Perth and Kinross

Local Heat & Energy Efficiency Strategy

2024–2045

PERTH & KINROSS COUNCIL

July 2024

Contents

FOREWORD

I am delighted to introduce Perth and Kinross Council's first Local Heat & Energy Efficiency Strategy (LHEES) which sets our ambitions until 2045. This Strategy and accompanying 5-year Delivery Plan (2024-2029) detail our approach to improve Perth and Kinross buildings' energy efficiency and to decarbonise heat in a fair and just way within a changing energy system.

Energy Efficiency and heat decarbonisation are core elements of the energy transition to Net Zero by 2045 tackling climate and biodiversity emergencies. To achieve this means all building owners in Perth and Kinross will need to do their part to cut their emissions. This strategy details how we as a Council area will approach this challenge.

Our ambitions for Perth and Kinross are reflected across two strategic priorities and multiple actions. These focus on identifying, prioritising, and delivering measures to improve buildings' energy efficiency, and where this is not possible to make a commitment to complete further research.

For a successful transition, our LHEES also emphasises the need for a just transition to Net Zero. This includes actions focussing on tackling fuel poverty by aiming to improve energy efficiency to reduce fuel bills; developing a resilient, stronger, and greener economy with green skills and jobs; working in partnership with communities to build community wealth and wellbeing from heat transition and mobilising partners and private and public investment to drive the heat transition to low and zero emissions heating.

We also want to create from the LHEES process the foundations for a more decentralised and self-sufficient energy system for our area. We have seen the consequences of not being self-reliant on energy as a result of global events and the spike in gas prices that has had an impact on everyone's energy bills. There is a commitment from UK, Scottish and local governments to increase our energy security so that this can't happen again.

This Strategy was informed by developing a rigorous evidence-base and through engagement with partners across Perth and Kinross and beyond. Ongoing collaboration, including sharing of knowledge, data, and innovations has been key to the development of Perth and Kinross's LHEES and will be key to its successful delivery.

With over half of Scottish energy demand in 2020 being for heating purposes, everyone in Perth and Kinross will either help support and deliver LHEES through improving their homes and businesses; or experience the benefits of these measures by having more energy efficient homes and workplaces with low or zero emissions heating.

I would like to thank everybody for their participation in developing the Strategy and its future delivery.

Cllr Richard Watters

Convener of Climate Change and Sustainability Committee

EXECUTIVE SUMMARY

Perth and Kinross Council has a statutory duty to prepare a Local Heat and Energy Efficiency Strategy (LHEES) and update it on a 5-year basis as part of the Local Heat and Energy Efficiency Strategies (Scotland) Order 2022 which came into force on 21 May 2022. As established in the Order, LHEES should have a two-part structure of a Strategy and Delivery Plan.

A LHEES is a long-term strategic framework for the improvement of the energy efficiency of buildings in the local authority's area, and the reduction of greenhouse gas emissions resulting from the heating of such buildings. A delivery plan is a document setting out how a local authority proposes to support implementation of its local heat and energy efficiency strategy.

The first Perth and Kinross Local Heat and Energy Efficiency Strategy (LHEES) (2024-2045) and accompanying 5-year Delivery Plan (2024-2029) is firmly aligned to the priorities and vision of the Council and its partners for a Perth and Kinross where everyone can live life well, free from poverty and inequality.

The LHEES 2024-2045 reflects the views of our communities, elected members, stakeholders, and partner organisations. These views have helped influence the development of the LHEES priorities and outcomes which are most important for Perth and Kinross. They will enable Perth and Kinross Council and partners to deliver more energy efficient homes and buildings, affordable warmth and heat decarbonised sources.

The LHEES vision for Perth and Kinross is that "by 2045, our homes and buildings will be more energy efficient and with more decarbonised heat sources providing more affordable warmth and no longer contributing to climate change". This will lead to the outcomes of significant reduction in carbon emissions, affordable and sustainable heating and health and well-being benefits.

The Perth and Kinross LHEES targets are aligned with the Scotland's statutory targets for greenhouse gas emissions reduction and fuel poverty. The targets will be used to measure progress in the Delivery Plan (2024-2029) and subsequent plans. However, it is recognised that these targets would be very challenging if no significant public and private investments are made available or come forward as well as if behaviours are not changing. This would be particularly the case for private households and small and medium businesses.

To support the LHEES vision and outcomes, the Strategy focuses on two Strategic Priorities:

- Decarbonising heat within a transitioning energy system focusing on heat networks and heat pumps.
- Improving buildings' energy efficiency aiming for affordable warmth and regulatory compliance.

These are broken down into the following delivery priorities:

- Delivering decarbonised heat within a transitioning energy system through Heat Network Zones which would include Perth City Centre, Perth Inveralmond Industrial Estate, Perth College/UHI, Perth Academy, Auchterarder, Kinross and Blairgowrie

- Delivering decarbonised heat within a transitioning energy system: Heat Pumps focusing on properties not connected to the gas grid, or off-gas, social housing technically suitable for a heat pump retrofit (i.e., well insulated property with a wet system). Off-gas private homes suitable for heat pump retrofit and social housing that requires energy efficiency improvements to enable suitability for heat pumps.

- Improving buildings' energy efficiency to meet regulatory standards in areas with concentrations of social housing having poorer energy efficiency (below EPC B) and low costs of intervention, areas where substantial energy and CO2 emissions savings can be achieved for privately owned homes (below EPC C) if cost effectiveness could be achieved when combined with the areas above and areas with high potential for heat demand savings in non-domestic buildings with lower cost retrofit interventions.

- Improving buildings' energy efficiency aiming for affordable warmth in areas where poor energy efficiency is the highest and acts as a driver of fuel poverty. This would target areas where low cost retrofit options are possible and where social housing is likely to experience a greater reduction in fuel poverty, due to low cost retrofit measures.

The delivery of the LHEES priorities will also be supported by the following mechanisms:

- Taking a Whole Energy Systems Approach: Through the development of the Local Area Energy Plan (LAEP) and a collection of complementary initiatives, the Council is taking a whole systems energy approach to the development and implementation of the LHEES from generation through to demand. This includes future energy systems forecasting and scenario tools and shared platforms, Council's Estate decarbonisation programme and business case development toolkit to develop a strategic investment programme enabling Smart Local Energy Systems.

- Developing green skills and the capacity of the supply chain.

- Working in partnership with communities to build community wealth and wellbeing.

- Mobilising partners and public and private investments for projects including through a possible Strategic Energy Partnership to unlock delivery of a pipeline of low carbon projects. An energy partnership would be a legally defined, collaborative arrangement between Perth and Kinross Council and an external organisation to bring capital investment and delivery capability into large energy-related projects.

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Introduction

1. INTRODUCTION

Perth and Kinross Council has declared Climate Change and Biodiversity emergencies. A Climate Change Strategy and Action Plan have been approved and all partners are mobilised to implement agreed actions. Heat decarbonisation and improving energy efficiency are at the centre of our efforts to achieve net zero by 2045.

As established in the Local Heat and Energy Efficiency Strategies (Scotland) Order 2022, Perth and Kinross Council has a duty to prepare a Perth and Kinross Local Heat and Energy Efficiency Strategy (LHEES).

Perth and Kinross LHEES is at the heart of a place based, locally led and tailored approach to the heat transition. Our ambition is to use it to develop a whole energy planning approach going beyond heat and energy efficiency to include transport decarbonisation, local renewable energy generation, energy storage, demand-side flexibility and networks.

This document presents the first Perth and Kinross Local Heat and Energy Efficiency Strategy (LHEES) (2024-2045) and accompanying 5-year Delivery Plan (2024-2029). Firstly, it presents what a LHEES is and provides policy and strategy context and a baseline for Perth and Kinross domestic and non-domestic buildings. Then, it details our vision, outcomes and targets and presents our local challenges and opportunities and our engagement and consultation process. Finally, it details our strategic priorities, delivery plan and governance and monitoring arrangements.

WHAT IS A LHEES?

A LHEES focuses on transforming and reducing the demand for heat and energy.

LHEES are at the heart of a place based, locally led and tailored approach to the heat transition. These local strategies will underpin an area-based approach to heat and energy efficiency planning and delivery. Scottish Local Authorities have a statutory duty to prepare LHEES and update them on a 5-year basis.

A LHEES should have a two-part structure of a Strategy and Delivery Plan. Perth and Kinross LHEES Strategy will:

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

National guidance frames the Strategy around six considerations which have shaped our development of strategic and delivery priorities, as shown in Table 1.

Table 1: National Guidance - LHEES considerations

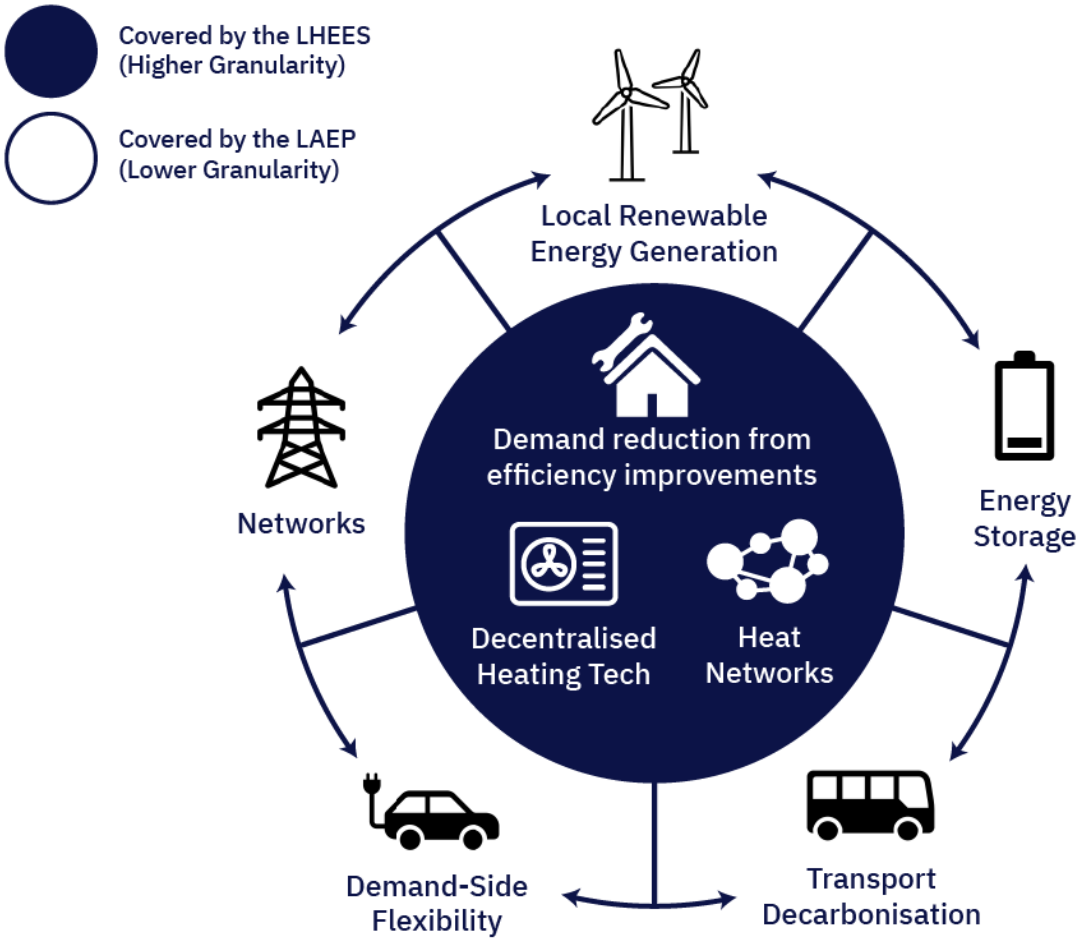
	LHEES Consideration	Description
Heat decarbonisation	Off-gas grid buildings	Transitioning from heating oil and LPG in off-gas areas
	On-gas grid buildings	On-gas grid heat decarbonisation
	Heat networks	Decarbonisation with heat networks
Energy efficiency and other outcomes	Poor building energy efficiency	Poor building energy efficiency
	Poor building energy efficiency as a driver for fuel poverty	Poor building energy efficiency as a driver for fuel poverty
	Mixed-tenure, mixed-use and historic buildings	Mixed-tenure, mixed-use, listed and buildings in conservation areas

Mixed-tenure and mixed-use buildings could include a mixture of owner-occupied, private rented and social housing, and non-domestic uses, or multiple ownership within the same tenure. Historic buildings include the buildings that are within conservation areas or those that are listed buildings.

These categories have been addressed separately as they may require alternative approaches and regulation for the installation of low carbon heat and energy efficiency solutions.

Recognising the need for compatibility with the wider energy system, Perth and Kinross Council has developed a Local Area Energy Plan (LAEP). The relationship between the LHEES and LAEP is shown in Figure 1. The LAEP will support collaboration with network operators, and other key stakeholders, to inform the development of targets as well as deliverable actions within a net zero energy system that balances out energy generation, transmission, storage and usage, including heat, at a substation area and Council wide scale, through to 2045.

Figure 1: Overview of LHEES and LAEP



Alongside this, the Council is working to prepare a Council Estate Decarbonisation Plan for its own building stock. The Council has also developed a toolkit that will assess LHEES and LAEP delivery actions and areas to develop a pipeline of investable energy projects to inform Smart Local Energy Systems (SLES). These aligned programmes of work will support the delivery of our LHEES and are further explored in the Delivery Plan section.

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POLICY AND STRATEGY CONTEXT

POLICY CONTEXT

2.1. National and UK Context

This section summarises the national and UK level strategies and legislations that set out the key drivers behind LHEES. Policies reviewed were selected due to their relevance to LHEES.

Climate Change Plan Update (2018-2032)

This update to Scotland's 2018-2032 Climate Change Plan sets out the Scottish Government's pathway to the new and ambitious targets set by the Climate Change Act 2019. The main target is that by 2045, Scotland will be net-zero, with a 75% reduction in emissions by 2030, 90% reductions by 2040 and stepped annual targets for every year, between these dates, to net zero 2045.

Furthermore, by 2032

- 35% of heat for domestic buildings will be supplied using low carbon technologies, where technically feasible, and all buildings (residential and non-domestic) will be insulated to the maximum appropriate level.
- 70% of heat and cooling for non-domestic buildings will be supplied using low carbon heat technologies.
- Improvements to the building fabric of Scotland's buildings will result in a 15% reduction in residential and 20% in non-residential heat demand.

Key outcomes relevant to the LHEES are shown below:

Outcome	Details
Buildings – Outcome 1	The heat supply to our homes and non-domestic buildings is significantly decarbonised, with high penetration rates or uptake of renewable and zero emissions heating.
Buildings – Outcome 2	Our homes and buildings are highly energy efficient, with all buildings upgraded where it is appropriate to do so, and new buildings achieving ultra-high levels of fabric efficiency.
Buildings – Outcome 3	Our gas network supplies an increasing proportion of green gas (hydrogen and biomethane) and is made ready for a fully decarbonised gas future.
Buildings – Outcome 4	The heat transition is fair, leaving no-one behind and stimulates employment opportunities as part of the green recovery.

Key funding available

- 1.6 billion in zero emissions heating.
- £95 million for heat decarbonisation and energy efficiency of the public estate

Heat in Buildings Strategy (2021)

The Heat in Buildings Strategy (HiBS) sets out the Scottish Governments vision for the future of heat in buildings, and the actions they are taking in the buildings sector to deliver climate change commitments, maximise economic opportunities, and ensure a just transition, including helping address fuel poverty.

The key targets are as follows:

- Majority of buildings should achieve a good level of energy efficiency by 2030 and all homes should meet an EPC band C standard by 2033.
- All social housing to meet EPC B or be as energy efficient as practically possible by the end of 2032; all private rented sector properties to reach a minimum standard of EPC C by 2028 where technically feasible and cost effective.
- A 68% reduction in emissions from heat in buildings by 2030 (relative to 2020 levels).

The HiBS sets out the aspirations for LHEES, in particular to:

- Support local community and wider national infrastructure issues.
- Act as an investment prospectus at national and local level, guiding delivery programmes, and signalling potential areas of investment to market actors.
- Support planning for the energy networks and over time will become an important evidence base for both the electricity Distribution Network Operators (DNOs) and Gas Distribution Network (GDN)
- Local public engagement, awareness raising and involvement in decision making.
- Supporting area based regulation.

The HiBS sets out the ambition for regulation in Scotland for heat decarbonisation and energy efficiency performance.

Key funding support includes a commitment from Scottish Government to invest £1.8 billion to support the targets and ambitions set out in the strategy.

Heat Networks Scotland (Act) 2021 and Heat Networks Delivery Plan

Heat networks (also known as district heating) supply heat from a central source to consumers, via a network of underground pipes carrying hot water. Heat networks can cover a large area or even an entire city or be local supplying a small cluster of buildings. The Heat Networks Scotland (Act) 2021 aims to accelerate the deployment of heat networks in Scotland through the introduction of a regulatory system aimed at boosting consumer confidence in the sector and providing greater certainty for investors. This Act supports the growth of heat networks through a number of initiatives including, ensuring that heat networks are developed in appropriate areas to maximise investor benefits and drive prices down for users and ensuring local communities are aware of developments which can support future users for heat networks. Targets include 2.6 TWh of heat to be supplied by heat networks by 2027 and 6 TWh by 2030.
The Act focuses on regulating the construction and operation of a heat network; making provisions about the powers of persons holding a heat networks licence; making provisions about conferring rights in heat network assets where a licence holder ceases operations; and for connecting purposes. The Heat Networks Delivery Plan sets out how the provision in the Act will be used to accelerate the deployment of heat networks in line with national targets.

Section 47 of the Heat Networks (Scotland) Act places a duty on local authorities to carry out a review to consider whether one or more areas in its area is likely to be particularly suitable for the construction and operation of a heat network. The LHEES Methodology sets out an approach to support local authorities to discharge this duty. This Methodology has been followed when preparing the Council's LHEES. In carrying out a review under Section 47(1), a local authority must have regard to the matters mentioned in Section 48(1). Heat Network Zones (designated by Local Authorities as per regulatory requirement) will be put out to a competitive tender process whereby operators who have first gained a licence and project-specific consent will bid for a zone permit (likely granting exclusivity to operate over a long-term period though this is yet be clarified). The secondary legislation is currently in development and will clarify the scope of the Act and how operators and public sector bodies will interact with it. A summary of the key provisions in the Act is included below:

Heat Network Act theme	Description
Heat Networks License	Prospective heat network operators will have to first obtain this licence with the intention of ensuring that market participants are solvent, competent, fit and proper and can provide their essential service in line with conditions set by a Licensing Authority, with ongoing monitoring and enforcement where necessary. This, in turn, will provide assurances to both consumers and investors in deciding whether to become involved in the sector
Heat Network Consents	The requirement to attain project-specific consent will ensure that projects are vetted to assess how they will contribute to targets on emissions reduction or fuel poverty. Heat network operators will have to obtain this consent if they are to progress with any prospective heat network project in Scotland. The

	consenting authority would most likely be Scottish Ministers to reduce the burden on both local authorities and network developers, and to reduce the risk of Local Authorities effectively self-regulating.
Heat Network Permits	Heat networks are in-effect mini grids, isolated from the wider gas grid. This means that operators do not have the same floating customer base in which to recover their costs from that gas and electricity operators benefit from. Granting operators long-term permits seeks to mitigate against this by providing a natural monopoly following a competitive tender process. The guarantee that operators will have exclusivity within a designated Heat Network Zone will provide certainty of a steady return on investment. Giving operators confidence that they will be able to recover their costs over a long period of time increases the commercial viability of a heat network. This confidence will allow investors to target more ambitious projects. It is not yet clear what the permitting element of the Heat Networks Act will mean for operators and the Council will continue to engage with the Scottish Government on the development of secondary legislation for the Act.
Heat Network Zones	To fully maximise the benefits of a heat network, strategic planning is required to identify zones that have the most potential. This zone-specific approach allows buildings with significant heat demands (anchor loads) to be identified, along with possibilities to utilise renewable sources for the supply. The requirement to identify and legally designate heat networks zones by local authorities will provide an informed evidence base which will enable long-term planning around where a heat network is commercially attractive and how they can advance key strategic goals around decarbonisation and fuel poverty. This provision of the Act has now come into force and more information can be accessed here
Building Assessment Reports (BARs)	This puts a duty on the public sector to assess their estate for suitable heat network connection. This will provide clarity on heat demand alongside connection suitability from an architecture perspective. Whilst this only applies to the public sector at present, this may extend to all non-domestic buildings in the future. This provision of the Act has now come into force and more information can be accessed here.
Powers of Licence Holders	This aspect of the Act will equip heat network licence holders with statutory undertaking powers. Operators will have similar wayleave and access rights granted to other utility providers. Such rights can be in relation to compulsory acquisition of land, wayleaves, survey works, and access to carry out work. This aims to reduce capital costs connected to construction and the associated delays often suffered. The Scottish Government are currently considering whether to extend this right to the road network, something that conventional utilities have rights over. Network wayleave rights will also be granted to operators. This will enable operators to request from the Scottish Ministers the

	right to install pipework and other apparatus up to any building. The building owners will be under no obligation to connect, but the ability to connect in the first place will provide operators with a higher degree of confidence in future asset connection.
Heat Networks Assets Schedule and Transfer Regime	This element of the Act requires heat networks to have a scheme in place to transfer operational rights to a third party to ensure sustained supply, if and when needed.

Key funding available includes:

- £1 million Heat in Buildings Development Funding
- Invest £400 million to support the development of large-scale heat infrastructure
- £300 million Heat Network Fund

Fuel Poverty (Targets Definition and Strategy) (Scotland) Act 2019.

The Act sets out a new target relating to the eradication of fuel poverty, as well as providing a revised definition of fuel poverty. By 2040; no more than 5% of households in Scotland are in fuel poverty; no more than 1% of households in Scotland are in extreme fuel poverty.

LHEES should be primarily driven by Scotland's statutory targets for greenhouse gas emissions reduction and fuel poverty. The LHEES Strategy and Delivery Plan should therefore seek to implement actions and delivery that support fuel poverty alleviation. It should be noted though, that the LHEES Consideration only covers fuel poverty driven by poor energy efficiency.

Scottish Energy Strategy & Just Transition Plan.

Published in January 2023 this sets out how Scotland will meet the challenge of reducing demand within main energy-using sectors such as heat in buildings, transport, industry and agriculture whilst using energy more efficiently, and becoming largely decarbonised by 2030. The Strategy identifies the requirement of significant investment to fund the transition and suggests a financing policy model that will seek to leverage private sector investment to support public investment. The Plan is currently under consultation.

Housing to 2040

Housing to 2040 sets out a vision for housing in Scotland to 2040 and a route map to get there. It aims to deliver an ambition for everyone to have a safe, good quality and affordable home that meets their needs in the place they want to be. This will inevitably include affordable low carbon heating systems.

Key targets include:

- 2042 - new buildings to use zero direct emissions heating

- 2026 - all new homes delivered by Registered Social Landlords and local authorities will be zero emissions

National Planning Framework (NPF4)

Published in February 2023, The National Planning Framework 4 (NPF4) sets the context for development planning in Scotland and provides a framework for the spatial development of Scotland as a whole. It is a statutory document, and all planning applications must consider the policy implications of NPF4. NPF4 requires that Local Development Plans consider the area's LHEES and that the spatial strategy should take into account areas of heat network potential and any designated Heat Network Zones. Policy 19 sets out the development management considerations which will facilitate and enable new developments to incorporate and promote LHEES.
NPF4 will be a key influence on the revised Local Development Plan (LDP) for Perth & Kinross and will stipulate how planning policy can be used at local level towards the achievement of strategic goals. LHEES and the LDP should incentivise developers to switch to communal heating systems or connect to a larger district heating scheme, particularly in designated Heat Network Zones. NPF4 will also place greater emphasis on the environment and sustainability against aspects relating to heritage protection.

New Build Heat Standard (forthcoming).

From the 1st of April 2024, new buildings in Scotland applying for a building warrant will be required to use zero direct emissions heating systems (ZDEH) to meet their space and hot water heating and cooling demands. This will include systems such as heat pumps and heat networks. The Council will need to incorporate these requirements into the next Local Development Plan to incentivise heat network connection where practical and feasible.

Hydrogen Policy Statement (2020).

This sets out the vision for Scotland to become a leading hydrogen nation in the production of reliable, competitive, sustainable hydrogen. The UK Government will take decisions on the role of hydrogen in the Great Britain gas network from 2026. Whilst hydrogen is not likely to be widely used as a fuel source for district heating, it is being introduced in a pilot scheme to 300 premises in Fife as part of a H100 trial project to promote renewable energy generated hydrogen for heating and cooking. Hydrogen is likely to play a key role in the wider energy system supporting transport, industry etc. Key targets are for 5GW of renewable and low-carbon hydrogen capacity by 2030 and 25GW by 2045. Funding available includes £90m Green Hydrogen Fund to support hydrogen pathfinder projects up to 2025/26 and a 100 million investment to support delivery of hydrogen economy over next 5 years.

Energy Efficiency Standard for Social Housing (EESSH 1&2)

The Energy Efficiency Standard for Social Housing (EESSH) aims to improve the energy efficiency of social housing in Scotland. EESSH1 was introduced in March 2014 which set an initial target for all eligible social housing to be no lower than EPC C & D by December 2020. In June 2019, EESSH2 was confirmed which proposes new targets up to 2032 to maximise the number of homes in the social rented sector achieving EPC B. EESSH1 & 2 aim to encourage landlords to improve the

energy efficiency of social housing in Scotland. Key funding available through the Social Housing Net-zero Heat Fund.

Tenements (Scotland) Act 2004

A Tenement Management Scheme, is outlined in Schedule 1 of the Tenements (Scotland) Act 2004, lists the 'scheme property' (explaining what parts for the tenement every flat owner should maintain) and explains how to come to arrangements about maintenance ('scheme decisions') and how costs are shared between owners. The Climate Change (Scotland) Act 2009 amends the Tenement Management Scheme to log insulation installation as a maintenance measure rather than an 'improvement' so changes can be approved via a majority rather than unanimously. Tenements (and Multi-Dwelling Units – MDUs) are a challenge for the LHEES as cooperation is required from a number of owners for any works to the building's fabric and communal areas.

Historic Environment Policy for Scotland (HEPS) (May 2019)

The Historic Environment Policy for Scotland (HEPS) is non-statutory, but relevant to a wide range of decision-making at national and local levels. It is supported by detailed policy and guidance. HEPS outlines six policies on managing change to the historic environment most notably HEP5 - Decisions affecting the historic environment should contribute to the sustainable development of communities and places.

The Planning (Listed Building Consent and Conservation Area Consent Procedure) (Scotland) Regulations 2015

Listed building consent is the mechanism by which planning authorities ensure that any changes to listed buildings are appropriate and sympathetic to their character. Conservation area consent controls the demolition of unlisted buildings in conservation areas. Both are important considerations when it comes to installing heat pumps or other technology and energy efficiency measures (such as external insulation) to the fabric of buildings.

Review of Electricity Market Arrangements (REMA) (UK Government).

The UK Government in 2022 launched a major review into Britain's electricity market design to identify opportunities for consumers to benefit from cheaper energy and enhanced energy security in the longer term. Proposals under the scope of REMA include the exploration of fundamental changes to the electricity market to remove volatile gas prices from setting the wholesale cost of electricity, allowing consumers to benefit from lower cost renewable energy. The outcomes of REMA are critically important to the successful delivery of the LHEES where it relates to heat pumps and heat networks where the supply relies on electricity. To remove the influence of gas on electricity prices will reinforce the business case for the electrification of heat in Perth and Kinross.

