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Littlebury Community Energy Project Community Energy Feasibility Study Findings

Send us your questions - **live**



Leave your questions on Post It notes
around the room.

Use the link below or scan QR code to
left to submit questions online:

<https://www.menti.com/almt9zjzcs41>

Littlebury Energy Project



FEASIBILITY STUDY

Kick-off, site visit and energy demand mapping



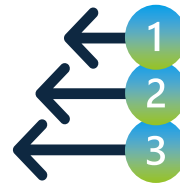
Review options for heat demand reduction



Appraisal of renewable options and energy infrastructure



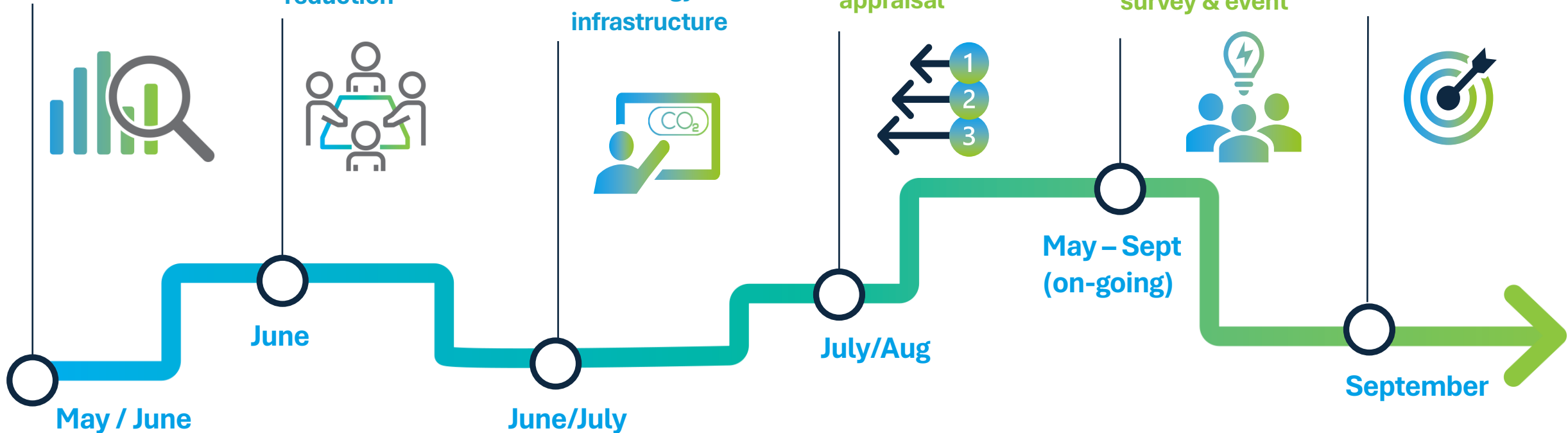
High-level financial appraisal



Community engagement activities – news, survey & event



Project report and final output



The Agenda



WHO WE ARE



Championing a sustainable future for all

- A purpose-led, not-for-profit sustainability consultancy
- Support businesses and organisations to transition to a net-zero carbon, circular, and sustainable future
- Work with partners to create homes, workplaces, and communities that enable sustainable living

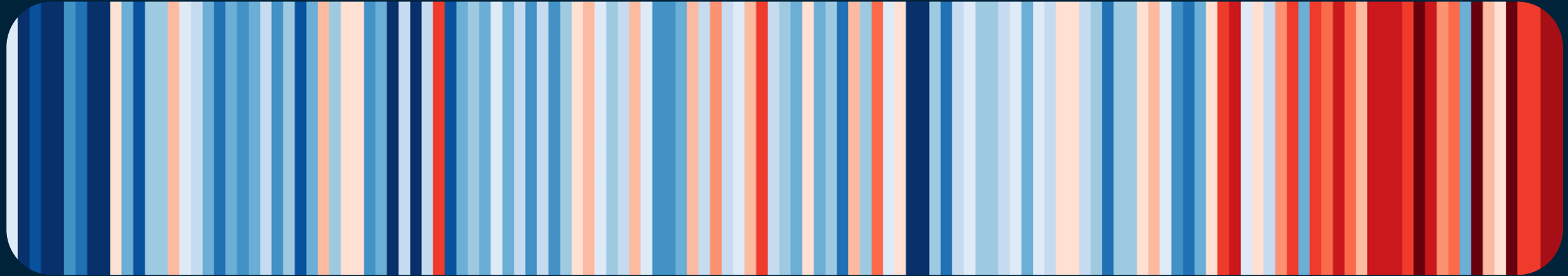


Award winning international renewable energy solutions provider

- Delivered first-of-a-kind rural heat network project in Cambridgeshire
- Local energy engineering specialists
- Capabilities spanning all potential decarbonisation options
- Passion for delivering local change

WHAT'S THE **BIG** PROBLEM?

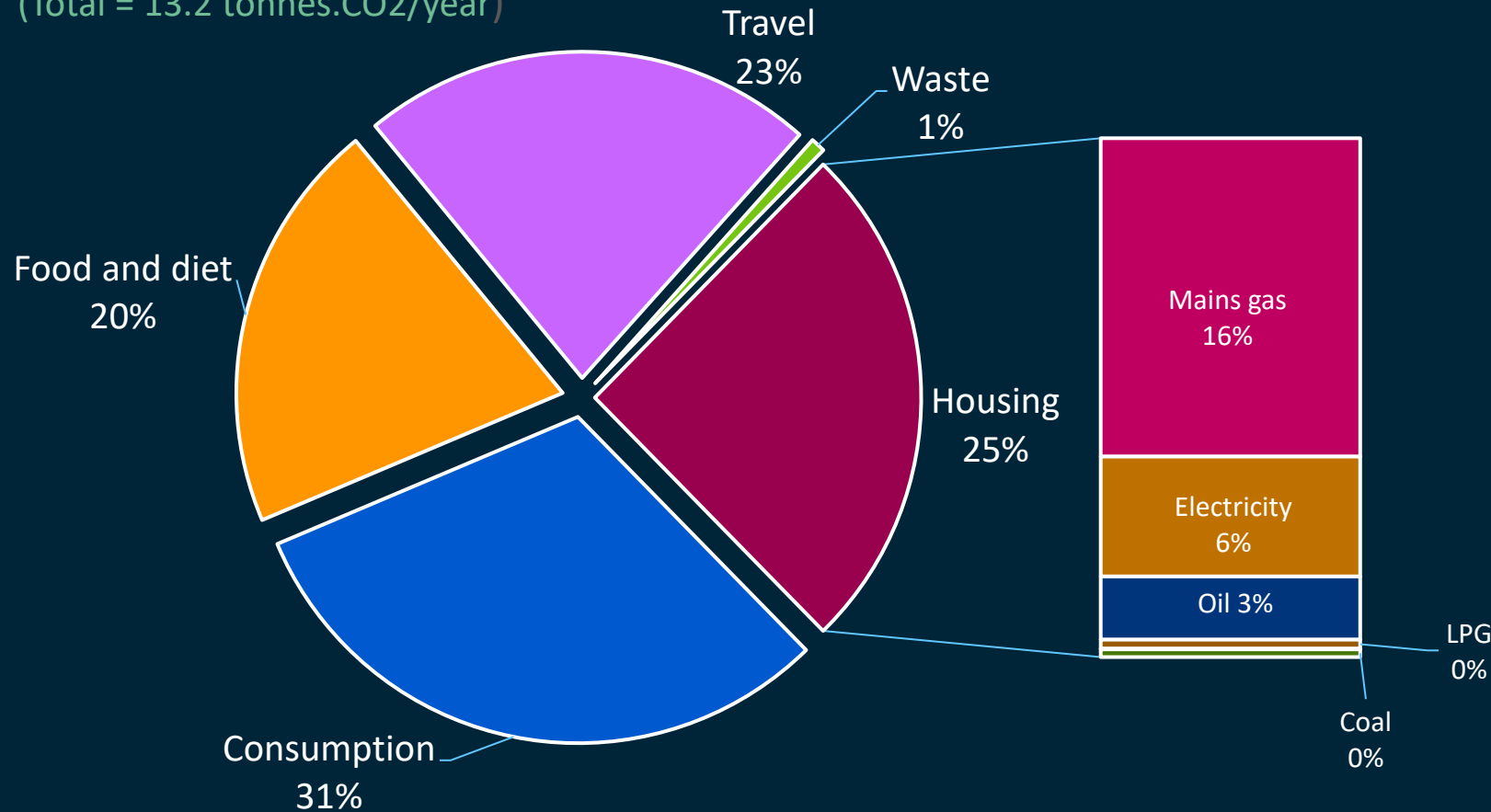
What's the big problem?



