ZERO WASTE SCOTLAND

Energy and Low Carbon Heat

LHEES Capacity Building Workshop 2

LHEES Stage 4 – Non-Heat Network Priorities

Wed 10th November 2021

Calum Robertson – Zero Waste Scotland

Chris Morrison – Zero Waste Scotland

Andrew Commin – Buro Happold

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Welcome and Introduction

Aims of the LHEES capacity building workshops –

- To provide a more detailed overview of LHEES Stages 1-4, with examples from supporting templates and tools
- To provide context for how the national assessment outputs from LHEES Stages 1-4 will be generated, where these fit within the wider LHEES process and the flexibility within the Methodology for local adjustment
- To provide an opportunity for local authority Q&A / feedback on these Stages

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LHEES Capability Building Workshop 02

Stage 4 – Non-heat network Priorities

Wed 10th Nov 2021 14:00-16:00

#	Item	Time (approx.)
01	Welcome and introductions	1400-1405
02	Context for Workshop 2	1405-1410
03	Stage 4 foundations	1410-1415
04	Stage 4 – Off-Gas Grid walk through	1415-1455
05	Break and Q&A	1455-1510
06	Stage 4 – other Priorities (non-Heat Networks) walk through	1510-1540
07	National assessment outputs and next steps – Stages 5, 6 and 8	1540-1545
08	Q&A	1545-1555
09	Summary and close	1555-1600

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LHEES Priority Areas

	No.	LHEES Priorities	Description
Low regrets heat decarbonisation	1	Heat networks	Decarbonisation with heat networks
	2	Off-gas grid buildings	Transitioning mainly from heating oil and LPG in off-gas areas
Secondary outcomes	3	Poor building energy efficiency	Poor building energy efficiency
	4	Poor building energy efficiency as a driver for fuel poverty	Poor building energy efficiency as a driver for fuel poverty
	5	Mixed-tenure, mixed-use and historic buildings	Covering mixed-tenure and mixed-use buildings (5.1), listed buildings (5.2) and buildings in conservation areas (5.3)
Heat decarbonisation	6	On-gas grid buildings	On-gas grid heat decarbonisation

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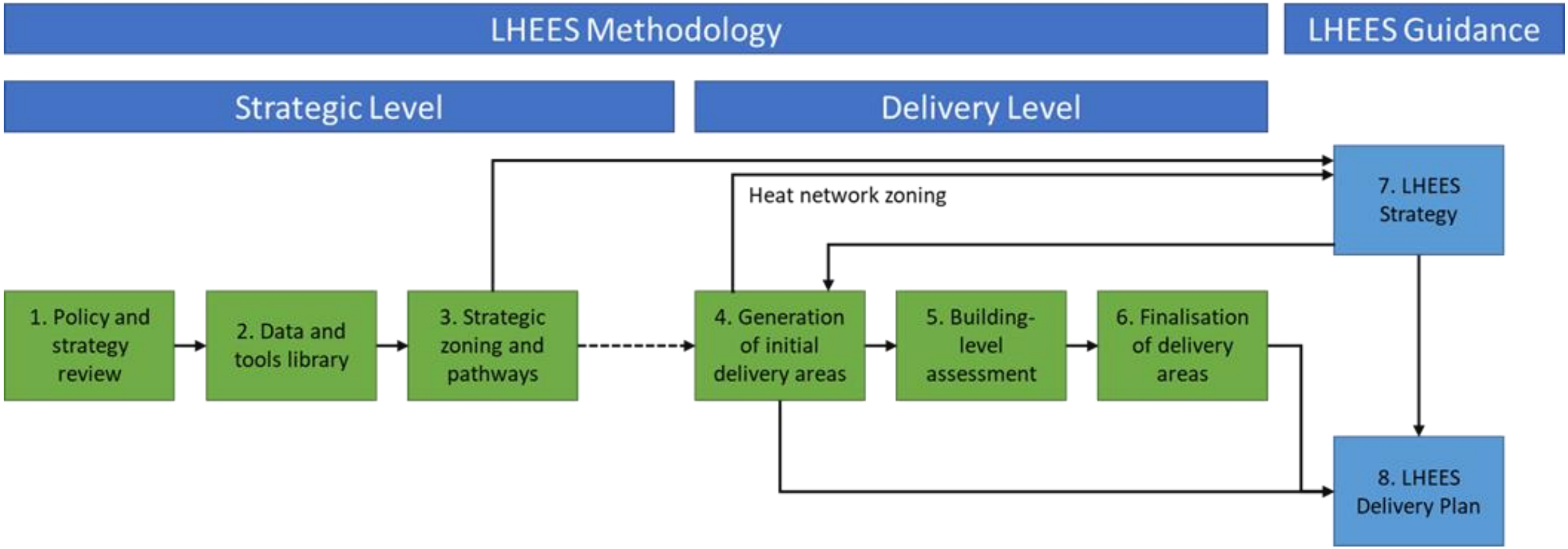
LHEES Structure and Stages



Stage 4 – Generation of Initial Delivery Areas

Purpose

To support local authorities to generate initial Delivery Areas for each LHEES Priority

Approach

- Delivery Areas generated using the Indicators, Criteria and Weightings identified in Stage 1
- Uses GIS techniques – these are at higher granularity than Strategic Zones
- Methodology provides detailed guidance for one approach to area identification
- An important starting point for identifying a range of projects, regulation and actions that are within the competence of the Scottish Government and local authorities (actions relating to identified areas to be developed in the LHEES Delivery Plan)

Stage 4 – Further Notes

- Detailed Practitioner Guidance sits separately to LHEES Methodology document

- Guidance developed for ArcGIS Desktop
  - Efforts made to restrict use of additional toolboxes
  - Methodology has been tested in QGIS and ArcGIS Pro