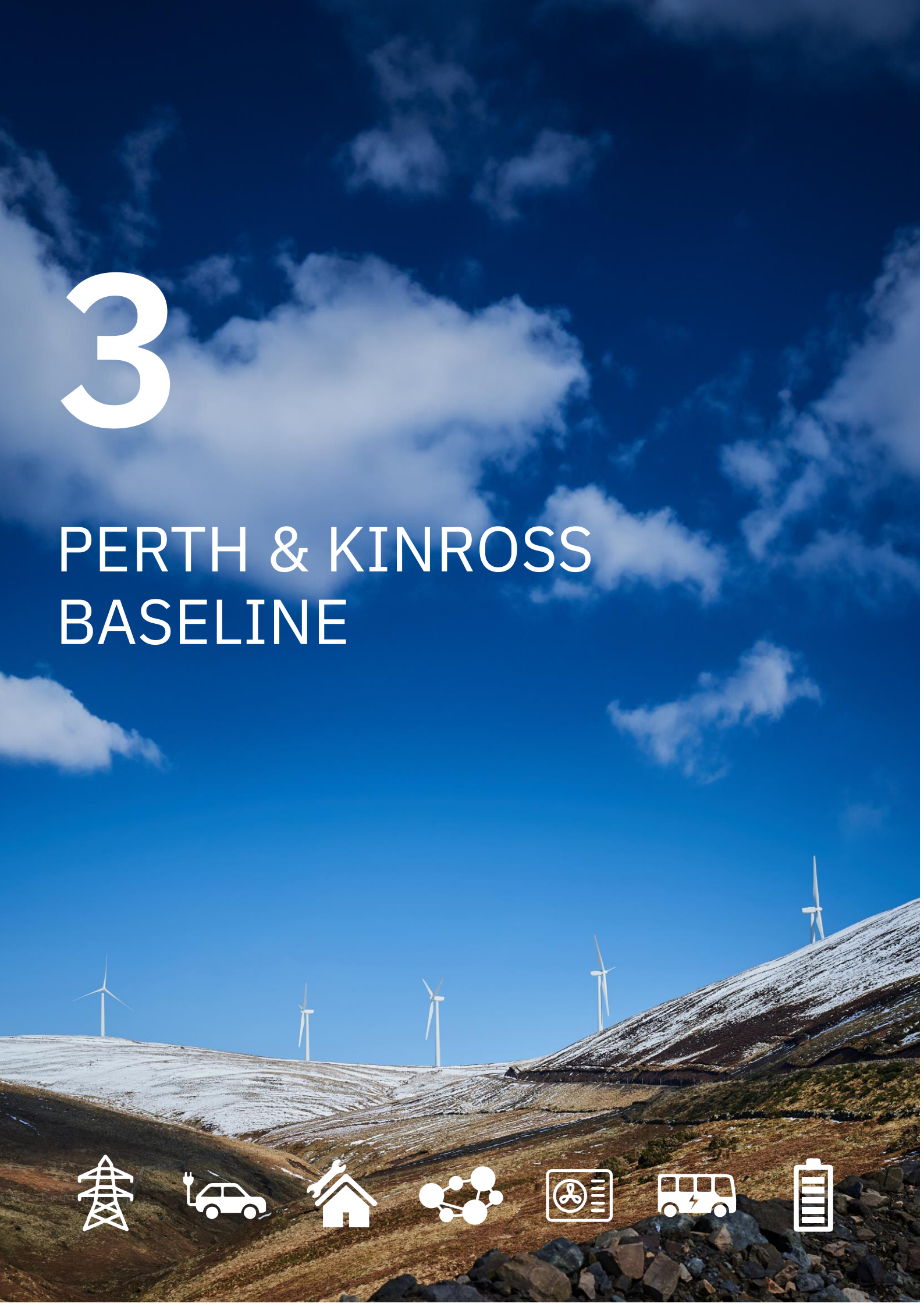
2.2. Perth and Kinross Context

At a local level a suite policy documents have been identified through the Policy review with linkages to the drivers and priorities for developing and implementing LHEES, as set by the Scottish Government. Key local policies and strategies include:

- **Climate Change Strategy and Action Plan** – Produced in 2021, this sets out the Council's next steps in relation to climate change, outlining the initial route map to support them to a net zero carbon and climate resilient Perth and Kinross, and identifies energy and buildings as a key requirement for change. The strategy commits to developing heat networks, where possible, helping to confirm LHEES as fundamental in reaching statutory targets.
- **Local Housing Strategy 2022-2027** – Priorities include a goal to deliver quality homes with affordable warmth, zero emissions and SMART technology. Intended outcomes that will drive these include supporting the implementation of the Council's LHEES; expanding the capacity of energy and fuel poverty advice services and improving the availability of information on fuel poverty and energy efficiency measures available to front line staff and service providers to households most in need.
- **Local Development Plan 2** – There are four main categories in the LDP: to create a successful, sustainable place; a low-carbon place; a natural, resilient place; and a connected place. Priorities include strategic district heating opportunity areas in Perth, Crieff and Blairgowrie, and Policy 34: Sustainable Heating relates to the coordination of Heat Network Zones, Major Developments and LDP Site Allocations.
- **Community Plan (Local Outcomes Improvement Plan)** – Strategic objectives include reducing poverty, including fuel poverty, through a suite of actions and targets including researching community renewable energy co-operative schemes elsewhere in UK and assessing the feasibility of implementing these in Perth and Kinross.
- **Corporate Plan 2022-2028 –** The Plan sets out a vision for a Perth and Kinross Council, where everyone can live life well, free from poverty and inequality. Targets include 6.5% of council housing to meet minimum EPC B by 2023/24 and 12% by 2026/27.

3

PERTH & KINROSS BASELINE

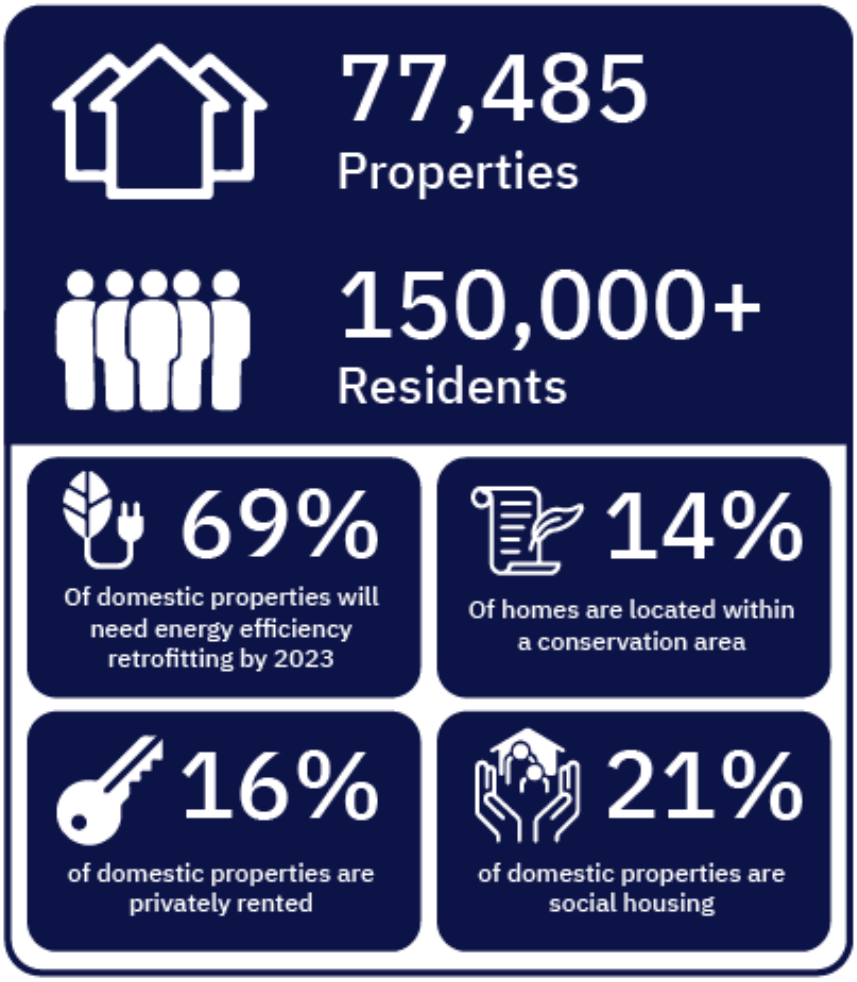


3. PERTH AND KINROSS BASELINE

This section provides a baseline of domestic and non-domestic buildings in Perth and Kinross.

3.1. Domestic baseline

What is the current state of Perth and Kinross's Housing?



The baseline information has been summarised here to provide context for the remaining sections.

Poor energy efficiency

A significant proportion (58%) of domestic properties across Perth and Kinross have an Energy Performance Certificate (EPC) rating of D-G, which is higher than the national average of 51%. The LHEES Methodology uses low loft insulation, uninsulated walls and single glazed windows as indicators of poor energy efficiency.
In Perth and Kinross:

- A quarter of heat is lost through the roof in an uninsulated home. Insulating your loft is an effective way to reduce heat loss and reduce your heating bills. 9% (6,827) of properties have low levels of loft insulation (ranging from 0-9mm), which is aligned with the national

average. Over half (59%, 4007) of the properties with low levels of loft insulation are owner-occupied.

- Nearly half of the heat loss in a building is through solid walls and the heat lost through an uninsulated solid wall is typically more than double that of an uninsulated cavity wall. Insulation of solid walls can therefore dramatically reduce heat loss and improve the energy performance of a building. 45% (34,979) of domestic properties have uninsulated walls over half of these, 58% (20,223), have solid brick or stone construction, making them more challenging to retrofit with wall insulation. Alternative insulation methods such as internal or external wall insulated will need to be considered for these properties.
- Heat loss through single glazing is around twice as fast as through standard double glazing. 8% of domestic properties have single glazing the majority of which, 93% (5,884) are privately-owned. Flats in mixed-use buildings stand out with the highest proportion of single or partially glazed windows, accounting for 21% (890) of these types of properties.

Energy Efficiency Indicator	Perth and Kinross	Scotland
Uninsulated walls	45% (34,979)	41%
Single/ partial glazing	8% (6,335)	8%
Low loft insulation (0-99mm)	9% (6,827)	9%

Key points include:

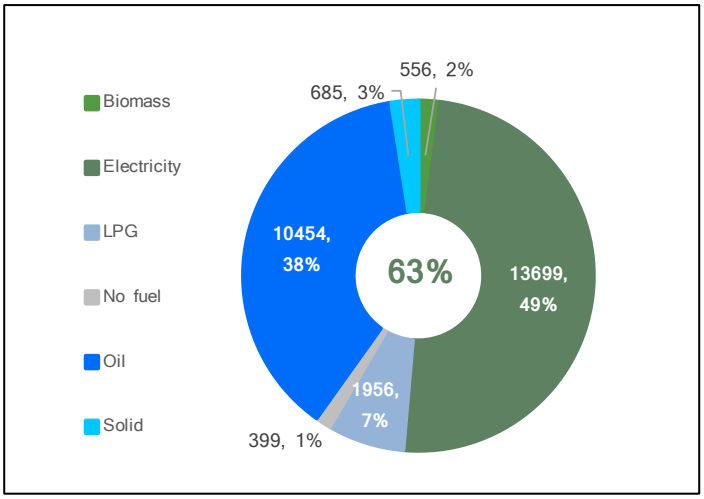
- The proportion of detached or semi-detached houses in Perth and Kinross (55%) is higher than national average (39%). This contributes to a larger number of external walls. However also presents an opportunity for delivering retrofit interventions, as these property types will typically have less stakeholders involved and are likely to have more external space for the installation of heat pumps.
- 45% of domestic properties having uninsulated walls, which is higher than the national average of 41%.
- 58% of these uninsulated properties are solid stone in construction, which present challenges when it comes to upgrading the building's structure.
- Larger properties will have a higher heating demand and be more expensive to upgrade. 15% of properties in Perth and Kinross have 7 or more habitable rooms.

There is a significant spatial variation of energy efficiency by area across Perth and Kinross, with Strathearn and Highland Perthshire having some of the lowest levels.

Fuel Type

In Perth and Kinross, 63% of domestic properties are currently serviced by the gas grid, while 36% of domestic properties are not (known as being off gas). This off-gas proportion is significantly higher than the national average. The remaining 1% of properties have unknown off-gas status. In on-gas areas, 99% of properties are currently connected to the grid. As can be seen from Figure 2, in off-gas areas there are several fuel sources used.

Figure 2: Breakdown of domestic fuel sources for off-gas areas



Nearly one fifth (17%) of all properties will need to transition from oil, Liquified Petroleum Gas (LPG) and solid fuel (e.g., coal) to alternative fuel types. This figure is nearly twice the national average representing a key challenge for Perth and Kinross. Nearly half (43%) of off-gas buildings will require either extensive retrofit to be heat pump ready (6,065 properties) or an alternative solution to heat decarbonisation such as electrification (5,082) or biomass (789). The majority of these properties are privately owned and will require consideration around funding and support, to tackle associated fuel poverty in these areas. Regulations have been proposed within the Heat in Buildings Bill consultation requiring owner occupiers (and owners of all other private homes) to meet EPC C targets before the end of 2033.

Mixed-tenure, mixed-use and historic buildings

Just over a quarter of the area's buildings (21,571) have more than 1 dwelling located in that building (e.g., small block of flats with 10 properties in a building). These properties are likely to require building level, rather than property level intervention. Half of these (10,610) are in a building that contains more than one tenure type (e.g., Housing Association and Owner Occupied). Decarbonising these properties presents a challenge as there will be multiple stakeholders involved in building level interventions. Engagement and novel approaches to ensuring different tenure types can work together to deliver building level intervention will be required to retrofit these properties.

Perth and Kinross has a high proportion of properties located in conservation areas (10609, 14%) and designated as listed buildings (3578, 5%) when compared to the national average. These buildings are likely to require additional consideration of planning permissions and design restrictions. The retrofit approach must carefully consider and be sensitive towards the historic character of the building.

The area also has a higher proportion of pre-1919 traditional buildings (18,800, 24%) than the national average. The vast majority of these (95%) have a wall construction of solid brick and stone. Installing external or internal wall insulation for these properties can often be more

expensive and involve more invasive installation procedures. Perth and Kinross Council will continue to engage with Historic Environment Scotland (HES) and signpost stakeholders and the public to dedicated Local Heat and Energy Efficiency Strategies Historic and Traditional Buildings guidance. The guidance signposts users to resources and provides general principles for working with traditional buildings, including planning considerations as well as the technical aspects of making traditional and historic buildings more energy efficient.

Fuel poverty

What is Fuel Poverty? A 10% threshold is used in a two-part metric where a household is in fuel poverty if:

'After housing costs, the total fuel costs needed to maintain a satisfactory heating regime are more than 10% of the household's adjusted net income *and* if, after deducting fuel costs, housing costs, benefits received for a care need or disability, and childcare costs, the household's remaining adjusted net income is insufficient to maintain an acceptable standard of living'.

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

Fuel Poverty (Targets, Definition and Strategy) (Scotland) Act 2019

Table 2 shows that the percentage of households in fuel poverty and extreme fuel poverty in Perth and Kinross is higher than the national average. This is likely due to the old building stock and the associated poor energy efficiency of properties in the area. The Scottish House Condition Survey (SHCS) 2019 is the most reliable data source available to local authorities to estimate overall fuel

poverty levels and how these vary spatially across Perth and Kinross.[1] However, since this was carried out, the increases of the energy price cap in 2021 and 2022 have likely led to an increase in probability of fuel poverty. To account for this the Scottish Government has developed an approach to deriving an uplifted value to the October 2022 energy price cap as shown below.

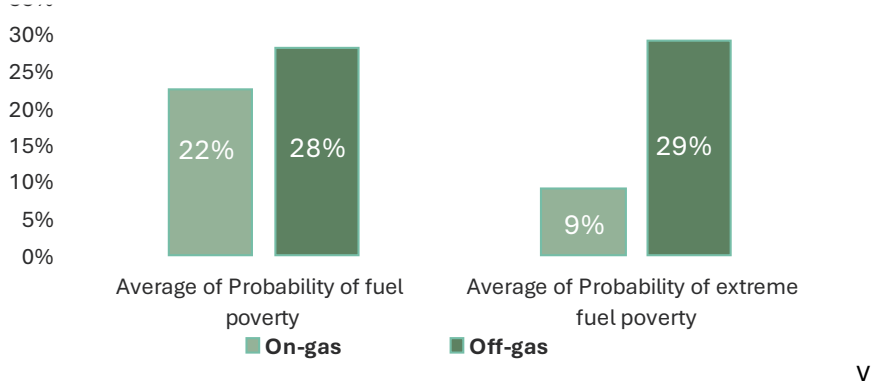
Table 2: Fuel Poverty Levels and Extreme Fuel Poverty Levels

	Scotland - SHCS 2019	Scotland - SCHS 2019 - Uplifted value (2022)	Perth & Kinross SCHS 2019 – Original value	Perth & Kinross SCHS 2019 - Uplifted value (2022)
Percentage of households in fuel poverty	24%	35%	28%	63%
Percentage of households in extreme fuel poverty	12%	Not Available	18%	40%

The average probability of fuel poverty and extreme fuel poverty is higher in off-gas properties than on-gas properties, as shown in Figure 3. In particular, off-gas properties with electricity and solid fuel types tend to have a higher probability of fuel poverty. Heat decarbonisation and energy efficiency improvements in off-gas properties therefore present the opportunity to reduce fuel poverty. However, any recommendations for interventions in heat decarbonisation should carefully consider the impact on fuel poverty, ensuring that it is not exacerbated.

Figure 3: Probability of fuel poverty for on-gas and off-gas properties

(Note: Data is based on 2019 SHCS values as was not available for the uplifted values)



[1] Note: The datasets to calculate accurate current fuel poverty levels are not currently available to Local Authorities and so proxy data must be relied upon to make best estimates.

3.2. Non-domestic baseline

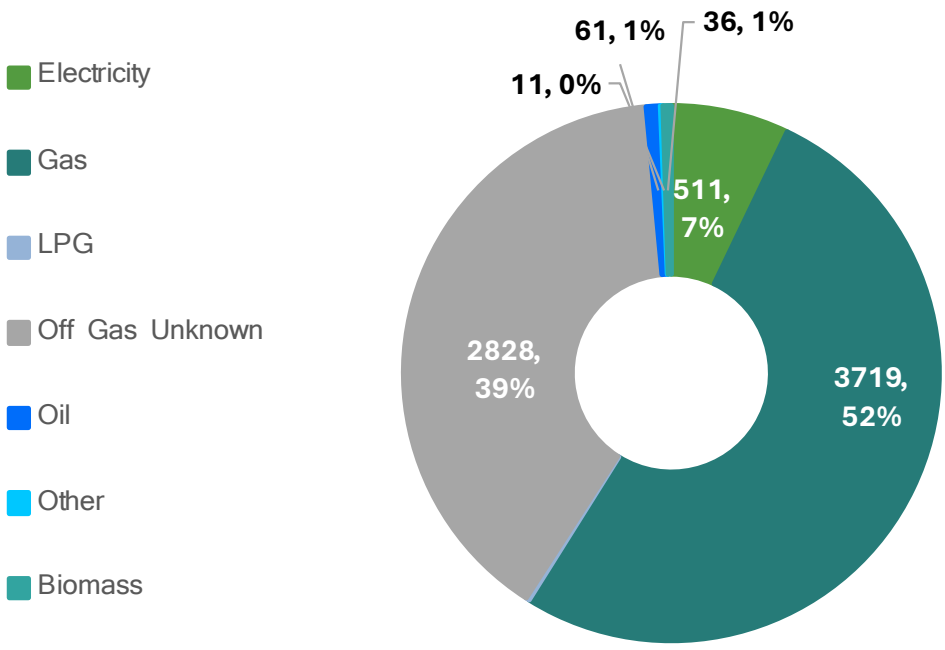
What is the current state of Perth and Kinross non-domestic properties?

The baseline information has been summarised here to provide context for the remaining sections.

Perth and Kinross non-domestic building stock is made up of 7,181 buildings with a total annual heat demand of 810 GWh/yr. In general, acquiring energy demand data for the non-domestic sector is more challenging as valid EPCs are only in place for 19% of properties in this sector. As such, heat demand data used in this baseline is based on modelled heat demands.

The division of fuel type by property count is shown in Figure 4. Approximately 52% of non-domestic properties are served by mains gas and this accounts for 63% of the total annual heat demand.

Figure 4: Heat source for non-domestic properties (by count of property)



As can be seen from Figure 5, the building typologies (sectors) with the largest heat demand are educational buildings (i.e., schools, colleges, and universities), offices and hotel buildings.

- Educational buildings have the highest heating demand at ~112 GWh. Approximately 59% of these buildings rely on gas.
- Perth and Kinross is home to around 1,000 office buildings, which collectively contribute to 13% of the total non-domestic heat demand (108 GWh).
- Hotels, which include individual holiday rental properties, have a total annual heat demand of 104 GWh. Compared to other building typologies, hotel buildings have a lower proportion of heat demand met by gas (48%, 50 GWh), which is likely to be attributed to their rural location.
- Light industry and manufacturing accounts for 11% of non-domestic heat demand in Perth and Kinross. Heavy industry and manufacturing only accounts for <1% of the heat demand. It is important to recognise that this figure may potentially be larger in reality, as certain process demands might not be accounted for in the formation of the dataset used.

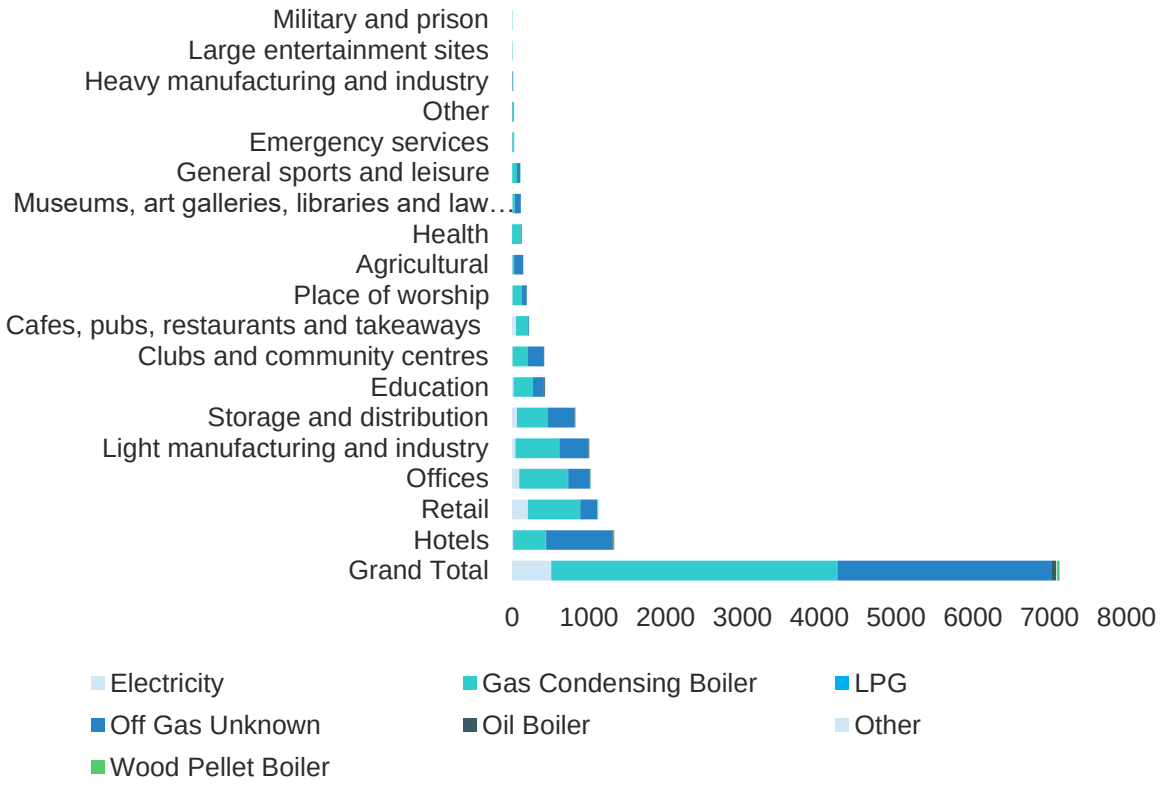
The majority of heat demand (60%) for Council owned properties comes from educational buildings, storage and distribution buildings (e.g., industrial estates) and offices. Over the last year the Council has made good progress where energy consumption has reduced by 6,817 MWh (12%) compared to the previous year with a carbon savings of 1,535 tonnes (14%). The Council is currently undertaking decarbonisation planning work across the estate, this work is further detailed in section 11.4.

Actionability in non-Council-owned buildings may be limited, highlighting the extent of the challenge to decarbonise the non-domestic sector. Public sector buildings are likely to be easier to influence than the private sector. Improved energy demand data will be supported through the Building Assessment Reports (BAR) required as part of the Heat Network (Scotland) Act. A BAR captures information on the heat supply and demand of the building and assesses its suitability to connect to a heat network. The Council will engage with key public sector buildings with high heat demands (e.g., leisure centres, hospitals) to understand current energy demand and existing plans and programmes for energy efficiency and heat decarbonisation.

Beyond the public sector, the Council will need to work with key delivery partners to engage with the private sector to improve the accuracy of heat demands for key buildings and to identify quick wins for energy efficiency and heat decarbonisation in targeted areas such as potential heat network zones. For example, engagement with the hotel sector which has the highest proportion of buildings heated through LPG, representing an opportunity area for transition to low-carbon alternatives with potential fuel bill savings.

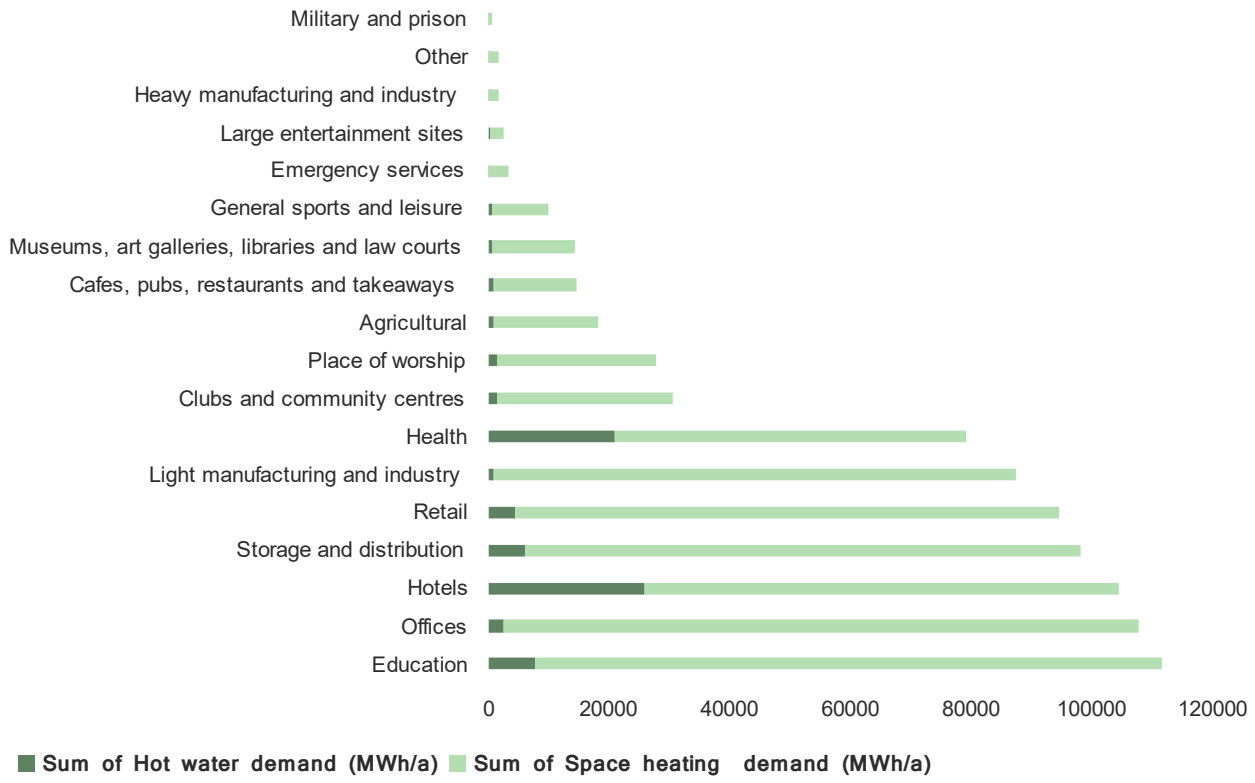
The non-domestic heat demand is not uniformly distributed across Perth and Kinross. Areas with the highest heat demand from non-domestic buildings are those that contain industrial estates or large campuses, such as Perth Royal Infirmary, and in urban centres such as Perth City Centre.

