ARUP

Zero Waste Scotland Capacity Building Services

LHEES Strategy Support - 01

Prepared by Arup for ZWS

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Outline and purpose of support pack

Introduction

This support pack aims to provide direction to enable local authorities to analyse, interpret and narrate LHEES Stage 3-4 content for inclusion in LHEES Strategy.

Suitable for all local authorities who are required to narrate Stage 3-4 outputs in line with requirements in LHEES Guidance, however will be particularly applicable for local authorities that are either:

i. developing LHEES without consultancy support; or

ii. using consultants for LHEES analysis only (i.e. Stage 1-6) and are therefore receiving completed Baseline Tools, GIS pack and maps/tables only.

Note: The outputs used in these slides are in **draft** form and are used for example purposes only

LHEES Guidance

LHEES Guidance

Available Material

- **LHEES Guidance (Chapter 4) –** Gives an overview of the key content that should be included within each section of the LHEES Strategy.

- **LHEES Strategy Example Template –** Provided as part of the LHEES Methodology, a template that can be used to develop the LHEES Strategy. Includes directions for completion, suggested layout and example content.

- **This Strategy Support Pack –** Provides further direction on how to interpret outputs from LHEES Stage 3-4 (Baselining, Strategic Zoning and Heat Network Zone analysis) and narrate these outputs for inclusion in the Strategy.

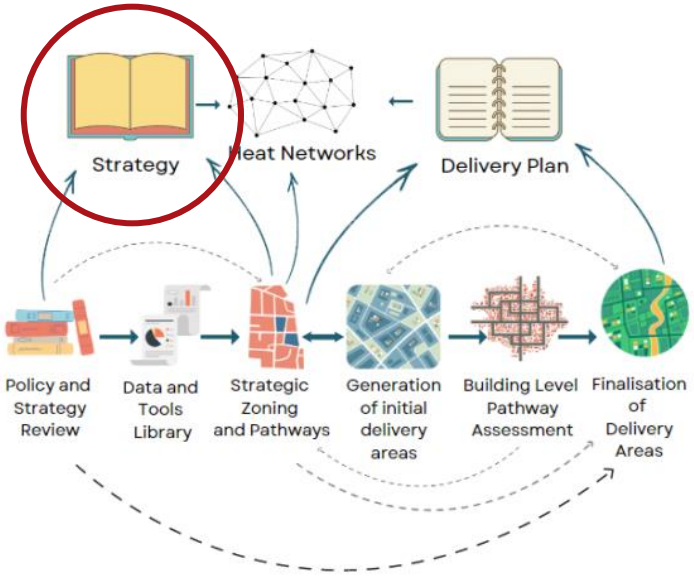


Figure 1: LHEES Process Diagram

LHEES Guidance

LHEES Strategy Requirements

The LHEES Strategy should present an understanding, at local authority level and across the LHEES Considerations, of the ***scale of the challenge*** *for heat decarbonisation and energy efficiency improvement, alongside a strategic assessment of potential pathways, identifying* ***areas where focus might be placed*** *in terms of further engagement and delivery.*

The target audience for the Strategy is local authorities, potential stakeholders, potential developers, the general public, community groups, the Scottish Government and delivery partners.

It is suggested that the LHEES Strategy contain the following sections (as also set out in the Example Template):

- Overview of LHEES
- Engagement and consultation
- Local authority progress
- Policy and Strategy context
- Considerations, targets and indicators
- Baselining of local authority building performance
- Generation of Strategic Zones and pathways, including Potential Zones for heat networks
- Summary of LHEES Strategy Findings and next steps

Focus of this support pack

LHEES Guidance

LHEES Strategy Requirements

Baselining

Section 4.11 in the LHEES Guidance and Section 7 in the Example Template

Baseline Summary

Overview of building stock within the local authority area developed from the outputs of the Domestic and Non-domestic Baseline Tools, including:

- Examination of core data indicators (e.g. wall insulation, fuel poverty, tenure, fuel use etc.) applicable across LHEES considerations showing the percentage of properties meeting the criteria of the Indicator.
- If possible, comparison of the baseline data with national averages.
- Indication of the Strategic Zones that may be a focus to develop Delivery Areas and near-term programmes and projects.
- Recommendations for interventions that can support priorities and targets across a Strategic Zone.
- Challenges and opportunities relating to heat decarbonisation.
- Ongoing work which will complement or support the identified challenges and opportunities.

LHEES Guidance

LHEES Strategy Requirements

Strategic Zones and Pathways

Section 4.12 in the LHEES Guidance and Section 8 in the Example Template

Building-Level Heat Decarbonisation

Visualisation of the Strategic Zones and geographic layout of the opportunities and pathways for building-level heat decarbonisation, including:

- Opportunities and challenges for heat decarbonisation in local authority.
- Indication of Strategic Zones that may be a focus of Delivery Areas and near-term Delivery Plan actions.
- Recommendations and conclusions that can be applied across the Strategic Zones for heat decarbonisation.

Energy Efficiency and Other Outcomes

Visualisation of the Strategic Zones and geographic layout of the opportunities for building-level energy efficiency retrofit, including:

- Opportunities and challenges for energy efficiency retrofit in local authority (including consideration of mixed-use, mixed-tenure and historic buildings).
- Buildings that may require additional focus/support in future (e.g. where energy efficiency may be a driver of fuel poverty).
- Indication of the Strategic Zones that may be a focus of Delivery Areas and near-term Delivery Plan actions.
- Recommendations and conclusions that can be applied across the Strategic Zones for energy efficiency.

LHEES Guidance

LHEES Strategy Requirements

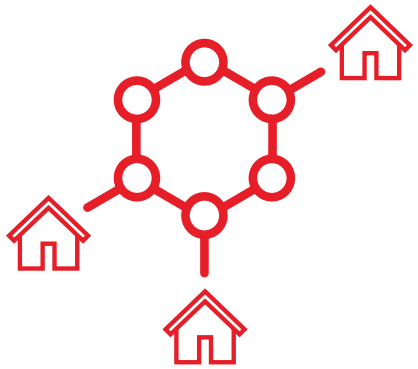
Strategic Zones and Pathways

Section 4.12 in the LHEES Guidance and Section 8 in the Example Template

Potential Heat Network Zones

Visualisation of the Strategic Zones and geographic layout of the opportunities for heat networks, including:

- An overview map and/or table detailing the potential heat network zones within the whole local authority area.
- High level maps of any areas of the local authority deemed as strategically important for heat networks, showing potential heat networks in higher granularity.
- If appropriate, summary maps and tables for areas likelu to be particularly suitable for the construction and operation of a heat network, or designated as heat network zones as per the Heat Networks (Scotland) Act.
- Opportunities and potential challenges for heat networks.
- Recommendations and conclusions in terms of heat network potential and next steps to progress a pipeline of projects.



LHEES Guidance

LHEES Strategy Requirements

Summary and Next Steps

Section 4.13 in the LHEES Guidance and Section 9 in the Example Template

Conclusion of the main findings set out in the Strategy, summarising clearly and concisely the outputs and next steps, including:

- Setting out long-term focus of LHEES at strategic level and the Delivery Areas which will focus on actions within the LHEES Delivery Plan.
- Short descriptions of progress and activity and/or a series of higher-level summary tables focussing on heat decarbonisation potential across each LHEES consideration.
- Summary to enable local authority and other delivery stakeholders to prioritise delivery of LHEES.
- Consideration how the content of the Strategy can be developed further towards the realisation of projects in the Delivery Plan and beyond.