- Flexibility in approach

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Off-gas grid walkthrough

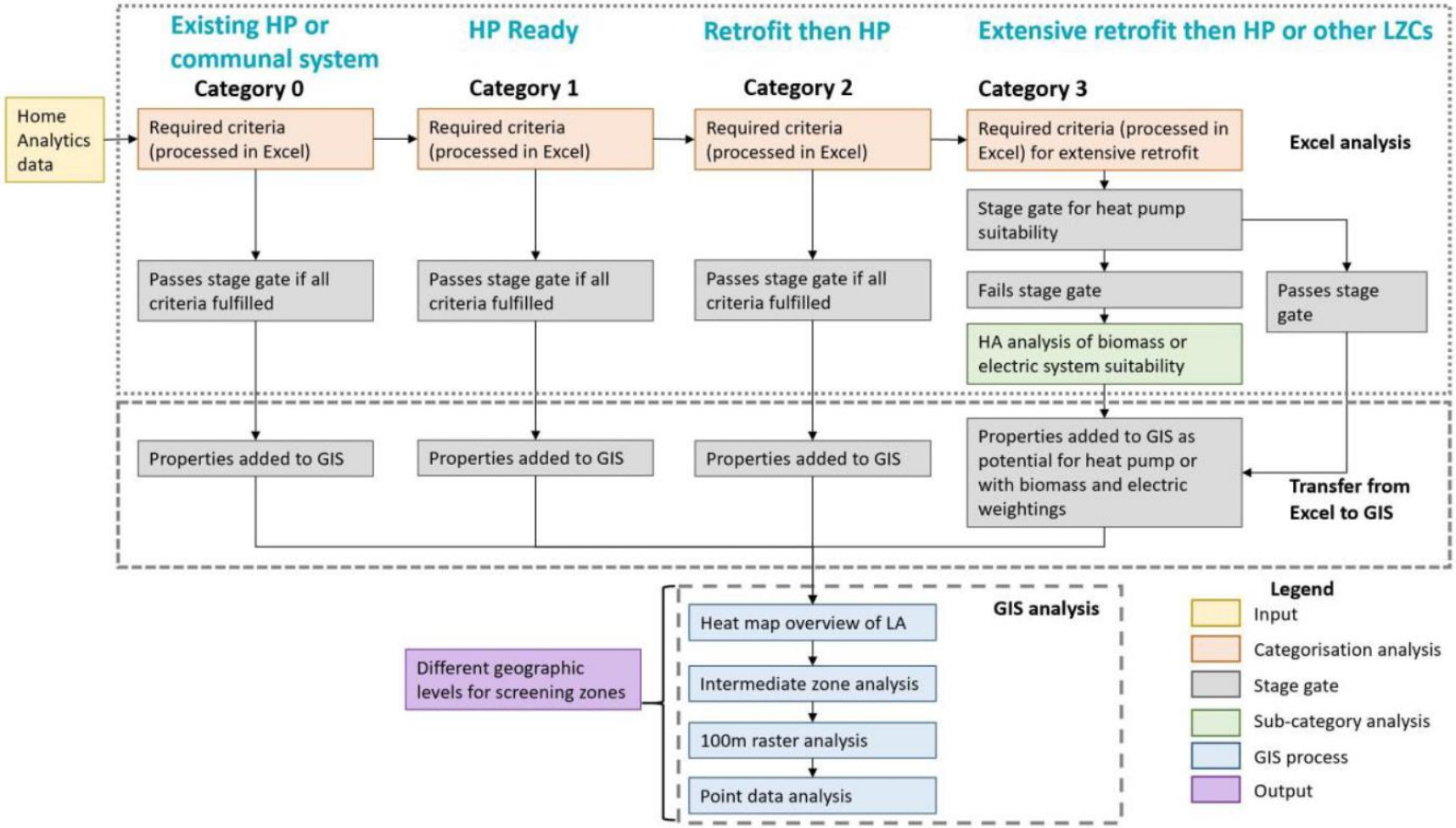
LHEES Stage 4: Generation of Initial Delivery Areas

Low regrets heat decarbonisation: Off-gas grid

Detailed Practitioner Guidance

Off-gas grid approach

- Properties that already have a low or zero carbon heat system
- Those with immediate potential for heat pump retrofit
- Those with secondary potential for heat pump retrofit (i.e. some fabric / heat distribution system upgrade)
- Those with tertiary potential for heat pump retrofit (e.g. costly fabric retrofit), and not suited to heat pump technology with electric storage, direct electric or biomass likely to be the most viable decarbonisation technology



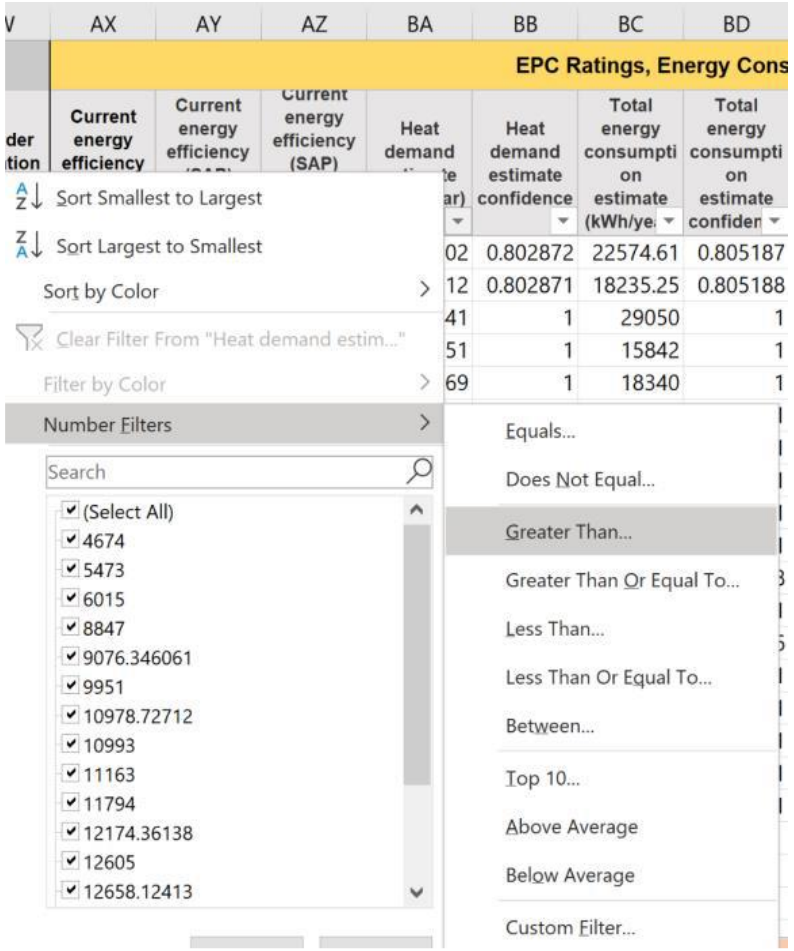
Off-gas grid – weightings

- For categories 2 and 3 additional analysis beyond being placed in a category is considered
- For Category 3 it is a suggested heating solution
- Category 2 is generally the most frequently observed, so there is a high level of difference in ease
- Weightings are applied to give a greater indication of ease of implementation

No.	Parameter to fulfil	Home Analytics Column Heading	Weighting (%)	Justification
1	The windows are double/triple glazed	Glazing type	20	Required to have thermal efficiencies needed for heat pumps – being in place reduces costs
2	The wall is insulated	Wall insulation prediction	20	Required to have thermal efficiencies needed for heat pumps – being in place reduces costs
3	If the building has a loft it has 100 mm+ of insulation	Loft insulation prediction	20	Required to have thermal efficiencies needed for heat pumps – being in place reduces costs
4	Property tenure is housing association or local authority	Property tenure	20	Easier to install due to ownership levers
5	Replacing oil or LPG	Main fuel type	20	Existing wet systems with a high carbon saving from fuel change. Solid fuel is considered more suited to biomass so not given additional weight.