Figure 5: Building typology (sector) by heat source



The proportion of heat demand used for providing hot water will influence the zero-emissions heating system used to meet heat demand. Figure 6 shows the heat demand for each building typology, split by space heating and hot water demand. Hotels and health sector buildings have a higher proportion of hot water demand compared to other building typologies. These building typologies also tend to have high peak demands which will impact system sizing and may require a secondary heating system to ensure peak demands can be met.

Figure 6: Split of heating demand by building typology



4

VISION, OUTCOMES & TARGETS

4. VISION, OUTCOMES AND TARGETS

This section presents the LHEES Vision, Outcomes and targets.

4.1. LHEES Vision

Informed by the evidence and working with stakeholders, a vision for Perth and Kinross LHEES (2024-2045) has been developed.

Perth and Kinross Council supports Scotland's Heat in Buildings Strategy (HiBS) vision that by 2045 our homes and buildings are cleaner, greener, easy to heat, and no longer contributing to climate change, as part of the wider just transition to net zero.

The vision for Perth and Kinross's first Local Heat and Energy Efficiency Strategy is:

Vision

By 2045, our homes and buildings will be more energy efficient and with more decarbonised heat sources providing more affordable warmth and no longer contributing to climate change.

The vision for Perth and Kinross's first LHEES is set within the overall ambition to become Net Zero by 2045 which the Council committed to in December 2021. The Council is also committed to a 75% reduction in carbon emissions across its area by 2030 and to make all its own buildings net zero by 2038.

4.2. LHEES Outcomes

The vision will achieve significant outcomes including:

Significant Reduction in Carbon Emissions: widespread adoption of energy-efficient technologies and decarbonised heat sources will have led to a substantial reduction in carbon emissions from homes and buildings.

Affordable and Sustainable Heating: heating in homes and buildings will become more affordable, with a greater reliance on renewable and low-carbon energy sources. This will reduce energy bills for residents and businesses while promoting sustainability. As energy becomes more affordable

and efficient, it will help alleviate fuel poverty, ensuring that vulnerable communities have access to the warmth and comfort they need without straining their finances.

Health and Well-being Benefits: Energy-efficient building designs and technologies will lead to improved indoor comfort levels, ensuring that people can enjoy warm and comfortable living and working spaces without the need for excessive energy consumption. Reduced pollution will improve air quality.

4.3. LHEES targets

The Perth and Kinross LHEES is driven by Scotland's overarching statutory targets for greenhouse gas emissions reduction and fuel poverty:

No household in Scotland is in fuel poverty by 2040

Net Zero emissions by 2045 and 75% reduction by 2030

The key targets and the current Perth and Kinross position are outlined in

Table 3 to **Table 5**.

Table 3: Energy efficiency targets against Perth and Kinross Baseline

Key Targets – Housing Stock	Target Year	P&K Current Level of Compliance value[2]	Number of households/properties requiring retrofit	Estimated retrofit costs (£M)
All Social Housing EPC D or Above	2026	93%	1,100	(Included in EPC B total)
All Social Housing EPC B or Above	2032	17%	13,600	£145.1
All Domestic Private Rented Properties EPC C or Above	2028	28%	8,700	£147.5
All properties should meet EPC Band C (residual Owner Occupier)	2033	32%	31,400	£616.1

[2] "This column shows the proportion of properties in Perth and Kinross that currently meet the EPC target derived from the recent release of EST Home Analytics data that has been updated with Council held data.

Table 4: Fuel Poverty targets against Perth and Kinross Baseline

Key Targets – Fuel Poverty	Target Year	P&K Current Fuel Poverty Levels	Number of households currently in fuel poverty
No more than 5% of households in fuel poverty (More than 10% of net household income on fuel)	2040	63%	44,900
No more than 1% of households in extreme fuel poverty (More than 20% of net household income on fuel)	2040	40%	30,200

Table 5: Heat decarbonisation targets against Perth and Kinross Baseline

Key Targets – Heat Decarbonisation	Target Year	P&K Current value	Estimated number of households/properties requiring interventions
70% of heat for non-domestic buildings will be using low carbon technologies	2032	9%	4,300
35% of domestic heat demand will be supplied using low carbon technologies	2032	18%	12,700

Given the statutory targets for Scotland are already ambitious with respect to the other nations in the UK and the huge scale of the transformation required in Perth and Kinross to meet these, Perth and Kinross LHEES targets are aligned with the Scottish statutory heat and energy targets. However, it is recognised that these targets would be very challenging if no significant public and private investments are made available or come forward as well as if behaviours are not changing. This would be particularly the case for private households and small and medium businesses.

Perth and Kinross Council has undertaken work to better understand how these national targets can be translated to a local level. Energy Savings Trust (EST) using the Portfolio Energy Assessment Tool (PEAT) developed a Regulatory Standards scenario to model the minimum retrofit work required to meet EPC targets for each tenure type. The Regulatory Standards scenario will simulate the impact of minimum building standards rising over time. Heat pumps cannot be modelled for flats and so for these properties only fabric measures will be considered. No retrofit measures will be recommended if the EPC of the property is currently at or above the EPC target specified. No heating upgrades will be recommended if the target SAP score is achieved by fabric upgrades before PEAT is able to consider a heating system retrofit. EST will use the default PEAT costs of each retrofit measure. Some properties may not be physically capable of achieving the targeted SAP band. Table 6 provides a summary of these results: A full description of scenario

assumptions and limitations is outlined in the Energy Savings Trust PKC PEAT Scenario Scoping document.

Proposed regulations to drive social housing providers and private landlords to retrofit their homes were consulted on as part of the Heat In Buildings Bill Consultation. The consultation, which closed March 8th 2024, includes proposals for legislation to:

- prohibit the use of polluting heating systems after 2045, and before then at point of property purchase or when a heat network connection is available in a Heat Network Zone; and,
- require a minimum energy efficiency standard by 2028 for Private Rental Sector and 2033 for owner occupiers

A deployment model has been developed to summarise key housing and budgetary statistics by EPC and tenure type targets, generating a carbon reduction and spending deployment profile, alongside an understanding of the ability to meet national targets within the local authorities unique building stock profile. To illustrate a potential retrofit pathway from 2024 an assumed proportion of the housing stock is upgraded each year. The costs and carbon and energy savings associated with each set of annual retrofits provides a trajectory Perth and Kinross Council can use to inform its future strategy and delivery actions including providing evidence to support national funding reform planning and engagement strategies. When modelling the annual uptake of measures, it is assumed that each property will have all of its recommended measures implemented together, as a single package. The rate of uptake will be modelled using a standard S-shaped adoption curve. Deployment modelling results are displayed in figures 7 to 9.

Table 6: Energy Efficiency targets and local context

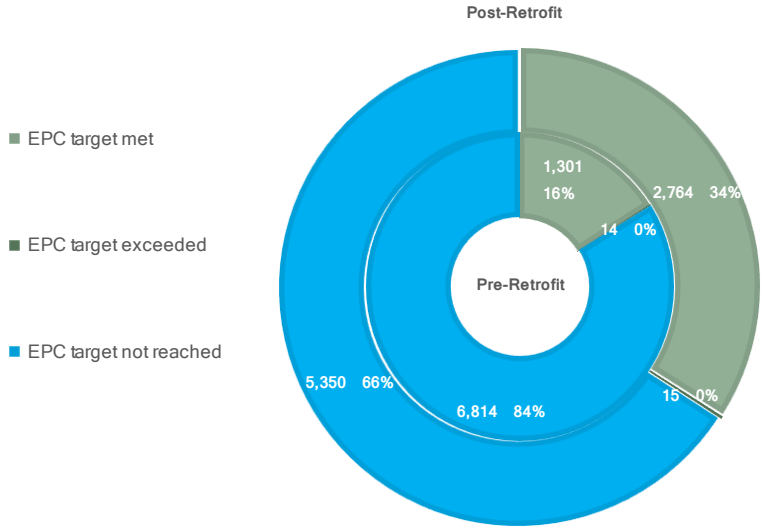
Regulatory Scenario (PEAT)	**Housing Association EPC B by 2032**	**Owner Occupied EPC by 2033**	**Private Rented Sector EPC C by 2028**
Total investment*	£65,177,330	£616,152,778	£147,517,977
Investment per home* (average)	£7,834	£12 800	£11,861
Average number of retrofits per year (non-compliant only)	594	842	611
EPC Compliant after retrofit	34%	84%	75%
Energy consumption reduction (MWh/yr)	3,452,061	35,744,779	8,394,107

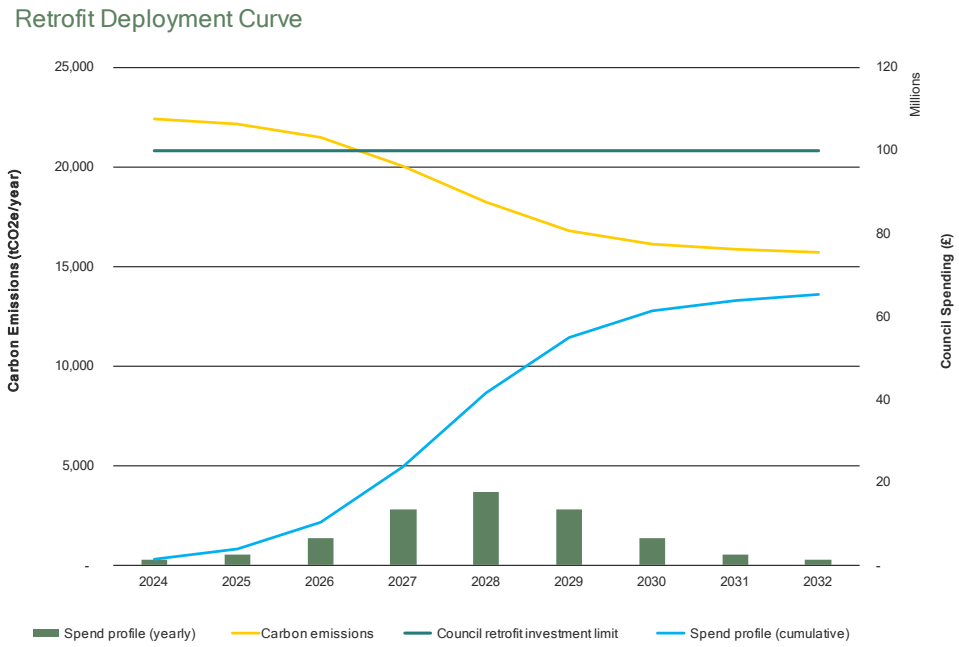
Carbon emissions reduction (tCO2e/year)	671,822	7,133,103	1,691,198
Change in Fuel Poverty	2%	9%	12%

Housing Association, EPC B or above by 2032

The below diagram illustrates the compliance levels with national targets for this sector currently within the inner circle (pre-retrofit) and post retrofit within the outer circle. Post-retrofit 66% or nearly 5,350 properties are unable to meet national targets providing evidence to support localisation of targets for delivery. This figure reflects the high proportion of retrofit and heating system decarbonisation work already completed in this sector. To meet national targets in this sector would require over 107 properties to be retrofitted per year, with a total required budget of 65 million pounds or an average cost of £7,834 per household. Total carbon savings are 671,822 tCO2e with an energy savings demand reduction of 3,452,061MWh.

Figure 7: Housing Association breakdown of EPCs achieved pre and post retrofit and associated retrofit deployment curve

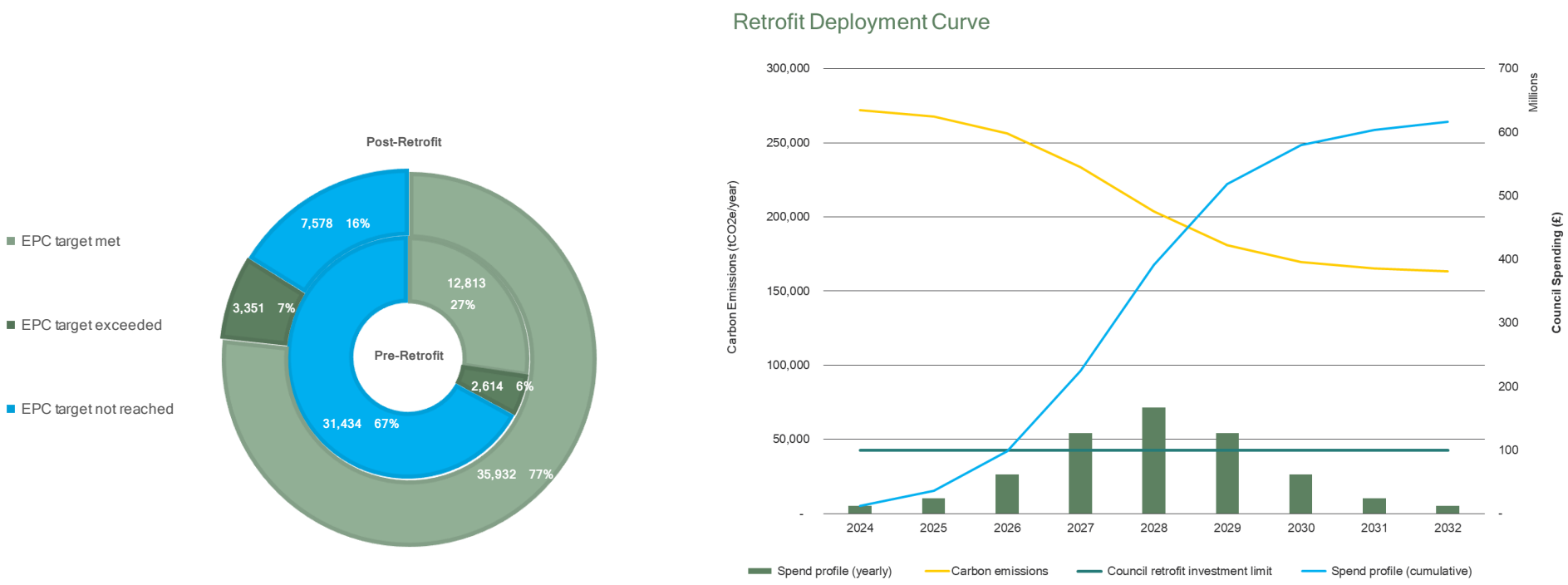




Owner occupied, EPC C or above by 2033

The below diagram illustrates the compliance levels with national targets for this sector currently within the inner circle (pre-retrofit) and post retrofit within the outer circle. Post-retrofit 16% or nearly 7700 properties are unable to meet national targets providing evidence to support localisation of targets for delivery. To meet national targets in this sector would require over 842 properties to be retrofitted per year, with a total required budget of 616 million pounds or an average cost of 12 800 per household. Total carbon savings are 7,133,103 tCO2e with an energy savings demand reduction of 35,744,779 MWh.

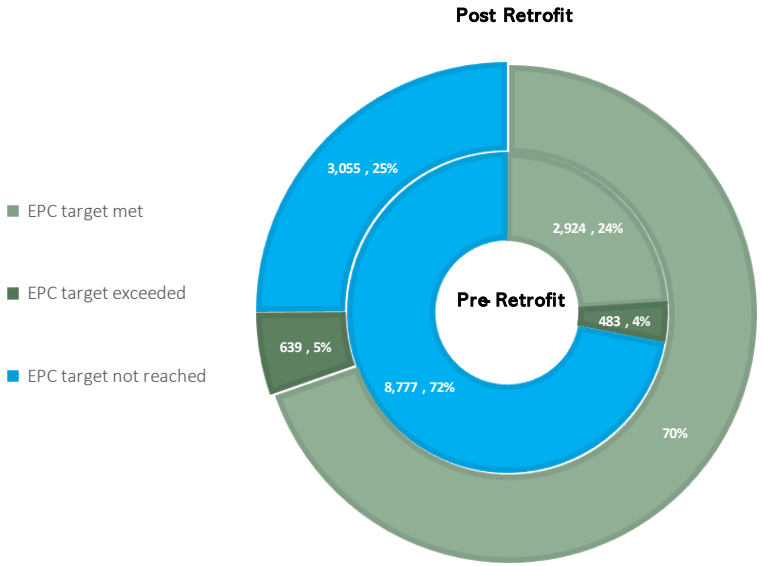
Figure 8: Owner Occupied breakdown of EPCs achieved pre and post retrofit and associated retrofit deployment curve

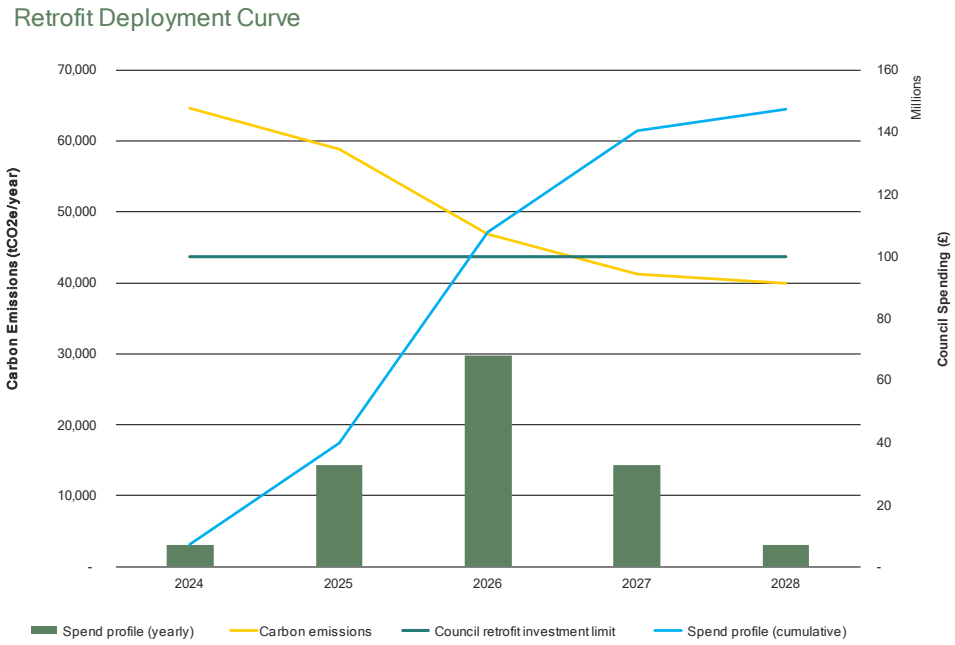


Privately Rented, EPC C or above by 2028

The below diagram illustrates the compliance levels with national targets. Post-retrofit 25% or over 3000 properties are unable to meet national targets providing evidence to support localisation of targets for delivery. To meet national targets in this sector would require over 600 properties to be retrofitted per year, with a total required budget of 148 million pounds or an average cost of 11,861 per household. Total carbon savings are 1,691,198 tCO2e with an energy savings demand reduction of 8,394,107 MWh.

Figure 9: Privately Rented breakdown of EPCs achieved pre and post retrofit and associated retrofit deployment curve





Local Authority (Social) Housing EPC B or Above by 2032

The Council has completed work to design and deliver a major programme of retrofitting for both for its domestic and non-domestic building stock as part of the Council Estate Decarbonisation Planning programme. Scenarios are based on more robust building stock data and focus on fabric first and mandatory switching to zero or low carbon systems. Domestic Scenarios have been informed by the national targets as set out below and aligned to targets for the wider building stock:

- Off-gas housing achieving EPC B and converting to low or zero carbon (LZC) heating systems by 2030
- All Housing achieving EPC B by 2032
- All Housing utilising an LZC heating system by 2045

Table 7 summarises retrofit scenario models for the decarbonisation plan for the Council's own assets. This work is a strategic assessment to identify indicative scope, costs, and impacts of a transformational retrofit programme which supports the Council's ambitions while aligning to wider policy. Scenario analysis has been undertaken to establish prioritisation indicative costs, energy reduction, CO2 abatement potential and deployment on several decarbonisation pathways. 'Do minimum' and 'Do more' scenarios are primarily differentiated by their approach to fabric interventions; where 'Do Minimum' focuses on practical interventions based on the building's characteristics, while 'Do More' pursues more ambitious U-value targets with less consideration of existing construction.

Table 7: Energy Efficiency targets and local context for Local Authority assets

Key Metric (2023-2045)	Non-Domestic		Domestic	
	Do Minimum	Do More	Do Minimum	Do More
Total Investment (Cumulative CapEx (£m) *Inflation Adjusted)*	172	203	266	332
Average cost per annum	£6,260,000	£7,300,000	£12,600,000	£16,810,000
EPC Compliant after retrofit (EPC B by 2032)	NA	NA	71%	78%
Energy consumption reduction (MWh/yr)	71%	76%	85%	86%
Carbon emissions reduction (tCO2e/year)	135,000	136,000	119,000	119,300
Cumulative Fuel Bill Savings (£m)	43	53	103	106

Post-retrofit less than 30% or 5500 of domestic properties are unable to meet national targets providing evidence to support localisation of targets for delivery,
To progress towards national targets in this sector would require a total budget of between£ 266-332 million. Total carbon savings are 119,000 tCO2e per year with an energy savings demand reduction of 85%. Similar figures are available for the non-domestic Council stock where transition works in this sector would require a total budget of between£ £172and 203 million. Total carbon savings are 135,000 tCO2e per year with an energy savings demand reduction of 71%.
Employment figures were also investigated for the non-domestic scenarios, indicating a range of 70 -95 work per year dependent on the scenario pursued. They do not consider the increased resources and staff that will be required from the Council.

These estimates need to be considered with a number of caveats[3].

The Council is currently undertaking a more detailed phase of this work to support delivery at an individual building level and to examine how proposed interventions will be implemented at the façade and with building plant, services and systems. It will appraise delivery-focused challenges across the engineering, cost, impacts, risks, supply chain capacity and programming themes. The work will also build the framework to enable and support delivery prioritisation decision-making to ensure this is rigorous, repeatable and targeted in line with Council objectives. Finally, an appraisal of the Council's operating model will be undertaken, in the context of planned large scale programmes of decarbonisation activity and reflected in a Target Operating Model (TOM). This will bring much richer evidence to support the Council's decisions and asset investment planning and development of delivery programmes.

[3] Exclusions reduced the number of buildings under consideration for the non-domestic estate to 164 buildings (from a non-domestic estate of ~210 operational buildings. Operational Sites have also not been accounted for).

The costings provided as the baseline figure for the domestic stock at the time of the evaluation were 7,887; the number of social housing properties is increasing and is currently sitting at around 8,025.

The CapEx presented for both non-domestic and domestic buildings is for plant, systems and materials only, and does not allow for design or delivery works.

There has been no consideration or costing of repairs to existing fabric and systems, disruption and decanting which may be delivered as part of a comprehensive retrofit programme for both the non-domestic and domestic programmes.

Costs have not considered a detailed delivery plan, prioritisation and sequencing logic that aligns with the Council's asset management plan (this statement applies to both non-domestic and domestic programmes).

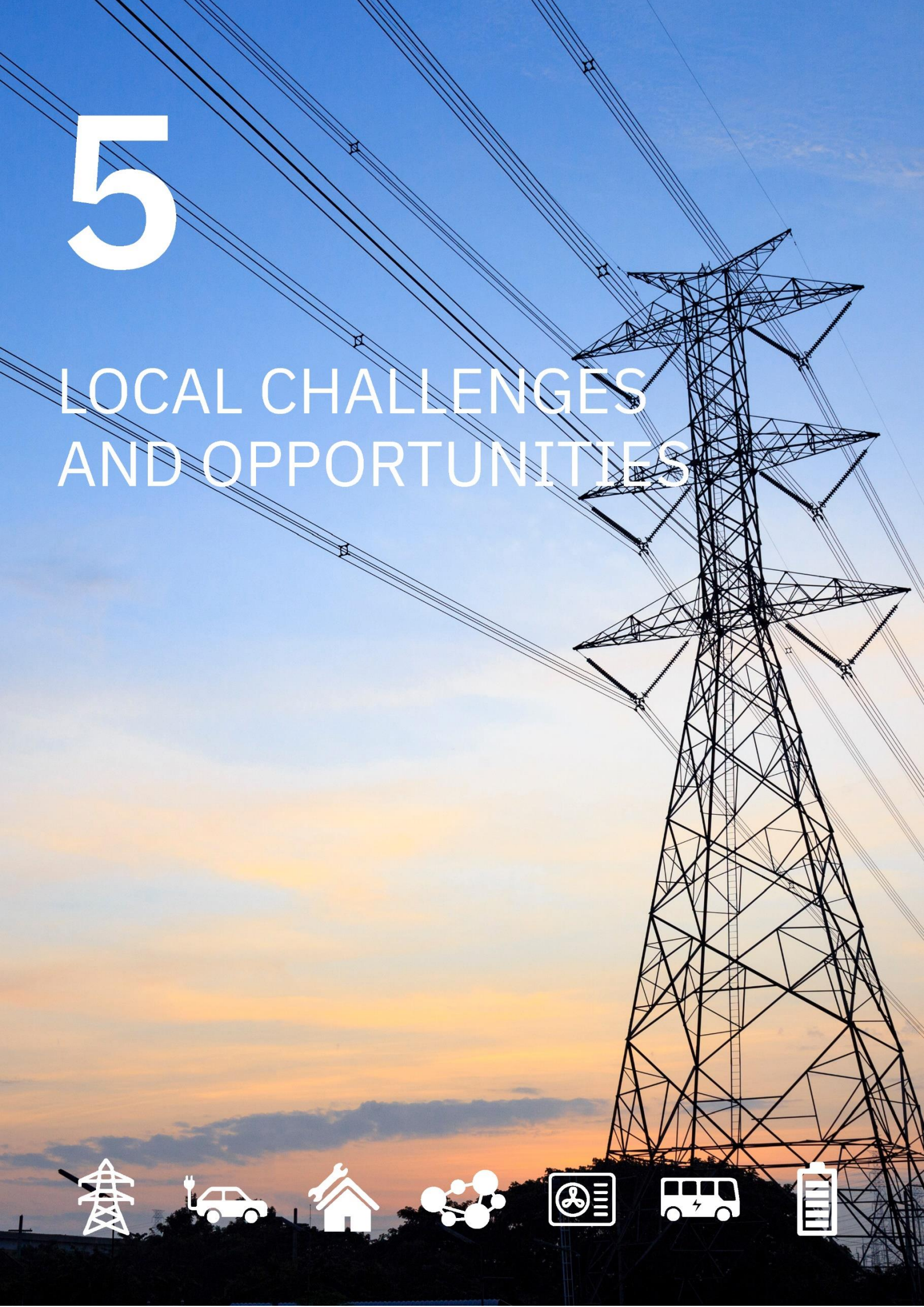
Feasibility of solar capacity to meet the energy intensity targets has been assessed for the non-domestic stock based on Skenario Labs data and GIS-based analysis for roof type (flat vs pitched) requiring further assessments.

There is a requirement to undertake more advanced economic assessment for both the domestic and non-domestic programme to inform investment; this includes the quantification of social value and the assessment of Repair Expenditure (RepEx) and Operational Expenditure (OpEx)

The EST modelling data used for the domestic housing stock was 6 months old at the time of the LHEES reporting. This data will now be in the region of two years old as this hasn't been updated as part of our Lot 4 work.

5

LOCAL CHALLENGES AND OPPORTUNITIES



5. LOCAL CHALLENGES AND OPPORTUNITIES

Delivering a heat and energy transformation at the scale required to meet the Scottish Government requirements and Perth and Kinross ambitions poses both significant barriers and challenges and offers significant opportunities.