The challenge of heat decarbonisation

Carbon emissions – around 90% of UK homes are reliant on fossil fuel heating

Household emissions UK average - individual consumption basis
(Total = 13.2 tonnes.CO2/year)



206 g.CO₂/kWh –
average carbon content of
UK residential heating (2022)

100 g.CO₂/kWh –
average carbon content of
France residential heating
(2021)

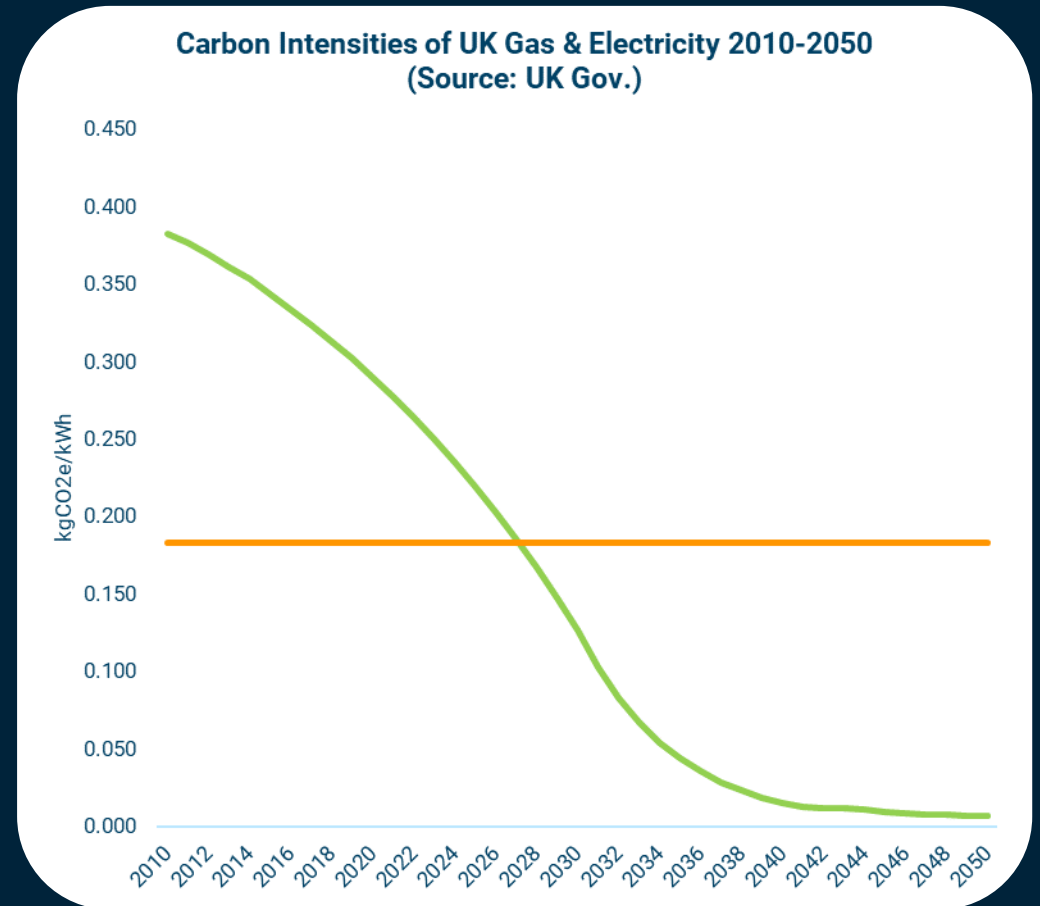
29 g.CO₂/kWh – average
carbon content of Swedish
residential heating (2021)

What's the big problem?

Mains-supplied **electricity is rapidly decarbonising**

The proportionate contribution that heating will play in a building's carbon footprint will **increase**

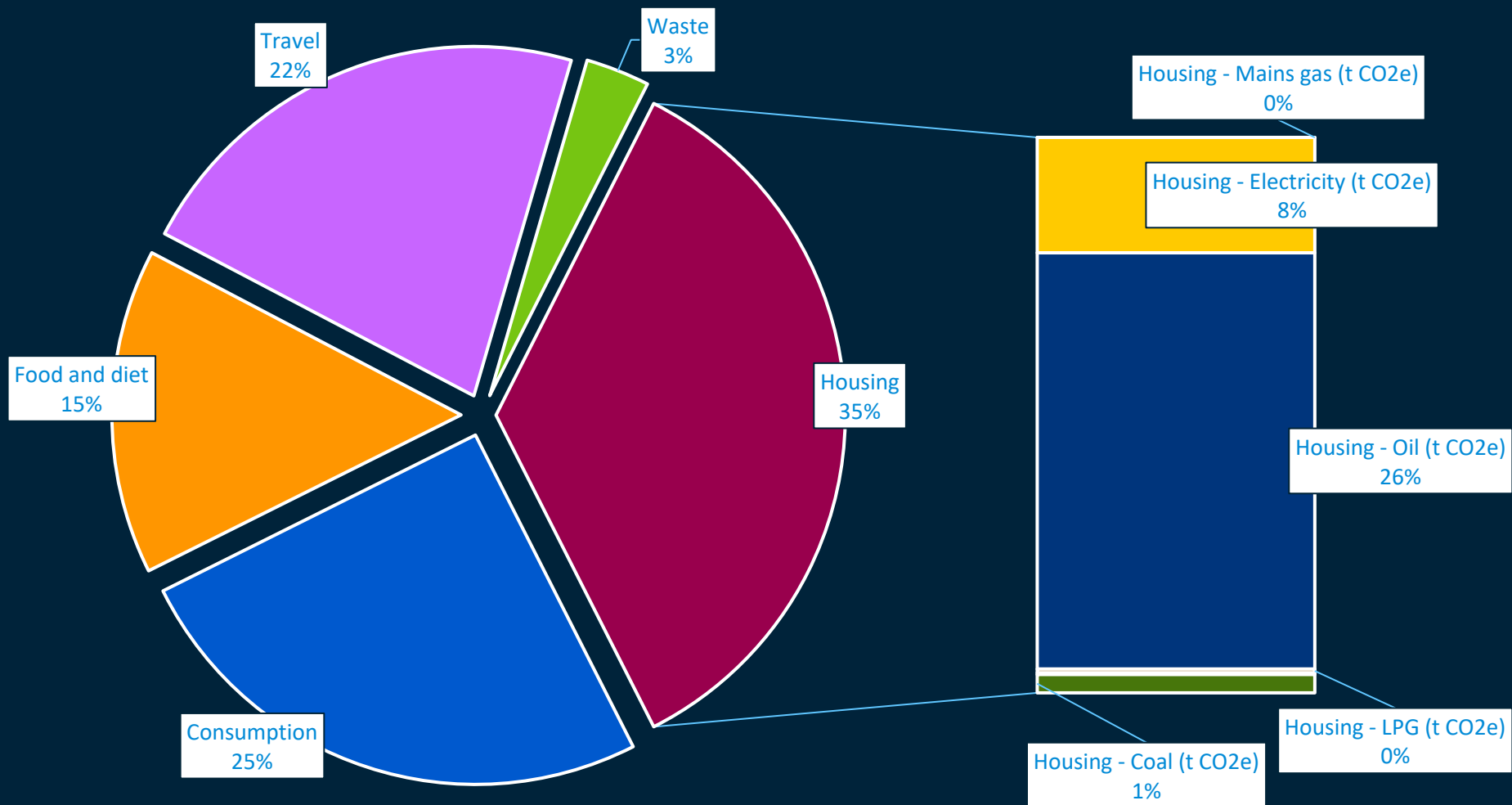
We need to stop burning things to heat our homes to mitigate global warming



WHAT IS **THE LOCAL** CHALLENGE?