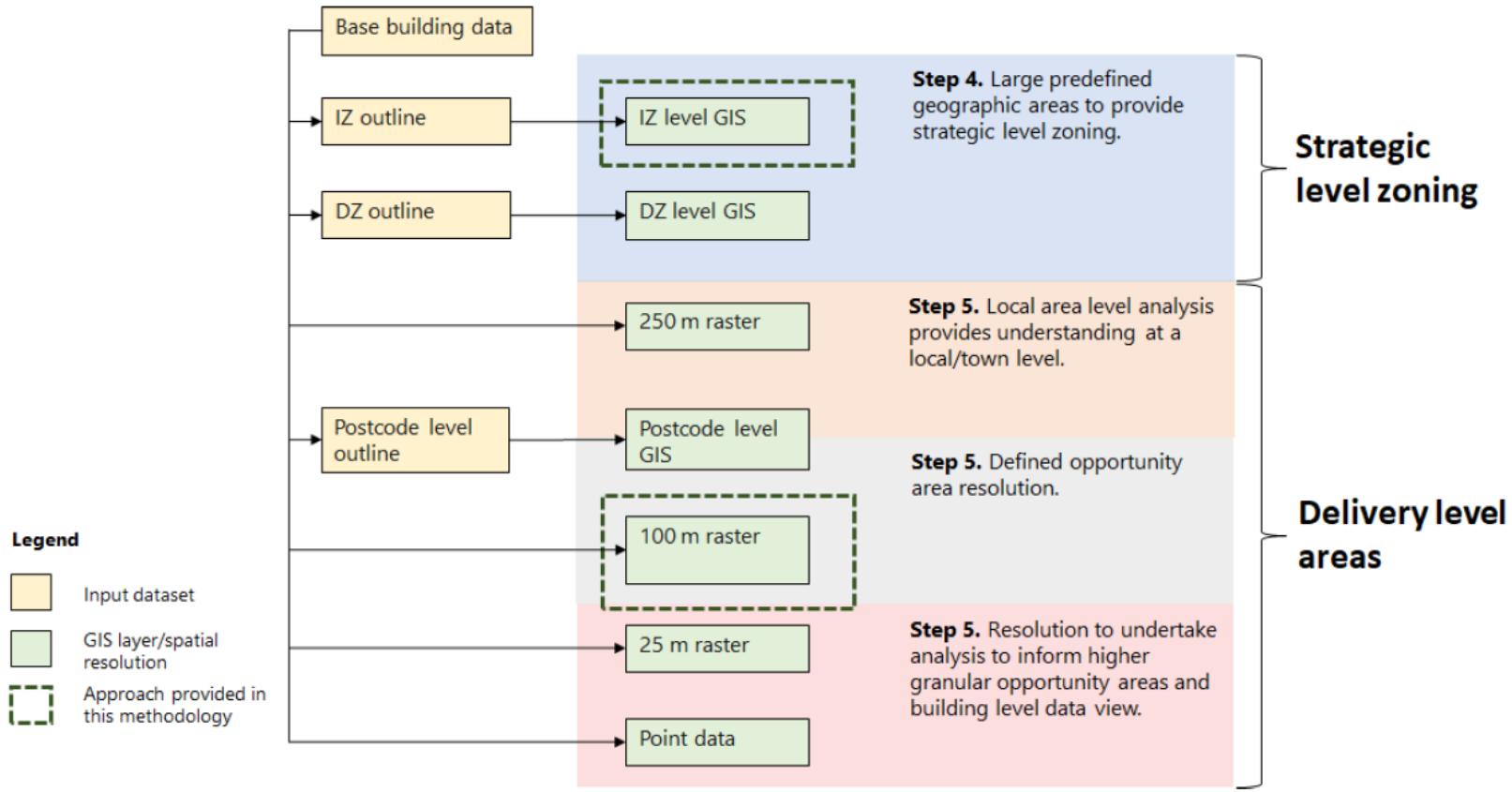
Off-gas grid – data inputs and preparation

- Input data is Home Analytics and requires the use of the “Off_Gas_Domestic_Template”
- Within Home Analytics a filter is applied to only bring in demands greater than 0
- This filtered information is then pasted into the “HA Address_Level_Data” tab within the “Off_Gas_Domestic_Template”
- Ensure “HA Input & Analysis” and “Outputs” contain the same number of properties (which will be reflected in row number) as held in the “HA Address_Level_Data” tab



Off-gas grid GIS approach

- GIS is used to visualise and interpret data at two key levels, strategic and delivery
- These are common across all LHEES priorities
- The principles and approaches are flexible and can be used to explore the data at any level listed
- These will be flagged but the focus is on the two core resolutions