5.1. Barriers and Challenges

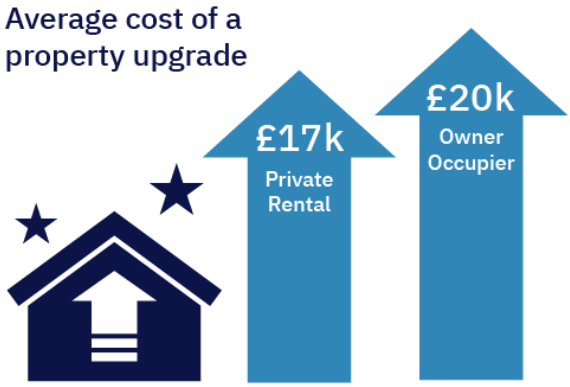
Several barriers and challenges to delivering the LHEES and reaching our strategic aims have been identified by PKC and key stakeholders. These include:

Physical building stock

Predominantly due to the age of the housing stock, Perth and Kinross houses have a higher percentage of hard-to-treat houses in every key criterion than the Scottish average, as shown in Table 8. The proportion of buildings built pre-1919 is significantly higher than national average with nearly all of these built using traditional construction methods with solid brick and stone and designed to provide passive ventilation. They are classed as "hard-to-treat" in retrofit terms as installing external or internal wall insulation for these properties can often be more expensive and involve more invasive installation procedures. The majority of these pre-1919 buildings are also either listed or located in conservation areas, or both, posing an additional challenge for retrofit interventions.

Table 8: Comparison of the Perth and Kinross vs Scottish Average Building Stock

Category	Perth and Kinross	Scottish Average
Age - Pre-1919 Buildings	24%	18%
Tenure - Private rented accommodation	16%	13%
Size - Detached or semi-detached	55%	39%
Fuel – Off gas	36%	19%
Energy Efficiency – EPC bands D-G	58%	51%
Heritage – In conservation area	14%	10%
Fuel poverty	28%	24%



Affordability and tenure

Perth and Kinross has lower levels of social housing at (21%) than the Scottish average. This is the sector that Perth and Kinross Council has the most direct control over. Private rented accommodation levels are higher than the Scottish average. While there are deadlines associated with the property transition, it has been observed that some landlords are preferring to sell their properties rather than upgrade them or it is reflected in rent uplifts.

Funding

The total investment required for homes and buildings to reach net zero by 2045 across Scotland is in excess of £33 billion. There is a lack of funding and support, at the right scale, to support the upgrade of heat in buildings. There are existing schemes to support social housing and fuel poor homes, as well as select grants and interest-free loans accessible to residents. Furthermore, the government's emphasis on funding heat networks does not lend itself well to a more rural area that has a relatively limited number of viable heat networks. Additionally, whilst there is private investment available, it is often harder to attract to more rural areas, especially given the economies of scale compared to city regions. In response to funding challenges, Scottish Government has established the Green Heat Finance Taskforce to explore and identify innovative financing mechanisms to help individuals and organisations make their properties warmer, greener and more efficient.

Public awareness and buy-in

Public awareness of what individuals and businesses can and need to do to make this energy transition is still widely lacking. For those that do want to take action – having a trusted source of technical knowledge has been identified by many as a barrier to taking further action.

In Perth and Kinross, several organisations currently provide free home energy advice and home visits, including SCARF, the HEAT Project, Warm Connection and the Citizens Advice Bureau. At the current combined scale of operation over the next 10-years, these organisations will only have the capacity to reach approximately 25% of homes requiring retrofitting.

Building public trust in new technologies will be important for adoption – both for heat pumps and heat networks. Both are still new to Scotland and Perth and Kinross with relatively low levels of consumer confidence. A key concern for consumers relates to being 'locked in' to a heat network with no option to go to the open market for a better price in response.

Skills and supply chain

Heat transition and energy efficiency bring a huge opportunity to create jobs and develop new skills in the workforce. However, there is undoubtedly a gap at present between the targets now set and the capacity of our supply chains and skills to deliver. This includes:

- For a scaled-up deployment of heat pumps, the existing workforce will need to develop (more) electrical skills to complement existing gas engineering or plumbing skills. Evidence from consultations suggests that these skills are already in great demand, with evidence of companies struggling to fill positions as a result of short supply.
- There is a need for growing capacity in the region's education and training system. This is not just for volume, but for effectiveness, responsiveness and connectivity between education and training providers and businesses.
- There is also evidence that there are not enough local businesses to supply the goods or services to support heat transition and energy efficiency improvements.

Lack of regulation and misalignment of national targets

While Scotland has leading climate targets, with a delay to the Scottish Government's Heat in Building Bill (which is to set out its plans to regulate the domestic and non-domestic sector decarbonisation) there remains limited influence the Council can exert to ensure the timely upgrade of buildings. This risks leaving the ambitions of Perth and Kinross potentially constrained when opportunities are identified, as there are no regulatory enforcements, other than for the social housing sector, that can be readily utilised. It is not until this regulation comes into force that the transition in the private market will be able to take full effect.

Grid capacity

Decarbonising heat, focusing on heat networks and heat pumps, which run on electricity, places significant pressures on the grid. Heat pump uptake potential for Perth and Kinross is high with approximately 49% of our buildings highly suitable for transition to meet regulatory targets. The grid is already constrained or near capacity at several locations within Perth and Kinross. Future changes in available capacity and wider energy system decarbonisation should be considered when planning strategic widespread deployment of heat pumps.

The Council are also working alongside SSEN and other partners to build evidence in the Local Energy Net Zero Accelerator (LENZA) platform which will utilise the outputs of our LHEES, LAEP and our live Delivery Plans to plan decarbonisation pathways by enabling low carbon technologies (LCTs) such as heat pumps to be sited in cost-effective locations whilst providing early warning to SSEN of additional demand on the network. This will help us to ensure alignment with grid investment planning in the near to medium term, while helping to improve and shape longer term roll out and investment required up to 2045. Alignment of our investment planning with SSEN and other key delivery partners will support the development and triaging of a pipeline of low carbon projects through to delivery avoiding risks and barriers posed by grid capacity.

Data availability

There are issues with the current data availability, access and sharing that impact on the ability to target priority areas for action and require the use of proxy data. These include:

- Non-domestic sector data
- Energy consumption and heat demand data, especially for large users
- Fuel poverty data
- Funding eligibility data
- Data protection and commercial sensitivity

5.2. Opportunities

The delivery of the Perth and Kinross LHEES also brings many opportunities.

Use of natural assets, waste heat and new technologies

There is potential for several technologies using our natural assets which could be used to provide heat sources for potential heat networks. These include:

- Water source heat pumps which could use heat from the River Tay and other local bodies of water.
- Ground source heat pumps which could use heat at a maximum depth of 200 metres underground.
- Energy from waste which could use heat produced from burning waste.
- Geothermal which could use heat from 500 and 2,500 metres underground.
- Heat pumps and exchangers which could use heat from wastewater or the public sewer.
- Other sources of waste heat.

Hydrogen

Hydrogen could be used on a large scale as a cleaner replacement for natural gas in the gas grid, supplying individual boilers or heat networks. The UK Government will take decisions on the role of hydrogen in the Great Britain gas network from 2026.

Given the Scottish Government's proposed hydrogen use hierarchy and the forecasted cost and supply constraints, hydrogen is not currently considered as a significant heat source in the Perth and Kinross LHEES, but the development of the sector and alignment with developing policy will be tracked in liaison with Scottish Gas Network, one of our key stakeholders.

Green jobs and building a green economy

With over £900M in retrofit investment needed in the domestic sector alone in Perth and Kinross over the next decade, there is significant potential to grow good green jobs. In addition to the direct skills required to deliver the transition (installation of heat pumps and insulation, etc.), there is also the potential for a secondary economy to develop focused on finding circular uses for the old assets (gas boilers, single glazed windows, etc).

Financing

Heat networks typically have high up-front capital costs alongside a longer-term return on investment. This causes challenges in business case development and at present, nearly all schemes require government subsidies to make them deliverable. There is increased private sector interest in heat networks, especially when at scale. In Perth and Kinross, the development of large-scale district heating in Perth may be a key strategic heat decarbonisation opportunity attractive to the market for private investment. However, this may be more attractive when packaged with other energy projects.

Public-Private Collaboration

There are opportunities for public-private collaboration. Partnerships could be developed between Perth and Kinross Council and other public sector/social organisations such as Registered Social Landlords (RSLs) or between public/social organisations and Distribution Network Operators (DNOs) or indeed the wider private sector. One option progressed by other areas in the UK is a Strategic Energy Partnership to bring private sector expertise and to secure significant levels of capital investment required for the development of heat networks and other energy-related projects. The projects taken forward by the energy partnership could deliver on local priorities relating to carbon reduction, fuel poverty and energy security with the aim of developing Smart Local Energy Systems.

Co-benefits

There are several societal co-benefits associated with the delivery of the LHEES. These include:

- Reduction in fuel bills, associated with energy efficiency improvements and potential heating source improvements (e.g., oil to heat pump)
- Warmer and healthier homes with improved indoor air quality
- Increased energy security, with local or renewable Scottish sources able to meet a higher percentage of energy demand.

The LHEES is an opportunity to bring in a whole energy system approach to maximise all of these.

6

ENGAGEMENT & CONSULTATION

6. ENGAGEMENT AND CONSULTATION

This section details the engagement and consultation process which took place for the development of the LHEES Strategy and Delivery Plan.

6.1. Engagement in strategy development

In line with Perth and Kinross Offer and with best practices in strategy development, engagement with our communities and stakeholders has been the driver to design Perth and Kinross LHEES and will be crucial for its successful delivery.

We have organised ourselves to design, agree and deliver an effective engagement plan with the support of Arup, our external adviser.

Perth and Kinross Council Climate Change Board, along with the Executive Director (Communities) and the Climate Change and Smart Investment Manager (senior responsible officer), agreed the overall strategy development scope and engagement plan. The approval of the Perth and Kinross LHEES strategy and delivery plan sits with the Council's Climate Change and Sustainability Committee.

Reporting to the Board, a Project Team led the development and engagement process with project leads ensuring co-ordination and day-to-day management. A cross-Council LHEES Coordination Team ensured that information and experience was shared across the Council with key individuals focusing on specific areas of work.

A stakeholder mapping was carried out to identify stakeholders. Based on the likely level of interest and influence on the project, stakeholders have been categorised into four groups:

- TIER 1 – Ongoing engagement throughout the project at defined workshops e.g., identifying priorities and actions for delivery. Specific engagement plans developed as required.
- TIER 2 – Participate in workshops and engage with the project at key milestones (if required). Potentially one-to-one contact during data collection stage and one-to-one interviews held with these stakeholders to gain further insight and understanding of priorities and delivery contributions.
- TIER 3 and 4 – Potentially participate in workshops and engage with the project at key milestones (ad hoc basis). Receive a direct invite to public consultation.

TIER 1 stakeholders were invited to form a LHEES Steering Group with Council's representatives and a first meeting of LHEES Steering Group took place on 30th March 2023.

The engagement plan was structured around a series of Steering Group workshops and one-to-one interviews. Workshops' invitations and interviews were extended to other stakeholders' groups when relevant to the topic. Workshop objectives and key outcomes are summarised below:

Table 9: Stakeholder workshop summary

Workshop	Outcomes
1 Objective settings: Knowledge building and awareness raising for key stakeholders; establishment of ongoing engagement opportunities and activities to support LHEES.	Good internal awareness of LHEES and LAEP requirements but less so externally Council and external organisations working towards heat decarbonisation and EE targets. Good alignment of strategic priorities for energy efficiency, heat decarbonisation and fuel poverty alleviation Funding a key barrier alongside regulation and skills and supply chain
2 Scenario Setting - Strategic Options and Priorities - Scenarios developed for optimisation modelling and to support finalising focus for the LHEES and LAEP.	Key challenges and opportunities for domestic and non-domestic decarbonisation identified (e.g. skills and supply chain, public awareness, grid capacity, cost/funding, investment opportunity and job creation) Key uncertainties of the future energy system identified (e.g. role of hydrogen, behavioural change and uptake, delivery model, rate of transportation decarbonisation) Scope of LAEP – role of community energy, energy resilience, flexible services
3 Heat Network Zones – identification of Heat Network Zones and discussion.	• Opportunity to link discrete zones in the Perth City Centre and include review and expansion of key anchor loads in a city-wide heat network currently being investigated with funding from HNSU. • Community interest in HN development noted in Kinross • Expansion of zones in Auchterarder. Kinross and Blairgowrie and review of anchor loads (e.g. Glen Eagles)
4 Online modelling feedback - Prioritised decarbonisation pathway used to inform the LHEES Strategy and Delivery Plan.	Input on local authority-led actions related to building energy efficiency and heat networks. - Council role in growing installer networks - Alignment with LHS Action Plan addressing SHQS abeyances (for social reasons) and exemptions (subject to technical, disproportionate cost or legal reasons) in Council stock. - Variety of housing stock and difficulties with economies of cale, social housing retrofit to inform owner occupied delivery areas, role of the Council in coordination of delivery. - Issues with skills and supply chain - Cost and fuel poverty impact - Off gas areas and consideration of HNs and hybrid HPs

	- Fabric first approach and prevalence of hard-to-treat buildings
5 Draft Strategy and Delivery Plan - Present the draft Strategy and Delivery Plan for discussion and feedback.	• Feedback on actions shaping the LHEES and LAEP, including how the local area can best approach the delivery of actions within a local context • Set out the enablers and barriers associated with each of the priority areas • Deliberate and assign actions to all local stakeholders , against each priority areas

In addition to the formal LHEES engagement, the Strategy development is based on wider stakeholder and community engagement by the Council and our partners. These include:

- Perth and Kinross Council's Local Housing Strategy inputs and consultation (2022).
- Big Place Conversations held across Perth and Kinross (Spring/Summer 2023).
- Net Zero Living – Pathfinder Places public engagement in Aberfeldy, Tulloch and Blairgowrie (Spring 2023).

6.2. Outputs of community consultation

Following consultation with partners and stakeholders, a draft LHEES vision with priorities for action was developed. Before the final strategy was developed, we wanted to make sure that local people, communities and stakeholders had their say on whether these priorities will make a positive difference to meeting their needs.

The views of residents, the local community and stakeholders are crucial in ensuring that the first LHEES truly reflects the issues faced by local people and includes the correct priorities and actions to address these issues. In developing the LHEES, we have consulted with local stakeholders from an early stage and want to continue that process with residents and the local community to make sure we get it right.

We issued a consultation document with evidence reports on 3 October 2023 with a deadline for response on 29 October 2023. Details of the consultation document and related reports could be accessed at Perth and Kinross Local Heat and Energy Efficiency Strategy 2024-2045 Consultation - Perth and Kinross Council Citizen Space - Citizen Space (pkc.gov.uk).

The Consultation document was asking a number of questions and although the number of responses was low, it provided a qualitative insight into the public perception of LHEES. A summary is provided below:

- **Vision and outcomes**: agreement and good positive support. Presented clearly. However, generally, quite complex and technical area with jargon.
- **Targets**: alignment to Scottish targets was supported. However, doubts about the availability of finance to achieve them as well as the need to change behaviors.
- **Challenges**: agreement with identified challenges. Historic and listed buildings would need more consideration.
- **Opportunities**: agreement with identified opportunities. Use of hydrogen was raised as difficult and not certain. More emphasis on social value opportunities as co-benefits. Expected future decoupling of gas and electricity prices could be highlighted. Heat as by-product to support heat network could be highlighted.
- **Strategic priorities**: Strategic priorities may need to be prioritized with improving the fabric of buildings first before changes to the heating system.
- **Strategic actions**: heat network zones focus should put more emphasis on the scope to use heat networks in rural towns, especially where there is active and motivated community involvement and therefore not use the model too rigidly. Emphasis on heat pumps is questioned in relation to installation and operating costs and this should be reflected in the delivery timescale and considering phased heat supply (lowering temperature in line with energy efficiency progress). Funding capacity of private owners was also highlighted as a challenge particularly when gas prices are cheaper than electricity. More generally, actions are comprehensive. It was suggested adding an action to complete a detailed risk review and maintain the resultant risk matrix/register for each action with early engagement with private

sector partners through this process to sense check and advise on actions and their progress/outcomes.

- **Delivery Plan**: early engagement with potential private sector partners would be beneficial and lead to quicker resolutions. In relation to criteria, it was supported. It was suggested to add information on the compatibility with target timelines for each of these.
- **Supporting mechanisms**: the whole energy system approach was supported. Skills supply and demand and local supply chain were highlighted as important with attraction of new people to the industry, upskilling and keeping it local. Supporting the community by providing better information, providing financial support, and also building on existing practices to take advantage of the heat transition was also highlighted. Mobilising public and private investment were supported including exploring a strategic energy partnership as this could simplify procurement, ensure commitment from partner(s), and is likely to lead to wider positive impacts. However, there is a need to ensure it does not prevent other investment in the area. Early involvement of private sector delivery partners was suggested to prevent challenges and delays in procurement and delivery. In particular, early confirmation and clarity on a) the role that the Council wishes to play in the long term energy solution (and heat network) development and deployment and b) the method by which it will procure development, investment, delivery and operational services for the energy system and c) the model to establish the approach to work with industry in the supply of services, for example MoU, joint venture or concession model. This will be important to provide investors with signals on the scale of opportunity and likely commercial arrangements underpinning heat networks deployment.

The outputs from the consultation have been used in finalising the LHEES Strategy and Delivery Plan.

6.3. Impact Assessments

Perth and Kinross Council has considered the following impact assessments in developing the LHEES.

Table 10: PKC LHEES Impact Assessment

Impact Assessment	Status	Comments
Strategic Environmental Assessment	Screened out at the Screening Stage	To view the Screening Report and Determination, please visit: https://www.pkc.gov.uk/article/23543/Strategic-Environmental-Assessment
Data Protection Impact Assessment	Required - Completed	DPIA checklist form was completed which reached the decision that a full DPIA was not required.
Equality and Fairness Impact Assessment	Required - On-going	Consultation with Perth and Kinross Equalities groups on-going as part of wider public engagement. Potential for significant positive impact.
Business and Regulatory Impact Assessment	Scoped out	Following internal screening this Strategy was deemed not applicable

6.4. Future Engagement and Communications

The engagement and stakeholder plan will continue to be updated by the LHEES steering group to map out longer term engagement activities. This plan will detail engagement to support actions identified in the Delivery Plan and set out how these stakeholders will be engaged to support delivery including the action owner, stakeholders, timescales for delivery, progress and funding allocated to each action.

Key stakeholders identified as part of the LHEES engagement, supported by PKC Climate Action Plan deliverables, will be utilised, building on the existing strong communication network established between the Local Authority, businesses, individuals, community groups and environmental organisations. To ensure engagement remains inclusive and diverse, the LHEES Coordination Team, comprising a cross functional team of internal PKC staff will provide input regularly. The non-domestic sector will be targeted through a dedicated engagement plan to inform a local business programme which would provide practical support to business owners. The communication aims will focus on the following:

Awareness Raising – raising awareness to;

- improve awareness of regulation, heat decarbonisation measures including awareness of heat networks, heat pumps and the benefits of energy efficiency measures.
- highlight the benefits, and positive impact on the environment and opportunities to combat fuel poverty.
- understanding of national, and Scottish targets which will impact and influence what we do.
- feature retrofit project examples and updates to demonstrate progress.
- transformational change required to reach a net zero carbon Perth and Kinross
- improve access to funding opportunities

Engagement – seeking views and opportunities for joint action from householders, businesses, and community groups on;

- LHEES Strategic and Delivery Plan priorities –a final awareness raising and delivery workshop will precede publication of the LHEES
- community wealth building and fuel poverty
- barriers which prevent stakeholders from adopting energy efficiency measures
- working with communities and access to support to enable positive action
- exploring commercial delivery models, including a Strategic Energy Partnership, for heat network and other low carbon pipeline projects. to support this engagement the Council has published a Request for Information to establish a long-term Strategic Energy Partnership (SEP) with a private sector partner.
- working with SSEN and other Councils and partners to align investment opportunities

Coverage – our engagement will;

- give every community in Perth and Kinross the opportunity to participate.
- ensure inclusivity for whole demographic coverage
- develop a range of measures to assess our level of engagement
- facilitate collaboration between the public and private sectors, DNOs and wider energy stakeholders to align strategic energy planning and investment
- explore opportunities to further develop local skills and supply chains

7

STRATEGTIC PRIORITIES

7. STRATEGIC PRIORITIES

7.1. LHEES Priorities

To achieve this vision and outcomes, two strategic priorities form the basis of the Strategy and Delivery Plan:

Priority 1
Decarbonising heat within a transitioning energy system focusing on heat networks and heat pumps.

Priority 2
Improving buildings' energy efficiency aiming for affordable warmth and regulatory compliance.

These are not ranked in order of priorities and a fabric first approach should always be used. These were developed through an evidence-based approach drawing on national and local strategies; engagement with key stakeholders; and an analysis of the buildings in Perth and Kinross.

The delivery of these two strategic priorities will be supported through prioritisation of actions, a whole energy system approach and key supporting delivery mechanisms. To support the successful delivery of our Strategic vision and priorities, a number of ideas for action have been identified, assessed and prioritised by the Council with key stakeholders.

Perth and Kinross-wide mapping of heat decarbonisation opportunities, alongside whole energy system considerations, was completed to identify where interventions are most suitable and where challenges exist. The analysis supports the development of a long term, strategic investment framework through prioritisation of our strategic zones, including heat network zones and more granular delivery priorities - targeting areas for projects, programmes, engagement and providing a focus for delivery of a pipeline of projects over the short to medium term.

7.2. Strategic Zoning

Strategic zones were generated to assess our strategic priorities - decarbonised heat within a transitioning energy system (potential heat network zones and heat pump suitability) and improving buildings energy efficiency, to meet regulatory targets and address fuel poverty delivering affordable warmth. The aim of Strategic Zoning is to understand the opportunities and potential challenges associated with our priorities at a strategic data zone level (e.g., 500-1000 residents).

A range of evidence was used to prioritise strategic zones and actions including:

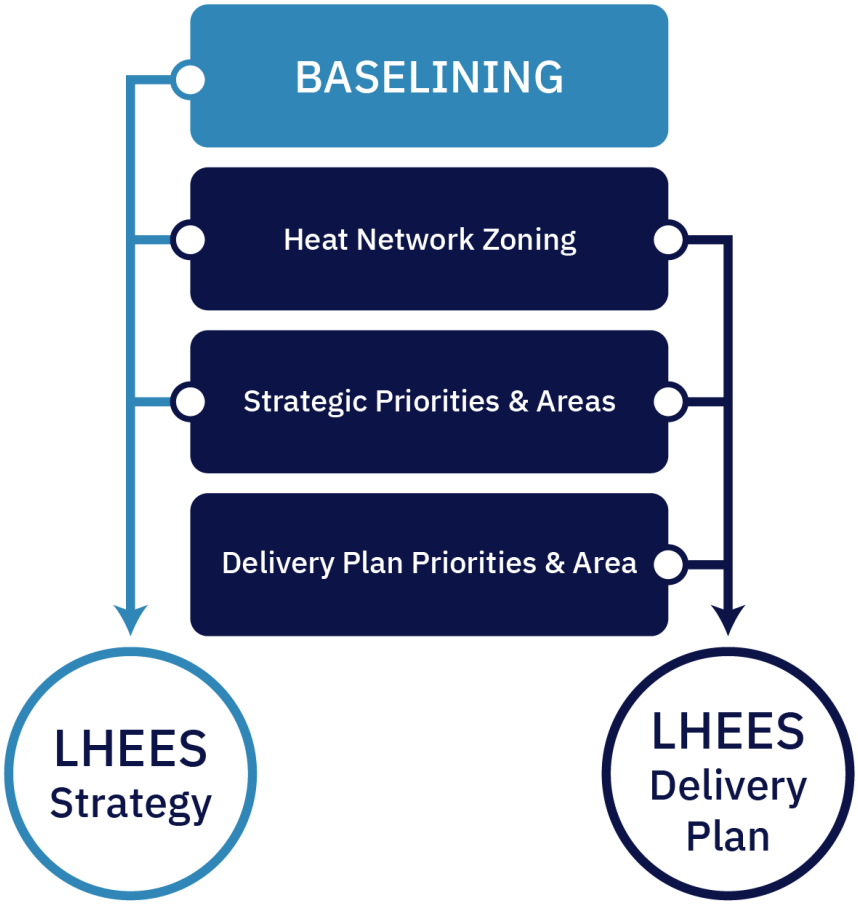
- the domestic baseline and non-domestic baseline for our building stock
- PEAT retrofit scenarios to ensure that buildings are retrofitted to comply with policy set out in the regulatory standards outlined in the Heat in Buildings and Energy Efficiency Standards for Social Housing post-2020 (EESSH2)
- Non-domestic retrofit analysis modelling energy efficiency measures influenced by the building typology to assess possible energy savings.
- Scottish and Southern Electricity Networks (SSEN) infrastructure and capacities including Primary substations (33kV/11kV) and the Electricity Supply Areas (ESAs) that they serve as an indicator of substation capacity.

Strategic Zones for our identified priorities aim to spatially set out areas of focus to decarbonise the building stock, with a focus on understanding the current performance of buildings, and an analysis of cost-effective opportunities for significant energy and emissions reductions. Strategic Zoning evaluates various aspects of energy efficiency and heat decarbonisation in Perth and Kinross.

The analysis and visualisation were undertaken using mapping which integrates multiple variables affecting heat decarbonisation, energy efficiency and deliverability to identify specific challenges and opportunities in delivering interventions. This approach represents a significant advancement beyond the LHEES methodology and facilitates a deeper understanding of opportunities and challenges, as well as actions that could form the basis of delivery planning for the Council.

7.3. Strategic vs Delivery zoning for priorities

The LHEES methodology requires development of strategic priorities and zones which set out how a local authority proposes to meet longer term national and local objectives and prioritise areas to meet these targets. This is supported by complementary, more granular delivery priorities and areas pinpointing targeted intervention and early, low-regrets measures in the near to medium term (5-year focus). This process is illustrated in the diagram below and delivery plan priorities are described further in section 7.



7.4. Strategic Priority 1a: "Delivering decarbonised heat within a transitioning energy system – Heat Network Zones"

Regulatory targets for heat decarbonisation are:

- **By 2030**, emissions from buildings have to be 68% lower than 2020 levels.
- **By 2032**, 70% of heat for non-domestic buildings will be using low carbon technologies.

What is a Heat Network? Heat networks (also known as district heating) supply heat from a central source to consumers, via a network of underground pipes carrying hot water. Heat networks can cover a large area or even an entire city or be fairly local supplying a small cluster of buildings.

What are Potential Heat network zones? Potential Heat network zones are areas particularly suitable for heat network development. The purpose of the zones is to attract investment from heat network developers.

Approach for Identifying Potential Heat Network Zones

Heat Networks (Scotland) Act 2021 places a duty on local authorities to carry out a review of potential areas for heat networks. The formal designation of heat network zones will use outputs from LHEES as a starting point for more detailed work on consideration and formal designation of

heat network zones. Secondary legislation and guidance are being phased-in between May 2023 and 2025 and will include the formal designation of potential heat network zones.

The approach to identifying potential zones builds upon the national heat network assessment methodology. Key stakeholders have preliminarily screened potential zones to identify any known issues or barriers which limit taking the zone forward for further investigation.

What is a Linear Heat Density? "Linear heat density is an industry standard metric that relates heat to distance, for a heat network it is heat demand per meter of pipe." It is an indicator of the financial viability of a heat network. A higher linear heat density indicates that there is high heat demand and low pipe length, which may lead to a heat network with better financial viability.

What is an Anchor Load? "Anchor loads are high heat demand buildings and key connections on a heat network that usually drive the economics of heat networks."

