators. It may help the level of overall energy efficiency to do this, but it would not be a requirement.
- Properties without existing hot water tanks would not need to get one fitted. The heat exchanger would provide instant hot water in the same way that a combi boiler. Those wishing to retain a hot water tank could do so.
- It may not be necessary to make any significant energy efficiency improvement to properties to be able to access the heat network. However, it may be beneficial to make some improvements to reduce heat demand to cut costs.

The downsides to connecting to a district heat network include:

- Connection can only take place when the pipe network reaches your property. This may take several years and take longer than some property owners are prepared to wait.
- Some replacement of internal radiators or microbore pipes may be required where the existing heating uses flow temperatures above 65C
- Although internal disruption should be kept to a minimum, there may be an element of external disruption as heat pipes need to be laid from the street to individual homes
- There will be no choice of supplier as a single heat provider will operate the network. This will mean that there is no opportunity to shop around for a cheaper deal. However, the chosen approach to the structure of the supply company should protect customers from the risk that this monopoly position will be abused.
- To enable properties to disconnect from the gas supply, saving on the standing charge, ny cookers using gas would need to be replaced. Knowing the timeline for connection should make planning for this easier and can be done at any time ahead of connection.
- The delay in getting heat network infrastructure developed and the pipe network constructed may result in difficult short-term decisions on heating systems, especially where an existing gas boiler breaks down or come to the end of its safe operational life.

5.2.2 Heat Pumps

Individual heat pumps are expected to be the main route to deliver net zero heat for a significant proportion of properties that currently use fossil fuels and are unable to connect to a district heat network. This may be due to their rural location or distance from neighbouring properties as explained in more detail in Section 7.

These heat pumps would normally be either air source, using an external fan box fitted to the outside of the property or ground source, using either a vertical borehole or a horizontal closed loop laid in trenches adjacent to the property.

The benefits of installing a heat pump are:

- The heat pump technology generates between 2.5 and 4 units of heat for every unit of electricity used, depending on the internal temperature required and the ability of the property to retain heat.
- Disconnecting from mains gas, LPG or oil reduces the exposure to future price fluctuations linked with global markets and could be considerable cheaper
- Using electricity will mean that the heating will progress towards net zero as the electricity grid reduces exposure to gas in coming years.

The disadvantages would vary considerably depending on the characteristics of each property and may include:

- The unit cost of electricity remains high compared with mains gas so even with the multiplier effect of a heat pump, the financial incentives to switch fuel source are marginal at best
- The property may not have the physical space externally for a fan box or for ground source bore holes – see Section 5.2.3 below.
- The flow temperature of the new heating may be lower than an existing gas boiler. This may require radiators to be replaced with larger units and the connecting pipework to be replaced, especially if this is microbore pipes of 9mm diameter.
- The lower flow temperatures are more efficient in well insulated properties where heat loss can be kept to a minimum. For many properties, achieving this level of heat retention will either be impossible, or very expensive. See Section 5.3 for more on energy efficiency.
- The need to replace gas cookers with an electric alternative to enable the gas supply to be disconnected

The most efficient heat pump solutions involve local electricity generation and storage to help reduce reliance on grid power supplies. There are significant long-term cost benefits to households in installing solar panels and battery storage alongside a heat pump. This adds significantly to the overall capital cost and additional levels of decision making. However, it may produce the most cost-effective solution that protects against changes in electricity prices.

5.2.3 Communal Heat Network

This potential solution may be an option for two or more properties that are in close proximity to each other and where there are costs benefits associated with a single heat pump solution that provides heat to a number of properties. For example, a block of flats or a steading development where there is only space for a shared air source fan unit. It could be as simple as a single heat unit for two properties. It would also reduce the visual impact which is important in Conservation Areas.

The issues for consideration are broadly similar to those outlined in 5.2.2. However, this approach brings added complications of collaboration with neighbours. Some energy supply companies are

now offering communal heat solutions, and this is likely to be an area where further service development will take place, offering a greater choice to customers.

Again, there may be considerable long-term benefits in combining local energy generation with the heat pump installation. This could also be a communal system, selecting the best sites for solar panels across all the properties involved to maximise the power output.

5.2.4 Electric heating

Around 10% of East Lothian's homes already use other electric heating systems. These can be expensive to operate, especially as a result of recent price rises. The priority for properties that already have electric heating, or where heat pump options are not feasible, is to ensure that the chosen heating system is as energy efficient as possible. This will provide an element of protection against the risk of fuel poverty if electricity prices remain high.

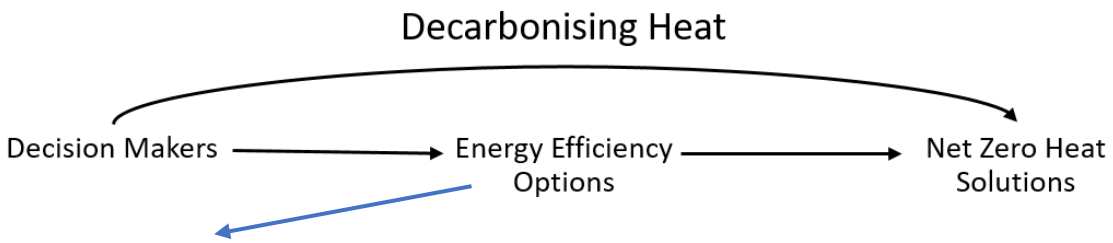
Free advice should be sought from Home Energy Scotland before deciding on the most appropriate electric heating solution. The following electric solutions may be suitable:

- Storage heating (Quantum Heaters) and high heat retention storage heaters. These benefit from using cheaper overnight tariffs to charge the heaters.
- Electric Wet Central Heating (Combi Boiler). These are probably the easiest to fit into a property that already has a wet heating system. However, when the unit cost of electricity is considerably higher than the fossil fuel it replaces, the running costs may be unaffordable and bring a risk of fuel poverty to the household.
- Infra-red Heating. This system relies on panels to heat spaces that are being occupied, rather than whole properties. There may be circumstances where this is an efficient option, especially when only part of a property is regularly in use.

5.2.5 Hydrogen

The Scottish Government do not envisage hydrogen having a role in domestic heating. The UK Government is scheduled to make a final decision on this in 2026. This delay brings uncertainty and undermines the ability to make firm decisions. Considerable uncertainties remain on the safety and economic viability of hydrogen in a domestic setting. The proposed strategy put forward by SGN shows a continuing reliance beyond 2045 on blue hydrogen, sourced from natural gas. This could make it very challenging to meet net zero emissions targets as the required technology for large scale carbon capture remains unproven. As a result, hydrogen is not considered as a heat source in this strategy. It will almost certainly have a role in high temperature industrial processes and therefore its production may become a source of waste heat that could be captured for use in heat networks.

The production of green hydrogen, using surplus renewable electricity to electrolyse water into hydrogen and oxygen produces a very significant level of waste heat. Around 25% of the input energy is lost as heat. If East Lothian is viewed as a future location for this industrial process, then it would be essential that this heat is captured for use in heat networks.



5.3 Energy Efficiency Options

These are predominantly the energy efficiency measures that could be adopted, where appropriate, to reduce energy demand within a property and can be seen as a step towards a more effective net zero solution. Any investment should bring immediate efficiency benefits ahead of a switch of the primary source of heating.

- Loft insulation
- Cavity Wall insulation
- External Wall insulation
- Glazing replacement
- Solar PV and battery
- Heat battery

There are currently a range of grant and loan schemes available to assist property owners with energy efficiency improvements. For owner occupiers more information and advice can be provided by contacting Home Energy Scotland.

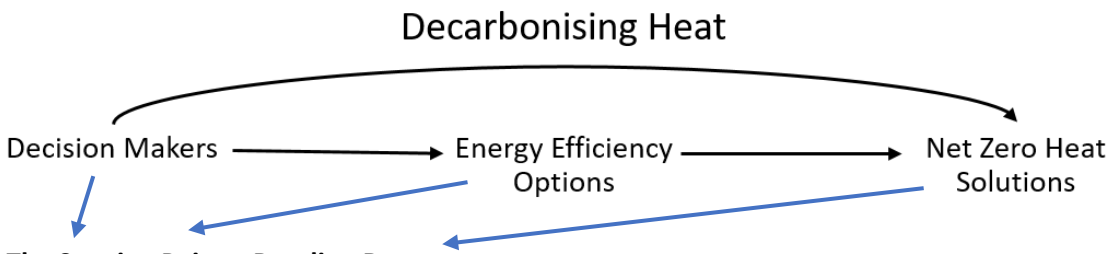
For properties that are within the designated Heat Network Zone, the cost of energy efficiency improvements may be included in their connection plan. This would be explored further ahead of any heat network development and the range of opportunities presented to decision makers at that time.

For properties that are within Heat Pump Zone, decision on the most appropriate options should be made in consultation with the free advice service available from Home Energy Scotland. They will help explain the options available and also take into account the challenges linked with the build-type of individual properties.