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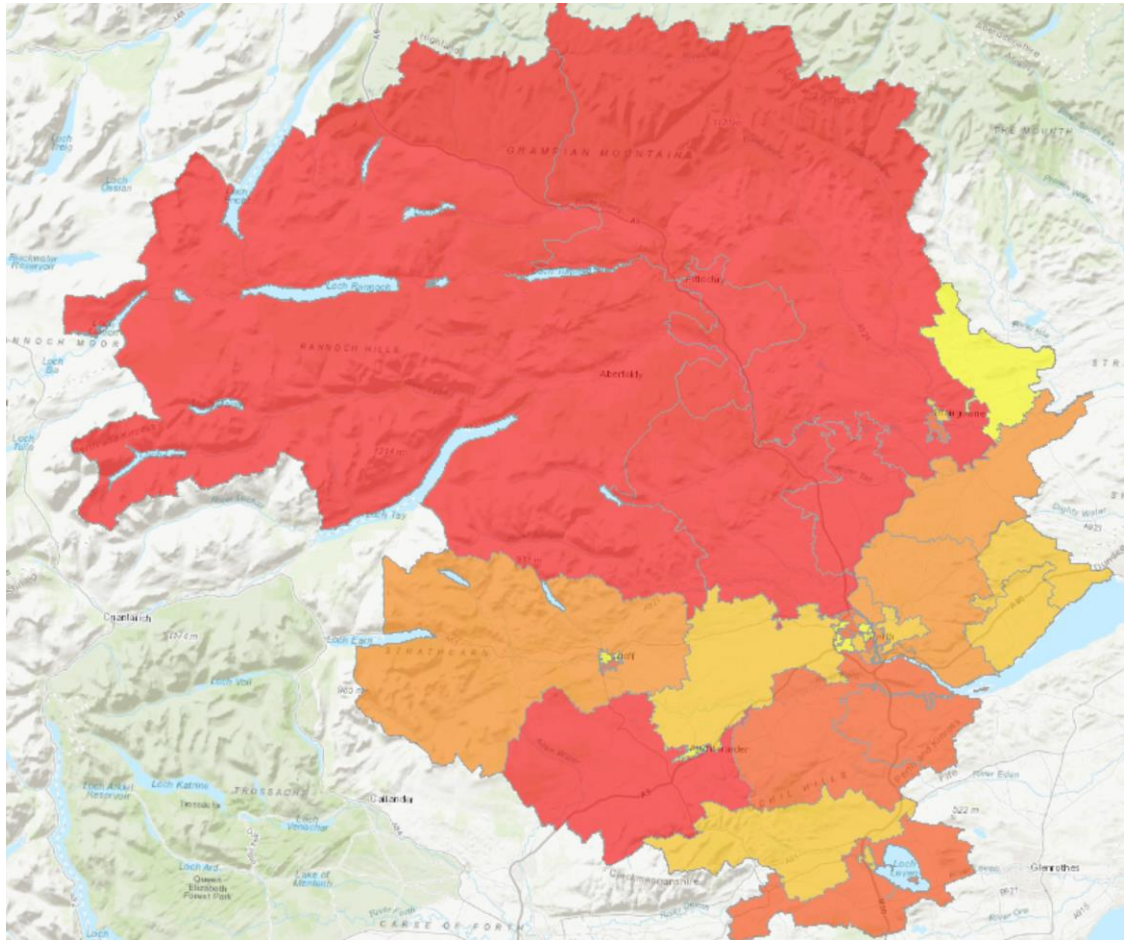
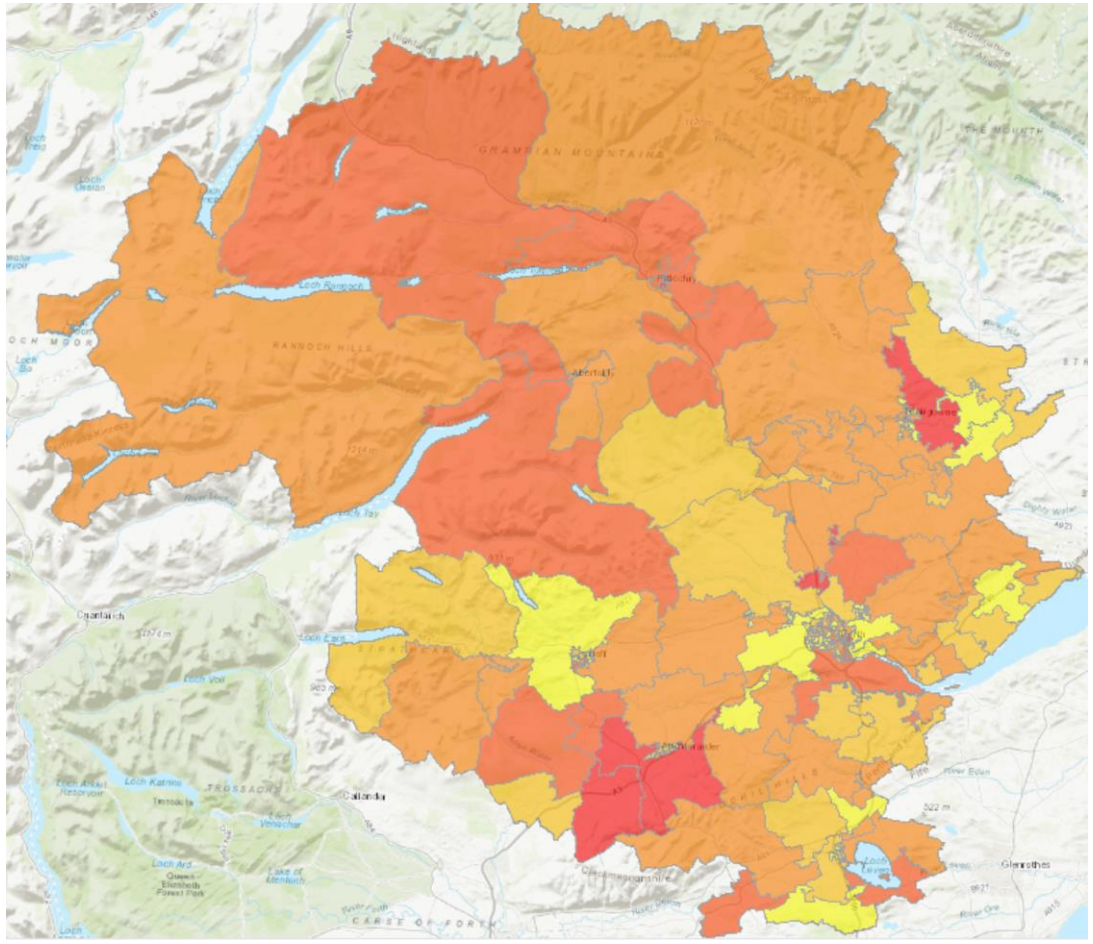
Off-gas grid strategic level resolution





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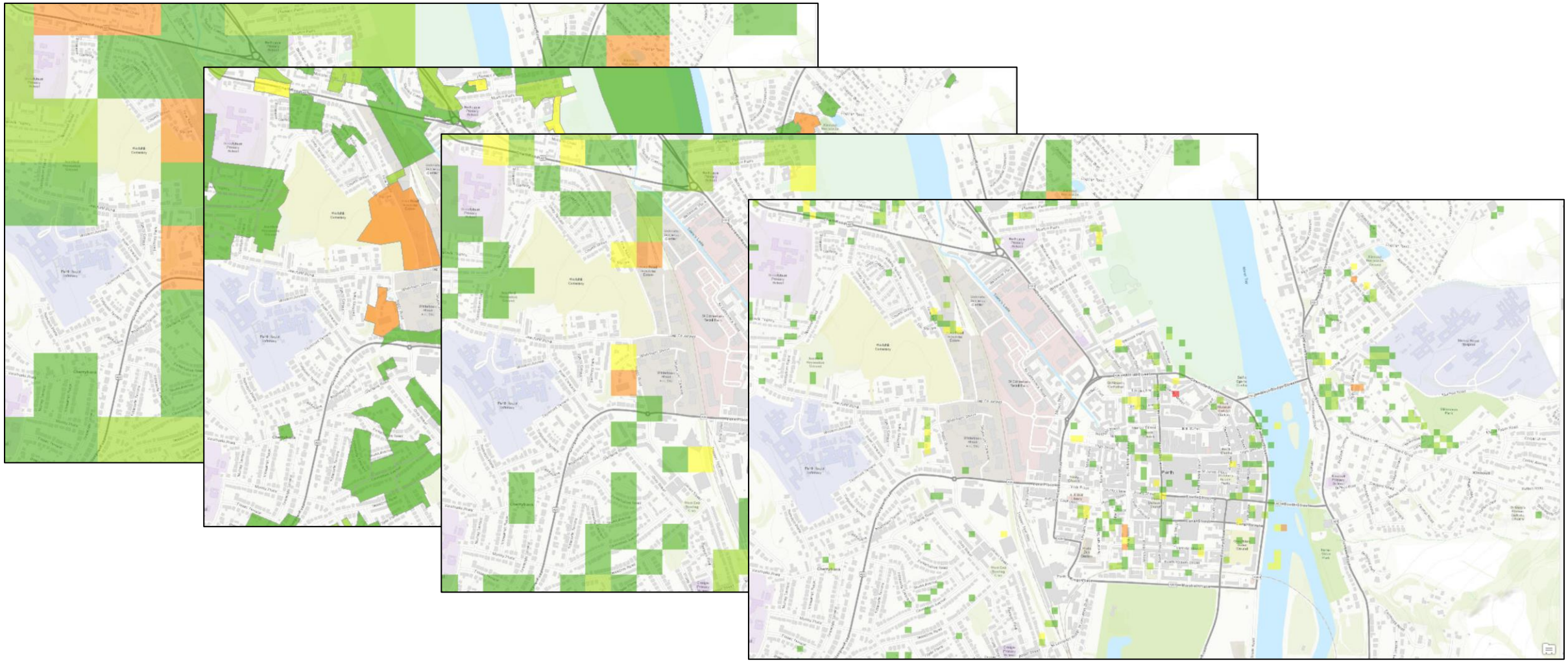
Off-gas grid delivery level resolution