Local emissions are around 50% higher than national averages

Littlebury emissions average- individual consumption basis (Total = 19.4 tonnes.CO2/year)



What's the local challenge?

There are many, including...



- Price Volatility
- Inconvenience of oil boilers
- Local air quality and smell
- Legislative pressure to remove Oil/LPG boilers (2035 currently)
- Decarbonising your home's heating is expensive and potentially disruptive

WHY LITTLEBURY?

Why Littlebury



Forward thinking –
community 'spirit'



Rural community -
environment /
conservation



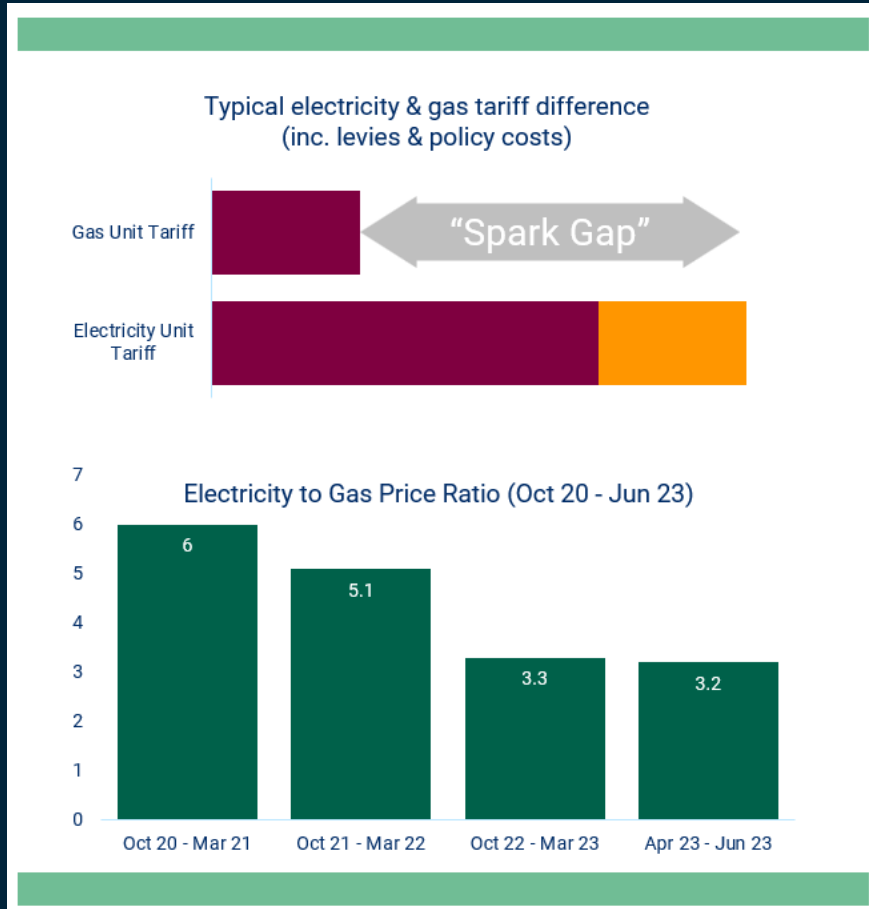
Space to do
"something different"

= Capability to decarbonise...

WHAT'S
OUR
CHALLENGE?

Our Challenge.

Decarbonising heat isn't easy!



- Fossil fuels are cheap (and subsidized!)
- Heat pumps are expensive
- Retrofitting can be complex
- Evolving technologies / design principles
- Evolving regulation and legislation
- Evolving grants / subsidies

OUR BRIEF

Our Brief

"to establish **technical and commercial viability** of solutions to **decarbonise heating** for residents of the village"



Cost to property
owners / residents



Grant eligibility /
investment case



Technical
feasibility



Carbon
Impact



Environmental
impact

THE DECARBONISATION OPTIONS

The Trilemma

What is the best available technique to decarbonise Littlebury?

**Centralised / Community
Renewable Energy**



VS

**De-centralised / Individual
Property Renewable Energy**



- ? CO₂ impact
- ? Economic impact
- ? Cost of heat
- ? Speed of execution
- ? Effort & inconvenience
- ? Environmental impact

The Trilemma

What is the best available technique to decarbonise Littlebury?

**Centralised / Community
Renewable Energy**



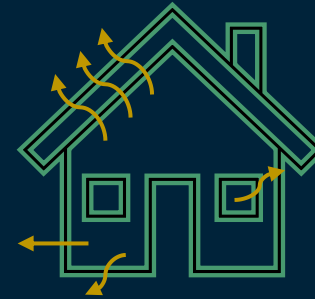
VS

**De-centralised / Individual
Property Renewable Energy**



AND?

**Energy Demand
Reduction**



The Trilemma

Centralised / Community Renewable Energy



Why?

- ✓ **Remote and contained**
- ✓ **Grant funding**
- ✓ **Minimal change to property**
- ✓ **Responsibility outsourced**
- ✓ **Rationalised design**
- ✓ **Resilience**
- ✓ **Power source options**
- ✓ **Decarbonise 'all' in one go**

Why not?

- ! **High capital cost**
- ! **Complexity**
- ! **Invasiveness of construction phase**
- ! **Loss of space**
- ! **Incubation time**
- ! **Uptake risk**

The Trilemma

Decentralised / Individual Property Renewable Energy



Why?

- ✓ Tailored solutions
- ✓ Elective
- ✓ Speed to execute
- ✓ Grant funding
- ✓ Comparative low complexity
- ✓ Contained within dwelling
- ✓ Deep decarbonisation

Why not?

- ! Environmental impact
- ! Ownership responsibility
- ! Owner effort / resource intensity
- ! Fragmented decarbonization
- ! Potential necessity for wider building improvements

The Trilemma

Energy Demand Reduction



Why?

- ✓ Reduce heating cost
- ✓ Improve thermal comfort
- ✓ Improve property value
- ✓ Improve 'low carbon heating system' efficiency

Why not?

- ! Limited carbon impact
- ! Invasive / disruptive
- ! Economics

THE ANALYSIS

The Analysis (Findings thus far)