All property owners living in the Dunbar and East Linton Ward can also benefit from energy efficiency advice from BeGreen which is funded by Community Windpower as part of their community benefits programme.

East Lothian Council has considerable experience within its Housing teams of delivering energy efficiency improvements for council tenants and also for homeowners at greatest risk of fuel poverty.

More detailed proposals to improve energy efficiency are provided in section 8.



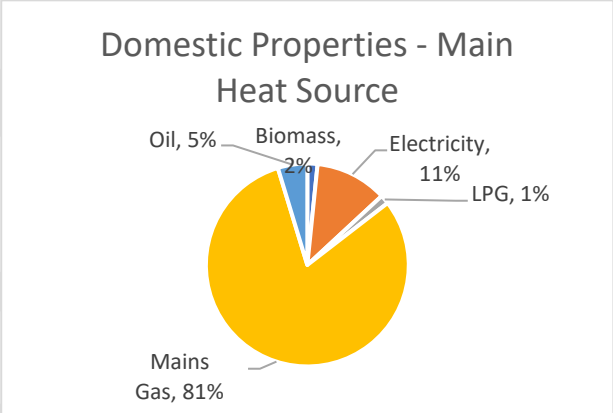
5.4 The Starting Point – Baseline Data

Every decision maker needs to identify the factors that are relevant to them and then consider the pathway they need to take. This is likely to be a complicated interaction of a number of factors and they may need additional guidance to aid that decision process.

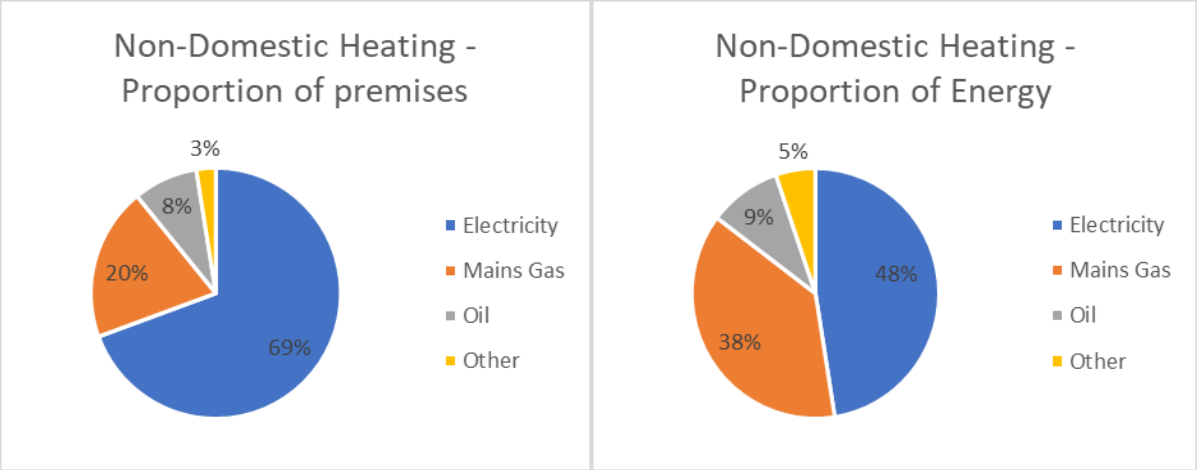
5.4.1 Most significant factors - existing source of heat and location

There is close correlation between the on-gas properties and the main centres of population.

- *43,200* properties on mains gas – almost all within towns and larger villages
- *3,300* using oil or LPG – almost exclusively in rural areas, but does include some villages
- *6,200* properties already use electricity, the majority in rural areas but a reasonable number in on-gas areas



Fossil fuels make up a smaller proportion of the primary heat source for non-domestic properties with *28%* using mains gas or oil as highlighted below. However, it is clear that some of these sites have larger heat demands as mains gas and oil combined account for *47%* of the overall energy use for non-domestic heating.



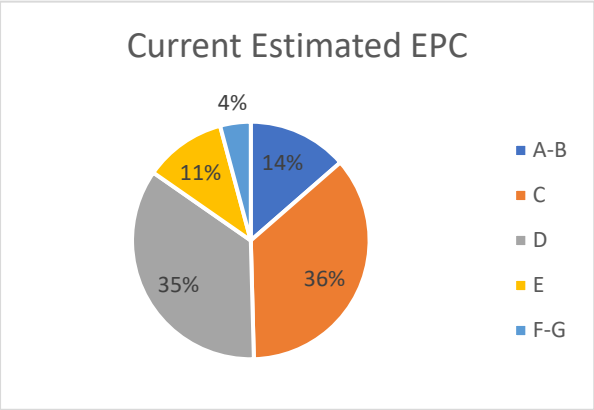
The most likely net zero heat solution for on-gas properties will be to connect to the district heat network at some stage in the future. That decision may be influenced by the timing of the expansion of heat network infrastructure.

5.4.2 Distance to Neighbours

There will be a subset of properties, both domestic and non-domestic that currently use mains gas but may be too distant from other properties or the street to make connecting to a future heat network cost effective. These calculations will only be possible once the delivery model for the heat networks is fully developed, and the cost of pipe infrastructure fully understood. At that stage a recommendation should be able to be made based on individual circumstances.

5.4.3 Current EPC rating

The percentage of domestic properties in each of the categories are provided below. The top performing properties, those rated A or B are grouped together. Similarly, the worst performing, those rated F or G are combined.



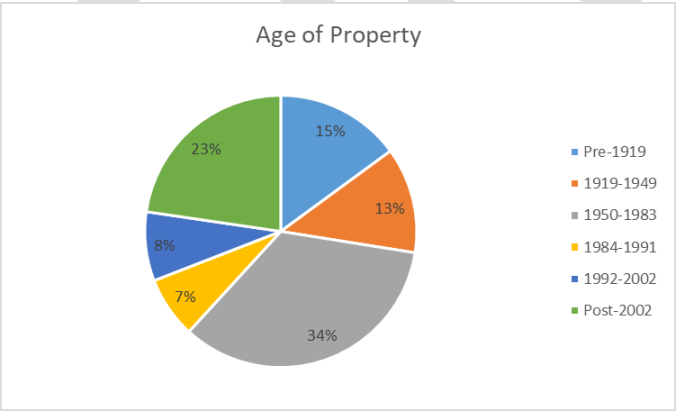
As explained in section 4.4, 40% of the ratings are based on estimates as these properties have never had a survey carried out. The margin of error in these is quite significant.

An estimated *50%* of properties across East Lothian are rated poor – D to G. This is in line with the national average where it is 51%.

Although there are numerous factors that impact on the overall rating, the owners of properties with poor scores need to consider taking action to improve energy efficiency alongside any decision on the suitable net zero heat solution.

5.4.4 Other Influencing Factors

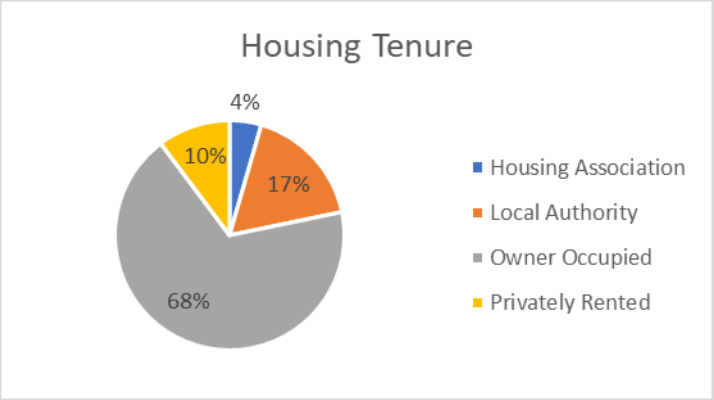
There are a range of other factors that will have an impact on energy efficiency decisions and potentially the ultimate net zero heat solution.



The age of the property plays a part. Older properties, such as many of the *15%* that were built pre-1919, are often stone built. These do not have wall cavities and are far harder to insulate. External or internal cladding may not be an option due to the visual impact or the need to ensure adequate air circulation. Many are in rural locations.