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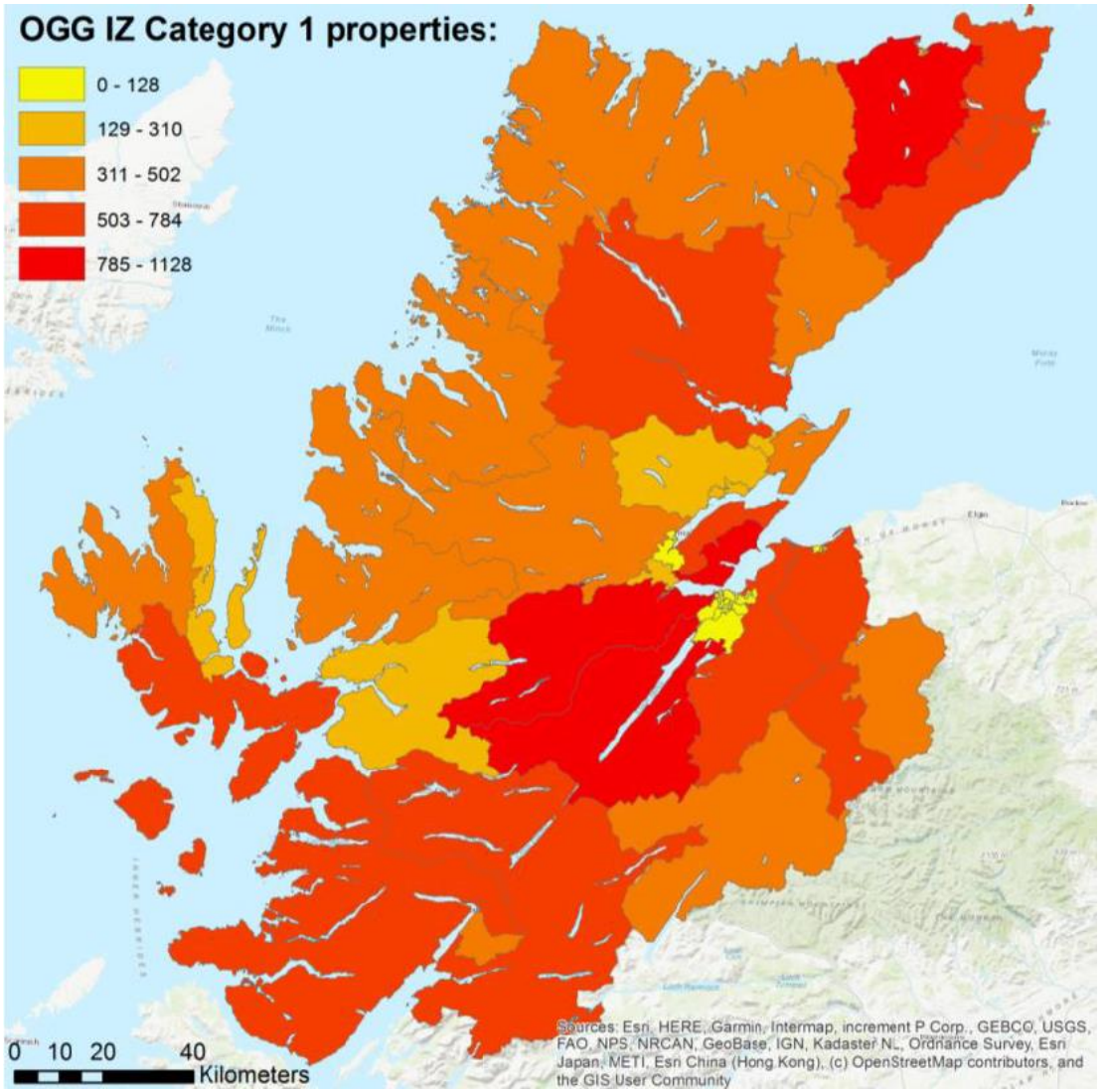
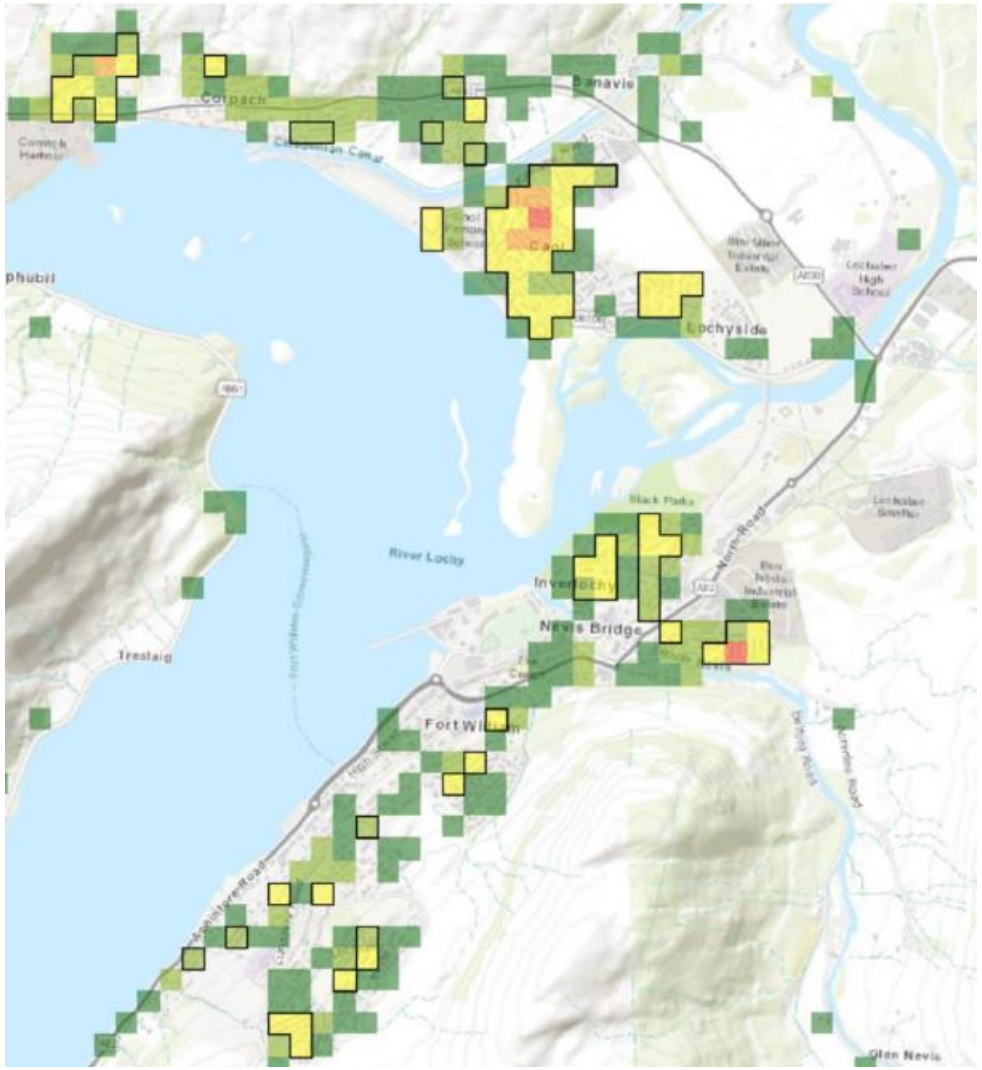
Off-gas grid GIS – strategic level