LHEES methodology: Heat Networks – Generation of Potential Zones Detailed Practitioner Approach

The LHEES methodology uses two sets of criteria to identify potential heat network zones (Table 11). Stringent zones have a higher level of heat demand and greatest potential financial viability, while Baseline Zones are still expected to be viable, but less so than Stringent Zones.

Table 11: Thresholds criteria used for Potential Zone identification and prioritisation

	Linear heat density benchmark (kWh/yr./m)	Anchor load threshold (MWh/yr)	Minimum number of anchor loads per cluster
Baseline	4,000	500	2
Stringent	8,000	500	5

Potential Heat Network Zones

Due to the rural nature of Perth and Kinross, the potential for heat networks in the local authority area is limited to a few urban areas and towns. Two zones were identified using Stringent criteria – one in the Perth City Centre and one in the Inveralmond Industrial Estate (Perth). These zones have higher heat demand density with a larger number of anchor loads, making them more likely to be financially viable. Five further zones were identified using Baseline criteria, indicating financial viability in these locations may be more limited. The identified zones include:

- Perth City Centre (Stringent and Baseline)

- Perth Inveralmond Industrial Estate (Stringent and Baseline)
- Perth College/UHI (Baseline only)
- Perth Academy (Baseline only)
- Auchterarder (Baseline only)
- Kinross (Baseline only)
- Blairgowrie (Baseline only)

A summary of potential heat network zones can be viewed via a web map to explore the full range of heat network opportunities in further detail. The seven potential zones are shown indicatively in Figure 10 to Figure 13. Currently the extent of the zones is indicative based on the criteria and approach outlined above.

The below table indicates the indicative heat demand and number of properties met by the potential heat networks in Perth and outlying rural areas. A total heat demand of 269 (GWh/yr) could be met through developing heat networks in these potential zones. Note these figures are conservative and are based on a value of 73 MWh/yr as the minimum heat demand[4] from a given residential building for it to be viable to connect to a heat network. The above identified zones are mostly residential and have a high proportion of social housing. Within the zones in the city centre there are over 14,000 households, with significant social housing (25-30%) and households in fuel poverty (25-30%) providing evidence of the wider scope and potential of heat networks.

Table 12: Thresholds criteria used for Potential Zone identification and prioritisation

Heat Network Zones	Social Housing Heat Demand (kWh/year)	Council owned nondomestic heat demand (kWh/year)	Other heat demand assumed to be met by HN (kWh/year)	Indicative number of properties
Perth City Centre	12,828,367	5,872,915	49,642,958	1,639
Perth - Inveralmond Industrial Estate	1,523,491	9,109,032	732,869	283
Perth Academy	2,652,177	3,507,115	8,032,898	323
Perth College/UHI	5,827,500	1,557,553	5,948,866	551
Totals	22,831,535	20,046,615	64,357,591	2,796
Blairgowrie	620,779	677,360	4,606,120	63

[4] This value was chosen to be consistent with the gas consumption threshold used by BEIS to determine whether an address is domestic or non-domestic.

Kinross	128,781	2,559,914	6,058,743	19
Auchterarder	863,918	75,098	3,490,457	99

The Council will work towards improving demand confidence and aggregation, clarifying supply options, and engaging with potential anchor load connections to support formal designation and refine zone boundaries. Potential zones will be further verified and reviewed in terms of suitability as part of the Heat Network Designation work to be undertaken in 2024/25.

Improved regulation, evidence, funding and policies at both a local and national level are required to maximise the incentive to invest in heat networks. The cost of heat compared to conventional fuels like gas is a key driver of this, but heat networks must also be shown as the most cost-effective decarbonisation option for buildings within Potential Heat Network Zones.

Challenges exist for the financial viability of heat networks. The delivery of these zones in isolation is also challenging. The level of funding required is beyond the scope of the Council to deliver independently. Mobilising partners and public and private investments for projects including through a possible Strategic Energy Partnership will help unlock delivery of, though potentially not limited to, heat networks. Identifying investment potential will facilitate the exploration of delivery model (s) with a major energy and heat supplier. Delivery models and stakeholder engagement is required to identify the role of community partners in development and delivery of heat networks. The development of a commercial delivery model and strategic energy partnership for the city centre provides an opportunity to inform how heat networks, and other low carbon opportunities identified in the wider LHEES and LAEP, could be delivered. The establishment of an energy partnership may help to unlock heat network development in those areas of Perth and Kinross that are less commercially attractive but could benefit the most from what district heating can offer.

Figure 10: Indicative Heat Network Zones Perth and Kinross

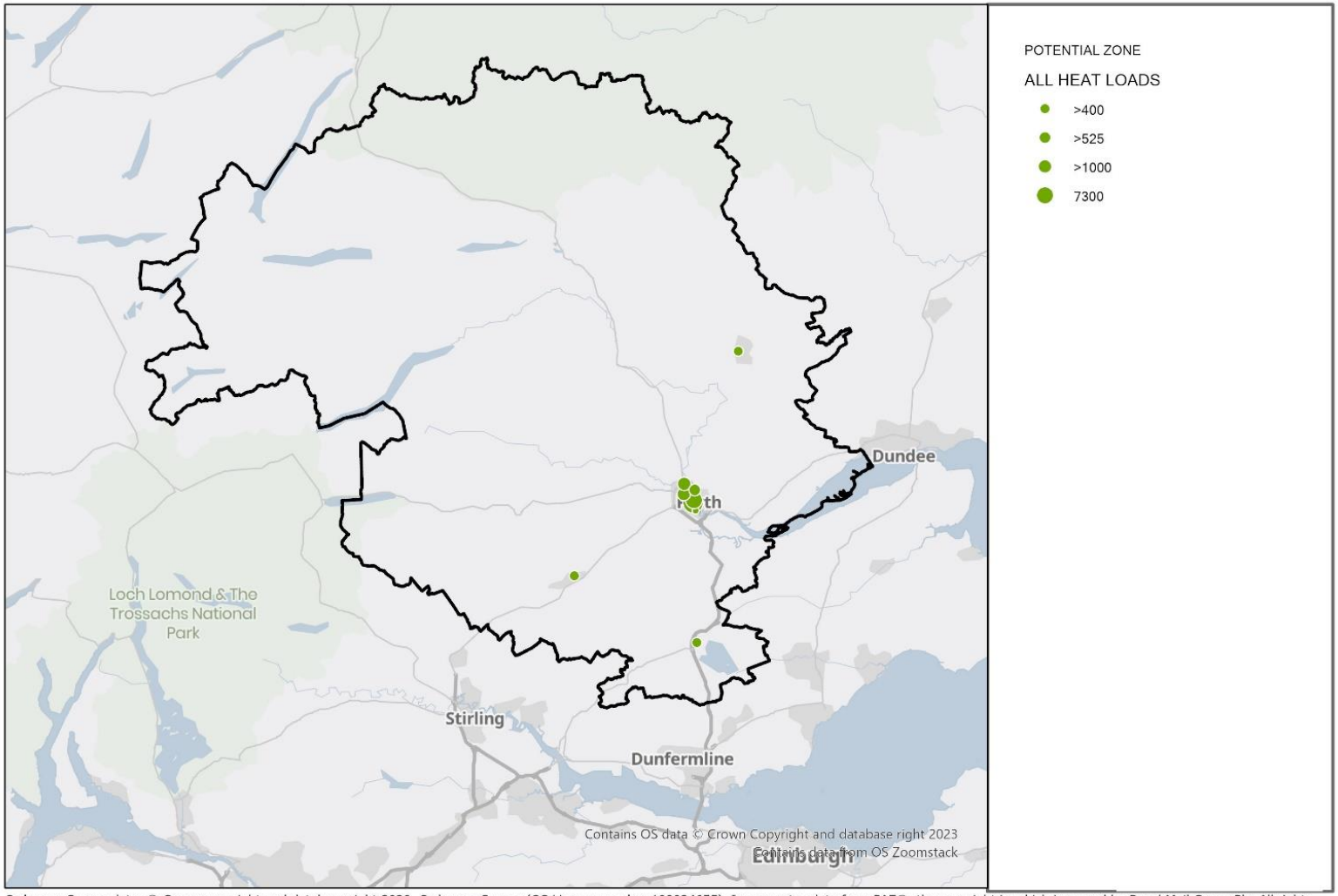


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Figure 10.1 Indicative Heat Network Zones Perth

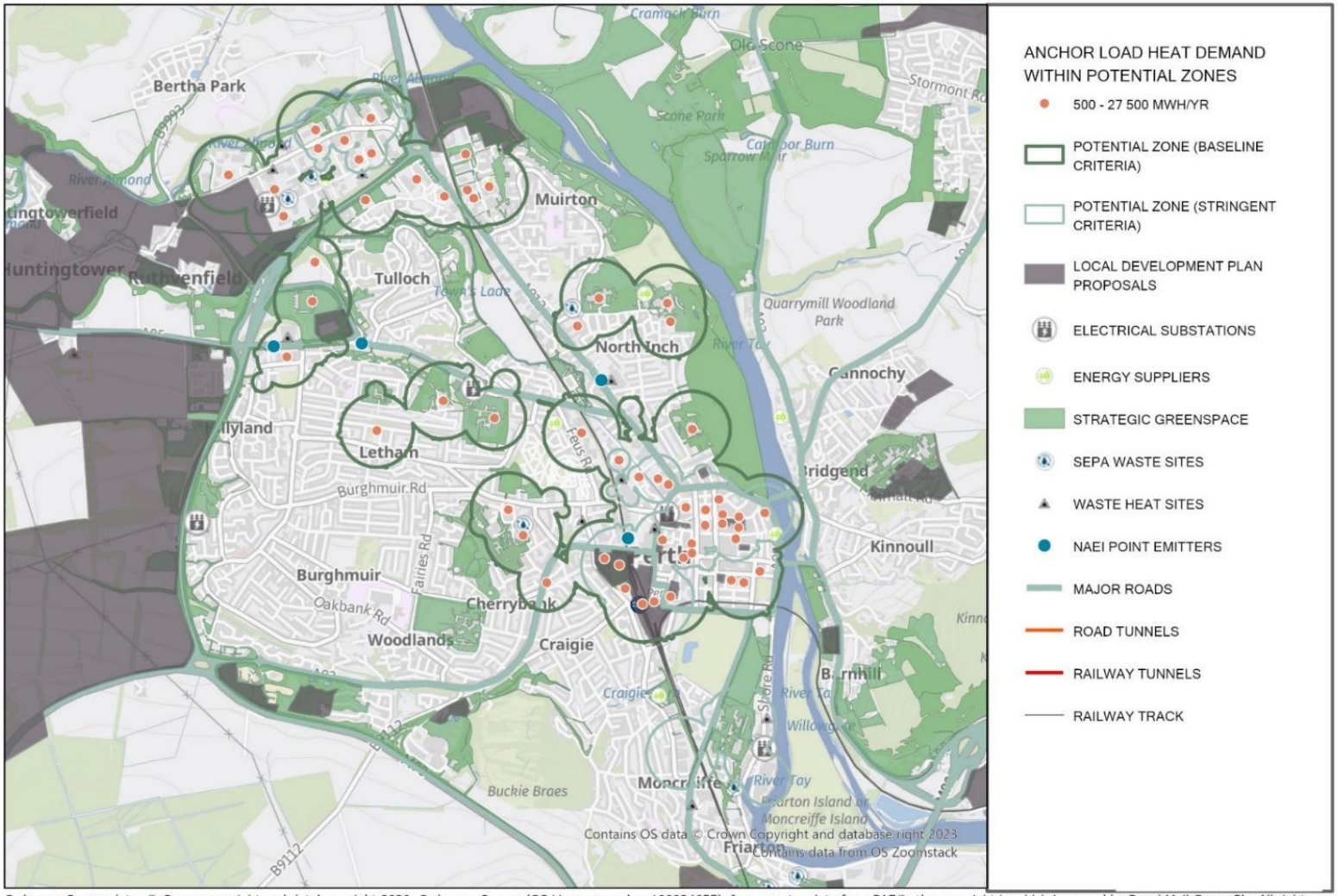

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Figure 11: Indicative Blairgowrie Heat Network Zone

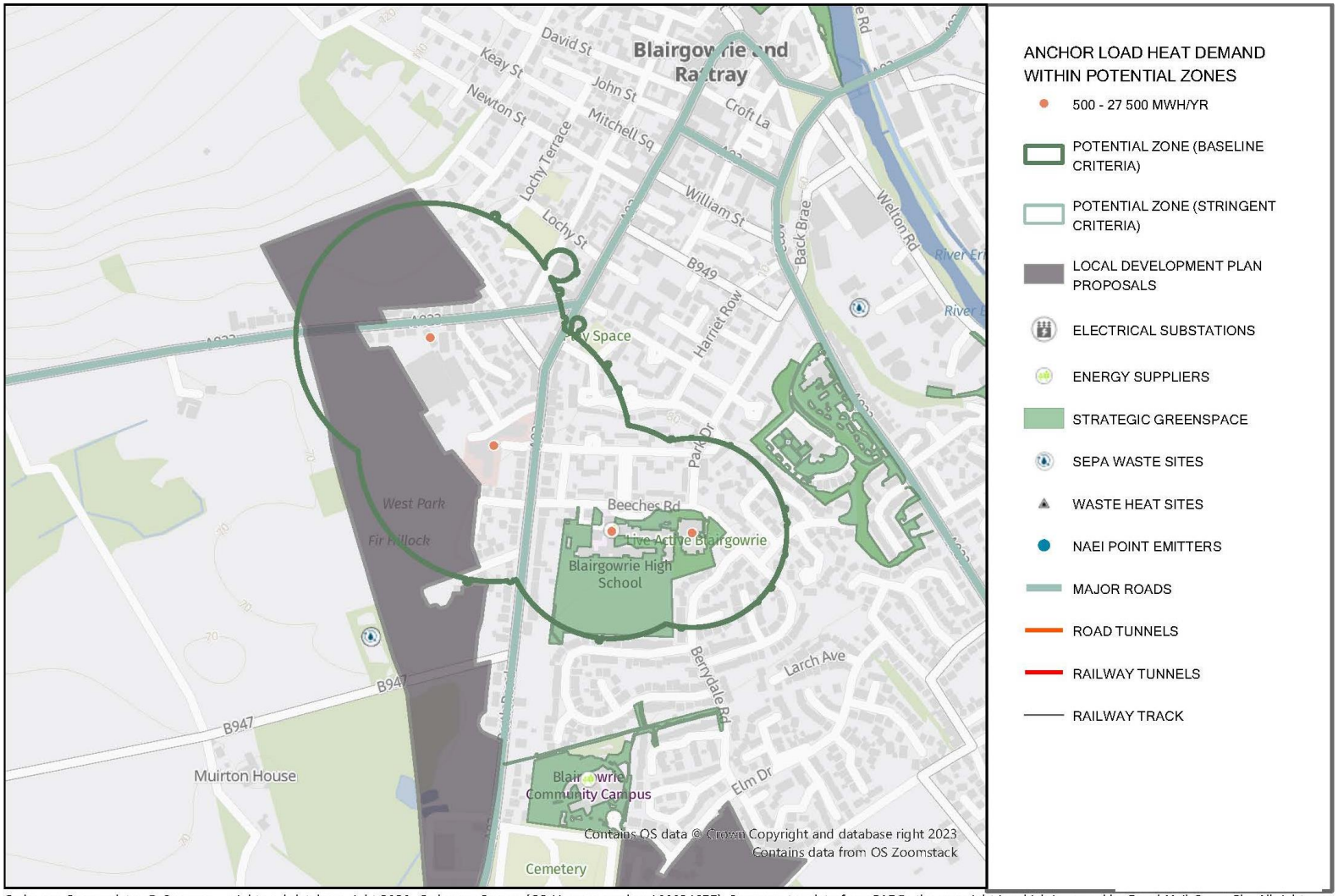


Figure 12: Indicative Kinross Heat Network Zone

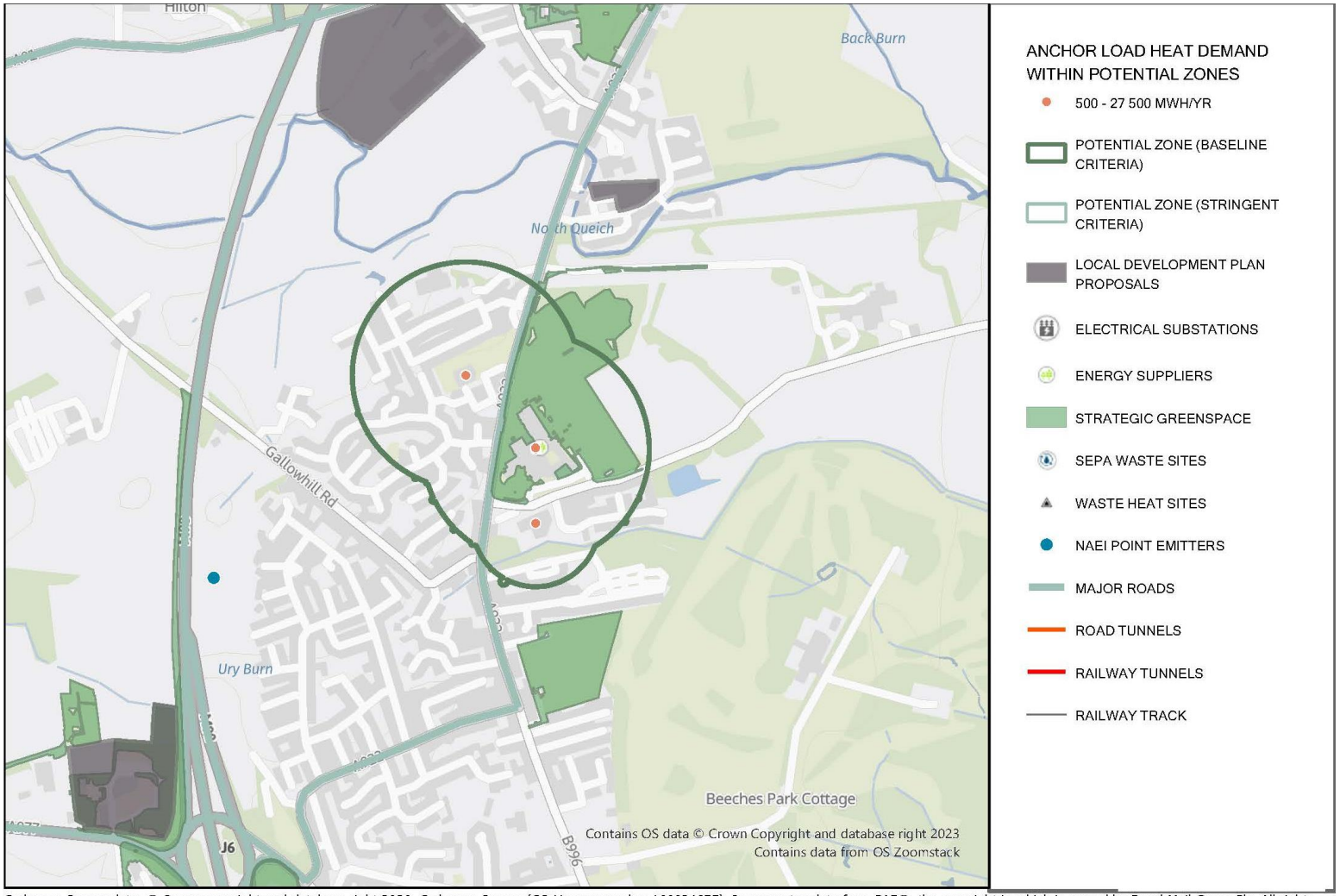
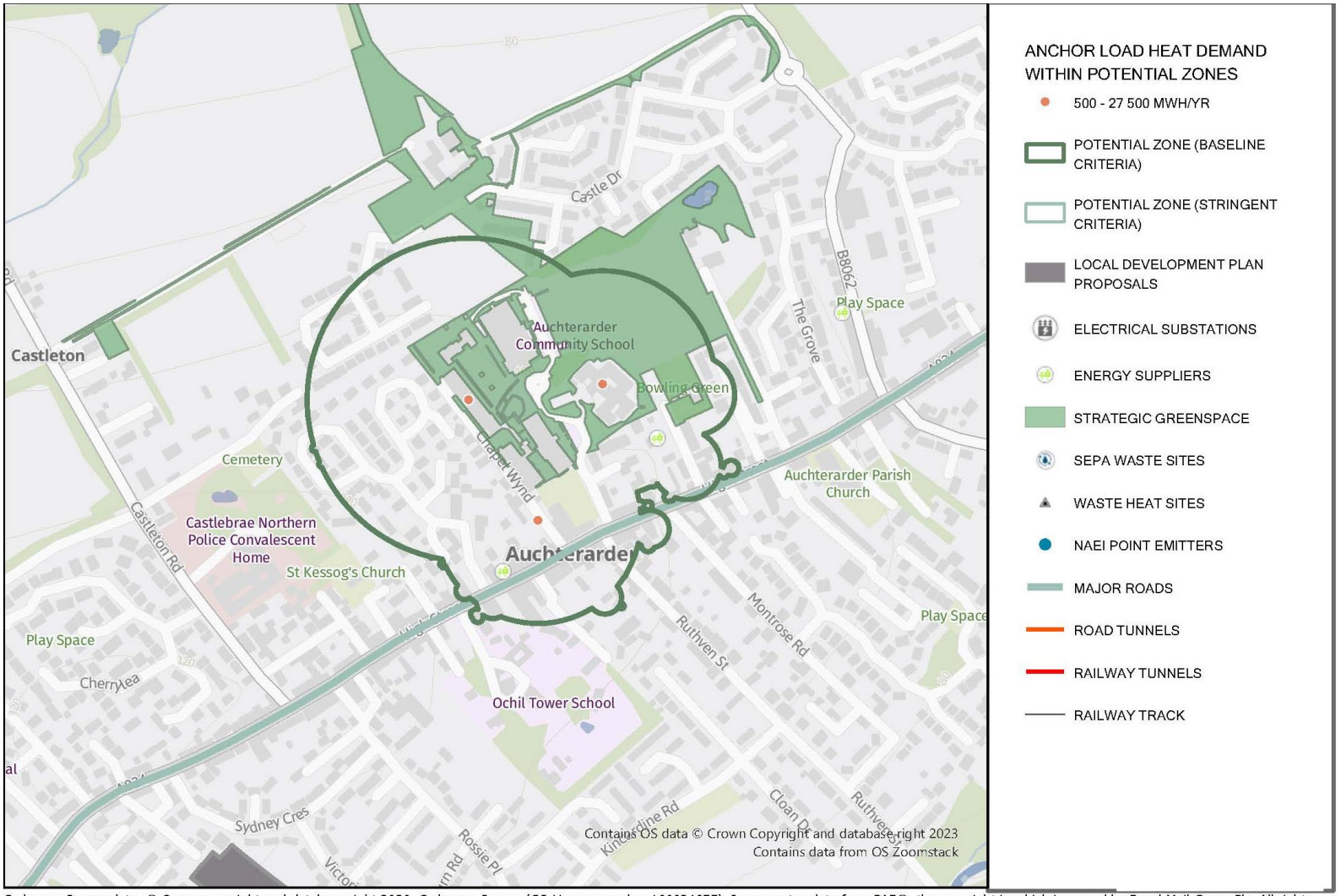


Figure 13: Indicative Auchterarder Heat Network Zone



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Perth City Centre Heat Network

Perth's heat demand using the Scotland Heat Map, indicated a total heat demand of 0.5 TWh/yr. For comparison, the City of Edinburgh has a total heat demand of 5.4 TWh/yr. Much of Perth's heat demand is concentrated in smaller areas of the city, providing several areas of high heat density that present a significant opportunity for the deployment of a large-scale heat network over time. The most significant opportunity for heat networks lies in Perth, where a feasibility study for a Perth City Centre heat network has recently been completed. It was proposed that this network could be supplied by a closed loop ground source heat pump and supply heat to 15 core sites. Additional buildings to the south and west of the proposed route (e.g., Dewars Centre, Perth Leisure Centre and social housing areas) were identified as potential future connections. Other heat sources such as geothermal heat or the River Tay could also be explored.

The Council has been successful in obtaining funding from the Scottish Government Heat Network Support Unit to develop plans for a strategic, large scale heat network within Perth and also an approach and delivery and procurement model for heat networks more widely including consideration of community stakeholders and benefit.

Blairgowrie, Kinross and Auchterarder Potential Heat Networks

Blairgowrie: A Baseline Zone has been identified in Blairgowrie. The anchor loads identified in this zone are Blairgowrie Community Hospital, Blairgowrie High School and Live Active Blairgowrie. Proctor Production Facilities and Blairgowrie Community Campus are located to the north and south of the zone respectively. The zone is adjacent to a development site identified for mixed-use development.

Kinross: A Baseline Zone has been identified in Kinross anchored by loads at the Live Active Loch Leven Leisure Centre, Kinross High School, Loch Leven Community Campus and Loch Leven Health Centre.

Auchterarder: A Baseline Zone has been identified in Auchterarder anchored by loads at the Auchterarder Community School and Parkdale Care Home (Council owned). The zone also includes Auchterarder Library and Aytoun Hall. There is a moderate proportion of social housing (33%) and fuel poverty probability (28%) in the zone.

Ground source heat pumps have been identified as the likely heat source for all three zones.

Key recommendations

Full details of actions to support heat network delivery are provided in the LHEES Delivery Plan. Key recommendations include:

- Improve learning through participation in the Scottish Government supported Danish mentoring programme, engagement with the Heat Network Support Unit and others to develop a long term, strategic investment framework through prioritisation of our strategic zones, including heat network zones and more granular delivery priorities - targeting areas for projects, programmes, engagement and providing a focus for delivery of a pipeline of projects over the short to medium term.
- Explore feasibility of connecting non-domestic and domestic buildings to heat network by progressing the requirements of The Heat Networks (Heat Network Zones and Building Assessment Reports) (Scotland) Regulations 2023 following the LHEES modelling (i.e., finalising Review (Section 47) and preparing for Designation (Section 48).
- Explore and quantify viability of low carbon or renewable heat sources for potential heat networks including though not limited to deep geothermal, heat from wastewater treatment plants/wastewater network, ground and river source heat pumps and other sources of waste heat.
- Work with Business Energy Scotland to engage the non-domestic sector to develop awareness and engagement campaigns, and identification and engagement with non-domestic building owners on suitability for heat networks, within Potential Zones
- Undertake stakeholder engagement to identify the role of community partners in development and delivery of heat networks particularly in rural areas. The Delivery Plan also highlights actions in rural areas to assess the suitability for nearby housing stock for connection to a heat network and consideration of potential for connecting to heat networks at early stages of site development for future housing and employment sites.

7.5. Strategic Priority 1b: “Delivering decarbonised heat within a transitioning energy system - Heat Pumps”

For the majority of Perth and Kinross properties that fall outside of potential heat network zones, heat pumps will be the recommended low carbon heating source. However, we understand that this would be challenging in terms of costs and public perception. The transition will focus in the near to medium term on early, low regret areas, such as off gas grid areas with carbon intensive heating systems and managed carefully to ensure we get the right technology in the right place.

What is a Heat Pump? A heat pump captures heat from outside – either from the air or ground - and moves it into your home. The heat pump uses electricity to do this, but the heat energy delivered to your home is much more than the electrical energy used to power the system. In well-insulated homes, heat pumps can be comparable in operating costs to gas and lower than oil. As they produce heat at lower temperatures than gas or oil-fired systems, their relative cost increases for poorly insulated homes.

On-gas and off-gas grid properties have been grouped into four categories depending on their heat pump suitability as shown in Table 13. LHEES heat pump suitability categorisation excludes consideration of electricity network capacity suitability or cost-effectiveness. Perth and Kinross has undertaken work to identify areas having spare network capacity. It shows that over 28,500 properties in Perth and Kinross are potentially highly suitable for a heat pump. At 2023 energy

prices, the potential for energy cost savings by switching to heat pumps for well insulated off-gas households is significantly more than for on-gas households. Full details of areas for with high heat pump suitability and spare grid capacity are provided in the accompanying web maps.