ARUP

Domestic and Non-domestic Baselining

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Domestic and Non-domestic Baselining

Overview

An examination of **core indicators** applicable across LHEES considerations should be included in the baselining section of the LHEES Strategy. This can be achieved using data from the Domestic and Non-domestic Baseline Tools. There are two types of data:

Local authority level statistics – point data that highlights the number and scale of the opportunities/challenges (i.e the percentage of properties that meet the criteria of core indicators)

Spatial aggregates (e.g. data zone or intermediate zone) – maps that highlights the strategic level locations of the opportunities/challenges.

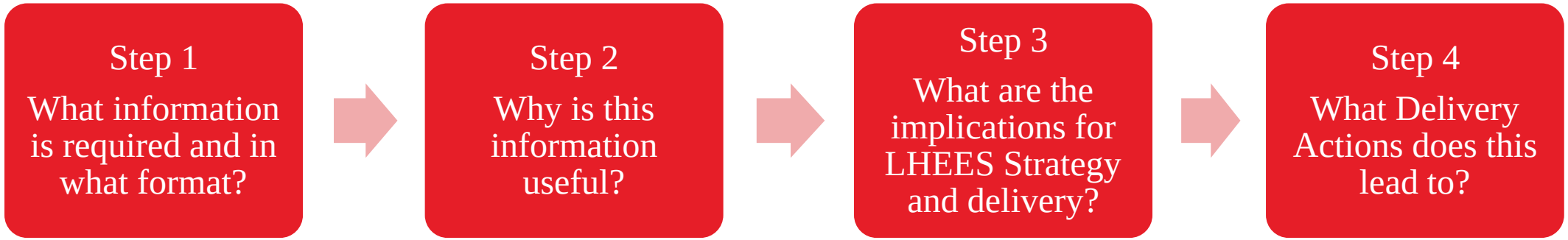
The core indicators can help to identify potential areas for **Strategic Zones** to prioritise for programmes and interventions that will go in the **Delivery Plan**, for example:

- Areas which show areas with high probability of fuel poverty can be targeted for fuel poverty alleviation.
- Areas which show use of high-carbon fuels can be targeted for heat decarbonisation.
- Areas which have low levels of loft insulation, single glazing and low energy efficiency ratings can be targeted for energy efficiency retrofit measures.

Domestic and Non-domestic Baselining

Process to review Stage 3 outputs for baselining

Four-step process when reviewing outputs from the Domestic and Non-Domestic Baseline Tools against core indicators for presentation in the LHEES Strategy:



Domestic and Non-Domestic Baselining

Domestic Baseline Tool Outputs

The **Domestic Baseline Tool** summary tabs provide tables and graphs showing the characteristics of the baseline building stock within the local authority area, including:

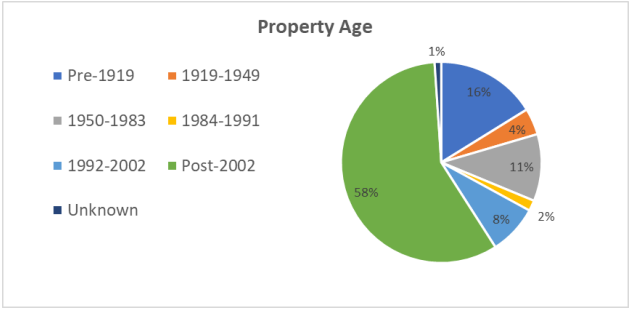
- Property Characteristics (building age, building type)
- Energy Efficiency and Heat Supply (fuel type, EPC band, insulation level, glazing)
- Mixed Tenure & Historic Buildings (tenure type, mixed tenure)

Energy and heat demand

Heat demand per property (kWh/property/year)	14,427
Energy demand per property	22,853

Income

	Percentage	Number of properties
Estimate of households in fuel poverty (fuel bill>10% of income)	21.6%	202.61
Estimate of households in extreme fuel poverty (fuel bill>20% of income)	6.3%	58.72
Council Tax Band A-C	11.6%	109.09

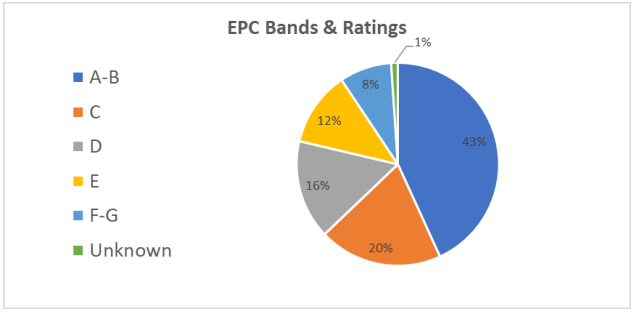


EPC Rating

	Percentage	Number of properties
EPC F-G	8.3%	78.04
EPC D-G	36.0%	338.06

Insulation

	Percentage	Number of properties
Uninsulated walls	24.5%	230.00
Loft insulation <100mm	8.3%	78.04
Single glazed windows	9.8%	92.02



Domestic and Non-Domestic baselining

Analysis of Outputs – Domestic Baselining Examples

Building characteristics

Step 1: What information is required and in what format?

- Property age
- Property type
- Property tenure

Format can be tables, graphs or charts.

Step 2: Why is this information useful?

Provides an overview of the current building stock within the local authority area and insight into the opportunities and challenges associated with particular buildings and/or characteristics.

Step 3: What are the implications for LHEES Strategy and delivery?

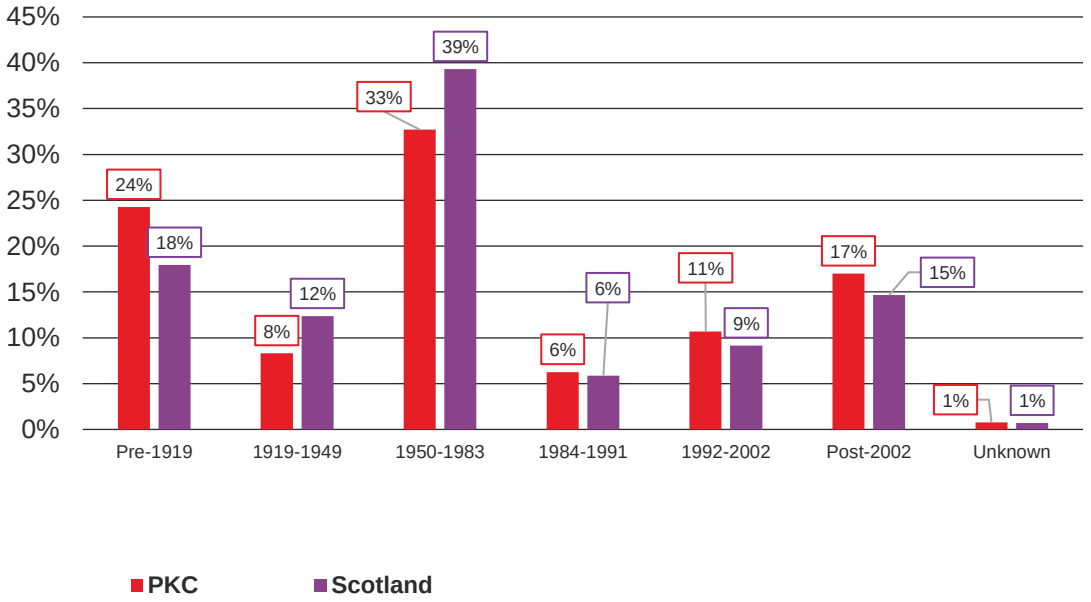
Consider: Are there buildings with a particular characteristic? What are the proportions compared with the national average? What are the opportunities and challenges from a heat decarbonisation / energy efficiency retrofit perspective?