- Discussed in the LHEES stage 3 workshop and shown how this can be done with the Baseline Tool
- Method is covered again in this session as the principles can be applied to summarise data for different pre-defined areas
- Giving flexibility to focus on different levels or focus on specific elements (e.g. Category 3 technologies)
- This flexibility uses a spatial join tool



Off-gas grid GIS – delivery level

- Carries out raster (or gridded) aggregation of data to show hotspots.
- Methods to statistically analyse the outputs to create focus areas across the local authority are also detailed.
- The method requires a spatial analyst licence for ArcMap – which maybe limited.
- Capacity building could cover how to overcome this issue, including how the analysis can be carried out in different software.



Off-gas grid GIS outputs

Strategic level

IZ spatial area layers:

- Number of Category 0 properties per IZ area.
- Number of Category 1 properties per IZ area.
- **Number of Category 2 properties per IZ area.**
- Number of Category 3 properties per IZ area.

Delivery level

100m x 100m Rasters:

a) Count of Category 0 properties per area

b) Count of Category 1 properties per area.

c) Count of Category 2 properties per area.

d) Count of Category 3 properties per area.

e) Average Category 2 weighting per area.

Prioritised 100m areas for further analysis.

Symbolised point datasets:

a) All Properties symbolised on Category.

b) Category 2 symbolised regarding the Category 2 weighting score.

c) Category 3 symbolised regarding the type of Category 3 heating solution.

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Poor building energy efficiency and fuel poverty walkthrough

LHEES Stage 4: Generation of Initial Delivery Areas

Secondary outcomes: Poor building energy efficiency and Poor building energy efficiency as a driver for fuel poverty

Detailed Practitioner Guidance

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Poor building energy efficiency and fuel poverty approach

Indicator Attributes	Criteria	Section Where First Used	Data Source & Column
Fuel Poverty	Probability ranging from 0-1.	Creation of IDW rasters in Section 3.5.5	Home Analytics - Probability of fuel poverty (fuel bill >10% of income after housing)
Extreme Fuel Poverty	Probability ranging from 0-1.	Creation of IDW rasters in Section 3.5.5	Home Analytics - Probability of extreme fuel poverty (fuel bill >20% of income after housing)
Loft insulation	Probability of loft insulation <100mm	Primary criteria, manipulated in Section 3.5.3 and then used throughout	Home Analytics - Loft insulation prediction: 0-99mm
Single glazed windows	Binary – Single Glazing	Primary criteria, manipulated in Section 3.5.3 and then used throughout	Home Analytics - Glazing type: Single/Partial
Wall insulation (all construction types)	Probability of walls being uninsulated	Primary criteria, manipulated in Section 3.5.3 and then used throughout	Home Analytics - Wall insulation prediction: Uninsulated

- Properties that already have a low or zero carbon heat system.
- Those with immediate potential for heat pump retrofit.
- Those with secondary potential for heat pump retrofit (i.e. some fabric / heat distribution system upgrade).
- Those with tertiary potential for heat pump retrofit (e.g. costly fabric retrofit), and not suited to heat pump technology with electric storage, direct electric or biomass likely to be the most viable decarbonisation technology.

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Poor building energy efficiency and fuel poverty – data inputs and preparation

- Uses Home Analytics data – requires cleaning.
- Remove unknown fuel poverty values (i.e. -1 in the Home Analytics data)
- Adjust sheet to only one header (to be suitable for GIS file format).
- Save as a CSV for file integration.
- Approach differs from the on and off gas grid approach as there is no pre-GIS analysis in Excel.
- This is because within this priority there is not a need to categorise properties carrying out spatial analysis and visualisation.

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Poor building energy efficiency and fuel poverty – GIS approach

- Carries out raster (or gridded) aggregation of data to show hotspots.
- Methods to statistically analyse the outputs to create focus areas across the local authority are also detailed.
- The method requires a spatial analyst licence for ArcMap – which maybe limited.
- Main difference to off-gas grid analysis is the use of an additional GIS analysis tool (inverse density weighting) as an intermediate step.
- Weighted analysis carried out for energy efficiency factors which can also integrate fuel poverty.
- This follows a similar logic to the Baseline Tool discussed in the previous session and provides the same flexibility.
- Can also look at tenure and other energy efficiency measures.