Data
Acquisition &
Analysis



Site Surveys



Stakeholder
Engagement



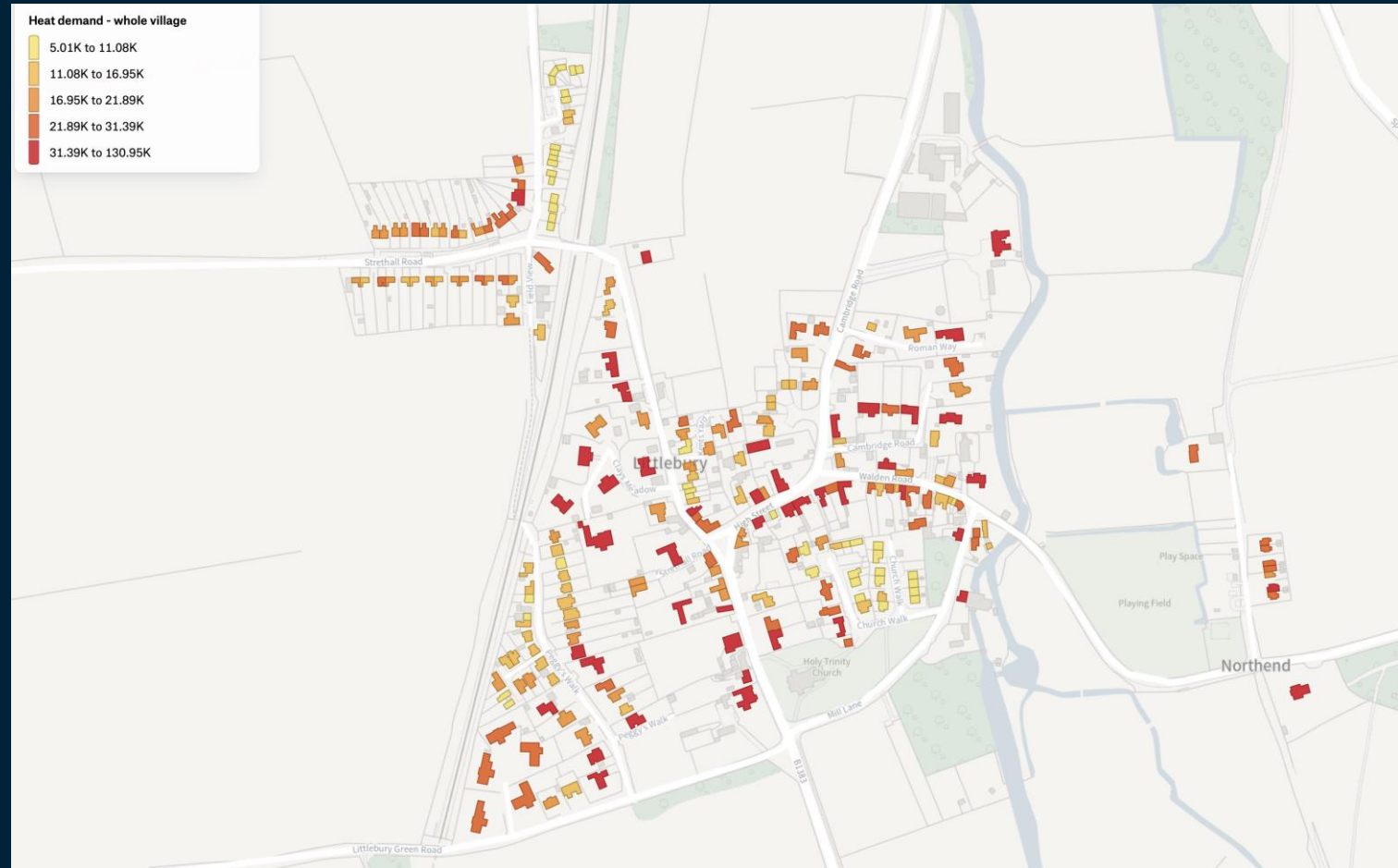
Qualitative
Optioneering



Quantitative
Simulation
Modelling

Village Heat Mapping

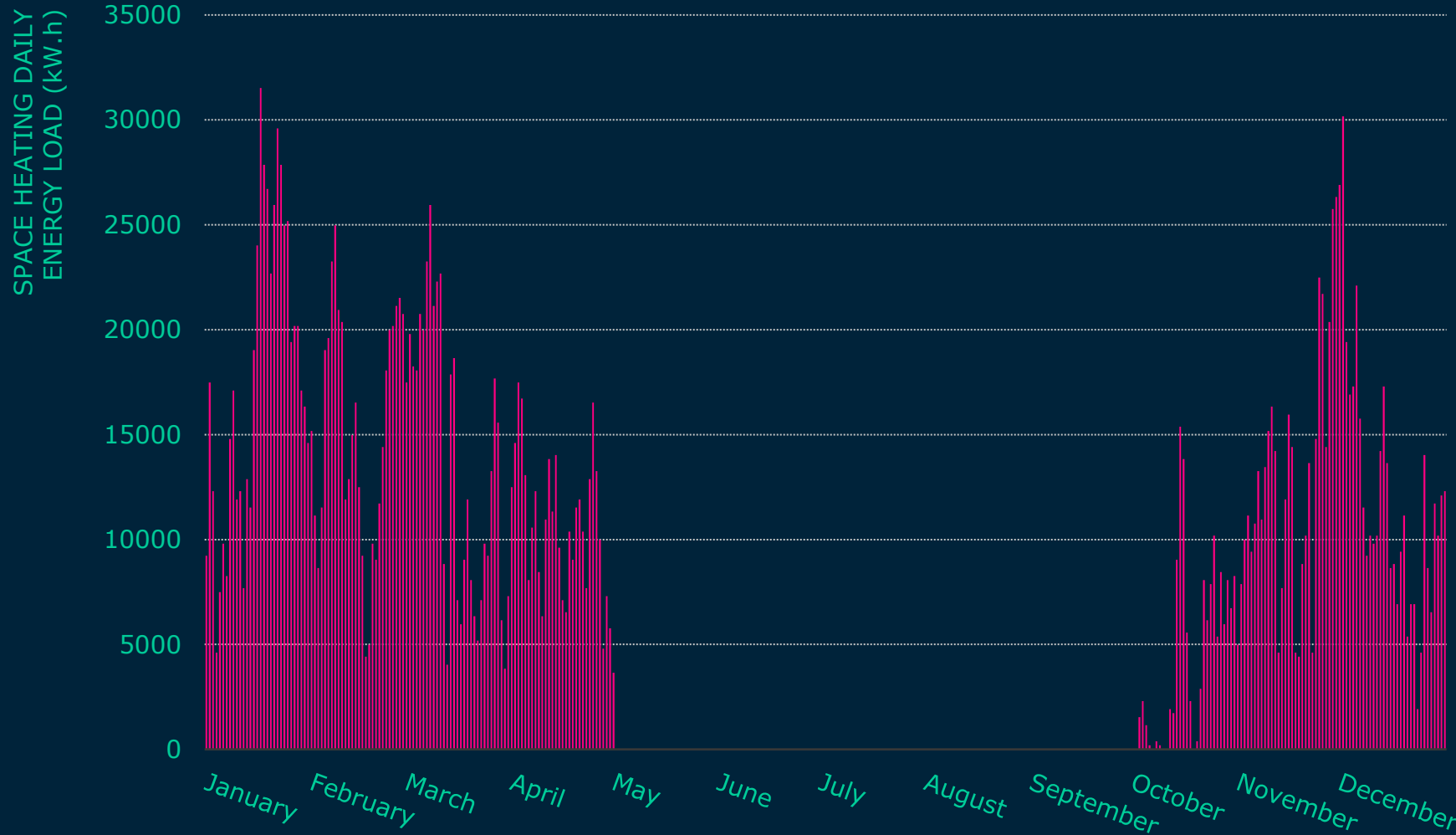
- No properties in village on gas network (no metering to rely on)
- Estimates drawn from survey data on cost of heat – so we have a wide error margin
- However – heating intensities by property age match previous data we have collected from metered data in the south of UK.
- No SMART meter data, so we have used estimates of time-usage behaviour....