E.g. A higher-than-average proportion of old buildings will have lower energy efficiency and create challenges around retrofitting.

Step 4: What Delivery Actions does this lead to?

E.g. Develop Delivery Areas using LHEES evidence base to identify where specific buildings are located at a higher granularity.

Example graph of domestic building age produced for Perth and Kinross baselining that compares with national average



Domestic and Non-Domestic baselining

Analysis of Outputs – Domestic Baselining Examples

Fuel use and heat decarbonisation

Step 1: What information is required and in what format?

- % on-gas and off-gas properties
- Main fuel type (e.g. gas, electricity or LPG/oil/biomass/other)

Format can be tables, graphs or charts.

Step 2: Why is this information useful?

Provides an overview of fuel use and proportion of on/off-gas properties in the local authority area and insight into the opportunities and challenges associated with heat decarbonisation.

Step 3: What are the implications for LHEES Strategy and delivery?

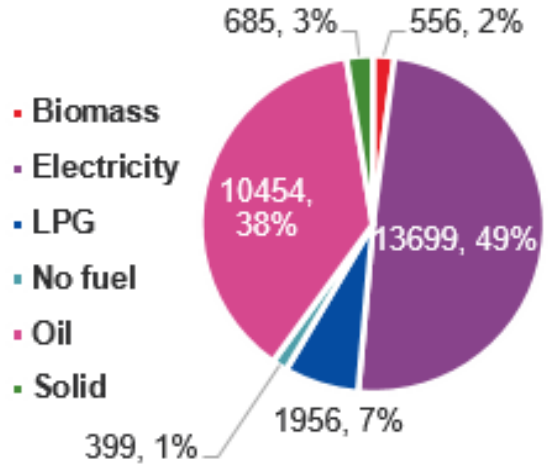
Consider: What are the number of buildings that are on/off-gas? Are there more buildings using a particular fuel type? What are the opportunities and challenges from a heat decarbonisation perspective based on the majority fuel type of the local authority area? What is the split between electrically heated and fossil heated in off-gas areas?

E.g. To decarbonise off-gas properties, all properties on oil, LPG and solid fuel (coal) will need to transition to alternative fuel types, and so clear alignment with national policy (Heat in Buildings Strategy).

Step 4: What Delivery Actions does this lead to?

E.g. Carry out targeted engagement with off-gas building owners through support bodies such as Home Energy Scotland; identification of delivery areas in off-gas areas where social housing providers could target heat pump installs collectively.

Example graph of domestic building off-gas fuel type produced for Perth and Kinross baselining

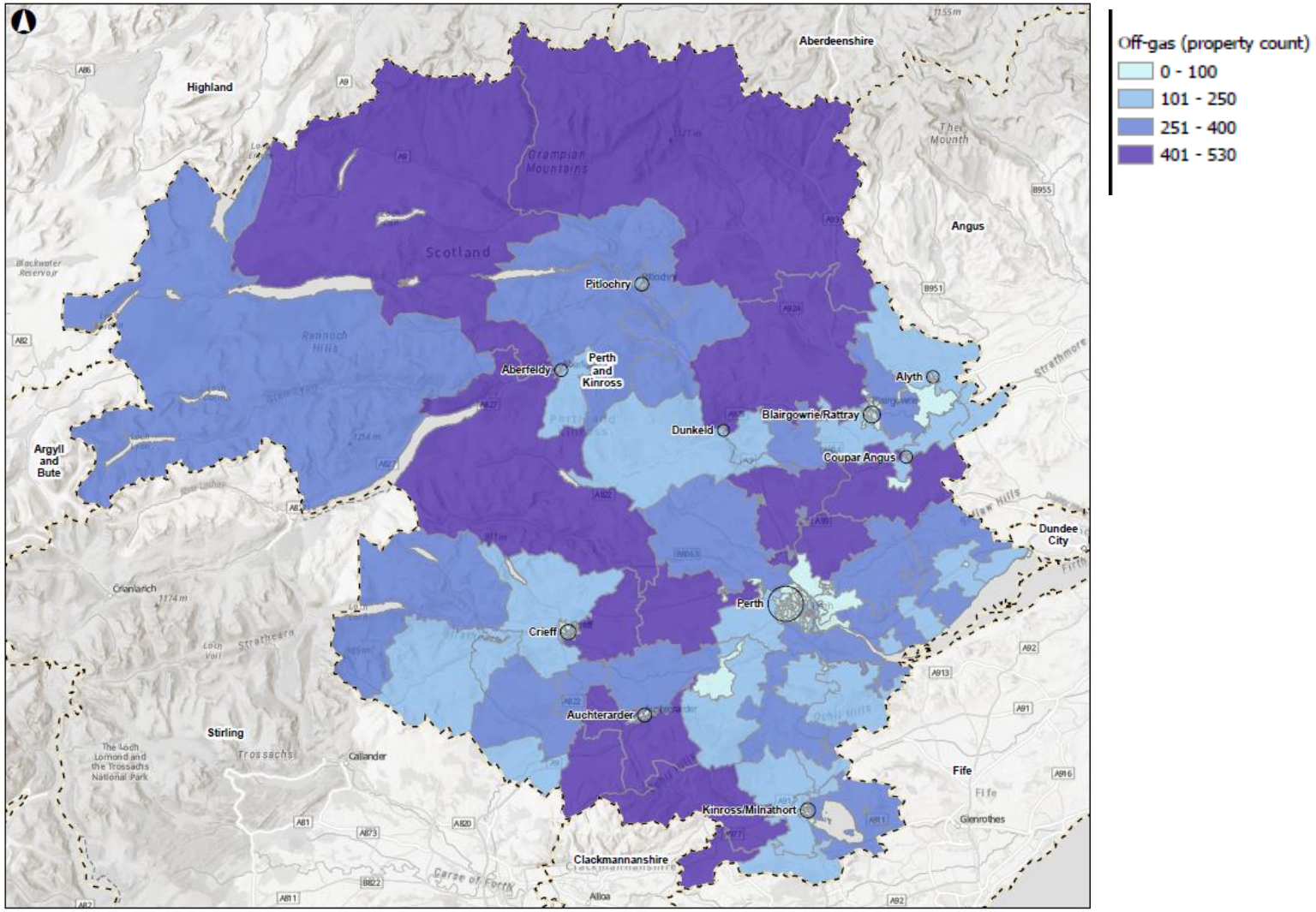


Domestic and Non-Domestic baselining

Analysis of Outputs – Domestic Baselining

Fuel use and heat decarbonisation

Example map showing off-gas property count produced for Perth and Kinross baselining



Domestic and Non-Domestic baselining

Analysis of Outputs – Domestic Baselining Examples

Energy efficiency and fuel poverty

Step 1: What information is required and in what format?

- % properties in each EPC band
- % properties with low insulation level (walls and loft)
- % properties with single glazing
- % of fuel poverty/extreme fuel poverty

Format can be tables, graphs, charts or maps.

Step 2: Why is this information useful?