Indicator Attributes	Criteria	Data Source & Column	Weighting (if only analysing energy efficiency)	Weighting (if also analysing fuel poverty)
Loft insulation	Probability of loft insulation <100mm	Home Analytics - Loft insulation: 0-99mm	0.333	0.166
Single glazed windows	Binary – Single Glazing	Home Analytics - Glazing type	0.333	0.166
Wall insulation (all construction types)	Probability of walls being uninsulated	Home Analytics - Probability of wall being uninsulated	0.333	0.166
Fuel Poverty	Probability of fuel poverty	Home Analytics – Probability of fuel poverty (fuel bill >10% of income after housing)	-	0.5 or 0 (0.5 for selected fuel poverty Indicator)
Extreme Fuel Poverty	Probability of extreme fuel poverty	Home Analytics – Probability of extreme fuel poverty (fuel bill >20% of income after housing)	-	0.5 or 0 (0.5 for selected fuel poverty Indicator)

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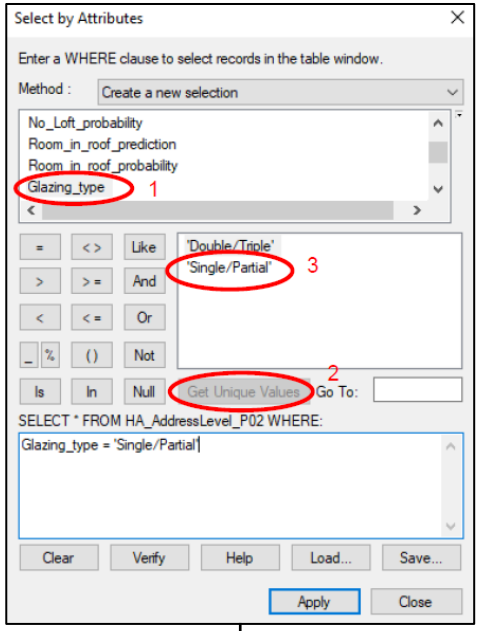
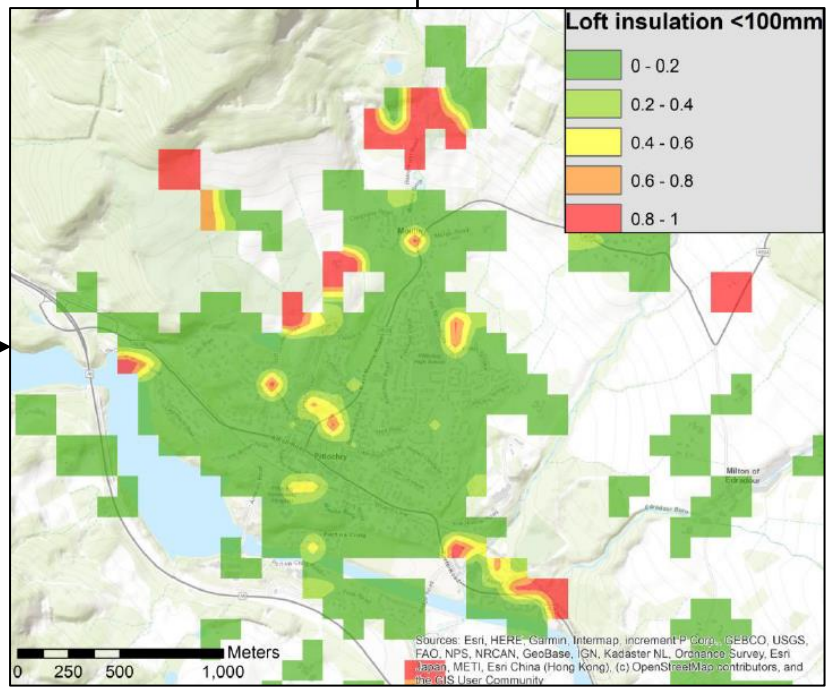
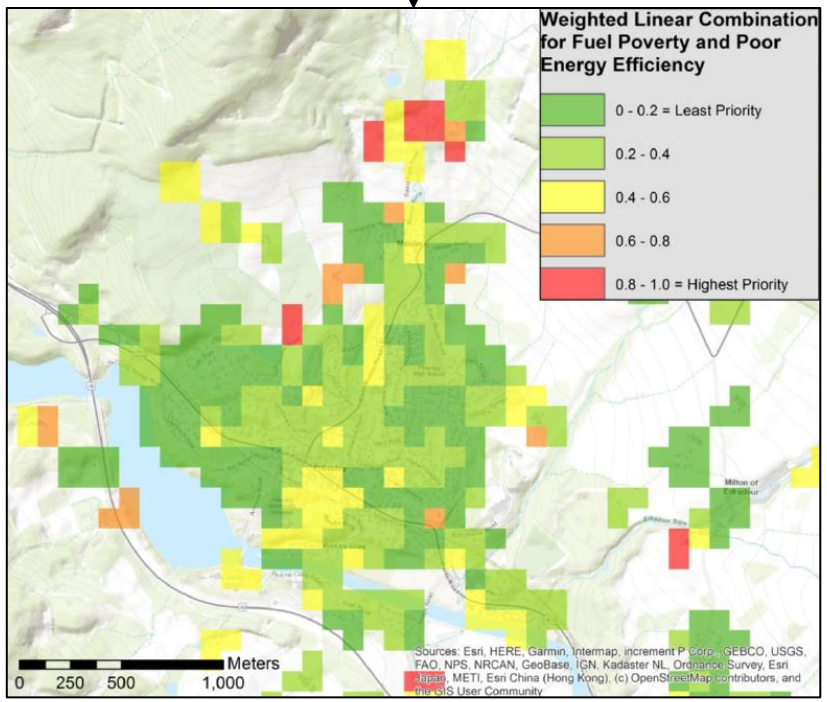
Poor building energy efficiency and fuel poverty – GIS approach



$$Standardised\ Score = \frac{Raw\ Score - Minimum\ Raw\ Score}{Maximum\ Raw\ Score - Minimum\ Raw\ Score}$$





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Mixed-tenure, mixed-use and historic buildings - overview