Table 13: Heat Pump Suitability Classification

Heat Pump Suitability Category	On-gas properties in Perth and Kinross	Off-gas properties in Perth and Kinross
Category 0 - Already have a low or zero emission heating system.	1% (314)	5% (1,472)
Category 1 Considered highly suitable for a heat pump installation (i.e., well insulated property with a wet system).	49% (23,938)	18% (4,851)
Category 2 - Require moderate fabric upgrades and/ or the addition of a wet system	18% (8,836)	34% (9,522)
Category 3 – Either requires significant fabric upgrades) or more suited to other low or zero emission heating system (i.e., biomass, direct electric or electric storage).	*32%* *(15,559)*	*43%* *(11,904)*

Off-gas social housing energy efficiency Category 1 suitable for heat pump

Deploying heat pumps in social housing properties that are off-gas, especially those heated by inefficient, carbon intensive systems such as LPG and oil boiler, may lead to fuel poverty and carbon reductions. The Council will develop and implement a heat pump retrofit plan within the Council's social housing stock and work with housing associations to target properties for heat pump retrofit.

Dunkeld, Crieff, Blairgowrie and Rattray, and **Glenfarg** emerge as priority regions for heat pump deployment in social housing properties not connected to the gas network. These areas host a substantial number of social housing properties that are readily suitable for heat pump retrofitting and display high substation demand headroom[5]. In addition, areas around **Crieff, Blairgowrie and**

[5] Demand headroom is the gap between the rating of the electricity network to supply electrical demand and the actual demand in that part of the network.

Rattray and **Perth** have a higher number of social housing properties connected to the gas networks, which are also suitable for heat pump deployment.

Off-gas private homes suitable for heat pump retrofit

Crieff, Dunkeld, Blairgowrie and Rattray, Glenfarg, Powmill have significant potential for heat pump deployment in privately owned properties that are off gas. **Crieff, Perth** and **Blairgowrie and Rattray** have higher suitability for heat pump installation amongst on-gas, privately owned properties. However, retrofitting these properties can prove to be challenging as the responsibility of installing the heat pump falls on the property owner.
Kinross and Milnathort, and **Coupar Angus** have high concentrations of properties that are heat pump ready however have limited spare grid capacity posing a risk to deployment. The Council will continue to work with SSEN to align investment planning in these areas. Work being completed for the associated LAEP will undertake modelling to explore the impact of low-carbon technology roll out on the area's whole energy system in different demand scenarios.

Social housing that requires energy efficiency improvements to enable suitability for heat pumps

The areas of **Dunkeld, Crieff, Blairgowrie** and **Rattray, Perth, Bridge of Earn** and, **Glenfarg**, have been identified as having both spare network capacity and a high concentration of social housing with secondary potential for heat pumps. These require moderate fabric upgrades and/or the addition of a wet heating system to be heat pump ready (i.e., Category 2). Blairgowrie and Rattray, Perth, Bridge of Earn and Glenfarg are also likely suitable for retrofit for heat pumps on-gas. The Council is currently undertaking further work to support delivery at an individual building level and to examine how proposed interventions will be implemented at the façade and with building plant, services and systems. Part of this work will consider prioritisation of fabric upgrades across Council owned domestic stock. Delivery Plan actions also address the need to collaborate with housing associations to encourage heat pump installations.

This could involve providing support in securing funding and grants, such as the Social Housing Net Zero Heat Fund. The Council could also work to streamline the installation process for registered social landlords through partnerships with heat pump suppliers and installers. Privately owned properties with secondary potential for heat pump retrofit and spare grid capacity are located in these same areas, however actioning retrofit in this sector is made more challenging as the responsibility lies with owner-occupiers and landlords. The Council will work with key delivery partners to target off-gas private homes which requires energy efficiency improvements to enable suitability for heat pumps through Delivery Plan actions such as collaboration with local energy groups (e.g. HEAT Project) to engage with residents by providing informative materials to promote the benefits of heat pumps and promote existing funding options.

A full summary of potential heat pump and secondary heat pump deployment areas can be viewed via a web map to explore the full range of opportunities available.

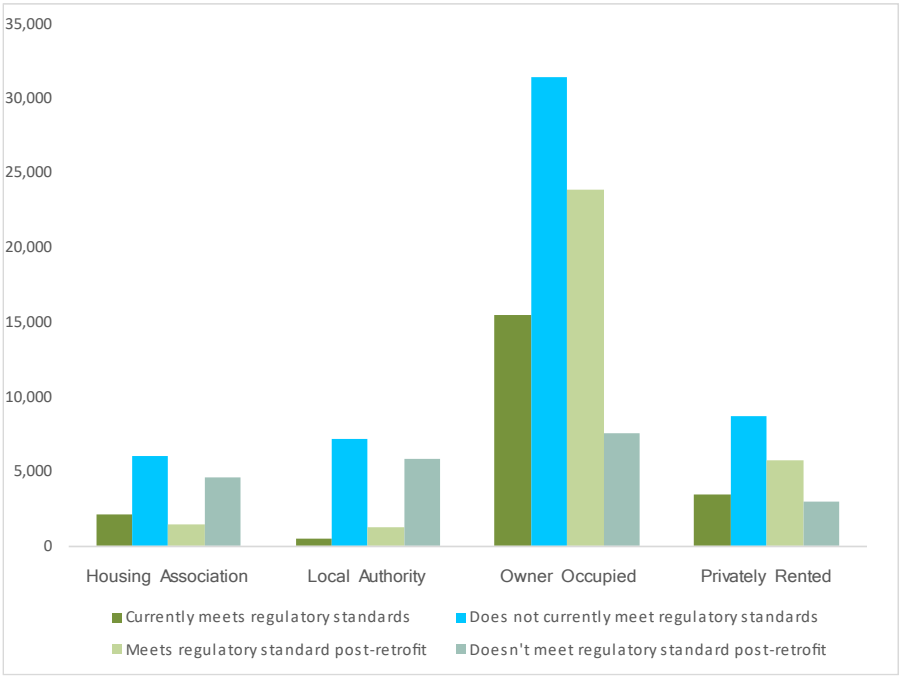
7.6. Strategic Priority 2a: "Improving buildings' energy efficiency to meet regulatory standards"

Regulatory targets for energy efficiency are:

- By 2026 All Social Housing EPC D and EPC B by 2032
- By 2028 Private Rented Sector EPC C
- By 2033, all homes have the equivalent of EPC C.

All domestic properties in Perth and Kinross were modelled using the PEAT regulatory scenario produced by the Energy Savings Trust (EST).
Figure 14 outlines the current status and post-retrofit status of properties according to the PEAT model. It demonstrates that there are many hard-to-treat properties, that even after implementing the full suite of standard retrofitting measures, would still not comply with regulatory requirements.

Figure 14: Predicted regulatory compliance pre- and post-retrofitting status of domestic properties in Perth and Kinross



Areas with concentrations of social housing having poorer energy efficiency in **Crieff and Pitlochry**, could be strategically targeted for cost effective "quick wins" to meet regulatory targets for 2026 and 2033, as the total cost of interventions to meet regulatory standards is low.

Challenges for the private sector are present across the area, where many privately owned properties have high intervention costs to meet EPC C targets, which may not be perceived as an attractive investment for property owners. Addressing this challenge will require innovative strategies and incentives to make energy-efficient upgrades more appealing and economically viable for property owners. The Council will work alongside private homeowners to incentivise investments and raise awareness.

Traditional (pre-1919) buildings make up nearly a quarter of our housing stock. These dwellings are large carbon emitters resulting from heat loss through traditional construction features including solid walls, and sash window contributing to fuel poverty and unhealthy living conditions associated with damp and mould. It is important when considering any work to a traditionally constructed building to understand how that building was designed to work and ensure passive ventilation, supporting air flow around building elements, is maintained to keep the fabric free from excessive moisture and subsequent decay.

Traditional properties are considered "hard to treat" as standard approaches to improve energy efficiency, such as increasing the insulation and double-glazing windows, required to install low carbon heating systems such as heat pumps, are often not technically feasible and or cost effective. The Council will work with social housing providers and private home owners to direct funding and advice for retrofit through EES:ABS and wider funding sources into Delivery Areas and signpost to resources to improve energy efficiency in traditional buildings including the Historic Environment Scotland (HES) LHEES Traditional and Historic Buildings Guidance.
Areas where substantial energy and CO2 emissions savings can be achieved at the lowest cost are limited and concentrated in **Bridge of Earn and Abernethy, North Muirton and Old Scone, Guildtown, Balbeggie** and **St Madoes, Errol and Inchture, and Coupar Angus and Meigle**

These areas represent immediate opportunities for cost-effective interventions and could also be used to plan works to take advantage of economies of scale, by strategically retrofitting nearby buildings simultaneously and in alignment with the Council decarbonisation assessment. This coordinated approach may lead to cost efficiencies and drive down the overall expenses associated with energy efficiency upgrades.

Non-domestic buildings that require retrofit to meet regulatory targets

Non-domestic buildings in areas across **Glenavon and Glendevon** have been identified as high potential for heat demand savings in non-domestic buildings with lower cost retrofit interventions. There are several hotels around these areas, which present opportunities for cost-effective retrofitting. However, retrofitting hotels will present certain challenges to owners, primarily due to restrictions imposed by the building's age and the need to preserve the architectural integrity.

Private ownership limits the Council's authority over decarbonisation plans and strategies beyond legislation. Engaging with the private sector around their existing decarbonisation plans can facilitate collaboration between the public and private sectors and align low carbon planning. Additionally, the Council can play a role in promoting awareness of funding incentives available for small and medium-sized enterprises (SMEs). For instance, through the SME Loan Scheme, SMEs can access an interest-free loan of up to £100,000, specifically designed to support energy efficiency improvements.
Continued engagement with the private sector, supported by the Council, would help to identify barriers associated with building retrofit and help to provide tailored solutions aimed at addressing the specific challenges faced by non-domestic building owners.

7.7. Strategic Priority 2b: "Improving buildings' energy efficiency aiming for affordable warmth"

To assess at a strategic level where poor energy efficiency is believed to be driving fuel poverty (i.e., where there is a greater impact of poor energy efficiency on fuel poverty) an approach was followed that considers three different building fabric criteria - low loft insulation, uninsulated walls, and single glazed windows as indicators of poor energy efficiency, alongside fuel poverty with specific weightings as detailed below.

Table 14: Energy efficiency as a driver of fuel poverty indicators and weightings

Indicator	Default Weighting	Perth and Kinross properties impacted
Fuel poverty probability	50%	45% (34,979)
Single Glazing Windows	16%	8% (6,335)
Loft Insulation (<100mm)	16%	9% (6,827)
Wall Insulation	17%	28% (63% uplifted value)

Energy efficiency, which acts as a driver of fuel poverty, is highest in areas around **Pitlochry, Aberfeldy, Crieff, Dunkeld, Perth and Blairgowrie and Rattray** emphasising the need for intervention to address fuel poverty in these regions.
When comparing areas with high energy efficiency driven fuel poverty with properties requiring lower cost retrofit options, the areas of **Pitlochry, Comrie, Gilmerton and St Fillans, Blair Atholl, Strathardle and Glenshee, and areas of Perth** showed the greatest opportunity.

Targeting these areas though tailored awareness campaigns about available funding to support fuel-poor households, such as the Energy Company Obligation (ECO4), which provides grants for energy efficiency upgrades funded by the applicant's energy supplier, is critical. By disseminating information about these financial support options, the Council can encourage greater participation in retrofitting initiatives. Furthermore, recognising the unique needs of vulnerable individuals, the Council should continue to provide support services and guidance to households that require assistance with the application process through organisations such as the HEAT Project and Scarf. This approach ensures that those who may face challenges in navigating the application process receive the necessary help to access available funding. A list of resources to support funding for energy reduction and reducing energy bills is available on the Council Climate Change website

Social housing properties in **Crieff, Pitlochry and Blairgowrie and Rattray** are likely to experience a greater reduction in fuel poor households due to the implementation of low-cost retrofit interventions. Local authority owned properties in these areas offer "quick win" opportunities for

the Council, as they provide substantial impact in terms of reducing fuel poverty, while requiring relatively lower financial investment compared to other locations.

Retrofitting social housing properties presents several challenges, primarily due to the occupancy of fuel-poor, vulnerable tenants. Access to the property can be limited as tenants might face difficulties in vacating their homes, and tenants may be resistant to changes to their home. To address these complexities, a person-centred retrofit approach should be implemented during the early planning stages.

Full details of where energy efficiency measures are most effective in terms of cost of interventions, carbon reduction and fuel poverty alleviation is located on the accompanying web maps.

Collaborating with local financial institutions, building societies, and mortgage providers can open possibilities for funding solutions aimed at making retrofitting more accessible to homeowners. One promising solution to consider is Property Linked Finance, which has the potential to cover up to 100% of intervention costs. The uniqueness of this financing option lies in its linkage to the property rather than the individual owner, which can offer a more inclusive financing opportunity for homeowners interested in retrofitting their homes.

8

DELIVERY PLAN

8. DELIVERY PLAN

Accompanying our Strategy will be a Delivery Plan. This has been developed in partnership with key stakeholders and provides a strong basis for action for local communities, government, investors, developers and wider stakeholders, pinpointing areas for targeted intervention and early, low-regrets measures in the near to medium term. Due to the dynamic nature of this plan, and rapidly evolving regulatory, funding and policy landscapes, it is intended to be kept as a live document and published as a live plan in LENZA, a digital planning platform being developed by Scottish and Southern Electricity Networks (SSEN) under Ofgem's Network Innovation Allowance.

8.1. Delivery Plan Priorities

The LHEES Guidance outlines that the LHEES scope should be framed around the 'LHEES Considerations', outlined earlier in this document. LHEES priorities are also shaped by the local context and as such the delivery of the LHEES will be supported through targeting areas and related actions linked to our local strategic priorities, supported by key delivery mechanisms and embedded in a whole energy system approach.

For each LHEES consideration, strategic priorities and areas have been identified to target both national and local objectives longer term. Strategic Priorities and zones aim to understand the opportunities and challenges associated with heat decarbonisation and energy efficiency improvements, at a strategic level while Delivery Plan priorities target areas for projects, programmes and engagement. At a more granular level, delivery priorities and areas, have been identified to define potential decarbonisation pathways at a building level and pinpoint areas for near term, low-regret actions to support LHEES delivery. Delivery areas are at a higher granularity than strategic areas (i.e., data zones) and set out clusters of buildings, such as postcodes, where potential solution(s) can be targeted to meet our strategic vision and priorities. It is important to note that delivery priority areas do not have to align with data zones identified in Strategic Zoning analysis as being opportunistic.

The LHEES Delivery Plan will focus on these areas to take forward actions in the near term that are within the remit of the Scottish Government, local authorities and wider partners to deliver. Proposed Delivery Plan priorities for the Perth and Kinross' first LHEES are centered around the Council and our partners local strategic priorities identified through a series of workshops and engagement sessions as illustrated in Table 15.

Table 15: LHEES Strategic and Delivery Plan Priorities

NATIONAL LHEES CONSIDERATIONS	PERTH AND KINROSS STRATEGIC PRIORITIES	PROPOSED PERTH AND KINROSS DELIVERY PRIORITIES
Heat networks	1. Delivering decarbonised heat within a transitioning energy system	1. Potential heat network zones
Off-gas heat decarbonisation	1. Delivering decarbonised heat within a transitioning energy system	2. Off-gas social housing suitable for heat pump retrofit 3. Off-gas private homes suitable for heat pump retrofit
Off-gas and on-gas heat decarbonisation	1. Delivering decarbonised heat within a transitioning energy system	4. Social housing that requires energy efficiency improvements to enable suitability for heat pump
Energy efficiency and energy efficiency as a driver of fuel poverty	2. Improving buildings' energy efficiency to meet regulatory standards	5. Social housing that does not meet regulations (e.g., below EPC B) identified for energy efficiency retrofit 6. Owner occupied properties that do not meet targets (e.g., below EPC C) 7. Owner-occupied properties that do not meet targets (e.g., below EPC C) AND potential suitability for HEEPS:ABS funding 8. Owner-occupied properties below EPC Band E

Delivery Plan priorities are the starting point for identifying projects and actions to include in the Delivery Plan. Each Delivery Plan priority may result in several delivery areas (e.g., clusters of buildings at neighbourhood or postcode level) for targeted interventions. Potential actions range from prioritising retrofit of our Council assets, wider social housing joint working to support heat pump roll out, and engagement and awareness raising with communities and the private sector as detailed below and in further detail in our Delivery Plan.

8.2. Delivery Plan Area Criteria

Our delivery priorities are shaped by our strategic priorities and associated stakeholder priorities. The LHEES evidence base, including consideration of grid capacity, has been analysed to target properties which match these priorities.
The key criteria used to develop delivery plan areas are as follows:

- Meeting regulatory targets – change in EPC, Energy savings (kWh), CO2 reduction (tCO2e)
- Fuel Poverty – fuel poverty change (%), Energy bill change
- Deliverable, technically feasible and evidence based – grid capacity, cost of intervention, type of wall insulation, etc.
- Potential funding availability
- Interventions that are already beneficial and no/low-regret (off-gas heat pumps, heat networks)
- Ability to influence.

The diagram in Figure 14 sets out an example of how the criteria will be used to identify Delivery Plan areas.

Figure 15: Example of how delivery plan area criteria will be applied to identify delivery plan focus areas

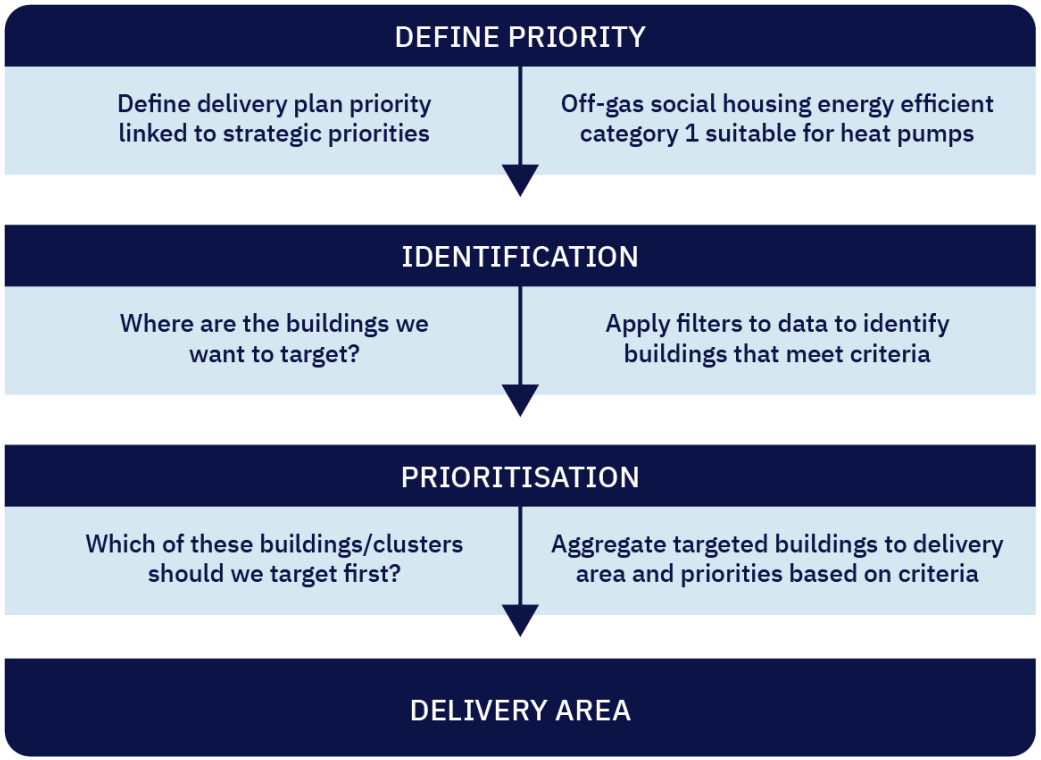


Table 16 provides a summary of key criteria, across identified delivery priorities areas. Heat networks have been identified separately in section 10.4 and detailed in the Delivery Plan. Currently evidence to support nondomestic delivery area targeting is not available at a suitable scale or confidence level.

The priorities areas identified, focus on early, low-regrets measures in the near to medium and provide a high-level evidence base and a live tool for the Council and partners to identify interventions across a range of technical solutions and funding streams. Further rationalisation of the priority areas will characterise the first stages of LHEES delivery and as funding options and regulation become clearer at national level, future iterations of the Delivery Plan.

Owner occupied and social housing which are currently not compliant comprise the largest proportion of buildings requiring retrofit. Only 3 % of the non-compliant owner-occupied buildings, are also likely eligible for HEEPS:ABS funding, although 37% are in the top 25% likelihood of eligibility for ECO flex funding. Investment per home is over £13,500, with that investment, however, nearly 80% of properties will achieve EPC targets. Figure 16 shows the colocation of these delivery priority areas and provides initial insights into potential delivery of measures across social housing and private homes in this category.

Figure 16: Energy Efficiency Improvements to meet Regulatory Targets for Social Housing and Private homes

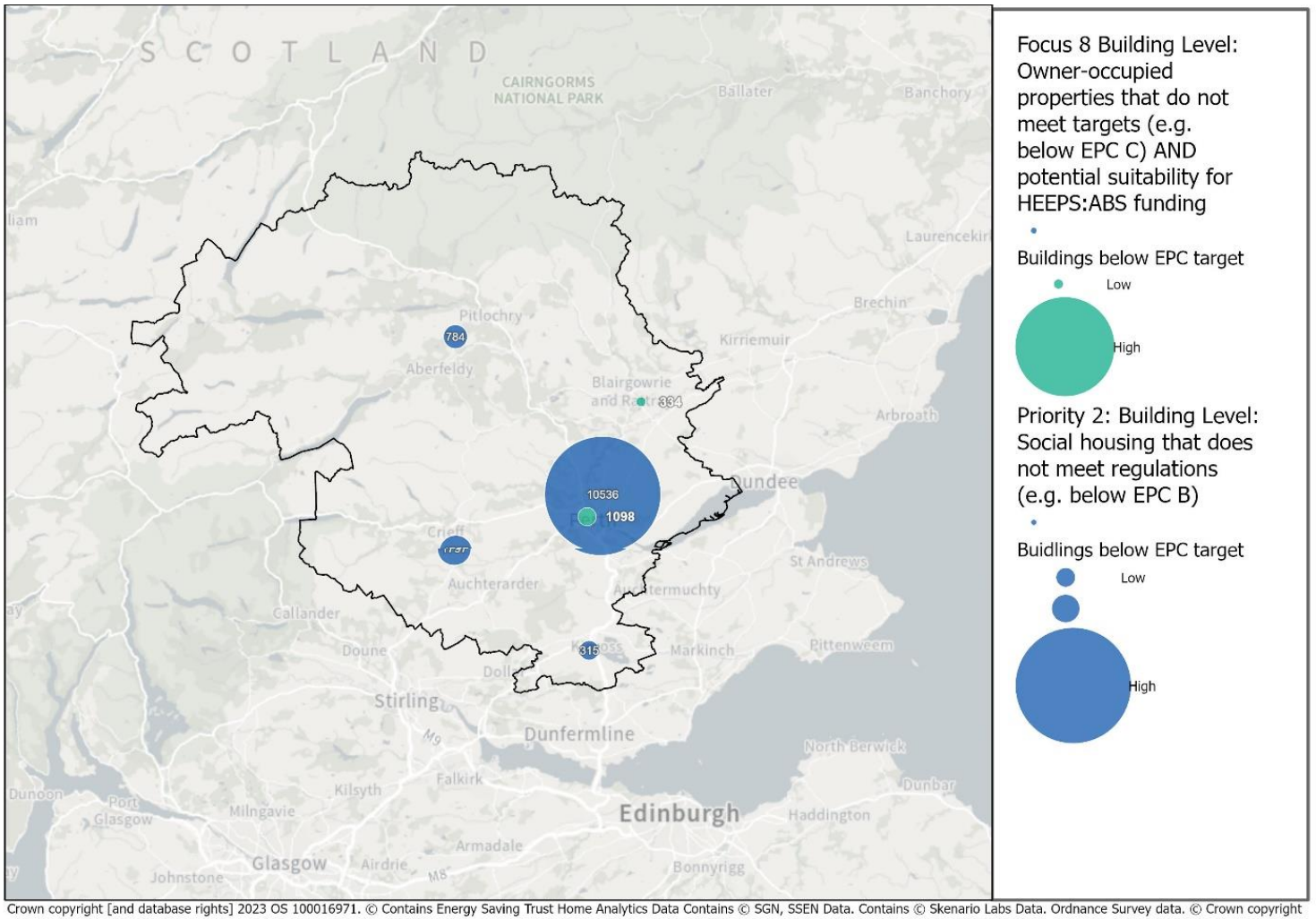


Table 16: Delivery Plan Priorities Summary of key criteria

Proposed Delivery Priorities and Key Criteria summary	Off-gas social housing suitable for heat pump retrofit (Category 1)	Social housing that does not meet targets	Owner occupied homes that do not meet targets	Off-gas private homes suitable for heat pump retrofit (Category 1)	Off-gas social housing requiring energy efficiency improvements to enable suitability for heat pump (Category 2)	Social housing that requires energy efficiency improvements to enable suitability for heat pump(Category 2)	Owner-occupied properties below EPC Band E	Owner-occupied properties that do not meet targets AND potential suitability for HEEPS:ABS funding
Total properties	672	13392	55822	4528	2519	4865	17853	1432
Mixed Tenure	25%	19%	13%	1%	19%	20%	9%	29%
Average number of retrofits per property	2,326	43,100	143,906	8,294	6,349	11,550	75,870	4,234
Total Investment	7,240,452	141,911,779	754,500,043	51,436,105	23,861,917	36,878,252	433,841,994	15,247,127
Investment per home (average)	10,774	10,597	13,516	11,360	9,473	7,580	24,301	10,647
Energy consumption reduction (MWh/yr)	4,612,183	74,330,981	587,959,025	43,303,517	11,121,173	19,116,656	346,321,078	10,984,469

Proposed Delivery Priorities and Key Criteria summary	Off-gas social housing suitable for heat pump retrofit (Category 1)	Social housing that does not meet targets	Owner occupied homes that do not meet targets	Off-gas private homes suitable for heat pump retrofit (Category 1)	Off-gas social housing requiring energy efficiency improvements to enable suitability for heat pump (Category 2)	Social housing that requires energy efficiency improvements to enable suitability for heat pump(Category 2)	Owner-occupied properties below EPC Band E	Owner-occupied properties that do not meet targets AND potential suitability for HEEPS:ABS funding
Fuel bill saving per annum	£128,473	£2,325,949	£20,924,179	£1,760,397	£669,221	£906,974	£13,948,107	£377,053
Carbon emissions reduction (tCO2e/year)	1,083,552	15,327,048	134,871,606	13,102,581	2,497,251	3,995,138	83,086,889	2,205,525
EPC Compliant after retrofit	105	2,757	44,230	4,287	962	1,615	10,905	955
% EPC Compliant after retrofit	16	21	79	95	38	33	61	67
Cost Carbon Ratio (average)	15	18	9	5	19	17	8	11

Proposed Delivery Priorities and Key Criteria summary	Off-gas social housing suitable for heat pump retrofit (Category 1)	Social housing that does not meet targets	Owner occupied homes that do not meet targets	Off-gas private homes suitable for heat pump retrofit (Category 1)	Off-gas social housing requiring energy efficiency improvements to enable suitability for heat pump (Category 2)	Social housing that requires energy efficiency improvements to enable suitability for heat pump(Category 2)	Owner-occupied properties below EPC Band E	Owner-occupied properties that do not meet targets AND potential suitability for HEEPS:ABS funding
% ECO Flex Low Income Vulnerable Cold 4th Quartile	0	1	32	12	1	1	29	0
% ECO Flex Fuel Poverty 4th Quartile	25	23	5	5	38	33	6	
ECO Affordable Warmth (Eligible - Definite to Possibly)[6]	134	1,777	15,692	254	420	995	4,349	1,186

[6] Combined total number of properties across Eco Affordable Warmth – Definitely, Likely and Possibly Eligible, double counting likely by combining categories.