Synthetic annual heating profile

Littlebury space heating daily energy load

Date: 15/07/2024



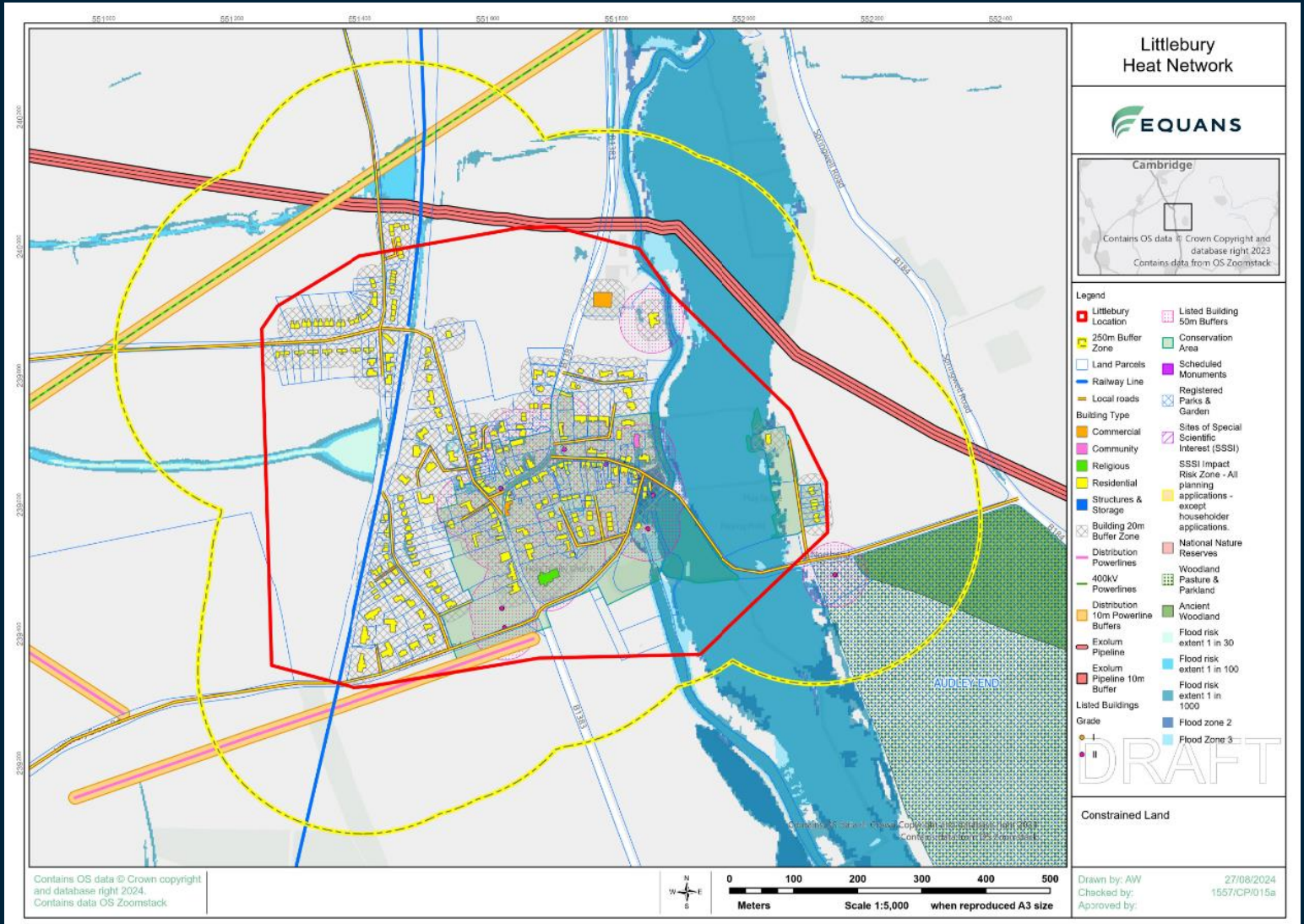
Bioregional



EQUANS

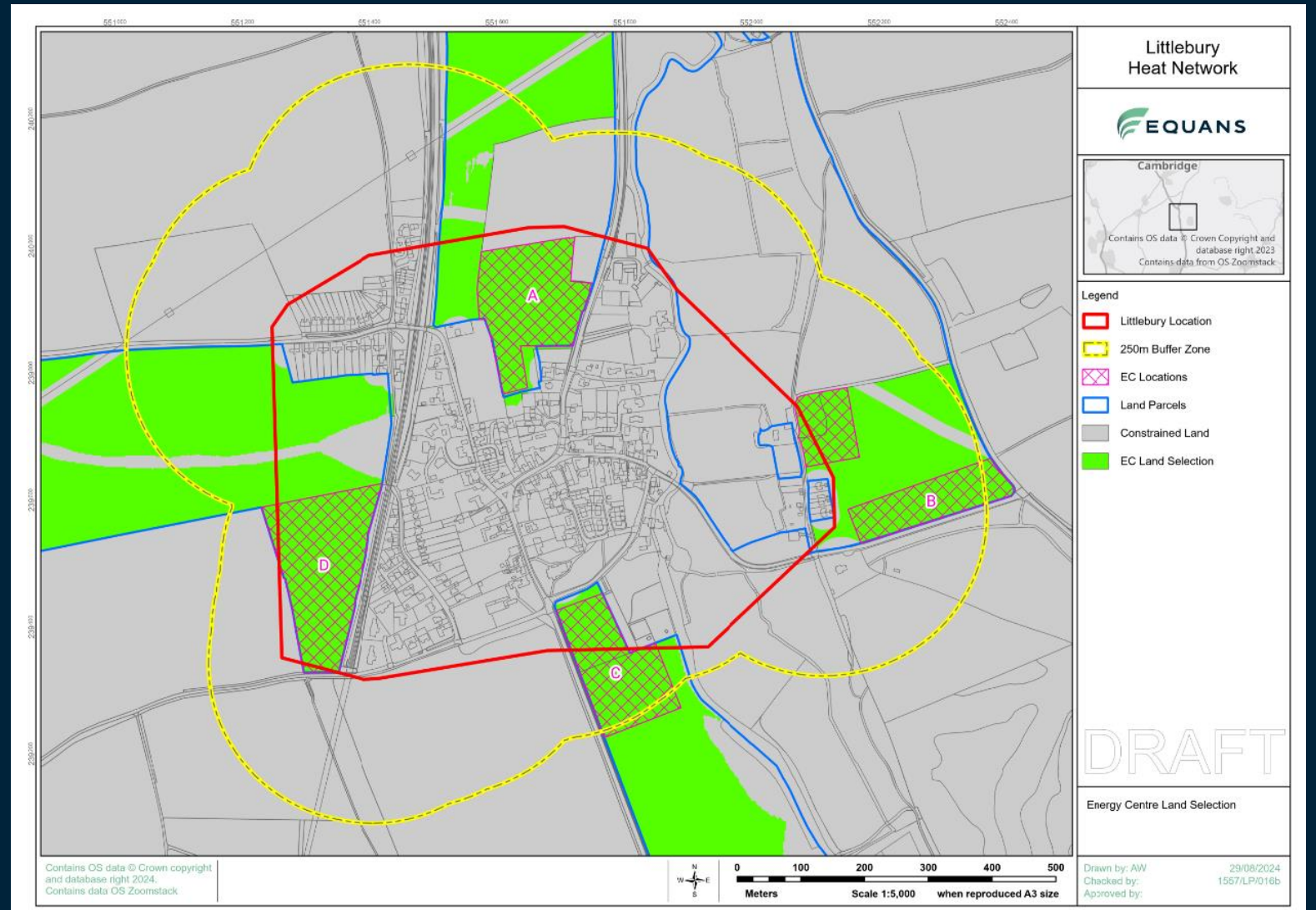
The Analysis (Findings thus far)

- Constraints map
 - Flood risk
 - Scheduled monuments
 - Conservation area
 - Woodland
 - Registered parks & gardens
 - Oil pipeline
 - Etc...
- Purpose is to identify areas with **NO CONSTRAINTS**



The Analysis (Findings thus far)

- Four potential locations identified A-D
- Informed by 'Constraints' mapping
- Approximate location of Energy Centre – not all of hatched area shown



The Analysis (Findings thus far)



Qualitative Optioneering

- Qualitative options appraisal
- Subjective only but useful to compare against set criteria
- Sites A & C clear favourites
- Sites B & D further away and some 'red flags'