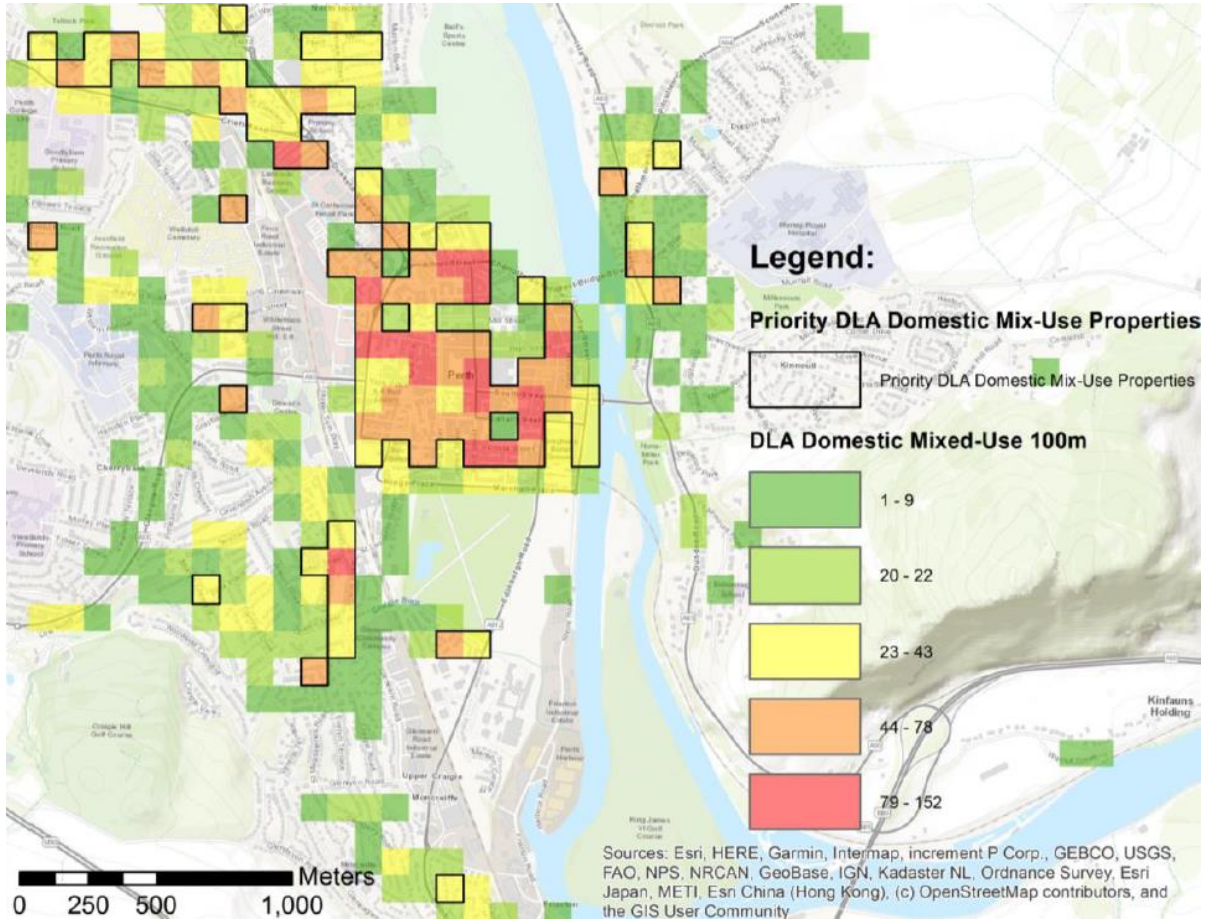
LHEES Stage 4: Generation of Initial Delivery Areas

Secondary Outcomes: Mixed-tenure, mixed-use and historic buildings

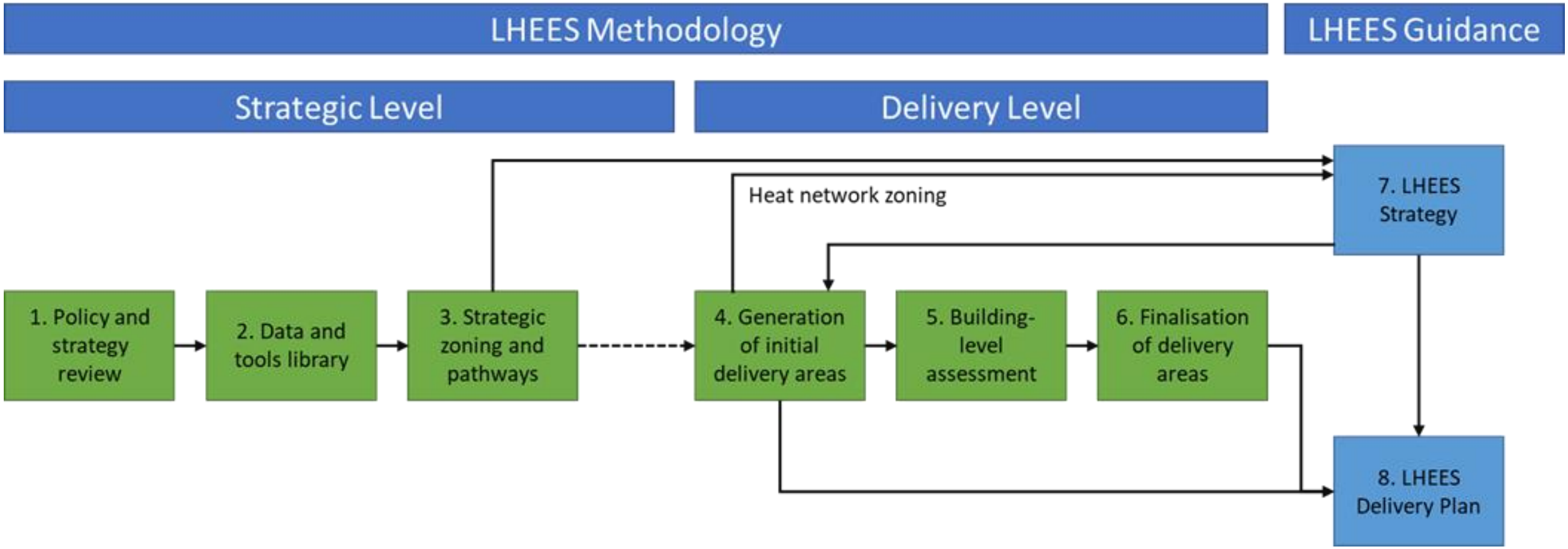
Detail Practitioner Guidance

Mixed-tenure, mixed-use and historic buildings approach

- Most basic analysis – carries out similar raster analysis as other priorities (focusing on counts).
- Cleans Home Analytics in a similar way to the energy efficiency analysis for the domestic base data.
- Non-domestic data is sourced by saving NonDomestic_MTMU and Mixed_MTMU tabs from the Baseline Tool.
- Outputs, particularly focus areas, can be useful



LHEES Stages 5, 6 and 8



National Assessment Outputs - Reminder

- Stage 3 outputs
  - Populated Baseline Tool
  - GIS visualisations of Strategic Zones (provided as maps)

- Stage 4 outputs
  - GIS shapefiles of Delivery Areas

- Local authority report with detail on:
  - the outputs,
  - where these take you and
  - how they can be used.

Overview of Ongoing Support

- Regular forum for local authorities and their contractors to share knowledge and experience relating to LHEES. Email LHEES@gov.scot.
  - Wed 3rd Nov 3-4:30 pm
  - Wed 1st Dec 3-4:30 pm
  - Thurs 13th Jan 2:30-4 pm
  - Thurs 10th Feb 2:30-4 pm
  - Wed 9th Mar 2:30-4 pm

- **Testing and Feedback template** shared, to collate ongoing feedback using a standard approach

- Zero Waste Scotland to provide semi-structured **Feedback Workshops** in Feb/Mar 2022 to collate feedback and experiences of using the LHEES Methodology

Overview of Ongoing Support

- Upcoming Capacity Building workshops from Zero Waste Scotland and Buro Happold
  - Workshop 1 – Thurs 28th October (14:00 to 16:00) – Stages 1, 2 and 3
  - Workshop 2 – Wed 10th November (14:00 to 16:00) – Stage 4, non-Heat Networks Priorities
  - Workshop 3 – Wed 24th November (14:00 to 16:00) – Stage 4, Heat Networks

- Follow-up separately with request for input / discussion on where additional capacity building support for LHEES would be of benefit

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LHEES Capacity Building Workshop 2

LHEES Stage 4 – Non-Heat Network priorities

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