Cost carbon ratios, summarised in figure 18, provide a good indication of where lower costs can deliver high carbon savings. Social housing that requires energy efficiency measures to enable heat pumps have the highest cost carbon ratio (19) and an investment per home under £10K supporting a fabric first, low regrets energy efficiency retrofit programme. A combined 17% of properties are in the 4th quartile or top 25% most likely properties eligible for ECO flex funding demonstrating the additional need for funding support in this area.

Off gas social housing that require energy efficiency improvements to enable suitability for heat pump suitable for retrofit also has a high cost to carbon ratio (17) and a higher likelihood of funding both for ECO flex funding (39%) and Affordable warmth funding (over 400 properties). The investment per home in this priority area is also under £10K indicating a good opportunity for the Council to work with social housing providers to implement fabric first energy efficiency measures. This opportunity is further detailed in the Delivery Plan.

Off-gas social housing suitable for a heat pump also has a good cost carbon ratio of 15 and cost per property of just under £11K. A quarter of these properties are mixed tenure, posing challenges in terms of implementation. Area based schemes targeting these properties alongside off-gas private homes suitable for a heat pump, at a cost of just over 11K per home would enable 95% of private homes to reach EPC targets. Figure 17 shows the colocation of these delivery priority areas and provides initial insights into potential delivery of measures across social housing and private homes in this category.

Figure 17: Heat pump suitability for off gas social housing and private homes

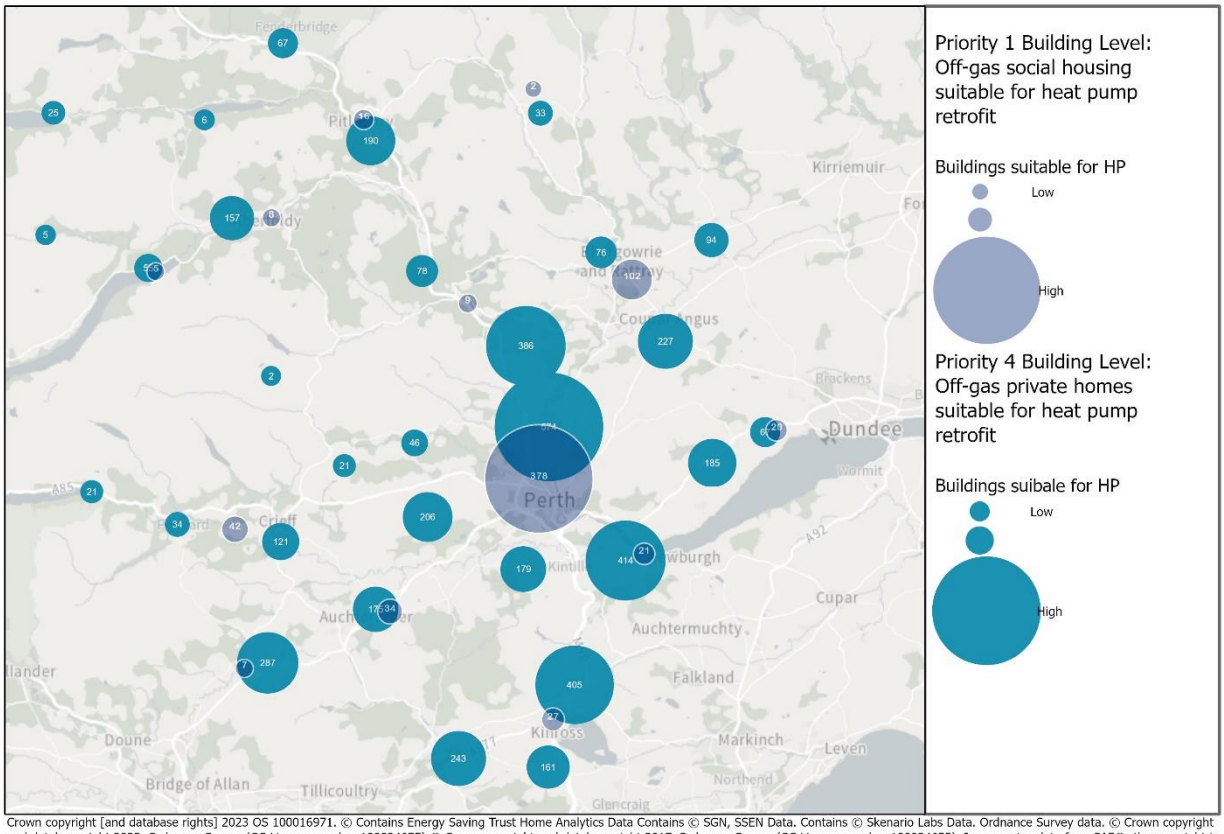
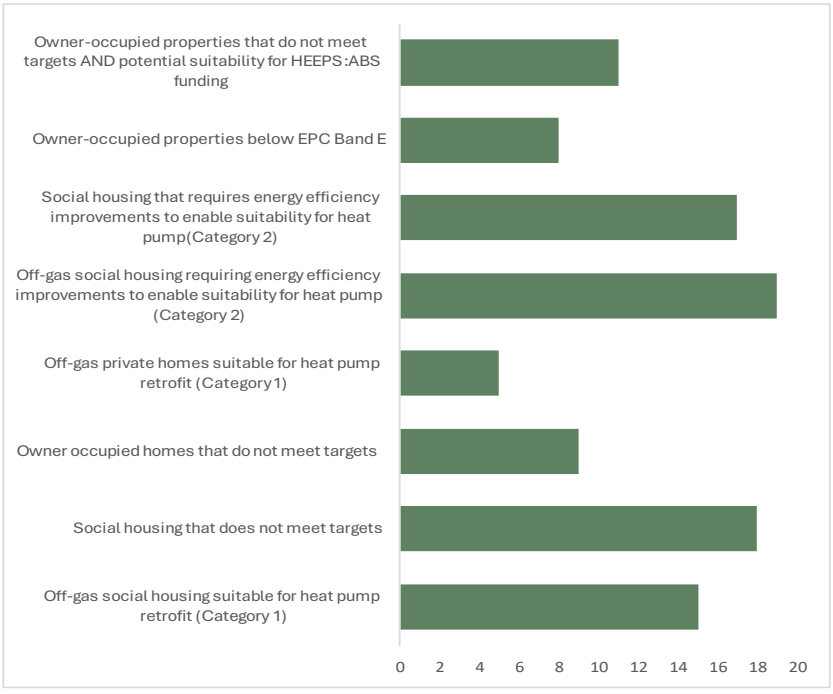


Figure 18: Cost – Carbon ratios per LHEES Delivery Plan Priorities



There are significant challenges in identifying eligibility for funding in the current landscape. Funding reforms currently being progressed by Scottish Government may help match funding with properties targeted for action.

The LHEES Strategy and Delivery Plan is also limited by available data and tools. The LHEES approach can only offer a strategic overview of non-domestic properties in the local authority area and building age, EPC band and ventilation type is not included in the assessment due to a lack of comprehensive data availability. The Council commissioned SkenarioLabs to improve the evidence base by providing a non-domestic baseline for space heating demand, hot water demand, building typology, fuel type, conservation areas and ownership alongside a non-domestic retrofit scenario improving the evaluation of heat demand and cost savings achieved through interventions. Similarly, the Portfolio Energy Advice Tool (PEAT) used for domestic decarbonisation pathway analysis currently excludes flats, resulting in no interventions being recommended for these premises. The Council is currently undertaking further work to support delivery at an individual building level and to examine how proposed interventions will be implemented at the façade and with building plant, services and systems across our domestic and non-domestic estate.

The Council will continue to work, with partners, to further target areas at a granular level such as neighbourhood or postcode level to prioritise a pipeline of projects for delivery. Working through with SSEN, using the LENZA platform, digital twins for the Council estate and through development of commercial delivery models for strategic investment (e.g., Strategic Energy Partnerships) the Council can continue to prioritise low carbon projects and programmes, informed by a whole energy systems approach, through to delivery. Delivery mechanisms are further detailed in the following section.

8.3. LHEES/LAEP Live Delivery Plan

The Scottish Government recognises that LHEES will evolve with the introduction of future standards and regulation, as well as the introduction of new delivery and funding programmes. This first LHEES is largely focussed on delivery within the scope of the current and near future funding, regulatory and policy landscape. For example, supporting the delivery of existing funding (e.g., HEEPS ABS, ECO4); while providing a pathway to meeting medium to long-term targets and objectives. Key decisions in relation to deadlines and mechanisms for enforcement of EPC targets and the use of mains gas are currently under consultation by Scottish Government. The LHEES forms an evidence base which acts as a live tool to be updated in line with local and national developments for Perth and Kinross Council and partners to identify interventions across a range of technical solutions and funding streams.

Local Area Energy Plan

Live Delivery Plans will be further informed and be informed by our Local Area Energy Plan (LAEP) providing a single, integrated process to consider the whole energy system alongside heat decarbonisation. The Perth and Kinross LAEP (2024 - 2045) outlines a vision for a net-zero carbon energy system and recommendations for achieving our 2045 targets. The LAEP provides an understanding of the nature, scale, rate, and timings of changes needed for the transition to a net zero energy system, taking a whole energy systems approach and considering the complex interdependencies of different energy vectors from generation through to demand.
The below diagram outlines how the LHEES building level decarbonisation pathways fit within the wider LAEP whole systems energy approach.

This plan has been developed through active involvement with various stakeholders in the local energy system. These include Distribution Network Operators (DNOs), regional transport authorities, housing providers, public services, local energy charities, and neighbouring local authorities. Engaging with stakeholders is crucial to secure support from diverse perspectives and foster collaboration as we progress towards a more localised and interconnected energy system to achieve our net zero targets.

The LAEP developed a model to test a range of build-out rates from 2023 to deliver the future energy system through various target years. Multiple scenarios for the future energy system demand, generation, distribution and storage, help us mitigate risk by testing the potential limits of the uncertain aspects of the energy system.
The figure below shows how LHEES and LAEP have been integrated, in a single data driven workflow which encompasses all energy vectors (heat, electricity and transport) at a local scale. LHEES provides a pathway for detailed building retrofit, heat pump and heat network zoning while LAEP models pathways for heat and power generation assets, hydrogen and transport. This analysis produces a replicable and robust evidence-based, decision-making process and provides clarity on the scale of the challenge and opportunities for change.

Figure 19: LHEES/LAEP whole energy system decarbonisation workflow

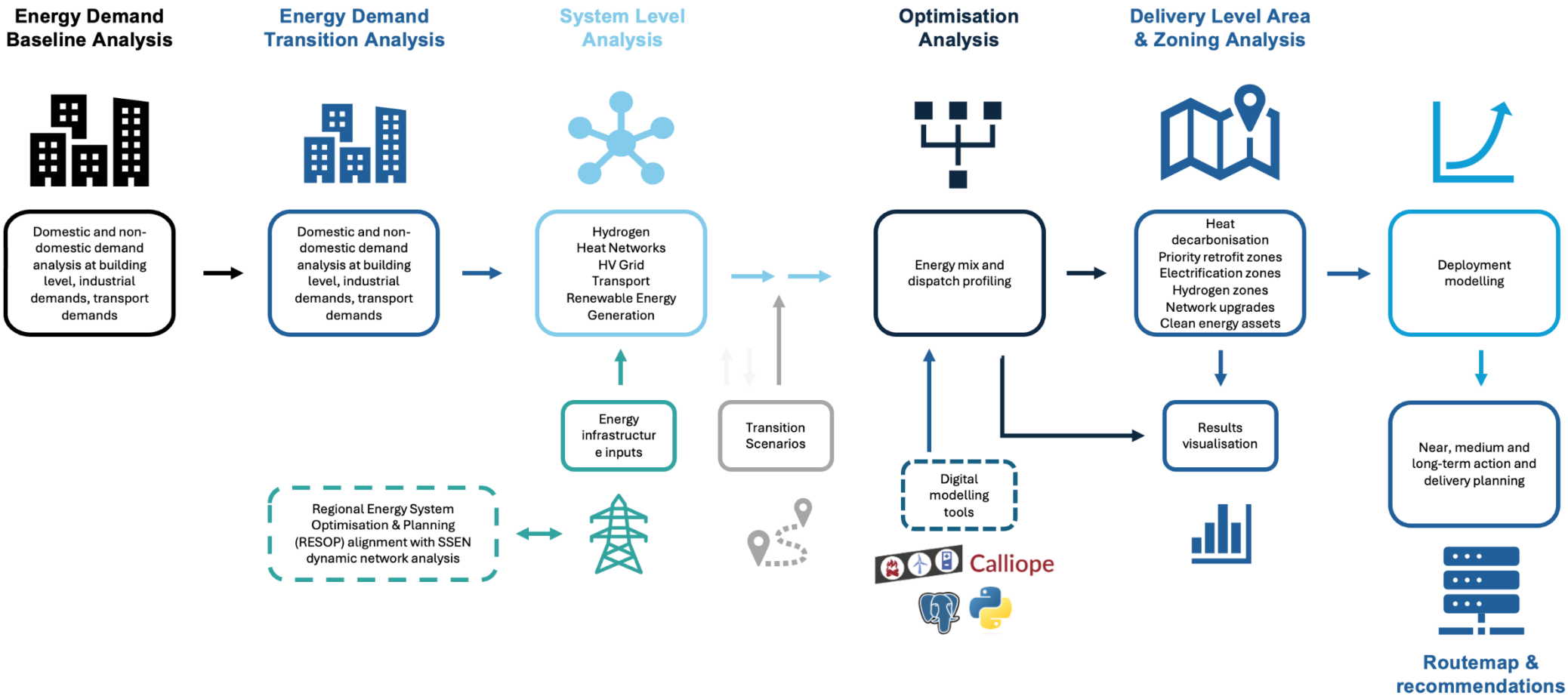
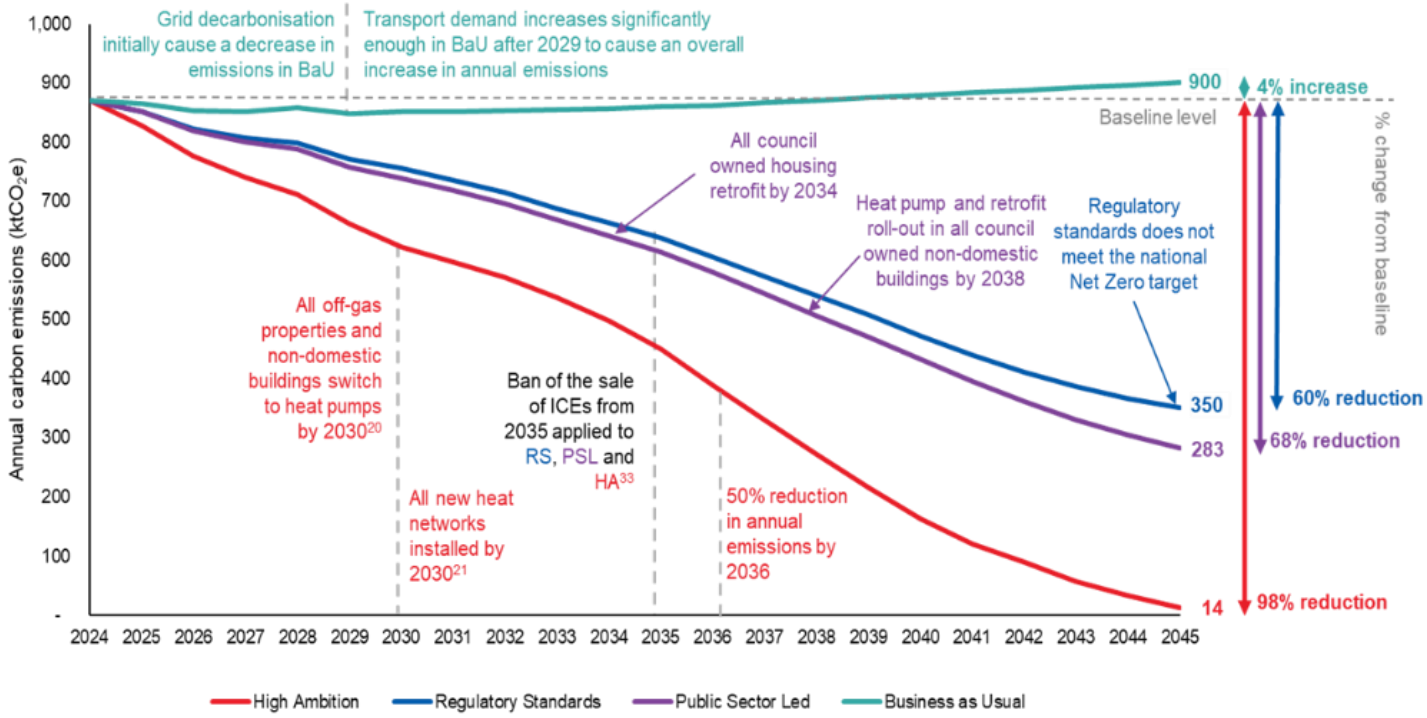


Figure 20: LAEP energy system decarbonisation deployment scenarios



High Ambition (HA):
Involving the build-out to the modelled optimised system.

Public Sector Led (PSL):
Only publicly owned energy system components achieve optimised targets (e.g., publicly owned buildings, Council vehicle fleet).

Regulatory Standards (RS):
All energy system components meet statutory requirements (e.g., Heat in Buildings Strategy).

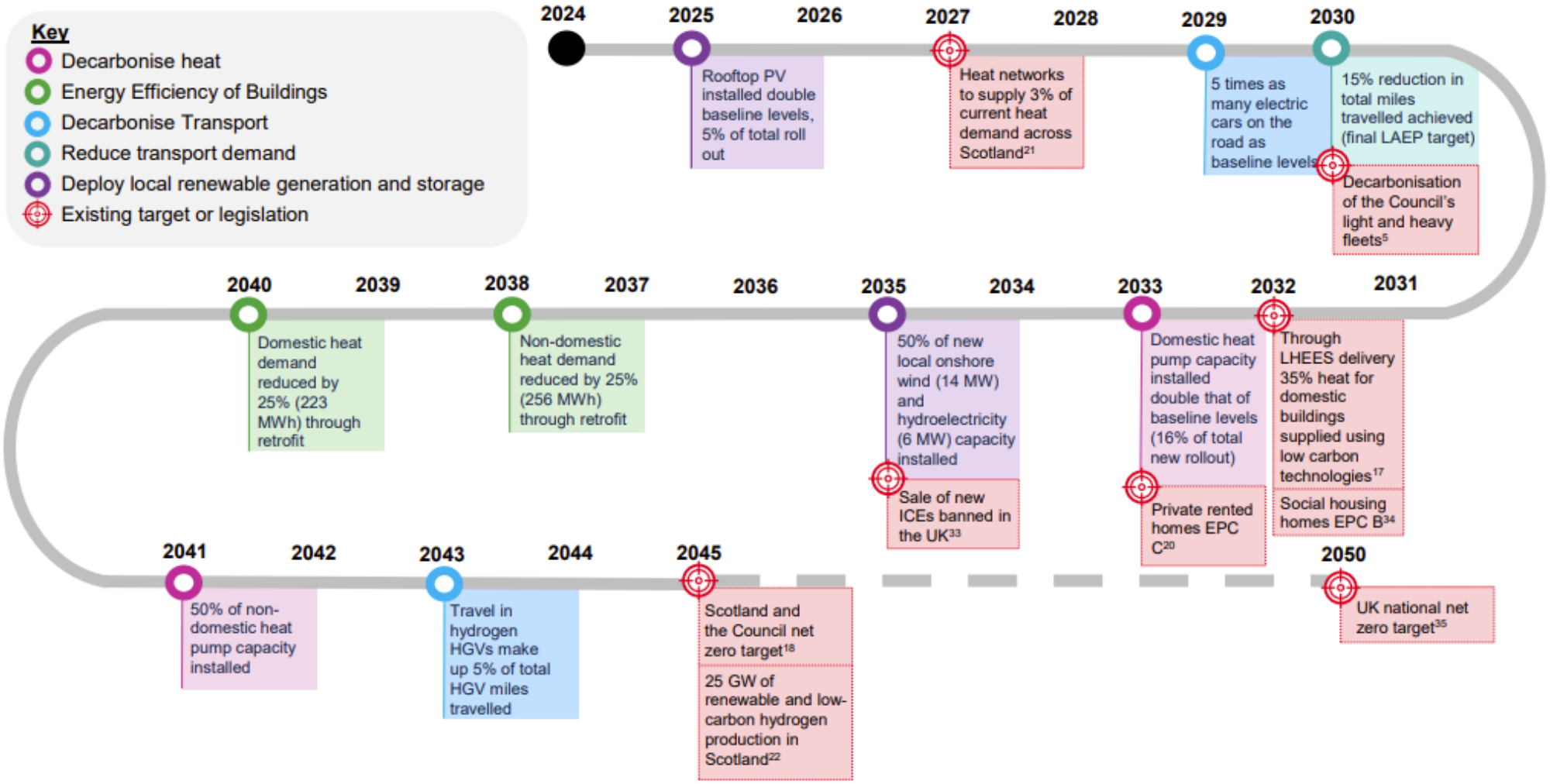
Business as Usual (BaU):
Assuming a BAU build-out rate and demand change

The Council area was be split into zones based on primary substation locations. Data on both demand and supply for different parts of the energy system were aggregated for each zone and modelling optimised the energy mix for each of these zones.

The LAEP suggests a pathway which leverages the area's unique opportunities for decarbonisation. This includes whole building retrofits to minimise energy use; heat networks to supply low carbon heat to developments where it is most cost-effective; and decentralised heat pumps in more rural areas. Drastic reductions in transport emissions will be enabled through smart spatial planning to reduce travel distances, plus an uptake in EVs and active travel modes. Finally, the local energy system will see a further shift towards local renewable generation operating at a local scale to balance local supply and demand. This reduces dependence on the wider grid, making the whole system more resilient to change while aligning with net zero.

The LAEP provides an evidence base to coordinate energy planning and investment across electricity, heat, and transport to maximise efficiencies and recognises the linkages between energy vectors. This evidence base informs the development of targets as well as deliverable actions and next steps. Medium term actions (2024 -2030) identified in the LAEP have been embedded with the LHEES Delivery Plan and longer-term actions through to 2045 have been included in a high-level route map.

Figure 21: LAEP Route Map



8.4. Key supporting delivery mechanisms

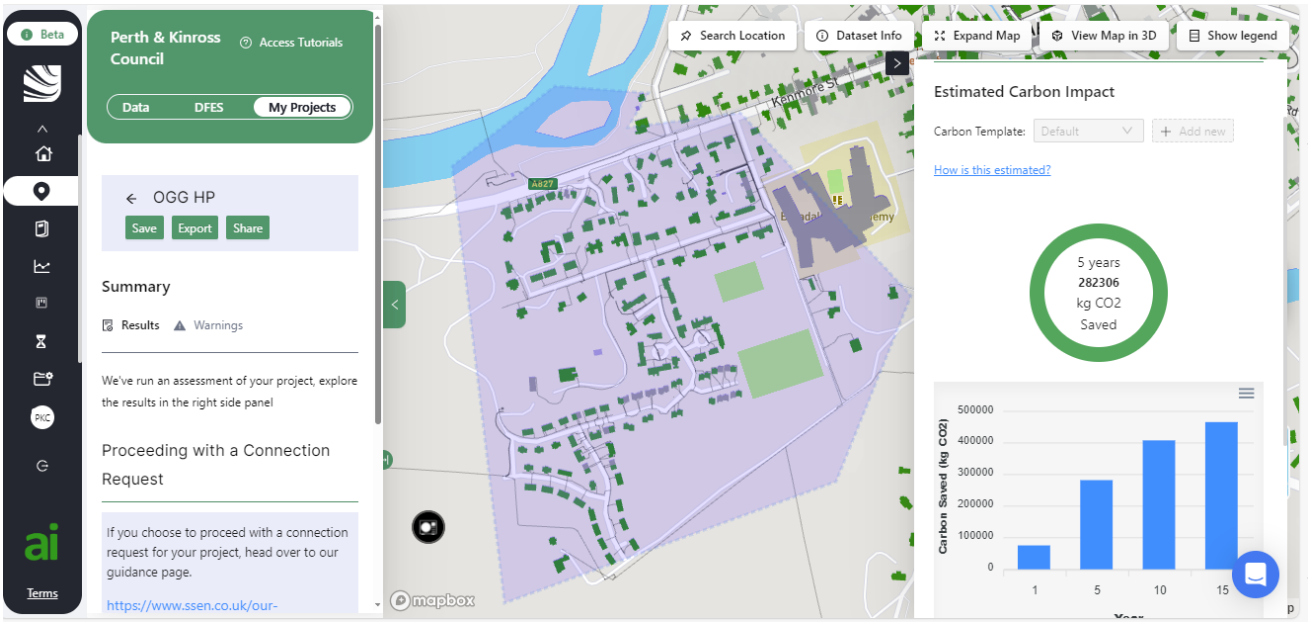
To deliver the LHEES priorities, key supporting mechanisms and programmes have been identified as follows:

Taking a Whole Energy Systems Approach

Through the development of the LAEP and a collection of complementary initiatives, the Council is taking a whole systems energy approach to the development and implementation of the LHEES from generation through to demand.

Key on-going areas of work to support this approach include:

Project RESOP (Regional Energy System Optimisation Planning) – RESOP is a public/private collaboration led by SSEN that takes a 'whole system' approach, by drawing together data on building suitability for heat decarbonisation (heat pumps and heat networks), building fabric retrofit and wider energy system demand (e.g. Electric Vehicles) and generation considerations into a single tool, LENZA, that will be used to plan and coordinate retrofit and roll out of low carbon technologies and will facilitate collaboration between network operators, local authorities and other energy transition stakeholders to achieve our strategic priorities and plan investment strategically. The Council will publish our LHEES and LAEP evidence base through the LENZA platform. The Council is also in active conversation with SSEN to align decarbonisation scenarios with Distribution Future Energy Scenarios (DFES).



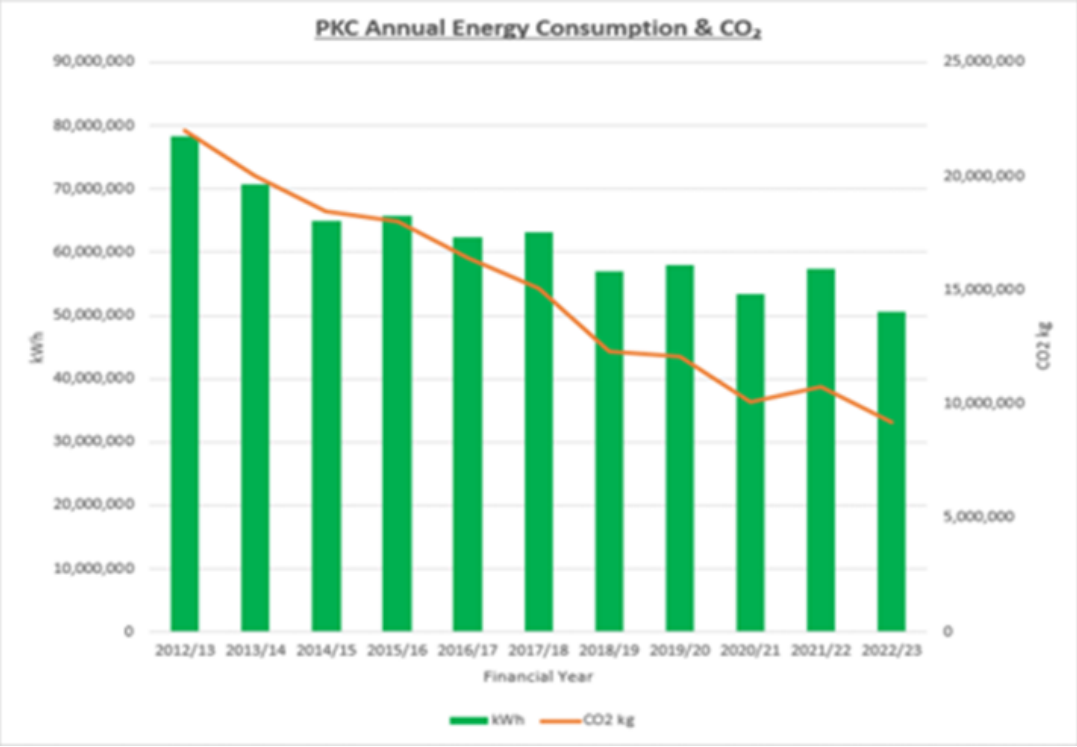
3D-UP – The Council is also currently supporting IES in Small Business Research Initiative (SBRI) competition funded by Innovate UK. This is phase 2 of a two-phase competition to accelerate the shift to a net zero economy. The proposal for 3D-UP (Dynamic, Digitised Decarbonisation investment and engineering roadmaps for UPgrading building portfolios) will develop a digital twinning infrastructure and methodology for the development of decarbonisation pathways for building portfolios. The decarbonisation pathways will be complemented by a suite of data-driven services that will catalyse the adoption and implementation of the decarbonisation actions by

reducing their cost and their duration. Perth and Kinross Council contributes to the project to refine the data-driven services as a stakeholder in the value chain of decarbonising building portfolios.