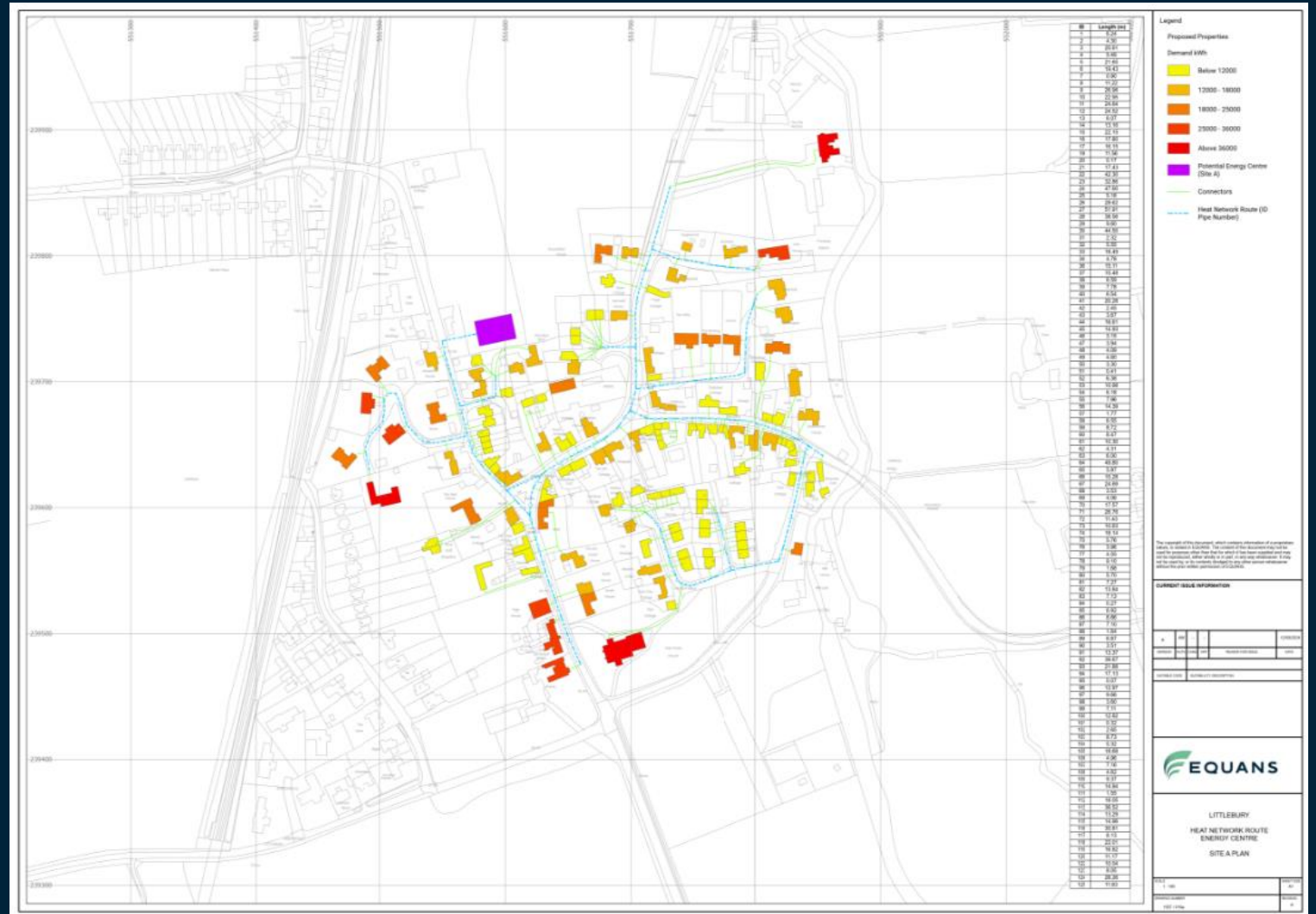
(✓✓✓✓ preferred site / ✓ least preferred site)

LITTEBURY POTENTIAL ENERGY CENTRE LOCATIONS – DECISION MATRIX

	Site A 1	Site B 3	Site C 2	Site D 4
Distance from centre of village	✓✓✓✓	✓✓	✓✓✓	✓
Land suitable for development	✓✓✓✓	✓✓✓	✓✓	✓
Visual impact on village	✓✓	✓	✓✓✓✓	✓✓✓
Potential Flood Risk	✓✓✓✓	✓✓✓	✓	✓✓
Proximity to Protected Land	✓✓✓✓	✓	✓✓✓	✓✓

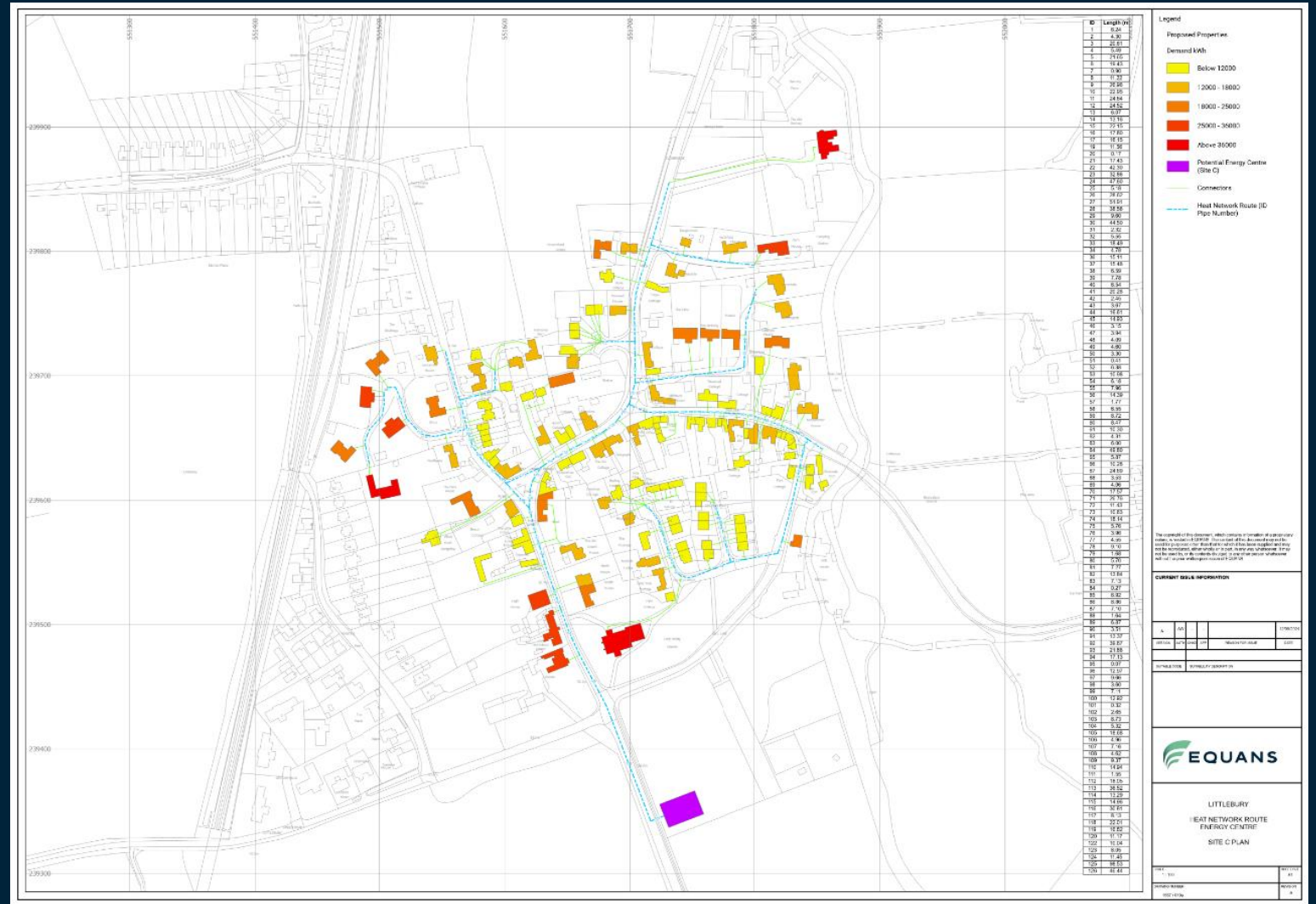
The Analysis (Findings thus far)