Provides insight into the energy efficiency standards and levels of fuel poverty within the local authority area and therefore the extent of intervention required to support building owners and to support compliance with existing and potential regulation.

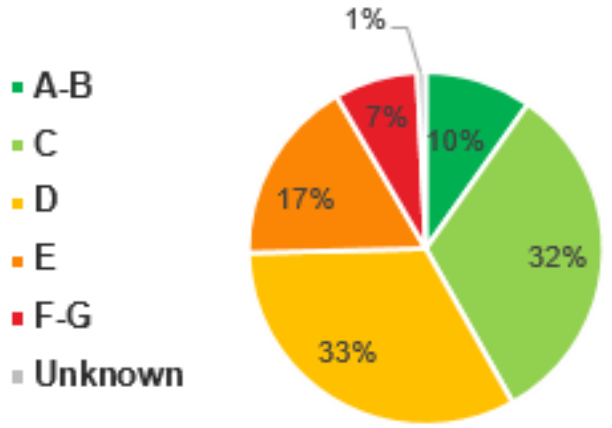
Step 3: What are the implications for LHEES Strategy and delivery?

Consider: What are the number of buildings that have low energy efficiency scores or indicators such as uninsulated walls, single glazing and low loft insulation (0-99mm)? What are the proportion of buildings likely to be in fuel poverty? What are the opportunities and challenges from an energy efficiency retrofit perspective based on the energy efficiency indicators of the local authority area?

Step 4: What Delivery Actions does this lead to?

E.g. Plan out the number of properties that will need to be retrofitted to meet energy efficiency standards/regulations (e.g. EESSH2); and support targeting of these through engagement with RSLs and Delivery Areas.

Example chart of EPC rating produced for Perth and Kinross baselining

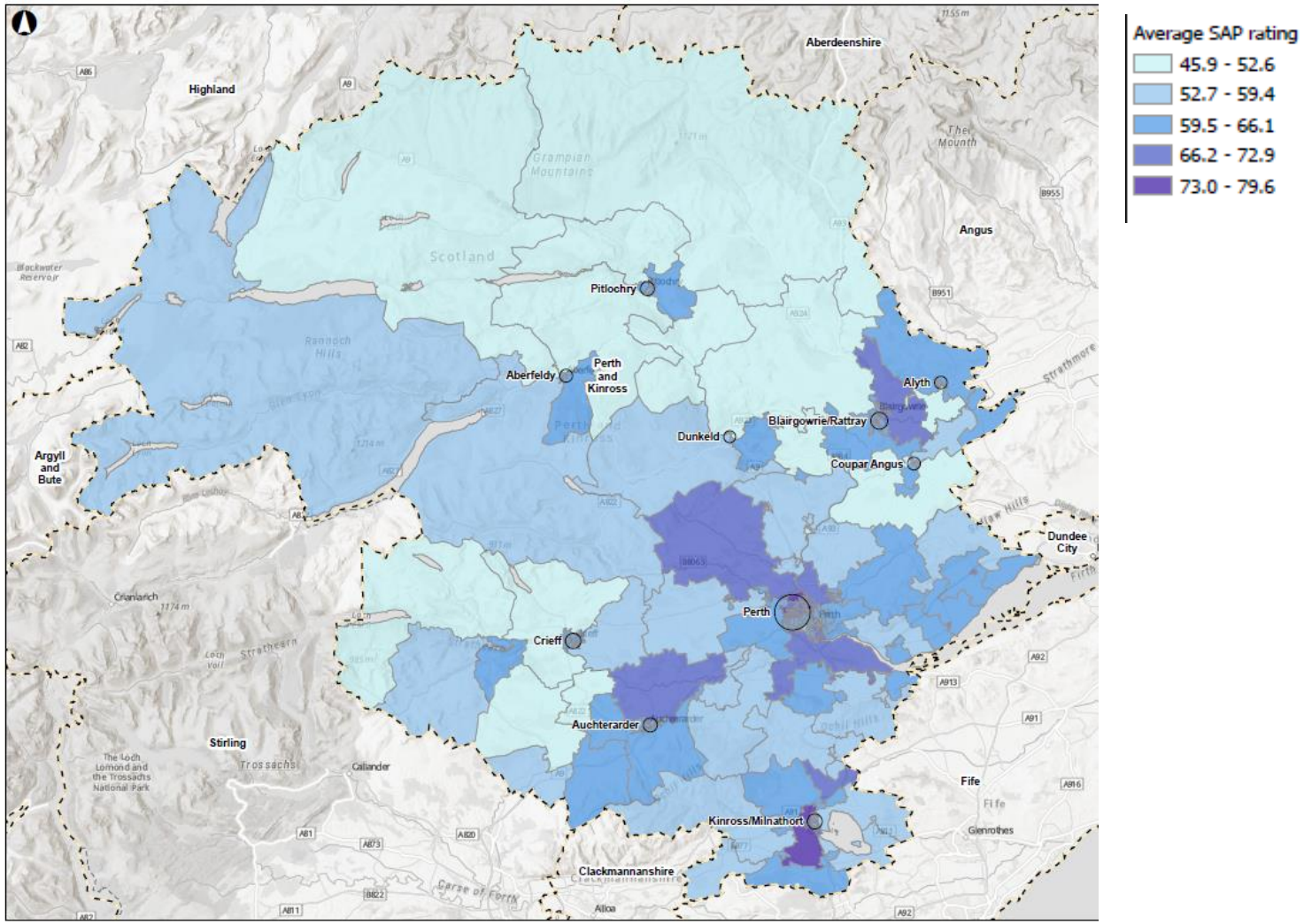


Domestic and Non-Domestic baselining

Analysis of Outputs – Domestic Baselining

Energy efficiency

Example map showing energy efficiency (SAP) produced for Perth and Kinross baselining



Domestic and Non-Domestic baselining

Analysis of Outputs – Domestic Baselining Examples

Mixed-use buildings

Step 1: What information is required and in what format?

- % properties which are mixed-tenure
- % properties which are mixed-use
- % properties which have more than 1 dwelling located in that building (E.g. small block of flats with 10 properties in building)

Format can be tables, graphs, charts or maps.

Step 2: Why is this information useful?

Identifies challenges and opportunities for interventions in properties with more than one dwelling in a building, mixed-tenure or with mixed-use.

Step 3: What are the implications for LHEES Strategy and delivery?

Consider: Which areas have the highest number of mixed-use properties? What are the opportunities and challenges from an energy efficiency retrofit and heat decarbonisation perspective based on the number of mixed-use properties the local authority area?

E.g. Multiple owners and multiple tenure types will need to be involved in building level interventions with careful stakeholder management. Specifically, highlight to Council and RSLs where joint action across tenures may be required.

Step 4: What Delivery Actions does this lead to?

E.g. Use LHEES Analysis from Stage 4 to identify at a higher granularity where clusters of mixed-tenure buildings are for the purpose of prioritisation for retrofit.