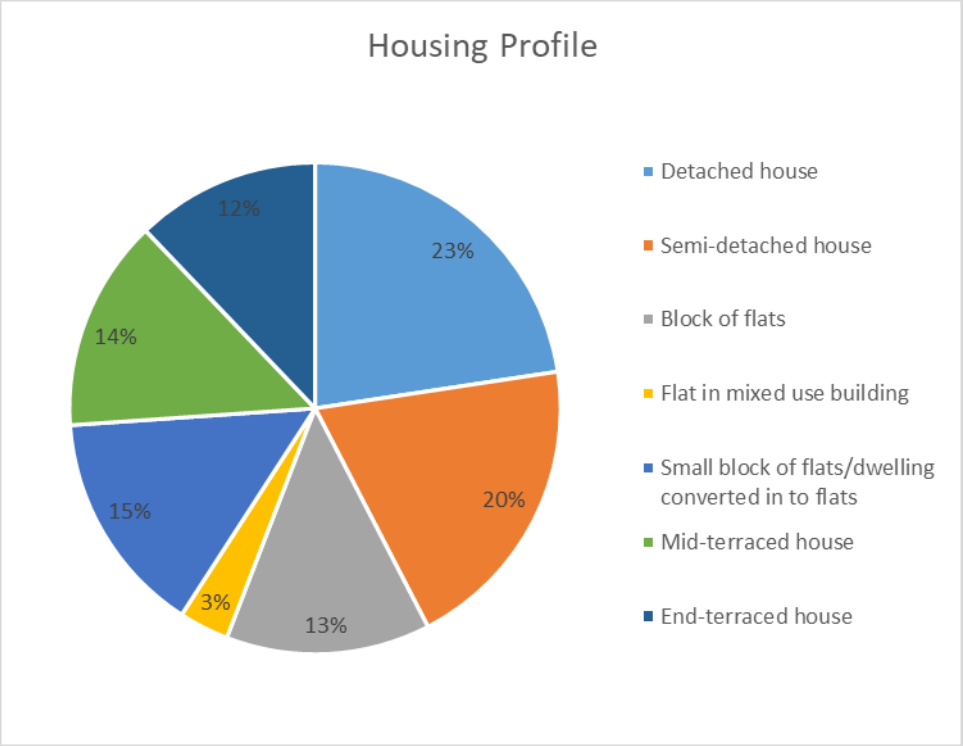
18% of domestic properties are within the 30 Conservation Areas across East Lothian. *5%* are Listed buildings, categories A, B or C. Due to planning restrictions that limit the changes that can be made, these properties consistently perform worst when it comes to energy efficiency. *11%* of properties are single or partially single glazed and the vast majority of these are Listed or in Conservation Areas. These figures highlight the very significant challenge in ensuring all properties are energy efficient. In many cases the cost involved would be excessive.

The tenure has a direct impact on decision making and who is ultimately responsible for making those crucial decisions.



15% of properties are classed as mixed tenure. These are flats where there is a mix of rented and owner-occupied properties. This can often complicate the decision-making process especially where consent of all owners is required for property improvements.

The chart below that shows the breakdown to the overall housing profile shows that *31%* of properties are in flats of various sizes. Effectively half of all flatted properties are in mixed tenure blocks.



There will be specific circumstances with many properties that will impact on the choice of heating solution. For example, the following are some of the reasons why an air source system may not be suitable:

- No space for the external fan box. These have to be a minimum of 1m away from neighbouring properties. They cannot be located on pavements. Many properties have no garden or other outside space, then an air source heat pump is not an option.
- No space for the thermal storage – either a hot water tank or heat battery. Many modern properties were designed for combi boilers and do not have the physical space for a hot water tank. Heat batteries may be a partial solution as they require an average a third of the space.
- Need to change radiators and/or microbore piping. Heat pumps tend to operate at lower flow temperatures that gas boilers. The potential internal disruption may put off some homeowners.

- More significant energy efficiency changes required. If it is not possible to improve the energy efficiency levels enough, it may not be possible for a heat pump to adequately heat some properties, such as older stone buildings.
- The local electricity grid may require upgrading to support the additional power load. SPEN would need to confirm that the existing grid supply is sufficient to provide the additional supply. Where it cannot, system upgrades may be required which could delay or prevent a heat pump installation. These costs may need to paid by the individual customers and make any changes to heat systems unaffordable.

6. Heat Network Zone

This section aims to provide the Council with a logical framework for identifying and prioritising opportunities and to decide whether to plan to extend the coverage of a district heat network across East Lothian.

6.1 Zone Characteristics

District heat networks are being considered as potentially the most efficient long-term heat solution to decarbonise a significant proportion of properties in East Lothian. They are an appropriate net zero heat solution for the majority of domestic and non-domestic properties that are currently connected to the gas grid. This effectively covers all the main centres of population, around 42,000 homes in total.

Choosing to connect to the heat network would be the default position for all on-gas properties unless there are circumstances linked to the property that might make connection inappropriate or not cost effective. The most significant is likely to be the distance of the property from any potential heat pipe network so effectively the distance from the street or neighbours. The detailed parameters on the distance will only become clear as the technology and financial implications are fully explored.

6.2 East Lothian's Heat Network Zone

The overarching vision for district heat networks would be:

- Provide long-term and cost-efficient solutions to mass decarbonisation of both domestic and non-domestic properties
- Directly addressing the challenges of fuel poverty by ensuring the most vulnerable households benefit from lower energy costs and can be protected from future price spikes
- Delivering a solution that combines heat provision with building energy efficiency retrofit, and in certain communities, improved electricity infrastructure
- Ensuring upfront connection costs are very small, ideally zero for most households, to minimise any barriers to connection
- Ensuring that the operation of heat networks brings significant investment into our communities, supporting sustainable jobs and reinvesting future profits into ongoing retrofit and energy efficiency programmes

6.3 Existing Heat Networks

East Lothian currently has 26 existing heat networks.

The only large-scale heat network is operated at Queen Margaret University's campus. This was originally designed to use biomass as its heat source, but for operational reasons it now uses mains gas powered boilers. The University is is already actively exploring options to reach net zero.

The remainder of the heat networks are small in scale and fall into two categories:

1. 15 are based at social housing or care settings. These are owned by Housing Associations or East Lothian Council with multiple properties serviced by a central main gas boiler. To decarbonise, all these sites will need to convert to a Net Zero option and should be considered as single point anchor loads for potential heat networks. In total they currently service just 391 properties, so cover less than 0.1% of East Lothian's properties.
2. 10 are rural heat networks based around farms that have installed biomass boilers, providing heat to multiple properties. Many will have benefited from previous grant

schemes to cover the installation costs. Though biomass boilers are no longer encouraged, for the purpose of LHEES these are considered already Net Zero.

In addition, just beyond the western boundary of East Lothian there is a district heat network under development by Midlothian Energy Ltd. This is a joint venture between Midlothian Council and Vattenfall. The heat source is the energy from waste facility at Millerhill, operated by FCC Environment. The initial target will be providing heat to the new Shawfair town, with the potential to expand the district heating network into areas of East Lothian and City of Edinburgh.

6.4 Potential Major Infrastructure Opportunities

There are a number of infrastructure projects in planning across East Lothian that may provide opportunities for the delivery of heat network infrastructure. These include:

1. **Cockenzie Power Station site**. East Lothian Council owns this large site and is currently preparing a masterplan for its redevelopment for both energy and employment opportunities. This work is already underway with the major decisions being made over the next two years.

   The coastal location could provide access to sea water for a sea source heat pump. The site development provides an opportunity to align major heat network pipe routes with roadways, before they are constructed. This could significantly reduce the overall construction costs. Any use of land at the Cockenzie site for district heat infrastructure would be very modest compared with the overall size of the site and could be located such as not to adversely impact the main developable areas of the site for employment and business development.

2. **Offshore Wind connections**. East Lothian is the landing site for a number of cables from offshore wind farms. There is a narrow window of opportunity, before grid agreements are secured to agree a Power Purchase Agreement that could provide an electricity supply to heat infrastructure. This could be a fixed rate deal for a period of 15 years. This would significantly reduce the risk of energy price fluctuations and help secure long-term capital investment. Provision would need to be made to take into account:
   - installation and maintenance of a physical connection into the site
   - generator downtime and in-year performance guarantees
   - long-term generation and performance guarantees

3. **Musselburgh Flood Prevention Scheme.** Design work on this scheme has already been taking place for a number of years, aiming to reduce the flood risk from the River Esk. This will involve the construction of linear flood barriers along either side of the river, connecting to the sea walls. There is an opportunity to include the pipework for a district heat network within the design so that key pipelines can be constructed at lower cost and with less additional disruption for communities.

4. **Active Travel Corridor.** In line with Scottish Government policies to promote active travel, East Lothian Council is preparing plans for an Active Travel Corridor, a combined cycle path and walkway along the route of the A199 (old A1) from Dunbar to Tranent, a distance of around 24km. A first phase of community consultation on these proposals took place earlier in 2023. With significant surplus heat in Dunbar as explained below, this provides an opportunity to bring this heat towards centre of demand via a pipeline beneath or alongside the proposed cycle path.

6.5 Capturing Waste Heat

There are a number of sources of waste heat that could be accessed to support district and local heat networks, including:

1. **Viridor Dunbar.** This Energy Recovery Facility owned by Viridor began operation in 2019. They have a commitment to make up to 10 MW of heat available for local use. To date this has not been accessed. There is potential to capture significantly more waste heat. In a presentation given to East Lothian Council in late 2021 Viridor indicated that the plant could satisfy the heating needs of 71,000 homes. The challenge for this opportunity is having a demand sufficient to justify the considerable expense of developing the pipe network required.