- Possible Heat Network layout (Site A) Total network length: **1.57km**
- Serves buildings not at village extremities and those harder to provide individual solution for
- **Indicative** only (subject to further detailed feasibility)



The Analysis (Findings thus far)

- Alternative Energy Centre location to the south (Site C)
- Slightly longer total network length: **1.69km**



The Analysis – Electrification of heat

- Heat – pumps (300%+ efficiency)
 - Air Source
 - Ground Source
 - Water source
 - Waste Heat
- Direct Electrical heating (100% efficiency)

The Analysis (Findings thus far)



Qualitative Optioneering

- **Heat Sources** – Subjective Qualitative Appraisal
- ASHP first or second choice against all parameters
- Elec Boilers ranked 2nd and has low capital costs but highest energy cost
- Ground Source variants would have high capex, land requirements and complexity
- River Source potentially feasible but high cost, performance risk and complexity

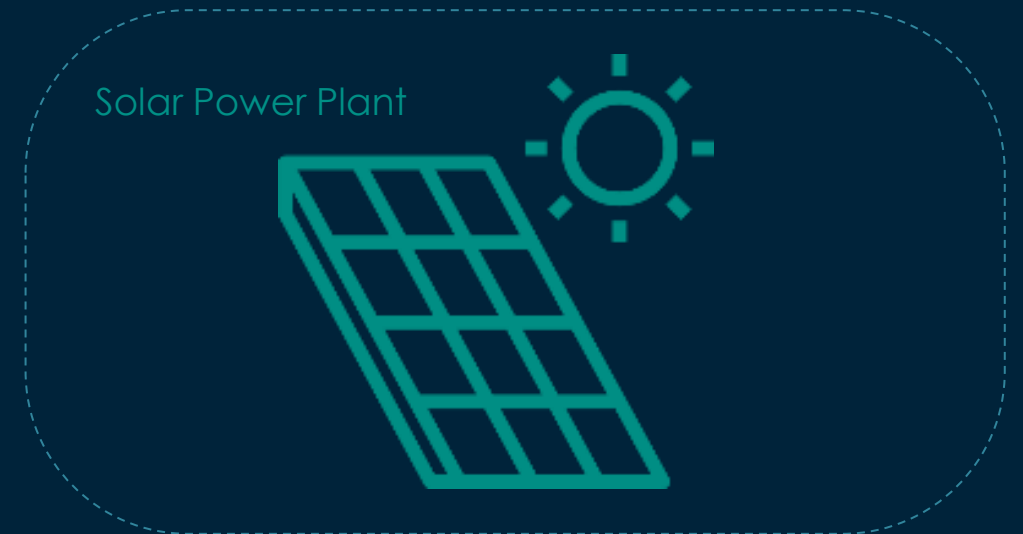
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LITTEBURY POTENTIAL HEAT SOURCES – DECISION MATRIX

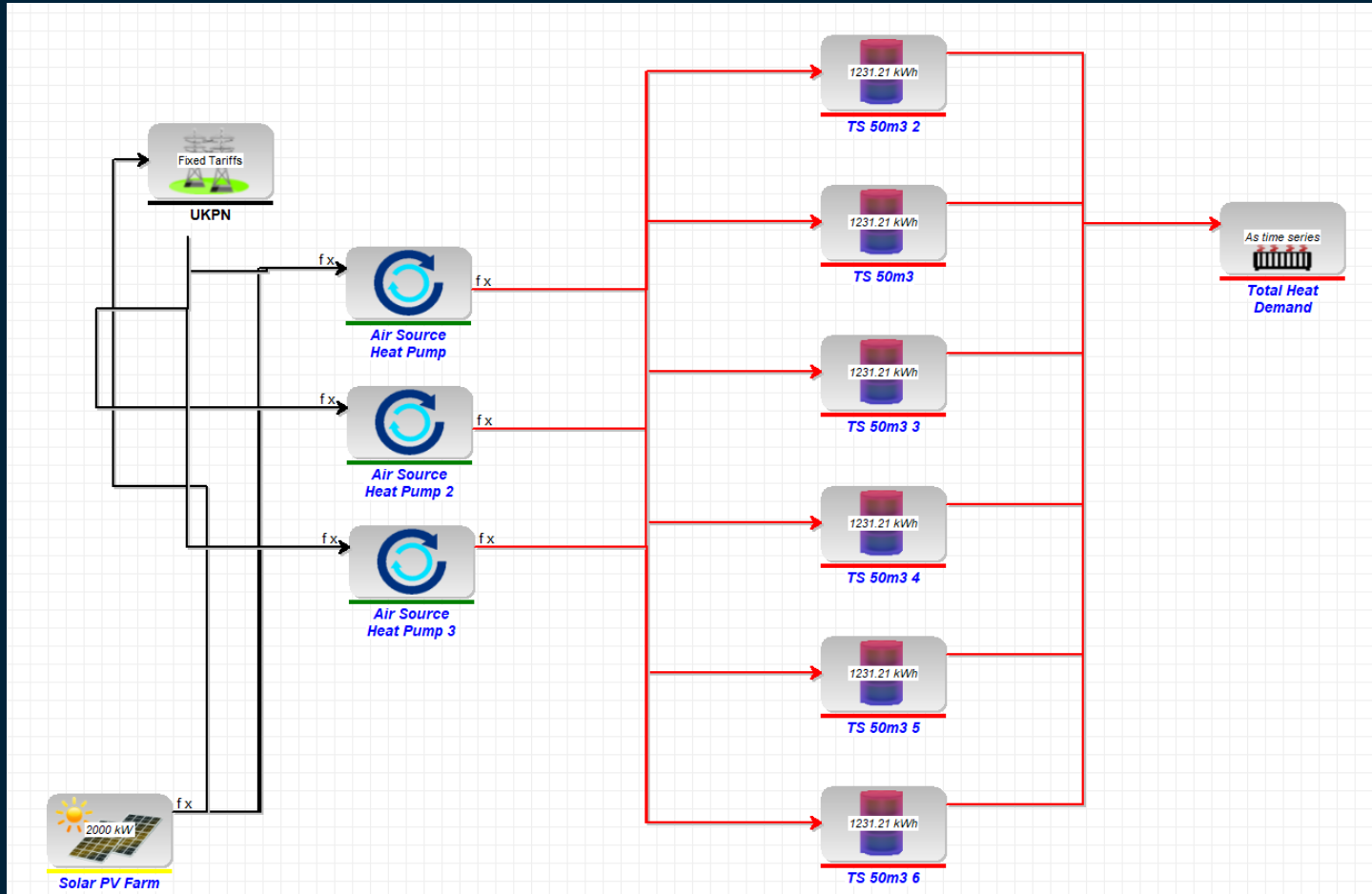
	ASHP	CL GSHP	OL GSHP	Elec. Blr	RSHP
	7	18	22	12	16
Benefits / Highlights	✓✓✓✓	✓✓✓✓✓	✓✓	✓	✓✓✓
Interdependencies	✓✓✓✓✓	✓	✓✓	✓✓✓✓	✓✓✓
Suitability to location	✓✓✓✓✓	✓✓	✓	✓✓✓✓	✓✓✓
Technical Risks	✓✓✓✓✓	✓✓✓	✓	✓✓✓✓	✓✓
CAPEX / Economics	✓✓✓✓	✓	✓✓	✓✓✓✓✓	✓✓✓

The Analysis (Local electrical generation)

- Grid source electricity can be expensive (and may become more so)
- Local electrical generation can lower costs, lower carbon and provide security
- Local wind and solar has been explored
- Significant impact on project economics (and customer cost of heat)



The Analysis (Findings thus far)