Example table of properties with >1 dwelling in a building and properties with mixed tenure produced for Perth and Kinross baselining

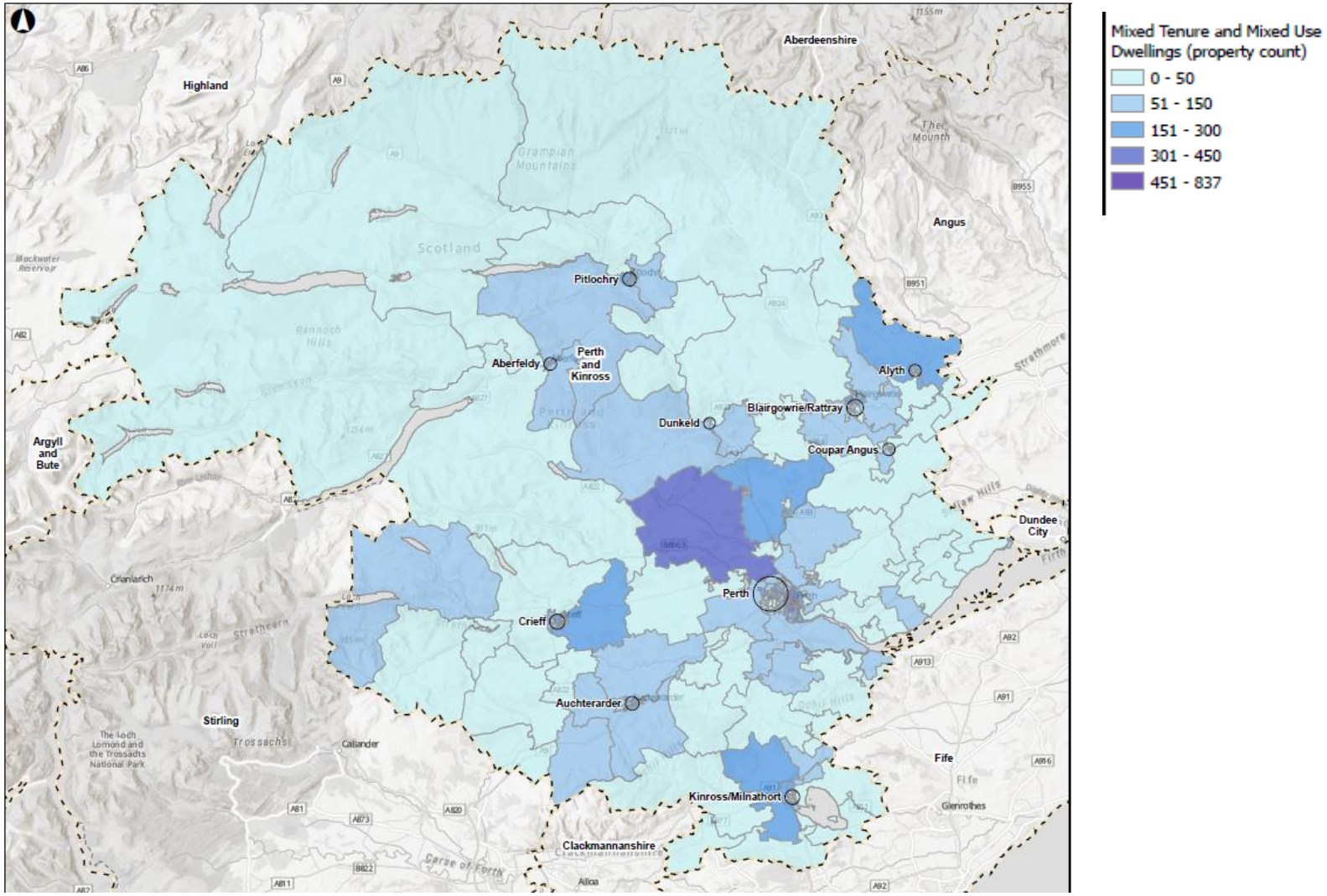
	Properties in a building containing more than one domestic property	Properties in a building containing multiple domestic tenures
Total number of indicator properties in Perth & Kinross	28% (21,571 properties)	14% (10,610 properties)

Domestic and Non-Domestic baselining

Analysis of Outputs – Domestic Baselining

Mixed-tenure buildings

Example map showing count of domestic properties that are classified as mixed tenure produced for Perth and Kinross baselining



Domestic and Non-Domestic baselining

Analysis of Outputs – Domestic Baselining Examples

Historic buildings

Step 1: What information is required and in what format?

- % properties which are listed
- % properties located in a conservation area

Format can be tables, graphs, charts or maps.

Step 2: Why is this information useful?

Provides insight into the number of listed buildings or buildings within a conservation area.

Step 3: What are the implications for LHEES Strategy and delivery?

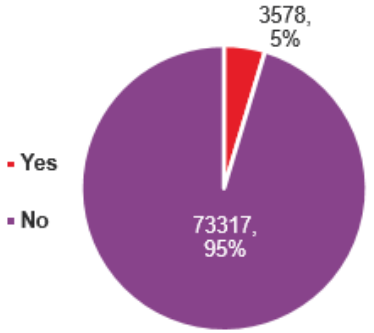
Consider: What is the proportion of listed/conservation buildings compared with the national average? What is the ownership of these properties? What are the opportunities and challenges?

E.g. Retrofitting listed buildings or properties in conservation areas will require careful consideration of planning permissions and design restrictions to meet the necessary standards for energy efficiency. The retrofit must be sensitive towards the historic character of the building.

Step 4: What Delivery Actions does this lead to?

E.g. Work with Historic Environment Scotland and council teams to develop targeted approach for historic building interventions.

Example table of listed properties per grade compared with national average produced for Perth and Kinross baselining



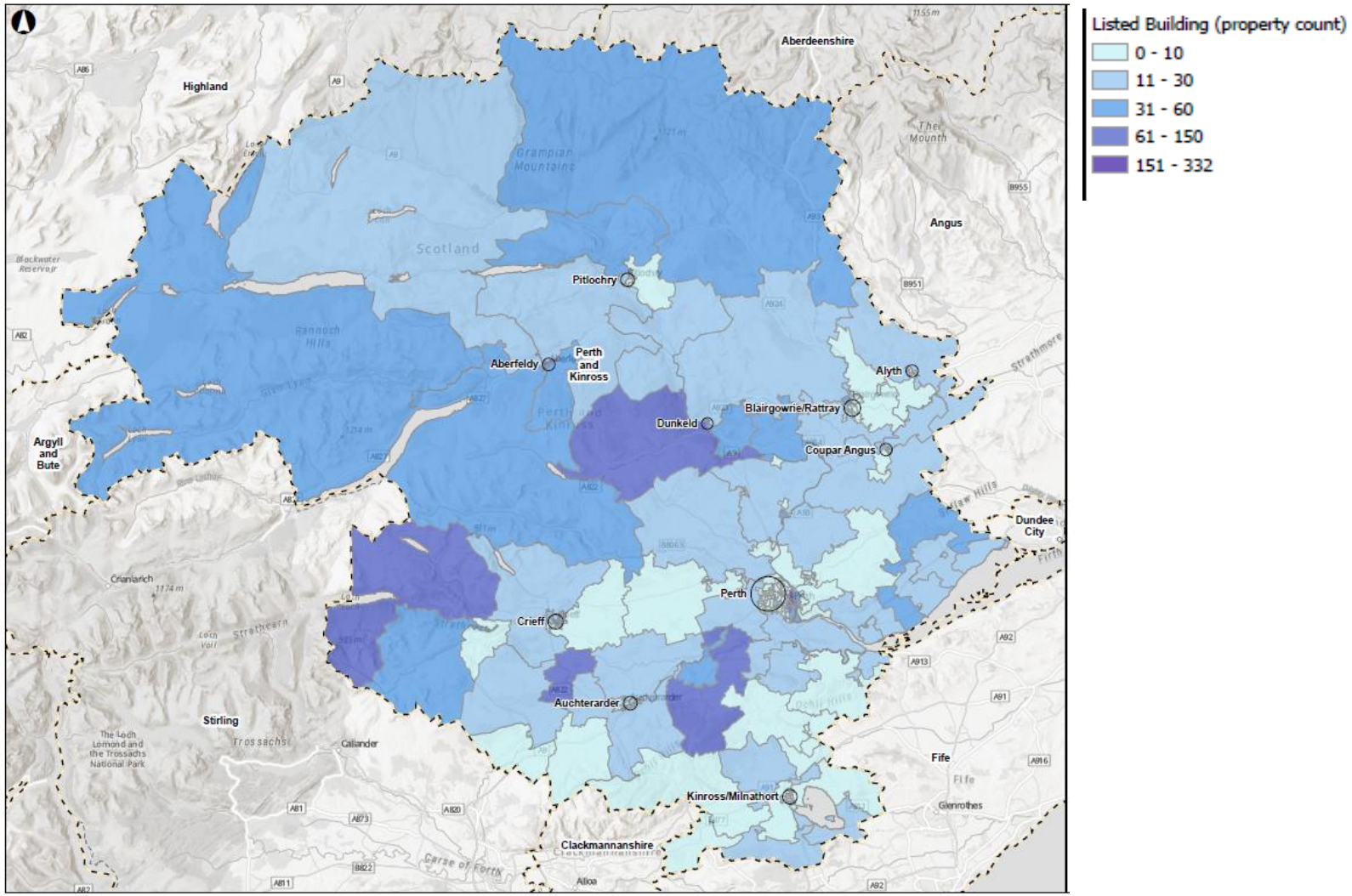
Grade	PKC	Scotland
A	0.21%	0.43%
B	2.12%	1.83%
C	2.32%	1.09%