2. **Wastewater Sewers.** Heat networks utilising heat from wastewater are operational at other locations in Scotland and a major project is being planned at the Seafield Water Treatment site in Edinburgh. This treats a significant proportion of East Lothian's waste via the coastal sewer. In addition, the sewer that transports the majority of Midlothian's waste runs to a pumping station outside Wallyford. There may be opportunities at a number of pumping station locations to access waste heat.

3. **Glenkinchie Distillery.** This site outside Pencaitland generates heat from whisky production. Currently hot water is cooled in pond prior to release into the Kinchie Burn. There is an opportunity to utilise this heat. The distance from the distillery to the village of Pencaitland might make utilising this heat impractical, but this needs to be fully explored.

4. **Bairds Maltings.** This site is also outside Pencaitland and generates low level waste heat from a number of processes. The site is keen to explore whether this heat could be used to provide heat to the local community via a heat network.

5. **Green Hydrogen.** Although there are no confirmed plans for green hydrogen production in East Lothian, there have been enquiries linked with future production at both Cockenzie and Torness as the locations where offshore power cables are coming ashore. Green hydrogen production involves the generation of considerable quantities of waste heat so having heat network infrastructure planned at either or both sites would unlock a very significant additional source of net zero heat.

6.6 Zero Carbon Heat Sources

The preparation of this LHEES has involved bringing together information on a range of potential sources of net zero heat to assess the potential for each to play a role in East Lothian's future heat solutions.

1. **Mine Water Source**

   A series of reports have been commissioned by East Lothian Council to explore the potential of utilising mine water. The most recent was completed by Synergie Environ and Townrock Energy in August 2023. This study explored various options for mine water district heating networks at the former Cockenzie power station site, and the benefits that such a heat network could bring for the council, the local area, and the resident populace.

   It identified that a maximum output of 9.7MW could be delivered at the Coal Authority's treatment site at Blindwells. This is viewed as a viable source of heat for a district heat

network and development of that project is being taken forward by the land agent, Hargreaves.

This report also demonstrates that mine water has the potential to support a viable district heat network from two separate extraction sites linked with former colliery sites near Prestonpans. This could provide heat to a number of council owned assets in Prestonpans plus several hundred domestic properties.

2. Sea Source

East Lothian's coastal location makes utilising the sea as a source of heat promising. It offers a limitless supply so can be readily scaled up to meet any need. At scale, it can readily deliver a CoP of 3, delivering three units of heat for everyone unit of electricity required. The ultimate cost of the heat produced is therefore directly linked to the cost of the input electricity.

The challenge for sea source heat is identifying appropriate locations for heat infrastructure that have development land on the coast and suitable access to the sea. As previously outlined, East Lothian has one prime location, the site of the former Cockenzie Power Station.

3. Ground Source and Water Source

In March 2021, Greenspaces Scotland and ParkPower produced a report, Green Heat in Greenspaces, examining the potential to utilise parks and other green spaces within urban settlements across Scotland to support low carbon heat solutions. It also explored the potential to extract useable heat from local rivers.

This study found that those public buildings with the highest heat demand, such as leisure centres, particularly those with swimming pools, hospitals, schools and care homes and offices are often closely located to urban greenspaces. Large greenspace sites have the potential to supply 100% of the heat demand for a nearby public building with high heat demand and provide potential for supply to other buildings via district heating networks. Over time the heat network might then be expanded to supply additional heat demand in the locality.

It concluded that there are promising options in Dunbar, Haddington and Tranent for ground source heat pumps, all of which ranked within the top 2% of most suitable sites across Scotland. However, the maximum scale of any one of these developments was limited by the available green space and would not be able to expand to heat many neighbouring sites. The cost-effectiveness of any project is also closely linked with the price of electricity and with significant price rises since 2021, this has severely impacted on the viability of these options.

The results for Water Source Heat Pump solutions highlight promising options for some settlements within the East Lothian area. The most promising settlement is Whitecraig, utilising the River Esk as its heat source.

6.7 Proposed Heat Network Zone

In developing any district heat networks, East Lothian Council would follow the Heat Network Project Journey as recommended by the Scottish Government's Heat Network Support Unit. This is summarised below.

A series of potential heat networks have been identified and could be developed if there is a strong economic case that takes into account all technical, financial and capacity limitations. These would be prioritised in collaboration with the Scottish Government's Heat Network Support Unit, potentially involving feasibility studies and then a decision as to which options might then proceed to full Business Case development.

1. **Mine Water Heat Network –** Based at the Blindwells site, Hargreaves, the land agent has already carried out a feasibility study in association with the Heat Network Support Unit and their own technical advisors. They will be responsible for progressing with any heat network development. This would involve a mine water source heat pump, developed in partnership with the Coal Authority to connect to future new-build domestic and non-domestic properties on the site. Depending on any development timeline, this might involve up to 1100 properties from the first phase of development and ultimately all properties in any future phases. At some stage a decision would be needed on the 400-500 homes that have been built or are planned with gas boilers.

2. **Midlothian Energy Heat Network –** There is an option for the existing network that is currently being developed by the Midlothian Council and Vattenfall joint venture, to extend pipes into the western edge of East Lothian, initially to Queen Margaret University campus. This could also provide heat to proposed non-domestic developments near Queen Margaret University and any future domestic developments to the west of the East Coast mainline railway.

   This heat network development would provide an opportunity to establish a wider regional heat network as part of national strategic infrastructure that could involve the export of future surplus heat from East Lothian into areas of higher demand, including Edinburgh. This could be an attractive growth proposition for investors.

   East Lothian Council has already made provision for this connection by including ducting in the design of the new A1 junction so that heat network pipes could be fitted when required.

3. **Coastal Heat Network –** This would involve constructing a heat centre with a large, modular sea source heat pump on the former Cockenzie Power Station site. This would involve a pipe network developed in phases, distributing water at 65-70C from the heat centre through an extensive network of insulated pipes that might include the following:

   - Phase 1: Prestonpans, Tranent, Cockenzie, Port Seton – approximately *12,300* currently on the gas grid
   - Phase 2: Musselburgh & Wallyford Extension – adding around *11,800* on-gas properties

- Phase 3: Coastal Extension - North Berwick via Longniddry, Aberlady, Gullane and Dirleton – adding *7,900* on-gas properties
- Phase 4: Macmerry, Elphinstone and Ormiston extensions – *1,600* on-gas properties

4. **Waste Heat Network** – This would utilise waste heat from Viridor's waste incinerator that is located 2km outside Dunbar. This would involve distributing hot water at 65-70C through an insulated pipe network. The major arterial pipes could be laid below the Active Travel Corridor across East Lothian.
    - Phase 1: Dunbar, Belhaven and West Barns – *3,500* on-gas properties
    - Phase 2: A199 Heat Highway construction, connecting with the Cockenzie Network in Tranent
    - Phase 3: East Linton and Haddington – *5,900* on-gas properties

Combined these heat network zones contain 80% of East Lothian's households and 97% of the properties currently connected to the gas grid. They also contain a significant majority of council owned properties, both domestic and non-domestic and most privately owned non-domestic properties.

When examined at an individual property scale, not all existing on-gas properties will ultimately be suitable for connection to district heat networks. The reasons may include:

- The property is too distant from the street to make connecting to the heat network cost-effective
- Property owners choose to convert to another Net Zero heat solution earlier than the heat network pipes arrive, such as fitting an air source heat pump.

The following villages currently on the gas grid and will require further investigation to determine whether a district heat network is the most cost-effective net zero heat solution.

- Whitecraig – This could be connected to the wider Cockenzie Heat Network via a pipeline extension along the river. Alternatively, it could utilise a water source option from the River Esk or from waste water utilising the main Midlothian sewer that runs past the village.
- Pencaitland – The distance from other heat network connections may mean the cost of connecting either to Dunbar or Cockenzie may be prohibitive. In that case a local heat network solution could be considered. This could utilise waste heat from either Glenkinchie Distillery or Bairds Maltings. This would require a separate feasibility study to assess the technical and economic viability of this to supply all the properties in the village.

6.8 Electricity Grid implications

Developing extensive heat networks to supply the majority of on-gas properties would have major implications for the electricity grid infrastructure. It may require upgrades at the Cockenzie site to ensure that there would be sufficient capacity to support the heat centre as it grows. This would be explored with SPEN as part of a feasibility study to assess whether an application for the grid capacity would be required.

The development of district heat networks should significantly reduce the scale of local electricity grid upgrades in many towns across East Lothian. SPEN will be reviewing the LHEES report to assess any other implications for their grid supply.

Outcome 2: Every property owner will be supported to find a more resilient heating solution

Key Priority Area 1: Heat Network Zone

Outcome 3: Heat solutions delivered to meet 2045 net zero target and tackle fuel poverty

Key Priority Area 1: Power Purchase Agreement

Key Priority Area 2: Heat Network Zone

7. Heat Pump Zone

7.1 Zone Characteristics

The section is relevant for all properties that are currently not connected to the gas grid or those that may currently use mains gas but are potentially too far from neighbours or the street to make connecting to a future district heat network possible.