Innovate UK Pathfinder Places (phase 2) funded project in partnership with Nicki Souter Associates, the University of Edinburgh and the HEAT Project to develop the key community co-created place-based solutions focusing on retrofit and rural transport over a 17-month period.

Council Estate Decarbonisation Planning – The Council has made good progress over the last decade. The Council has prioritised properties below EPC D initially along with properties that do not have an EPC. Over the last year 328 properties below EPC D were targeted for improvement measures including surveys, insulation and/or review of additional measures planned where they can be included in Capital programme. Over 1000 properties have no EPC, surveys are being progressed to target these properties with a further over 600 properties being targeted which have an out-of-date EPC. Non-domestic building consumption has reduced by 35% or nearly 28,000 MWh with a 30% reduction in gas. In the previous year, energy consumption reduced by 6,817 MWh (12%) compared to previous year or a reduction of 1,535 tonnes (14%) CO2 compared to previous year. Reductions in energy consumption have been achieved largely through good practice for Building Management Systems (BMS), data monitoring, energy management, energy audits, and end user engagement supported by energy savings projects. Carbon savings have also been assisted by the de-carbonisation of the electricity network.

Figure 22: PKC Non- domestic energy and CO2 consumption



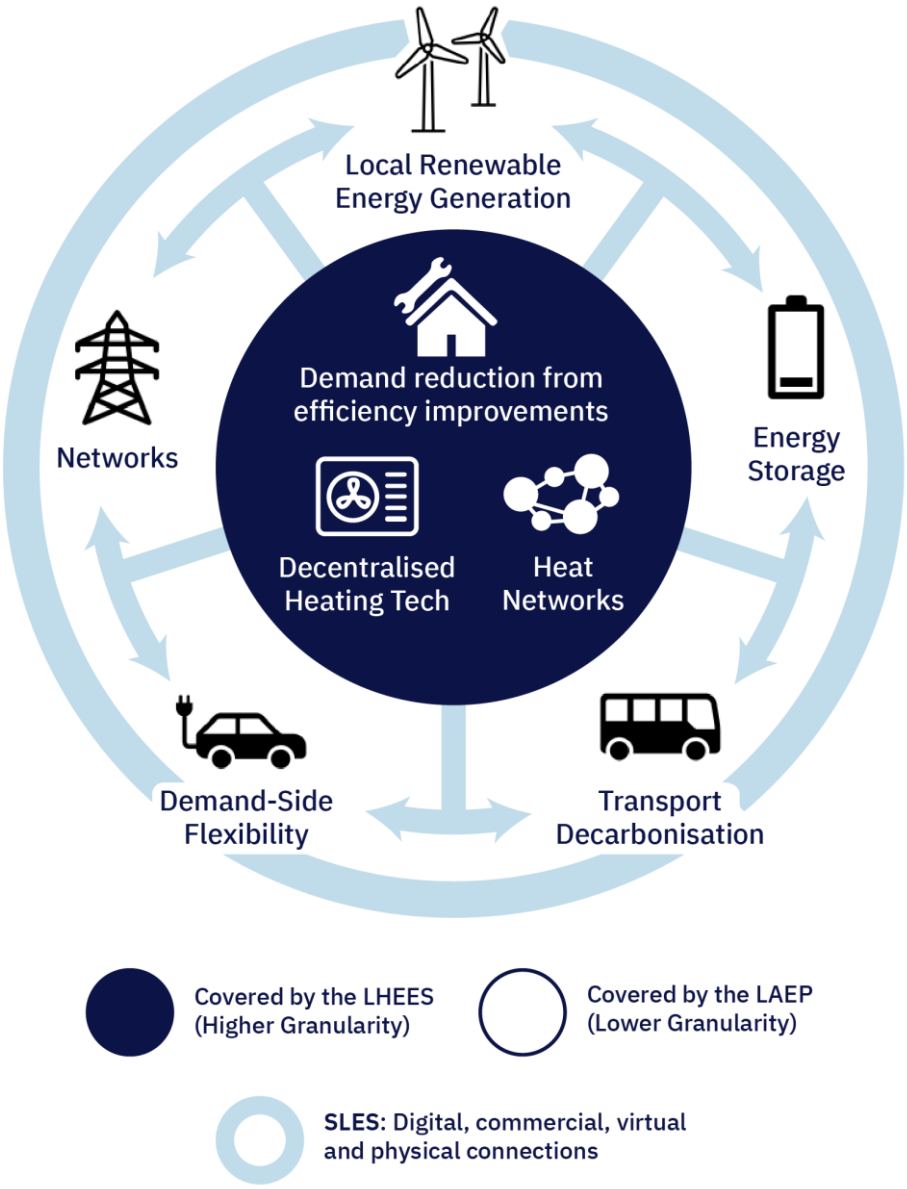
The Council is currently undertaking work to design and deliver a major programme of retrofitting both for its domestic and non-domestic building stock, focusing on how decarbonising projects

should be prioritised. The work will support delivery at an individual building level and to examine how proposed interventions will be implemented at the façade and with building plant, services and systems. It will appraise delivery-focused challenges across the engineering, cost, impacts, risks, supply chain capacity and programming themes.

The work will also build the framework to enable and support delivery prioritisation decision-making to ensure this is rigorous, repeatable and targeted in line with Council objectives. Finally, an appraisal of the Council's operating model will be undertaken, in the context of planned large scale programmes of decarbonisation activity and reflected in a Target Operating Model (TOM). This will bring much richer evidence to support the Council's decisions and asset investment planning and development of delivery programmes.

Smart Local Energy Systems (SLES) - The Council has developed a toolkit that will allow us to filter projects and develop business cases to triage delivery actions and areas into a pipeline of investable energy projects based on a range of priorities. This will lead to the development of an investment programme enabling Smart Local Energy Systems.

Figure 23: Whole energy systems approach enabling SLES



Developing green skills and the capacity of the supply chain

There are now numerous studies and policy documents that point to the opportunity for green jobs in the future. In Scotland the National Strategy for Economic Transformation published in March 2022 set out a number of Actions including:

- working collaboratively with employers and unions to increase investment in upskilling and retraining to better meet the needs of employers and employees in Scotland's transition to net zero.
- supporting and incentivising employees, and their employers, to invest in skills and training throughout their careers.
- expanding Scotland's available talent pool, at all skills levels, to give employers the skills pipeline they need to take advantage of opportunities.
- implementing the Climate Emergency Skills Action Plan to align Scotland's skills system with business needs to reach net zero.
- implementing the next phase of the Green Jobs Workforce Academy and launching new skills guarantee for workers in carbon intensive industries.
- developing proposals for a national digital academy to open up access to a range of subjects for all learners.

The priority in decarbonising Scotland's domestic heat by retrofitting homes and improving energy efficiency will dramatically reduce consumption and hence bills, regardless of the ultimate source of heat. Thanks to boiler or heat pump efficiency improvements, any of the options will deliver significantly cheaper heat for households than older inefficient boilers or electric radiators.
The STUC report on Green Jobs in Scotland estimated - with the right policies and funding in place - Scotland could see job creation in the region of 156,000 - 367,000 jobs. Perth and Kinross may be well placed for energy related jobs because of the presence of SSE and SSEN (see table below).

GEOGRAPHICAL HUBS FOR ENERGY DEVELOPMENT
Does not reflect supply chains

		Industry	Jobs	% of jobs in Scotland	Key workplace
1	ABERDEEN CITY	Extraction of crude petroleum and natural gas	7000	80.4%	
2	PERTH & KINROSS	Production of electricity	2000	35.7%	SSE
3	GLASGOW CITY	Manufacture of gas; distribution of gaseous fuels through mains	1750	25.9%	
4	CITY OF EDINBURGH	Manufacture of gas; distribution of gaseous fuels through mains	1500	28.4%	
5	SOUTH LANARKSHIRE	Distribution of electricity	1500	28.4%	
6	NORTH LANARKSHIRE	Distribution of electricity	1500	22.2%	
7	FALKIRK	Manufacture of refined petroleum products	1000	71.9%	Grangemouth Refinery

Source:
ONS Business Register and Employment Survey; Transition Economics analysis

The shift away from fossil fuels for electricity and heating means that there will be increasing demand for more electricians, electrical engineers. Employers point towards specific skills and understanding in fields such as insulation, Passivhaus standards, maintenance of low carbon technology (including district heating, EV charge points, heat pumps, solar DC systems, etc.).

Already there are large-scale programmes of retrofitting, with domestic gas boilers being replaced with air- or ground-source heat pumps. From 2025, gas and oil boilers will not be permitted in newbuild homes. The H100 Fife project[7] is a demonstrator project providing green hydrogen through a new gas network to around 300 households in Buckhaven and Dunbeath.
This means that the incumbent workforce will require to develop (more) electrical skills to complement existing gas engineering or plumbing skills. This will not only be for the installation of low carbon heating systems, but the replacement of electricity distribution boards in domestic and commercial properties where such heating systems are retrofitted. However, evidence from consultations suggests that these skills are already in great demand, with evidence of companies struggling to fill positions as a result of short supply. Energy Savings Trust has launched Green Heat Installer Engagement Programme including toolkits for insulation and heat pump installers to support businesses already working in the sector as well as to attract new businesses into the sector and includes information on the business opportunity, new legislation and policies and recommended qualifications and upskilling courses.
An Installer Skills Matrix has also been developed for Scotland which outlines the recommended minimum qualifications, with Recognition of Prior Learning (RPL), for the various trades (e.g. electricians, plumbers and heating engineers) broken down by measure (e.g. air source heat pumps).

However, there remains a significant challenge in fully understanding skills demand across region, by sector and for Clean Growth as a whole. Business engagement is a critical factor here. There is limited intelligence, poor channels of communication on need where there is engagement, and no smooth engagement with businesses. This serves to constrain education and training providers' ability to respond to business skills need effectively. There is a clear requirement to engage with businesses to drive participation in and contribute to the discourse on green jobs, and to stimulate meaningful conversations around skills need in this area. This is particularly important in light of some of the findings of the recently published Independent Review of the Skills Delivery Landscape.
There is a need for growing capacity in the region's education and training system. This is not just for volume, but for effectiveness, responsiveness and connectivity between education and training providers and the Net Zero/Clean Growth business base.
Perth and Kinross Council, with stakeholders, has identified the need to assess skills provision and support providers as well as the local supply chain to meet the demand arising from heat transition and energy efficiency works, operations and maintenance.

[7] https://www.h100fife.co.uk/

Working in partnership with communities to build community wealth and wellbeing

Perth and Kinross Council is committed to work in partnership with communities through the Perth and Kinross Offer and for communities to develop solutions locally shared and owned. Communities could take advantage of heat transition and energy efficiency opportunities and build community wealth and wellbeing. This could cover energy production, storage or distribution as well as purchasing goods or services. Perth and Kinross Council, with stakeholders, has identified the need to evaluate mechanisms to support communities in achieving such an aim.
There are several on-going projects across Perth and Kinross that are either community-led or community-focused that support the heat and energy transformation. A collection of these is listed in the Table below.

Theme	On-going projects
Home Energy Advice to Residents	The HEAT Project, SCARF, Warm Connections, Citizens Advice Bureau all provide free home energy advice
Community Energy Projects	Rumbling Bridge Hydro, Welton of Creuchies Wind Farm, Comrie Croft Smart Energy Grid Demonstrator Project are a sample of a few of the several on-going community energy projects
Support businesses to address energy efficiency and decarbonisation	Green Business Grants from PKC provide funding for businesses, The HEAT Project provides free energy advice to SMEs
Community decarbonisation	Several groups are focused on decarbonising their communities and community assets – examples include CATCH – Loch Leven and the Blairgowrie and Rattray Development Trust

Mobilising partners and public and private investments for projects

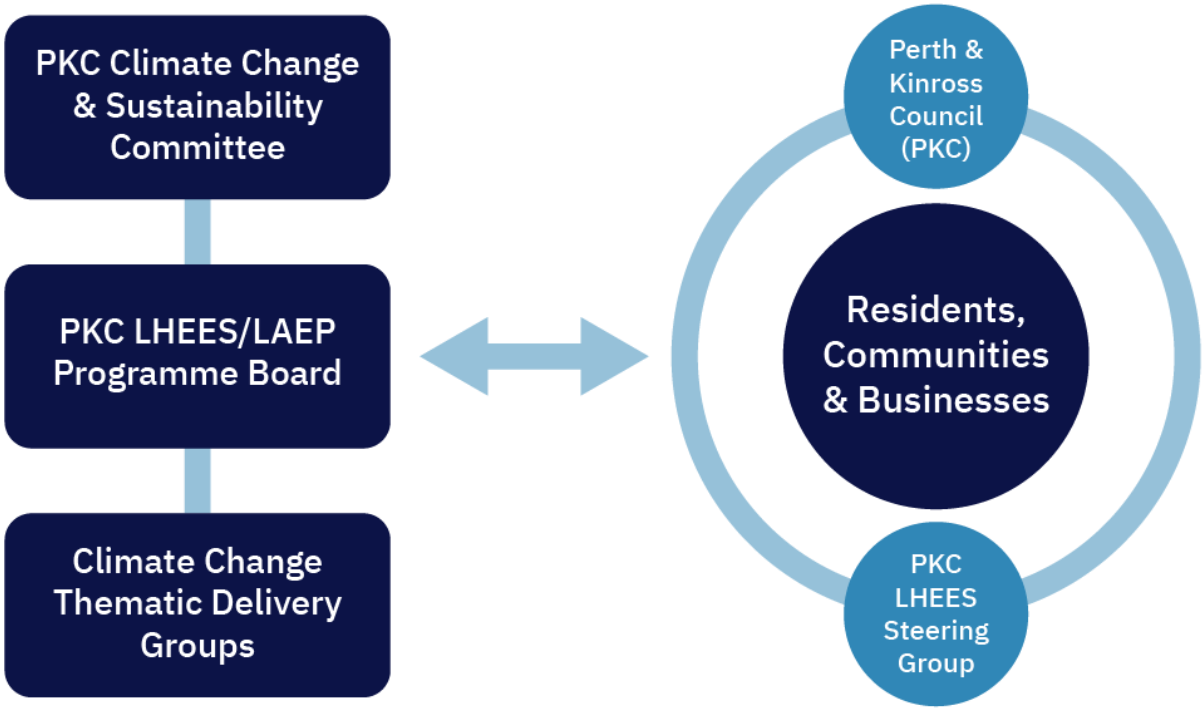
Perth and Kinross Council, with stakeholders, has identified the need to evaluate a possible Strategic Energy Partnership to unlock delivery of pipeline of low carbon projects. An energy partnership would be a legally defined, collaborative arrangement between Perth and Kinross Council and an external organisation to bring capital investment and delivery capability into large energy-related projects. The projects taken forward by the energy partnership could deliver on local priorities relating to carbon reduction, fuel poverty, and energy resilience. The Council is also considering the scope of any partnership proposed and will assess the potential for an energy partnership to be the leading body in the delivery of the wider net zero agenda for Perth and Kinross rather than focused solely on heat networks. This could mean mobilising other public/social partner organisations to aggregate demand and programmes. Development of this is a key action in the LHEES Delivery Plan and all options relating to procurement route, governance structures, control versus risk arrangements and co-investment would be explored.

The Council has recently published a Request for Information (RFI) to provide an early-stage indication to the market and to identify parties interested in working with the Council and its partners to establish a long-term Strategic Energy Partnership (SEP) with a private sector partner. The aim will be to develop and deliver strategic energy and low carbon projects to enable Perth and Kinross to meet net zero by 2045. The Council will also explore commercial delivery models through the Heat Network Support Unit (HNSU) funded project to explore a city-wide heat network in Perth which could act as a key anchor project for a SEP.

8.5. Governance

The delivery and review of Perth and Kinross LHEES Strategy and Delivery Plan will be supported by the following Council's Governance arrangements and relationships:

Figure 24: LHEES Governance



Perth and Kinross Council's Climate Change and Sustainability will provide scrutiny, assess performance and consider LHEES Strategy and Delivery Plan reviews.

Perth and Kinross LHEES/LAEP Programme Board will provide strategic directions and monitor progress and performance. An Executive Sponsor and a Senior Responsible Owner have been identified. Decisions will be escalated to the Executive Leadership Team (ELT) as required.

Perth and Kinross Council Climate Change Thematic Delivery Groups and external partners will deliver actions via identified project managers and agreed workstreams.

Perth and Kinross Council LHEES/LAEP Programme Board will be supported by a coordinator who will monitor the Delivery Plan actions and will report to the Board. Perth and Kinross Council Climate Change and Energy Officer will support coordination and governance administration, engagement and education, identifying LHEES/LAEP actions aligned to Climate Change working groups and monitor and report on progress and performance of Delivery Plan actions.

The LHEES Steering Group will support Strategic and Delivery Plan coordination of Delivery Plan actions with wider stakeholders and delivery partners.

8.6. Monitoring

Perth and Kinross Council LHEES coordinator's tasks will include:

- **Data**: improve, update and share data by working with partners to ensure access to evidence for all stakeholders and improved intelligence and tools to plan and align strategic investment with partners.
- **Communication and engagement**: co-ordinate communication and engagement plan
- **Risk & Monitoring**: develop risk register and produce monitoring report.
- Reviews: prepare and co-ordinate LHEES Strategy and Delivery Plan reviews
- **Best practices and training**: provide support to project managers in the form of templates, best practices and training.
- **LHEES Steering Group**: coordinate and support LHEES Steering Group

Perth and Kinross Council will develop a monitoring and evaluation plan (MEP) building on and aligning with supporting strategies such as the Local Housing Strategy and Climate Action Plan. The MEP will set out actions and progress towards national targets and strategic priorities and where possible align with existing Key Performance Indicators (KPIs) to measure progress towards strategic priorities and outcomes.

The MEP will consider outcomes of the LAEP and further LHEES optioneering to identify a pipeline of low carbon projects within the live Delivery Plan. Projects and areas for delivery will be prioritised using criteria set out section 11, and through delivery mechanisms such as the Smart Local Energy Systems (SLES) and project RESOP to plan and align strategic investment with our partners and communities.

Monitoring reports will be produced every quarter for the Steering Group and the Board and annually for the Climate Change and Sustainability Committee. The Delivery Plan will be reviewed annually and maintained as a live document. There will be a full review of the Strategy and Delivery Plan every 5 years. The next full review will be in 2029. A Risk register will be developed and has been included as one of the early actions of the Delivery Plan.

Engagement will be maintained and developed with key stakeholders through the LHEES Steering Group and between the Steering Group, Perth and Kinross Council and our residents, communities and businesses to achieve a successful LHEES Strategy and Delivery Plan.

A Communication and Engagement Plan will be developed by the Steering Group and has been included as one of the early actions of the Delivery Plan. The Plan will set out how the Steering Group will conduct regular consultation and engagement with stakeholders. Engagement with residents, communities, businesses and private landlords would be particularly important. It will also ensure there is awareness of the key heat transition and energy efficiency priorities for Perth and Kinross until 2029.

9

GLOSSARY

GLOSSARY

Abbreviations

Acronym	Description
EES	Energy Efficient Scotland
EESSH	Energy Efficiency Standard for Social Housing
EPC	Energy Performance Certificate
EST	Energy Saving Trust
GIS	Geographic Information System
HEEPS:ABS	Home Energy Efficiency Programmes for Scotland: Area Based Schemes
IZ	Intermediate Zone
LA	Local Authority
LHEES	Local Heat and Energy Efficiency Strategy
LPG	Liquefied Petroleum Gas
mxd	Map Exchange Document
PEAT	Portfolio Energy Analysis Tool
SAP	Standard Assessment Procedure
ToC	Table of Contents
UPRN	Unique Property Reference Number

Terms

Terms	Description
Baselining	Baselining is the purpose of understanding at local authority or strategic level, the current status of the buildings against the LHEES Considerations, Targets and Indicators.
Building-level Pathway	As part of LHEES Stage 5, a building-level pathway is the outcome of the assessment undertaken using PEAT. It provides the likely energy efficiency retrofit technologies, as well as the low carbon heating system (where applicable) to support building level decarbonisation.
Criteria	Criteria are the settings applied to the Indicators for each Consideration in order to support Baselining, Strategic Zoning and the identification of Delivery Areas. An example of Criteria is a simple “no” applied to the indicator of “wall insulation (Y/N)” to identify properties with uninsulated walls. Another example is the definition of an “anchor load” within the Heat Networks analysis, which applies a minimum threshold to the “heat demand” Indicator. The LHEES methodology provides a set of default Criteria that local authorities may wish to use, with flexibility to update and augment these to support local needs or for more focused analysis linked to specific actions and project identification within the Delivery Plan.
Data - Alternative	Alternative data can overwrite the Core data to improve accuracy (national to local level of detail, e.g., local housing data to overwrite fields in Home Analytics).
Data - Core	Core data is the data that is essential to complete the minimum requirements of the LHEES analysis. Core data will come from national datasets e.g., Home Analytics or the Scotland Heat Map.
Data - Supplementary	Supplementary data allows inclusion of additional Indicators to inform specific, local baseline & targets; also, Supplementary data can be used in GIS investigation to complement the Core analysis carried out in any assessment. An example of Supplementary data would be the inclusion of a constraint’s appraisal as part of a district heating analysis.
Data Zone	Data zones are groups output areas which have populations of around 500 to 1,000 residents.
Delivery Area	Delivery areas are at a higher granularity than Strategic Zones. These spatial zones should set out clusters of buildings within a Strategic Zone or across the whole local authority that identify potential solution(s) at a delivery level. They will be an important starting point for identifying a range of projects, regulation and actions that are within the competence of the Scottish Government, local authorities and wider partners (included as actions to be developed in the LHEES Delivery Plan).
Detailed practitioner approach	These Steps form part of the detailed practitioner approach in LHEES Stage 4, Generation of Initial Areas to set out particularly suitable heat network zones and to support project identification.
Indicator	For a given Consideration, the purpose of an Indicator is: 1) to act as a key information field to help characterise and baseline the local authority. 2) to act as a key information field to support strategic zoning and generation of initial delivery areas.

	3) if suitable, to act as a key information field to measure progress against Targets over the duration of the LHEES - set out in the LHEES Delivery Plan. For some Considerations, one Indicator may be sufficient, but for others a range may be appropriate.
Intermediate Zone	Intermediate zones are a statistical geography that are designed to meet constraints on population thresholds (2,500 - 6,000 household residents), to nest within local authorities, and to be built up from aggregates of data zones.
LHEES Considerations	The LHEES Considerations are a list of technologies, building typologies and policy priorities used to identify and target interventions. They include: - Heat networks - Off-gas grid buildings - On-gas grid buildings - Poor building energy efficiency - Poor building energy efficiency as a driver for fuel poverty - Mixed-tenure, mixed-use and historic buildings
LHEES Delivery Plan	An LHEES Delivery Plan is a document setting out how a local authority proposes to support implementation of its local heat and energy efficiency strategy.
LHEES Guidance	The LHEES Guidance sets out the production and content requirements for a local authority to prepare a Local Heat and Energy Efficiency Strategy and Delivery Plan. Its purpose is to ensure that a Local Heat and Energy Efficiency Strategy and Delivery Plan contain outcomes and actions that are backed up by robust data and analysis, supported by stakeholder engagement, and that are linked to national and local priorities, plans and targets.
LHEES Methodology	The LHEES Methodology is a more detailed, step by step approach, which includes models, tools and templates, and represents best practice in how to produce an LHEES in accordance with the requirements set out in the LHEES Order and Guidance.
LHEES Stages	There are 8 LHEES Stages proposed in this methodology. The purpose of the LHEES Methodology is to enable the local authority to complete LHEES Stages 1 to 6. The completion of these Stages will provide the local authority with the data analysis and evidence base to enable them to complete their LHEES Strategy and Delivery Plan documentation. There are two LHEES reporting templates included alongside this methodology– LHEES Strategy example template and LHEES Delivery Plan example template. The completion of these two templates will satisfy the completion of LHEES Stages 7 and 8. The 8 LHEES Stages proposed in this methodology are: 1 - Policy and strategy review 2 - Data and tools library 3 - Strategic zoning and pathways 4 - Generation of initial delivery areas 5 - Building-level pathway assessment 6 - Finalisation of delivery areas 7 - LHEES Strategy 8 - LHEES Delivery Plan
LHEES Strategy	An LHEES Strategy is a long-term strategic framework for— - the improvement of the energy efficiency of buildings in the local authority's area, and - the reduction of greenhouse gas emissions resulting from the heating of such buildings

Mixed-tenure, mixed-use and historic buildings	Mixed-tenure and mixed-use buildings could include a mixture of owner occupied, private rented and social housing, and also non-domestic uses, or simply multiple ownership within the same tenure. Historic buildings include the buildings that are within conservation areas or those that are listed buildings. These categories may require established alternative approaches and regulation for the installation of low carbon heat and energy efficiency solutions and where specific advice and support might be available relating to the installation of these solutions.
Potential Zones	The analysis carried out for strategic zoning and pathways for the heat networks Consideration is to identify potential zones rather than the otherwise used naming convention of Delivery Areas. The potential zones identified are to be included in the LHEES Strategy and should inform actions around further investigation / progression within the LHEES Delivery Plan. The heat networks Consideration analysis and activity carried out within LHEES is also anticipated to support activity related to formal zone designation as required by the Heat Networks (Scotland) Act 2021.
Raster	A matrix of squares, or grid, used as a method of data analysis in GIS. Each cell in the grid contains a value representing information on the cell's contents.
Strategic Zone	Strategic Zones present a visualisation of the potential pathways to decarbonise the building stock at a local authority level. These could, for example, be split out by intermediate zone or data zone. They are useful to understand the baseline performance, the scale of potential and initial areas of focus, which could be used to inform Delivery Areas and follow on engagement.
Targets	Targets are the measurable aspect of the Consideration and are likely to be taken directly from national and/or local policy documentation, for example net-zero by 2045, or EPC C by 2040. Targets are likely to comprise of end-point targets and milestone targets and would sit along a timeline within (and beyond) the LHEES. This timeline would help to prioritise the types of projects undertaken within the LHEES over its duration.
Weighting	For some Considerations, one Target and Indicator may be sufficient, but for others a range of Indicators may be appropriate to contextualise and characterise performance against a Target and/or progress towards a Consideration. If multiple Indicators are used in strategic zoning or the identification of delivery areas, a Weighting can be applied based on the importance of each. The LHEES methodology sets out a core set of default Weightings for instances where multiple Indicators are suggested as a default setting. There is flexibility to update and augment these to support local needs or for more focused analysis linked to specific actions and project identification within the Delivery Plan.