Domestic and Non-Domestic baselining

Analysis of Outputs – Domestic Baselining

Listed buildings

Example map showing count of domestic properties that are listed produced for Perth and Kinross baselining

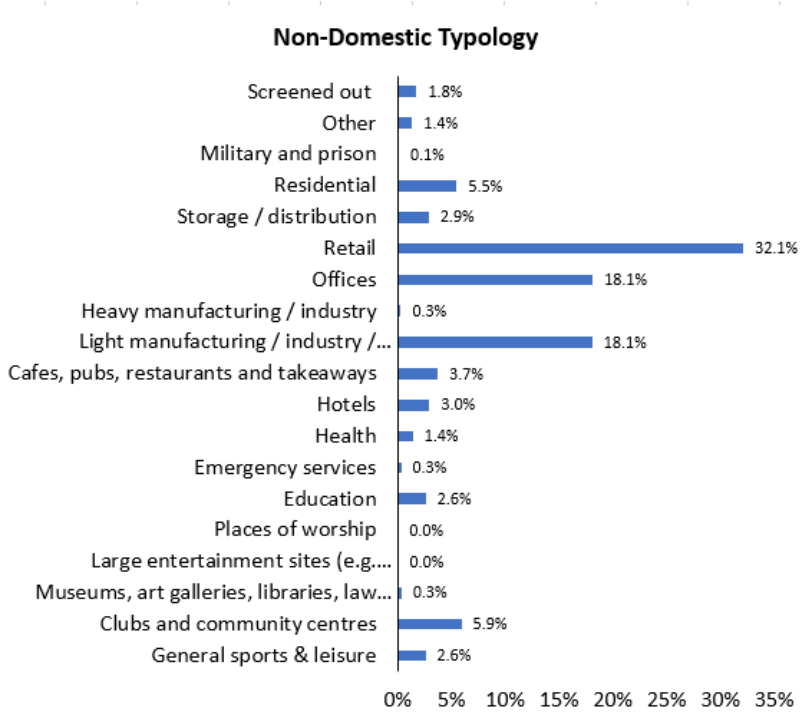


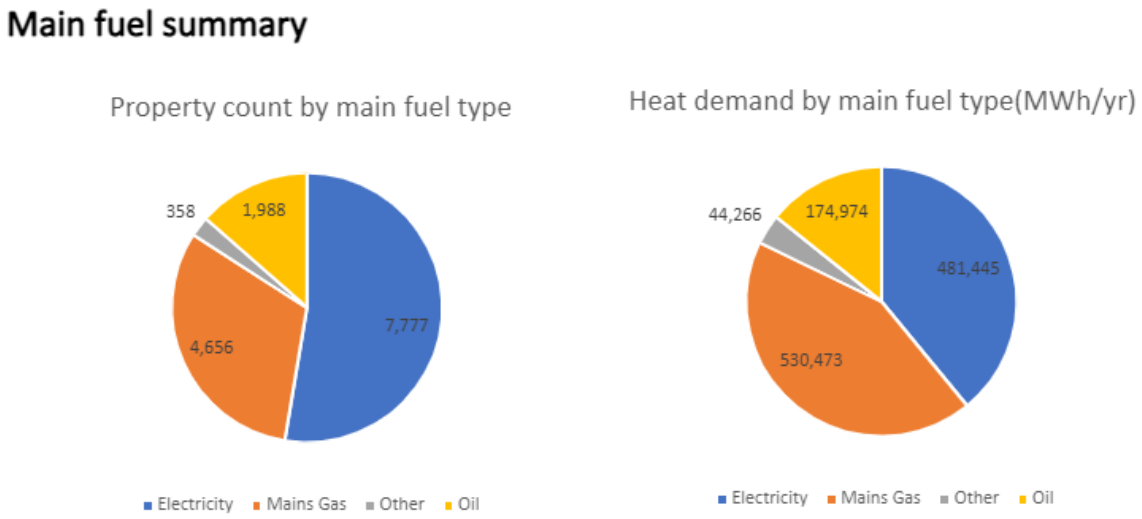
Domestic and Non-Domestic Baselining

Analysis of Outputs – Non-domestic Baselining

Non-domestic baselining is undertaken as part of LHEES Stage 3 Methodology. The **Non-domestic Baseline Tool** summary tabs provide tables and graphs showing characteristics of the baseline building stock within the local authority area, including:

- Property typology (e.g. education, health, museums, hotels etc)
- Property count and heating demand (MWh/yr) across multiple categories (floor area, age, fuel type etc)





Domestic and Non-Domestic Baselining

Analysis of Outputs – Non-domestic Baselining

Summary of non-domestic indicators:

- Property typology
- Property age
- Floor area
- Main fuel type
- Primary/secondary heating system
- Heat demand
- Space heat demand
- Hot water demand
- Urban/rural classification

The **LHEES Methodology Non-Domestic Approach** document can be used to:

- Support identification of opportunities and challenges for different non-domestic typologies, ages and fuel types

Domestic and Non-Domestic baselining

Analysis of Outputs – Non-Domestic Baselining Examples

Typology

Step 1: What information is required and in what format?

- Property typologies across local authority area

Format can be tables, graphs, charts or maps.

Step 2: Why is this information useful?

Provides an initial overview of what type of non-domestic properties are within the local authority area, according to the 19 typologies within the LHEES Methodology and their geographical layout.

Step 3: What are the implications for LHEES Strategy and delivery?