Properties that already use electricity or biomass for their heating and hot water will not need to make changes to their heating systems to reach net zero.

The Heat Pump Zone covers all the rural areas of East Lothian. In addition, the following villages are currently off-gas and a significant proportion of the households in these communities currently rely on oil or LPG for their heating.

- Drem
- East Saltoun
- Garvald
- Gifford
- Humbie
- Innerwick
- Oldhamstocks
- Spott
- Stenton
- Tynninghame
- West Saltoun
- Whitekirk

Most of these villages contain Conservation Areas with older, stone-built properties.

7.2 Individual Heat Pumps

The most appropriate net zero heat solution is likely to be an electric powered heat pump. As previously explained, there are two main types, air source and ground source. The suitability for any property for these heat solutions would need to be assessed on a property-by-property basis, drawing on advice from Home Energy Scotland. It may also require a technical survey to identify suitable measures. As previously outlined, there are a range of practical reasons why a heat pump may not be suitable. In summary these are:

- There is no land available for a ground source loop or vertical boreholes
- No space for the external air source fan box
- No internal space for the thermal storage needed for hot water
- For existing wet heating systems there may be a need to change radiators and/or microbore piping
- The local electricity grid is unable to support the additional power load involved

In addition, the capital cost involved, even considering any grant and loan funding available, may make this option unaffordable.

There are a growing number of properties that have already made the decision to instal heat pumps. Their experience may be useful in helping others understand the issues involved in fitting a heat pump. A concerted effort will be made to build on the existing Green Homes Network to identify

volunteers who are prepared to share their experience with others and provide reassurance on decisions being taken. This will provide another level of valuable information to aid complex decision making. This will be coordinated by community groups that form the East Lothian Climate Action Network. Developing this support network will be an action for the first year of the Delivery Plan.

7.3 Communal Heat Pump options

There may be opportunities for smaller scale heat network solutions and communal heat pumps alongside individual properties having their own net zero solutions. This could help address the lack of external space for certain properties. It may also be a more long-term cost-effective solution. Again, decisions on this may be supported by Home Energy Scotland.

Communal solutions also bring issues about the share of capital costs, billing and ongoing maintenance. No proposals on how schemes like this might operate have been developed. This is an action for the first year of the Delivery Plan.

Once a suitable governance structure has been agreed, a rapid assessment of rural communities will be carried out to try and identify those areas where a communal solution might be appropriate. This work would need to be carried out promptly to reduce the risk of some property owners taking individual action without considering the wider community possibilities. Early community driven initiatives in Innerwick and Tyninghame are helping develop the approach to this, with additional support from BeGreen.

A communal ground source heat network is being proposed as part of a new development in Dunbar. This type of initiative may be part of the solution for other new developments.

This research phase may involve student projects coordinated by ELCAN.

7.4 Electricity Grid implications

There are major limitations on the capacity of the local electricity grid, operated by SPEN to cope with the increased load involved with additional heat pumps. A software tool was provided by SPEN to help identify areas of grid weakness. This had limited use and will require additional development work to make it an effective tool.

An early action for the Delivery Plan involves continued engagement with SPEN on grid upgrades to avoid delays to any heat pump installations, especially in rural areas.

This information is particularly important for the Heat Pump Zone as the increase in electricity demand will be spread across all households. In the Heat Network Zone the major increase in electricity demand will be concentrated at the Heat Centre location.

Outcome 2: Every property owner will be supported to find a more resilient heating solution

Key Priority Area 2: Heat Pump Zone

8. Energy Efficiency

Improving energy efficiency of buildings will help reduce the overall energy demand, reduce the cost of heating properties and significantly impact on reducing fuel poverty. It will also support the rollout of net zero heat solutions by acting as preparatory step and supporting the overall decision process for individual properties.

8.1 Targets

The following energy efficiency targets set by the Scottish Government highlight the scale of the challenge involved.

Target	**East Lothian implications**
Private rented homes to be EPC C by 2028	*3,000* across East Lothian not currently meeting this standard
All social housing to be EPC B by 2032	*10,000* local authority and housing association properties rated C or lower
All other homes to be EPC C by 2033	*19,000* will need to be improved
All fuel poor homes to be EPC B by 2040	Excluding social housing around *34,000* homes could fall into this category

Overall, an estimated 65% of properties are likely to need some level of energy efficiency retrofit to meet Scottish Government targets. It is not yet clear what impact being connected to a district heat network would have on future EPC ratings. This will be tested as soon as the new standards are announced. This will have an impact on the decision property owners make.

If heat networks are developed, they will not reach all communities within East Lothian in time to meet some the targets outlined above. This will also impact on decision that are made.

8.2 Differences across Tenure Types

Although the energy efficiency of domestic properties varies considerably depending on a wide range of factors, it is noticeable that there are differences across tenure types.

The best performing type are the social rented properties owned by housing associations. Less than *5%* have EPC ratings of D or lower. All properties have a current EPC certificate, and these tend to be more up to date, so this is more reliable information. These tend to be well maintained by the social landlords including the council and have benefited from more consistent investment to ensure tenants are protected from rising bill and the risk of fuel poverty.

The private rented sector is the worst performing with nearly *60%* of properties rated D or lower. This has huge implications for increased living costs for tenants and the associated fuel poverty. This is why the Scottish Government has focused early targets on this sector and banked this up with legislation to force improvements.

EPC data on East Lothian Council's properties is less up to date on Home Analytics as EPC surveys are not routinely carried out after any upgrade work is completed. The Council's own property database has up to date information on all properties, but this is not available via Home Analytics. The Council has an ongoing programme of property upgrades funded by the Council.

Mixed tenure properties can be the most difficult to deliver major improvements, even when there is grant funding available that can also support owner occupiers. It may be impossible to progress any energy efficiency measures such as external wall insultation in a whole block if one property owner opts not to sign up. These issues will continue to restrict progress on installing energy efficiency measures.

8.3 Historic Buildings

East Lothian has an estimated *9,600* domestic properties within the 30 Conservation Areas. As these cover the historic centres of towns and villages, they also encompass many non-domestic properties, often occupied by small businesses. Conservation Area properties are on average considerably less energy efficient.

- Only *4%* of Conservation Area Properties are rated A or B compared to *16%* in other areas
- *67%* are estimated to be rated D-F compared to 46% in other areas

This is a factor of the nature of the properties – older and stone built. It is also impacted by the restrictions placed on these properties by planning regulations. These include restricting the fitting of certain types of double glazing. Across East Lothian *11%* of properties have single or partially single glazing. That proportion rise to *31%* in Conservation Areas.

There are similar issues with Listed buildings.

The Scottish Government has recently carried out a consultation on changes to the planning regulations relating to energy efficiency and renewable technology for Conservation Areas. The Council have submitted a response to this consultation, which confirms that we support the principle of increasing permitted development rights for domestic renewable technology. These changes should make it easier for property owners in Conservation Areas to improve the energy efficiency of their properties. It is important that we make the public aware of these changes, and this will form an action for the first year of the Delivery Plan.

There are significant challenges associated with making changes to the fabric of older buildings to improve energy efficiency. These can include:

- Repair work may be needed prior to retrofit
- Ensuring air flow and water vapour dispersal are not compromised to the building's detriment
- Consideration of using natural materials better able to buffer moisture and prevent condensation
- Preventing damage when retrofitting
- Maintaining historic character
- Use of lime render as external wall insulation
- Presence of lath and plaster potentially restricting internal wall insulation options

Seventeen of East Lothian's Conservation Areas are contained with the Heat Network Zone. The most efficient heat solution for properties within these will be to connect to a heat network. Every effort should still be made to improve energy efficiency, but this might involve a reduced need to make expensive and potentially risky fabric changes. The properties would remain relatively energy inefficient compared with other property types. However, the risk that this leads to excessive bills and the risk of fuel poverty will be mitigated by a stable and secure heat supply.

8.4 Improving Insulation

The most effective way to reduce energy consumption in a property is to reduce heat loss through the roof, walls, windows and floor. The nature of a building's construction has to be taken into consideration when planning changes improvements to insulation. Maintaining adequate ventilation is essential to prevent a build-up of moisture which can lead to damp and mould.

8.4.1 Roof insulation

This is the cheapest intervention that brings the most immediate improvement in energy efficiency.

The first thing for any property owner to check is the depth of insultation in any areas of roof space that they can access. This should be at least 250mm. Homes that had insulation fitted many years

ago often have less which reduces the effectiveness. Adding additional insulation on top is a relatively cheap solution and would bring immediate benefits in reducing heat loss. It is essential that insulation coverage does not leave gaps.

For many properties, especially those with rooms in an attic or with dormer windows, there may be areas of roof space that have limited on no access. It is difficult to tell whether these have effective insultation or not. A simple test is how quickly the temperature of the room drops on a cold night when heating is turned off. The use of thermal imaging cameras may help identify areas of heat loss or poor insulation coverage. Although getting access to these areas may be disruptive, the end result on heat loss could be very dramatic.