Quantitative Simulation Modelling

- EnergyPRO simulation of village (left)
- Variety of options assessed and optimised.
- Combination of air source, thermal storage and some direct electric resilience shown to be most effective

Domestic heat pumps – at home level

- installed in approximately 40,000 properties in 2024 so far!
- average installation cost is around £12,800 (excl. government £7,500 grant)
- Average heat-pump COP's are now 2.9 (significant improvement on older models)
- High temperature and low temperature heat-pumps are now on the market, but higher temperature heat pumps have much lower COPs (so more expensive to run)
- BUT – requires space and a system which can take it

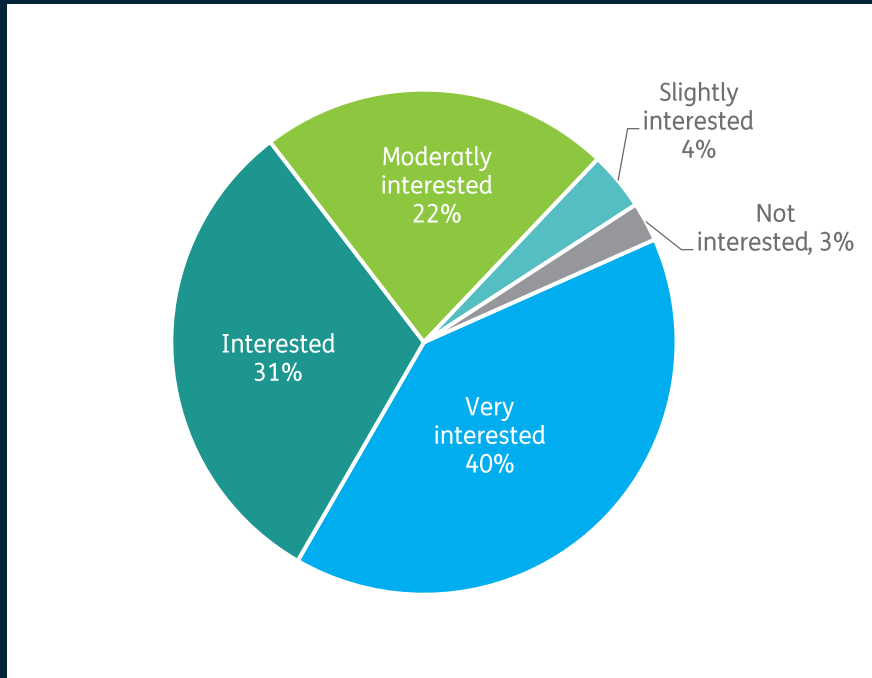


WHERE DO WE GO FROM HERE?

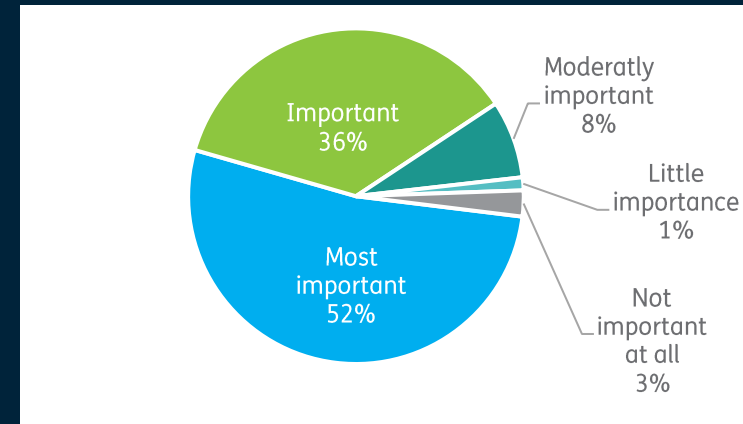
Community feedback

Littlebury resident motivations for the project – key findings

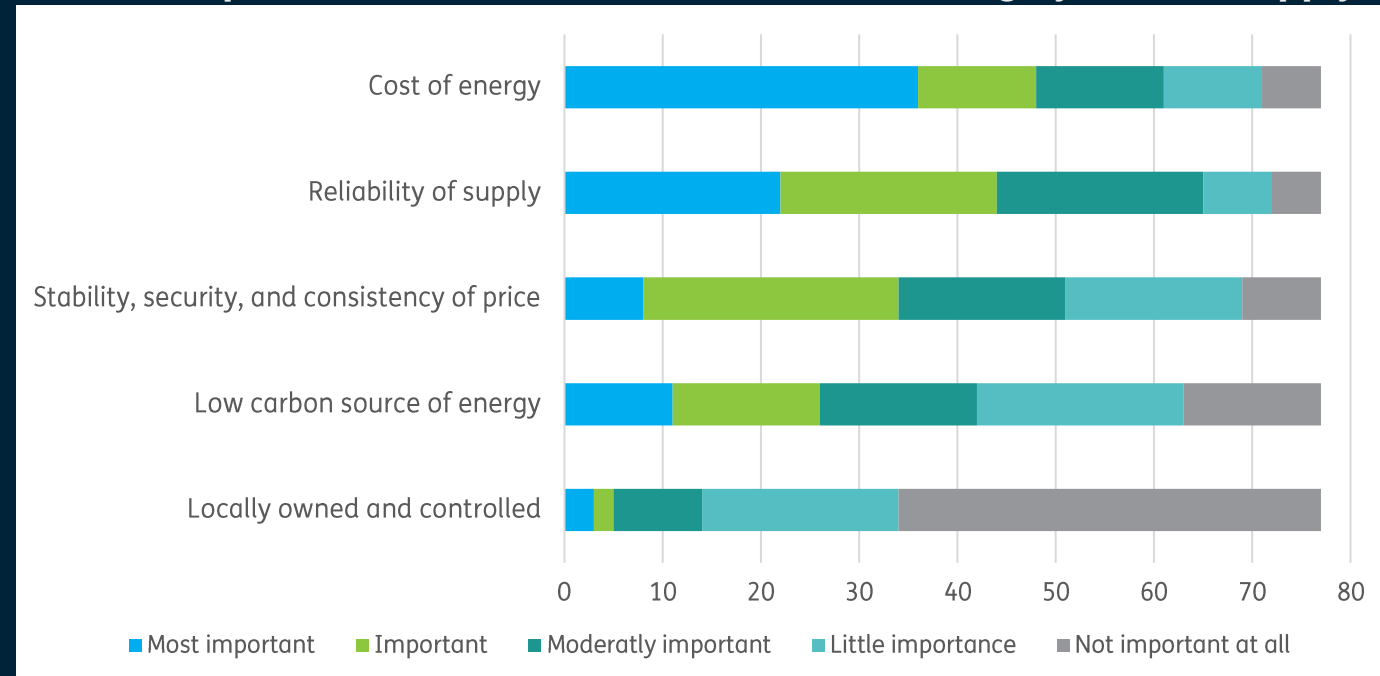
Interest in exploring a community-led low/zero carbon heating system:



Importance of reducing personal carbon footprint:



Ranked importance of five factors related to heating system or supply:



What do we need from you?

- Sign up to receive project updates
- Read the study when published:
<https://lep.swce.co.uk/>
- Share accurate information about the project, become an advocate!
Ask questions to the project team to get clarity: contact@lep.org.uk or 01799 252501
- Join the LEP working group
Your support enables a village-wide solution to be found

Q & A

NORTH ANGLE **SOLAR FARM**

Brief Overview

Overview:

- **Developed in parallel to Swaffham Prior Heat Network**
- **An 'expansion' to an existing 12MWp solar farm that we delivered in 2016**
- **A 'conventional' solar farm, optimised for long-term revenue generation**
- **Enhanced biodiversity net gain and community orchard – exemplar project**

Key Technical / Development Challenges:

- **Electricity Network Connection**
- **Archaeology and Ecology**
- **Covid 19 Pandemic, BREXIT, Ukraine / Russia Conflict, Suez Canal...**
- **Winter.**