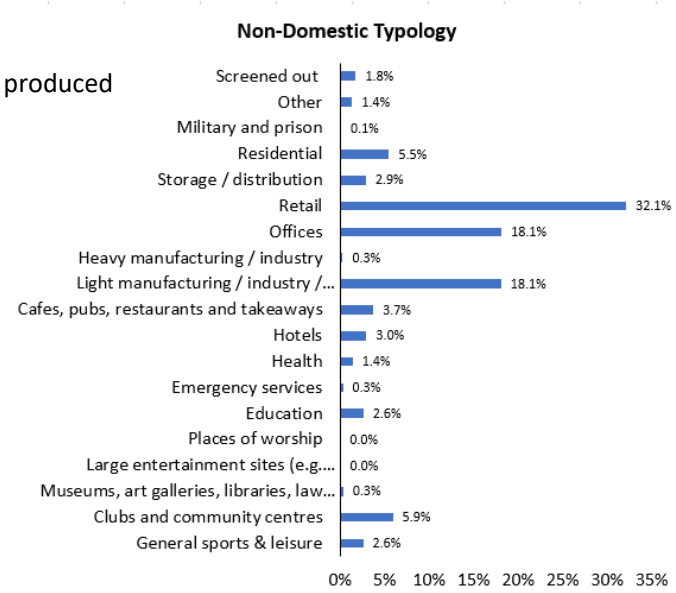
Consider: Are there more buildings of a certain typology? Are some types grouped in one location? What are the opportunities and challenges of each typology from a heat decarbonisation / energy efficiency retrofit perspective?

E.g. Health sites have a steady baseload demand which makes them suitable for connection to a heat network, whereas cafes and shops can have more variable demand. Industrial sites could provide waste heat – also for a heat network.

Step 4: What Delivery Actions does this lead to?

E.g. Starting to set out actions for the short-, medium- and long-term depending on whether the buildings are council, public or privately owner. This may include actions around engagement, suitability for heat network connections or where a request for data/building information is required. Additionally, actions may be structured around geographies, typologies and/or types of measures.

Example graph of typology produced for Fife baselining



Domestic and Non-Domestic baselining

Analysis of Outputs – Non-Domestic Baselining Examples

Floor area

Step 1: What information is required and in what format?

- Property count by floor area
- Heat demand by floor area

This shows the number and size of property with the highest heat demand.

- Heat demand for typology split by floor area
- Property count for typology split by floor area

This shows the number and size of **each type** of property with the highest heat demand. Format can be tables, graphs, charts or maps.

Step 2: Why is this information useful?

The properties with high heat demand will be key to engage with to promote energy efficiency and heat decarbonisation.

Step 3: What are the implications for LHEES Strategy and delivery?

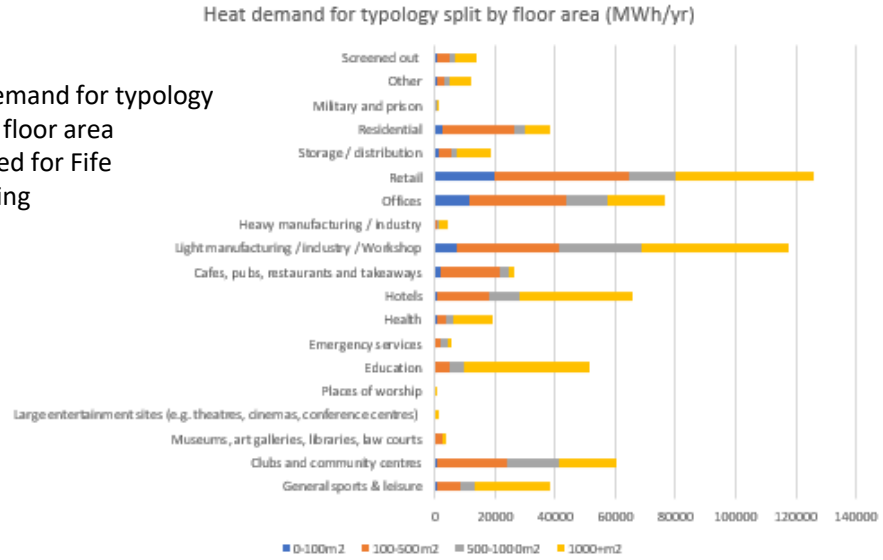
Consider: Is the highest heat demand from a small number of large buildings or a large number of small buildings? What type of properties and/or typologies contribute to the highest heat demand density – are they public or privately owned? What level of influence and/or control does the council have over these buildings?

E.g. If a building has a high heat demand and small floor area it may be more feasible for heat network connection or heat pumps. High heat demand can be an indicator that energy efficiency measures are required.

Step 4: What Delivery Actions does this lead to?

E.g. Again, depending on level of control and influence – actions are likely to centre around information gathering and engagement

Heat demand for typology split by floor area produced for Fife baselining



Domestic and Non-Domestic baselining

Analysis of Outputs – Non-Domestic Baselining Examples

Fuel type

Step 1: What information is required from the outputs?

- Property count by fuel type
- Heat demand by fuel type

This shows the number and fuel use of property with the highest heat demand.

- Heat demand for typology split by fuel type
- Property count for typology split by fuel type

This shows the number and age of **each type** of property with the highest heat demand.

Step 2: Why is this information useful?

The properties with high-carbon fuels will be key to engage with to promote energy efficiency and heat decarbonisation.

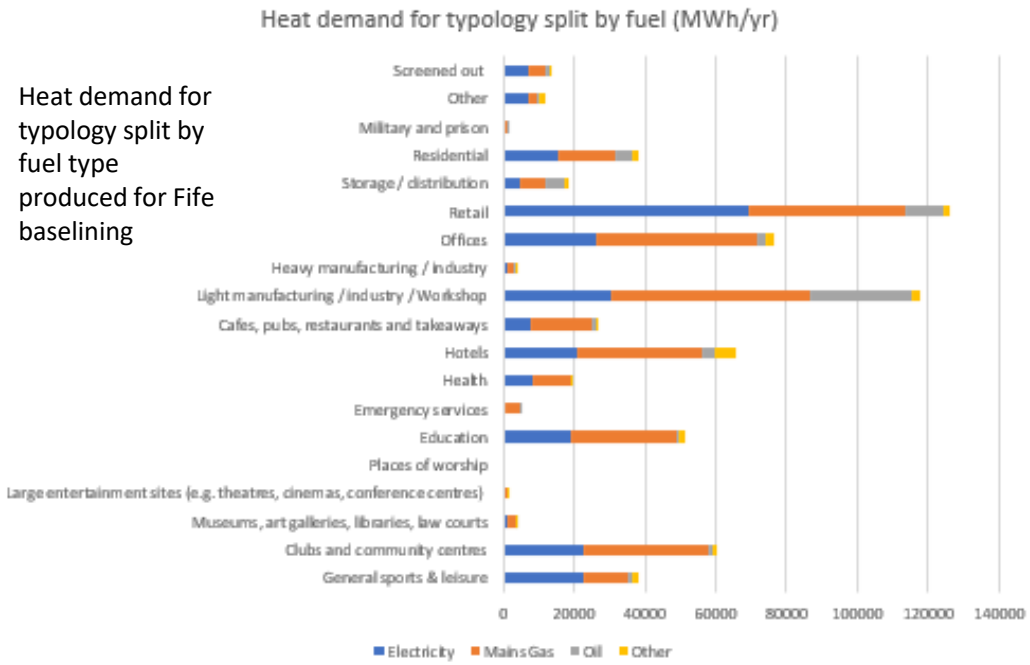
Step 3: What are the implications for LHEES Strategy and delivery?