It should be a priority for all landlords to ensure that every step has been taken to insulate roof spaces to appropriate standards.

8.4.2 Wall Insulation

The data on cavity wall insulation within Home Analytics is very uncertain. EPC surveys tend to rely on information homeowner provided information or assumptions made by the assessor rather than bore-scoping or the use of thermal imaging cameras.

Thermal imaging cameras are very effective during cold spells when the heating is on at identifying properties where there is no cavity wall insulation installed or where an installation may be defective.

If a property has uninsulated cavities, then this should be a priority for action. An element of grant funding is available for most properties though there may be difficulties finding a contractor able to undertake the work.

8.4.3 Draft proofing and ventilation

At the most basic, this involves ensuring that there are no gaps around doors and windows where heat can escape. However, in older properties that were never intended to be air-tight this can also be an issue. With low air flow there is a risk of moisture build-up that can lead to mould and unhealthy conditions. Home Energy Scotland or a technical survey should be able to advise on what measures would be suitable for any property.

8.5 Solar PV and batteries

The combination of local electricity generation with storage has the potential of effectively reducing the cost of heating for a property that relies on electricity. This is particularly important for any property in the Heat Pump Zone and considering installing a heat pump.

East Lothian benefits from an above average level of sunshine and solar panels can be expected to deliver a good performance level through most of the year. Even in winter panels can be expected to make a small contribution to electricity demand as the coldest days tend to be sunny. The positioning of panels is important, avoiding shade or partial shade. Ideally properties should face south, southeast or southwest, but using optimisers would reduce the issue for properties that don't face south.

The capacity of the local electricity grid infrastructure needs to be checked with SPEN. This needs to be able to cope with any surplus electricity that is exported at periods of high sunlight and power generated exceeds the need of the property. This may result in properties that would otherwise be suitable for solar PV being ruled out.

The addition of battery storage can nearly double the amount of self-generated electricity that can be used, and this has a very significant impact on the time taken to cover the cost of the installation. There is an additional internal space requirement for the battery and control panel. Batteries can be installed in roof spaces and control panels can be fitted next to fuse boards and relatively small.

Home Energy Scotland can advise on what would be suitable for any property. Installing battery storage would also make properties more resilient to grid disruptions.

Surplus electricity generated can be exported to the grid and a property owner will be paid a guaranteed rate for this. The rates offered by suppliers vary so it pays to look at all the options as there will almost certainly be periods over the summer when panels will generate more than is required.

Outcome 4 - East Lothian's homes and buildings are as energy efficient as possible

Key Priority Area 1: Conservation Areas

Key Priority Area 2: Owner Occupiers

Key Priority Area 3: Council Homes

Key Priority Area 4: Private Rented

Key Priority Area 5: Social Rented

Key Priority Area 6: Council owned non-domestic

Key Priority Area 7: Other non-domestic

Key Priority Area 8: Solar PV Installations

9. Community Wealth Building

9.1 The Scale of the Opportunity

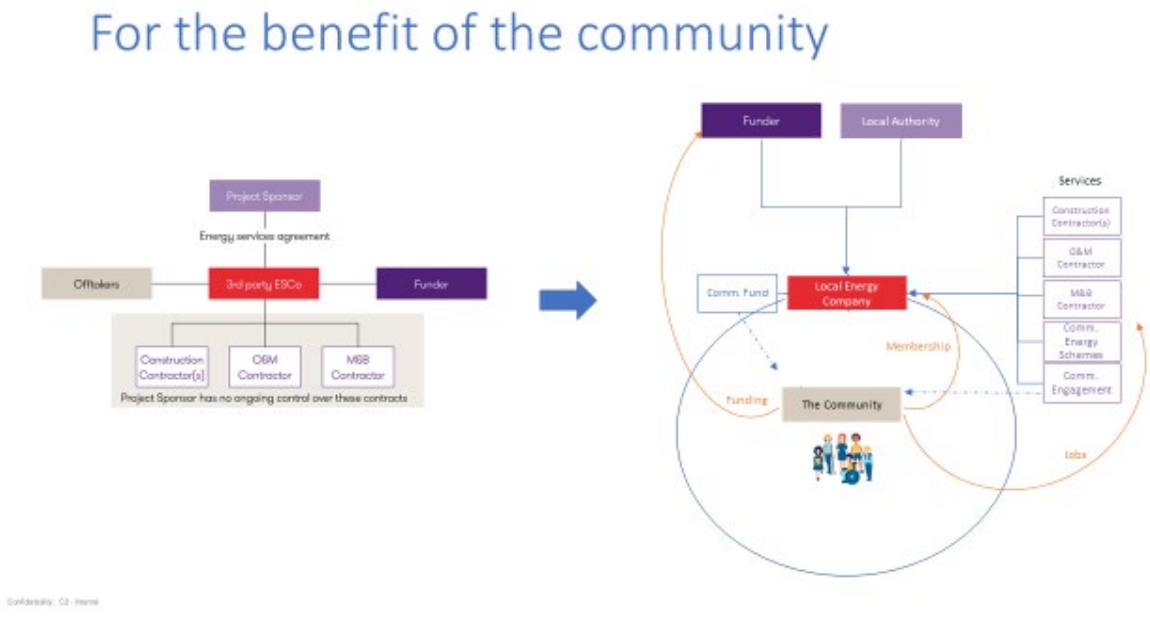
An estimated £45m is spend annually by domestic households on mains gas for heating. Almost all of this is lost to the local economy, being paid to gas supply companies. The potential establishment of a district heat network as a completely new utility would bring the opportunity to take a different approach. If, in the long-term a similar sum annually continues to be spent on heating homes, but via a radically different delivery model that involves community ownership, more of the financial benefits will remain within our community.

The capital investment required over the next 20 years to establish district heat networks and improve energy efficiency of all buildings would run to hundreds of millions of pounds. With the right approach, a significant proportion of this can create and sustain local jobs and businesses, helping ensure that this investment has long term economic benefits.

9.2 Community Role in Heat Networks

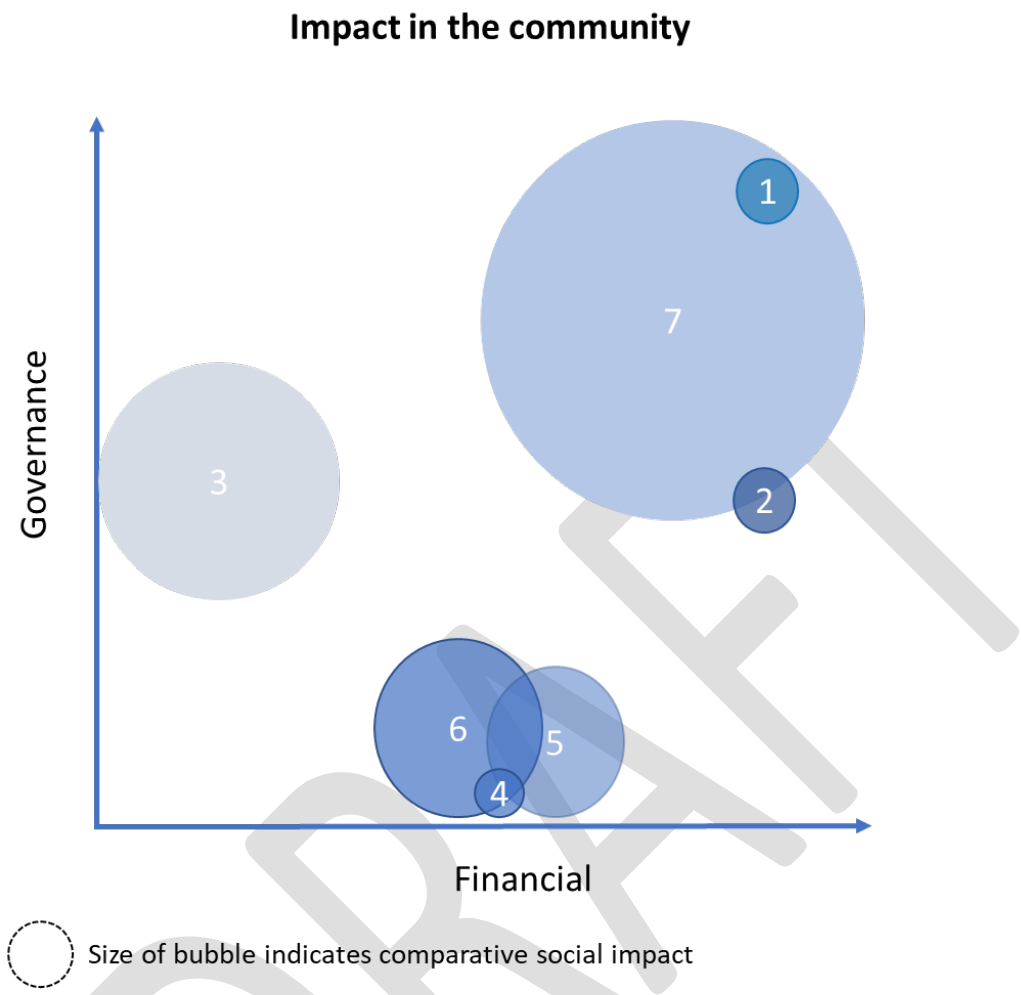
The establishment and long-term operation of heat networks across East Lothian creates an opportunity to retain benefits within local communities. This could support community wealth building, provide local jobs and also tackle significant factors in fuel poverty.

The diagram below highlights the difference between an energy project being delivered on a commercial basis and one where the community has a significant role to play.



Work is underway to help determine the most appropriate organisational and governance structure for East Lothian's future Heat Networks.

There are a number of different models that could be considered as possible options. These are summarised below, with the graph showing the impact each might have in terms of governance and financial benefits.



1. Equity – Community investment (ownership) in the Local Energy Company

2. Debt – Community lends money to the Local Energy Company

3. Membership - In the Local Energy Company (ideally with the right to vote)

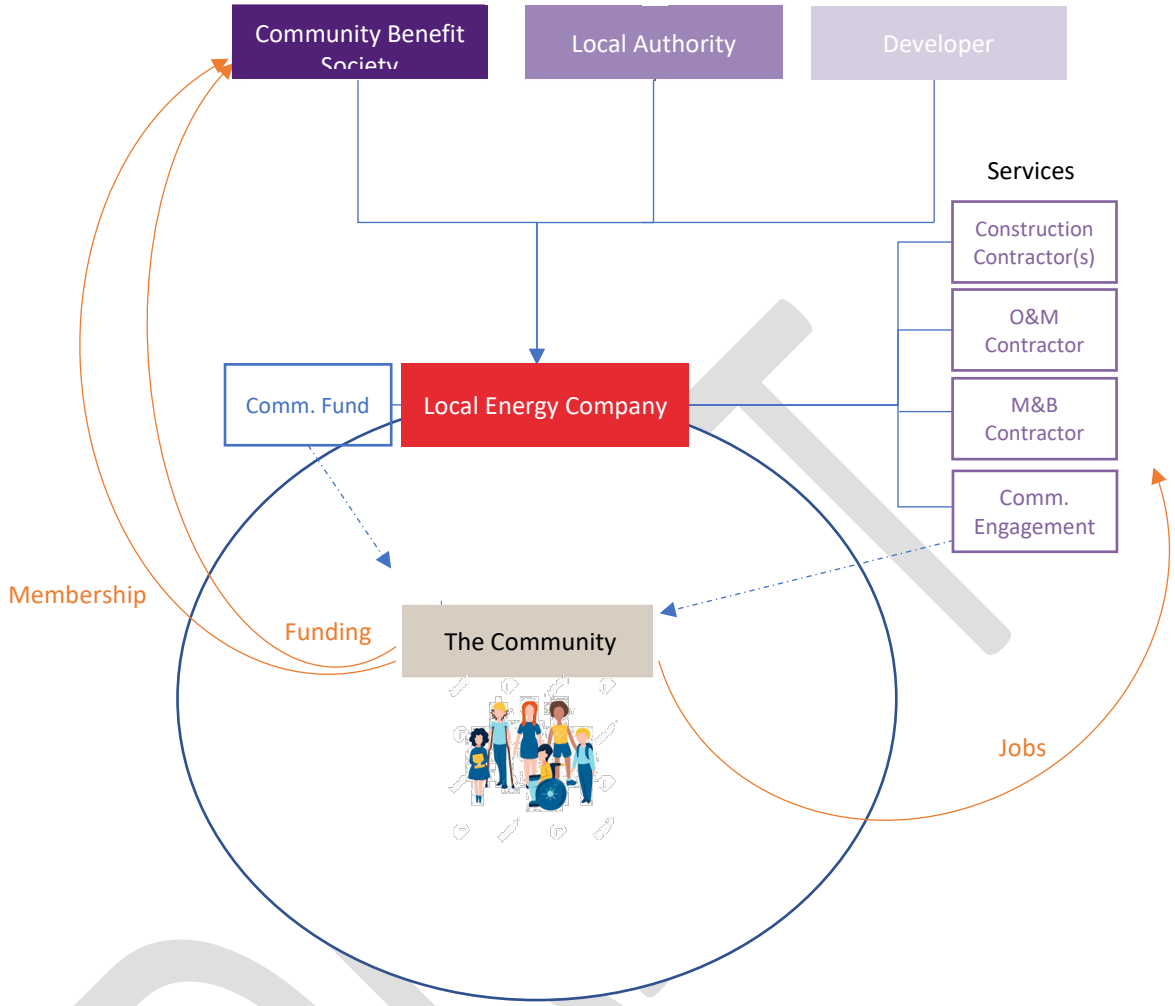
4. PHPA (Power or Heat Purchase Agreement) - Agreement to buy energy from other community owned energy assets

5. Community Fund - Money set aside to spend on enhancing the community

6. Community Engagement - Activities to support the community this includes fuel poverty support, door knocking, energy advice, collective switching etc.

7. Hybrid Models - A combination of 2 or more of the above models

For example, a model involving a hybrid model involving East Lothian Council and a Community Benefit Society might involve the following relationships.



The purpose of a community benefit society within this structure is to serve the broader interests of the community. There can be no alternative or secondary purposes, including any that may preferentially benefit members. Community benefit societies normally have members who hold shares and are accorded democratic rights on the basis of one-member-one-vote. Any profit made by a community benefit society must be used for the benefit of the community. Community benefit societies must only use their assets for the benefit of the community. If a community benefit society is sold, converted, or amalgamated with another legal entity, its assets must continue to be used for the benefit of the community and must not be distributed to members. This lock on the assets of a community benefit society can be reinforced by adopting the prescribed wording for a statutory asset lock.

An initial step will be the bringing together of an Energy Steering Group, drawing on expertise within the community and staff from East Lothian Council. This group will explore the different governance options and make recommendations on the most appropriate vehicle to deliver the best outcomes for East Lothian's residents.

9.3 Tackling Fuel Poverty

Better homes are crucial for public health. Cold, damp homes create a lot of pressure on NHS and social care services. Improved public health through better houses would avoid huge personal and financial costs.

There is a unique opportunity to ensure that East Lothian's new heat provider has a specific priority to reduce fuel poverty. This would meet the strategic objectives of the Scottish Government, East Lothian Council and many other community organisations. This could be achieved in a number of ways:

- Ensure that the cost of heat provided by the heat network is kept as low as possible and the risk of significant price fluctuations minimised. This could be achieved through a long-term fixed rate for electricity.
- There should be no financial barrier to connecting to the heat network. This is essential otherwise it creates a significant barrier to less affluent households and they would be forced to opt out of connecting.
- The cost of any equipment required for individual properties, such as a heat exchanger should be included within the overall cost of heating. This would include the fitting cost.
- The involvement of a Community Benefit Society could direct an element of future profits towards providing a social tariff that would offer cheaper heat to those at greatest risk of extreme fuel poverty
- By coordinating energy efficiency improvement programmes with the roll out of heat networks, grant funded upgrades would continue to benefit those in greatest need

9.4 Growth opportunities for businesses

There are a range of existing local businesses with significant potential to benefit from decarbonisation, bringing growth in local employment with high paying, skilled jobs. This might include businesses such as Sunamp, Had Fab and the small number of renewable technology fitters based in East Lothian.

The need for energy efficiency retrofit and the installation of heat pumps may provide significant growth opportunities for existing heating engineers who are prepared to retrain.

R3, managed by East Lothian Housing Association has already indicated a desire to expand their scope and potentially cover installation and servicing for heat pumps and heat exchangers. There may also be a role for East Lothian Council, providing apprenticeships and scale.

Other businesses specialising in heat network infrastructure that are based elsewhere may be encouraged to locate future growth in East Lothian, covering design, manufacture and installation.

9.5 Skills shortage

The number of homes to be retrofitted and connected to heat networks each year to meet targets is significant, requiring a substantial skilled workforce. The range of roles that will be required includes:

- Insulation fitting
- Heat pump installation/ maintenance
- Heat network construction/ operation
- Pipe network design and
- Smart energy
- Data & digital services

- Emerging innovative technologies
- Funding and investment coordination
- Retrofit coordination
- Traditional skills for historic buildings
- Supporting roles (e.g. welders, scaffolders)

East Lothian Council through its East Lothian Works team already has a number of programmes in place and under development that will help address the skills shortage. This includes a Scottish Government Demonstrator Project, based at Wallyford Learning Campus, for Modern Apprenticeships in Global Infrastructure & Built Environment. This will include the facilities management qualifications that are currently only available in the West of Scotland. In addition, a partnership with Edinburgh College involves the delivery of Level 4/5 in Construction Crafts with Level 5/6 Building Services planned for early 2024. These courses are for school and post school. There is also an Edinburgh College certificated construction certificate for post school.