Consider: Are there substantially more properties using a particular fuel type? Which fuel types and property types relate to the highest heat demand? What are the opportunities and challenges from a heat decarbonisation perspective based on the majority fuel type of non-domestic properties? What level of influence and/or control does the council have over these buildings?

Step 4: What Delivery Actions does this lead to?

E.g. Use fuel type data to support prioritisation of low carbon technologies and heat network analysis for Delivery Areas to displace fossil fuel systems.

Heat demand for typology split by fuel type produced for Fife baselining



Domestic and Non-Domestic baselining

Analysis of Outputs – Non-Domestic Baselining Examples

Space and hot water heating

Step 1: What information is required from the outputs?

- Space heating by demand level
- Hot water by demand level

This shows the hot water and space heating split of properties.

- Space heating for typology split by heating demand
- How water for typology split by hot water demand

This shows the hot water and space heating split of **each type** of property.

Step 2: Why is this information useful?

Space heating demand tends to be the largest heat demand, so is key for determining heat network connection viability. Buildings with a high hot water demand can also be suitable for heat networks.

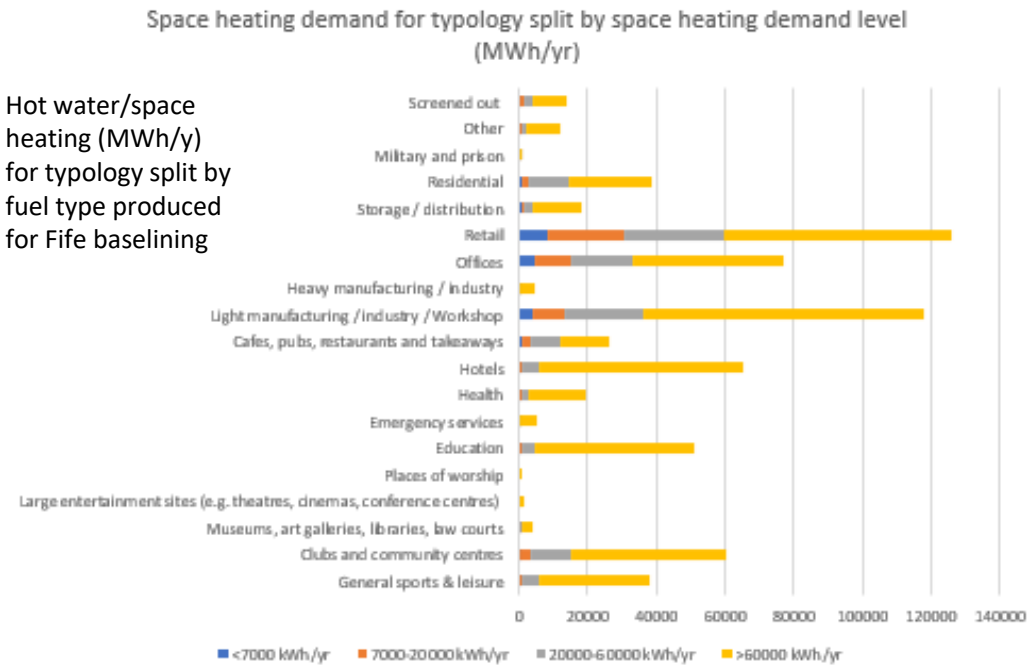
Step 3: What are the implications for LHEES Strategy and delivery?

Consider: Where is the highest demand? What building typologies have high hot water and space heating demands? What level of influence and/or control does the council have over these buildings? What is the confidence in this data?

Step 4: What Delivery Actions does this lead to?

E.g. Use space heating and hot water demand data to support heat network analysis for Delivery Areas to displace fossil fuel systems.

Hot water/space heating (MWh/y) for typology split by fuel type produced for Fife baselining



Domestic and Non-Domestic baselining

Analysis of Outputs – Non-domestic Baselining

Spatial distribution of non-domestic buildings

Maps could also be provided as an output of the Non-domestic baselining. This is to provide an overview of where non-domestic property relating to certain indicators are located, as well as highlighting where there are groups of non-domestic buildings e.g. industrial sites.

Key characteristics that could be summarised:

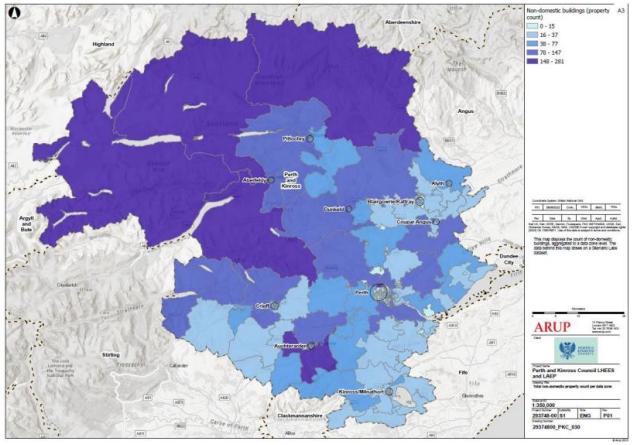
- Building count
- Total heat demand

For discussion around spatial distribution, consider:

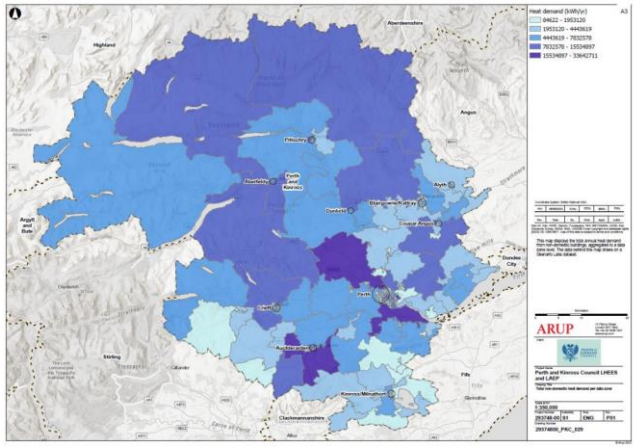
- The areas with the highest number of non-domestic buildings. Are there groups of buildings in a particular location e.g. industrial estate?
- The areas with the largest non-domestic heat demand.
- Split by geography/typology/indicators

In particular, highlighting areas of concentrated heat demand can help identify where **data collection and engagement** will take place.

Note caution, that low numbers of non-domestic buildings in a strategic zone could skew the outputs – point data may be more useful and may support better delivery planning.



Map of non-domestic building count across data zones produced for Perth and Kinross baselining



Map of non-domestic heat demand across data zones produced for Perth and Kinross baselining

Domestic and Non-Domestic baselining

Creating a summary for the LHEES Strategy

- The analysis of the baselining outputs and conclusions should be checked with relevant Council teams to ensure accuracy (either once the analysis has been completed or later during strategy engagement).
- Going through the step-by-step process set out in this support pack for the core indicators, as well as comparing against national averages* should ensure that the opportunities and challenges that will form the LHEES Strategy become apparent.
- This should enable a focus for summarising performance against core indicators and the writing up the LHEES Strategy (following the Template structure if preferred).
- Suggest that results and discussion should only be presented for the most relevant core indicators that align with the selected LHEES considerations. Additional detail may not need to feature in the Strategy or can be put in appendices.

*Note - contact Energy Saving Trust for national averages