The Integrated Regional Employability and Skills Programme that forms part of the Edinburgh and South East Scotland City Region Deal is developing a network of Recruitment and Skills Centres to act as a tangible interface between the partners and business. There is a clear opportunity for a focus on heat and energy efficiency employment as a sector of high demand.

The college sector, supported by ESP Scotland is ready to coordinate training provision to help deliver the significant increase in skilled workers that would be required to deliver this transformation in heat and energy efficiency. Some of this training could be provided in East Lothian, taking advantage of new facilities at the Wallyford Learning Campus.

9.6 Wider economic impacts

The decisions taken as a result of LHEES have the potential open up additional economic growth opportunities, helping attract businesses linked with heat infrastructure to be based in East Lothian.

9.6.1 Cockenzie site

The location of a major heat centre on the site will make the location potentially more attractive to other businesses and job creators. A connection to a net zero heat supply will enhance marketing activities and be attractive to a range of other industries.

The infrastructure to manage waste heat will also be attractive. Any business that generates heat can improve their energy efficiency by feeding that waste heat into the heat network. This could improve their overall energy efficiency performance that could enhance their ability to secure new business.

9.6.2 Green Hydrogen production

There are no known plans for green hydrogen production in East Lothian. However, were this to come forward, this is an energy intensive process that generates significant waste heat. The ability to capture that heat and distribute it within a heat network would have a positive impact on the business model of any proposed site and help diversify the heat supply.

9.6.3 Horticulture

Recent price rises have focused attention on food security, especially out of season. A major input cost into food production out of season is heat. A relatively cheap supply might open up the potential to expand East Lothian's production utilising spare capacity within the heat network.

9.7 Local investment- for local returns

Investment rules have until recently made pension fund investment into local projects difficult. Those rules have been relaxed which opens up the possibility of long-term investment. East Lothian Council and council employees together pays tens of millions of pounds annually into the Lothian Pension Fund. Lothian Pension Fund administers the Local Government Pension Scheme (LGPS) in Edinburgh and the Lothians. This is a multi-employer scheme and the second largest LGPS fund in Scotland with over £8 billion in assets. This is invested in a diversified portfolio of assets, including equities, bonds, property and infrastructure. Lothian Pension Fund is unique in Scotland with its own FCA-regulated investment team. They claim that this results in better alignment of interests and a truly long-term investment focus. It also provides a unique opportunity for infrastructure investment into district heating that will generate secure returns.

Outcome 6: A significant proportion of the benefits of Net Zero investment remains within the East Lothian economy

Key Priority Area 1: Community Wealth Building

Key Priority Area 2: Tackling Fuel Poverty

Key Priority Area 3: Developing the local supply chain

Key Priority Area 4: Lothian Pension Fund

10. Funding and Investment

East Lothian Council does not have the capital or revenue capacity to deliver the desired outcomes of this strategy. As a result, significant funding and investment will be required if the visions outline in this document are to be realised. The various options for governance for an Energy Supply Company as outline in section 9.1 may impact on the range of funding opportunities available.

10.1 Grant and loan funding

A review was carried out of the current grant and loan funding and delivery programmes that could be utilised to support LHEES Delivery actions. This is by no means a comprehensive list of all the funding opportunities available.

Consideration should be given to potential changes in the policy landscape that may involve new delivery and funding programmes. The clear designation of zones within LHEES will help decision makers adapt quickly to new opportunities as they arise.

10.1.1 Potential sources for East Lothian Council

Scheme Name	Details	Status
Energy Efficient Scotland: Area Based Scheme (ABS)	Funded by Scottish Government. Targets energy efficiency measures for owner occupiers and private landlords owning 3 or less properties. This ongoing scheme is delivered by East Lothian Council and prioritises fuel poor areas (usually Council Tax Band A-C)	Scheme already operating and will continue to focus on priority retrofit aligned with LHEES outcomes
Heat Network Support Unit	Funded by Scottish Government to support and develop heat networks. Can offer 100% funding for feasibility studies and up to 50% of Outline Business Cases.	Initial application is underway in support of Cockenzie Heat Centre feasibility
Heat Network Fund	Funded by Scottish Government with a total of £300m available before April 2026. Heat network projects must be of a large scale and demonstrate a positive social and economic benefit.	Case will be made in support of wider capital investment for heat network priorities
Public Sector Heat Decarbonisation Fund	Funded by Scottish Government via Salix. Total of £20m to help public sector decarbonise their heating systems by replacing them with zero direct emissions systems, as well as for retrofit energy efficiency measures to support the overall decarbonisation of heat in buildings	Announced in July 2023 with more information expected soon with tight application deadline
Social Housing Net Zero Heat Fund	Funded by Scottish Government and also open to other social landlords. Total of £200m by 2026 with two themes: 1 – zero direct emissions heating systems 2 – “fabric first” energy efficiency only projects	ELC application can be prepared once net zero heat solutions are agreed via LHEES. Also encourage RSLs linked with getting heat network ready

As part of the investigation into the development of the capital investment model for the district heat networks, options will be explored to unlock additional investment into East Lothian’s social housing stock.

10.1.2 Potential sources for social landlords

The main opportunity is the Social Housing Net Zero Heat Fund as mentioned above. For properties within the Neat Network Zone, confirmation of heat network plans will enable applications linked with further energy efficiency measures linked with getting heat network ready, or potentially towards the capital cost of connection.

For rural properties in the Heat Pump Zone, proposals could be considered focused on communal heat pump solutions.

10.1.3 Potential sources for private landlords

The Private Rented Sector Landlord Loan is a Scottish Government funded loan that helps landlords improve the energy efficiency of their properties and meet minimum standards. This is administered by the Energy Savings Trust.

Up to £15,000 can be borrowed per property for insulation measures and £17,500 for up to two home renewable systems per property plus an energy storage system up to a maximum of £6,000. Landlords with five properties or fewer can borrow up to £100,000 and those with six or more can borrow up to £250,000 with the loan repayable over eight years.

10.1.4 Potential sources for homeowners

Advice on the range of grant and loan funding that is currently available to support owner occupiers with energy efficiency improvements and net zero heating solutions is available via Home Energy Scotland. More information can be found at Home Energy Scotland Grant and Loan.

In addition, Home Energy Scotland will be able to advise whether homeowners would be eligible for support under the Warmer Homes Scotland grant scheme - Warmer Homes Scotland.

As part of the investigation into the development of the capital investment model for the district heat networks, options will be explored to enable property owners to unlock additional funding for energy efficiency improvements. This may involve an increase in unit cost paid for heat by that household for a number of years. However, any increase in unit cost should be more than offset by the overall reduction in heat required to maintain a warm home due to increased energy efficiency. Any agreement of this nature would remain with the property so if a home is sold, the next owner would continue to pay the slightly increased unit rate for heat.

10.2 Capital Investment

The Scottish National Investment Bank invests on a commercial basis but will provide patient, long-term capital for heat network projects. Early discussions have already taken place regarding East Lothian's heat network priorities, and it is expected that an approach will be prepared for investment and also for their assistance in bringing together other investors.

An engagement event for investors is planned for November 2023 to showcase East Lothian's possible heat network opportunities. The feedback received at this event will be taken into account in any feasibility studies.

10.3 Community benefits and bonds

A community benefit company would have a range of options to raise additional capital, especially to support the development phase of any infrastructure projects. This might include receiving financial support in the early years from renewable energy community benefits schemes or the

issuing of local bonds. The range of options will be fully explored to enable decision to be made on the most appropriate corporate structure.

Outcome 5 – Investment and grant funding secured to deliver Net Zero projects

Key Priority Area 1: Feasibility Studies and Business Case Development

Key Priority Area 2: Investment for Retrofit and Infrastructure

Key Priority Area 3: Grant funding from Scottish and UK Governments

Key Priority Area 4: Community Funding

11. Government Support

There are a number of areas relevant to the implementation of this LHEES that will be reliant on actions from the Scottish and UK Governments.

11.1 Consistency of message

Changes in policy direction by governments at any level will undermine public confidence.

The Scottish Government have committed to publishing a Public Engagement Strategy for Heat in Buildings, which will set out plans for the national awareness raising around energy efficiency and heat decarbonisation, including heat networks.

11.2 Legislative changes

There are a number of elements of heat network development that would be more effective if backed by changes in legislation. This would include:

- Classifying heat networks as a utility. This would place heat networks on the same level with gas or electricity.
- Extending the compulsory purchase

11.3 Future Public Sector Funding

The Scottish Government have made clear funding commitments for the remainder of this parliament. The vast majority of the infrastructure development for district heat networks would take place after 2026. Progress on these will certainly require significant public funds into the next parliament and beyond.

Outcome 7: Additional legislative changes and support required from Scottish and UK Governments

Key Priority Area 1: Additional changes to legislation to remove barriers to achieving ambitious targets

Key Priority Area 2: Public sector investment to unlock timely decisions and action

Key Priority Area 3: National action to facilitate local delivery