

# Community Heat Development Unit

Project Progress Update



# Shareenergy

**A co-operative, started in 2011**

**Now 18 employees, running the Big Solar Co-op** (1MW and counting!)

**Around 100 societies started**

**Financial reporting for around 40 BenComs and CBS's**

**A consulting team, doing feasibility studies for CEF**



# Why?

- Multiple CEF feasibility studies, few moving past feasibility
- Locations often unsuitable
- Lack of clarity about how the projects will be financed
- An attempt to get domestic housing added to schemes which are mostly ignored in policy terms

# Objectives

- Help kick start some successful community heat networks
- Identify realistic locations
- Describe parameters for success
- Create a template business plan

# Key Network Features

- Large ASHP, On Gas areas
- Wind turbines (to reduce electricity costs)
- No on-site offtaker assumed (but this would improve finances)
- 10% of heat to be provided by hydrocarbons (/ constrained wind?)
- Large thermal storage tanks
- Focus on heating domestic buildings... enabled by non-domestic anchor loads

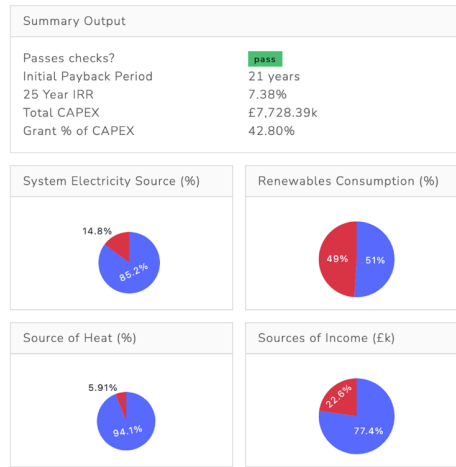
This doesn't preclude GSHP or WSHP, but helps keep the search wide.

Off-gas areas are typically not dense and have no significant anchor loads

# Nationwide Site Search

How to find the most feasible sites, going from this:

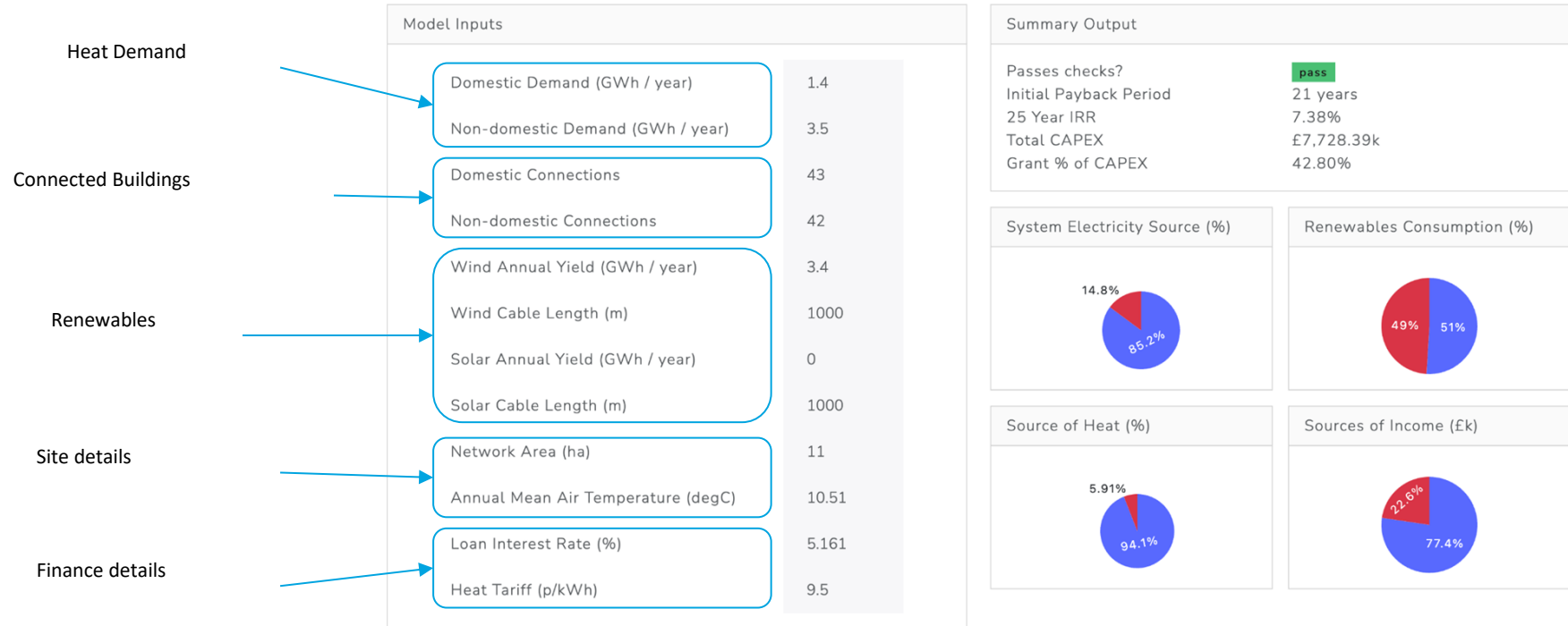
Model Inputs	
Domestic Demand (GWh / year)	1.4
Non-domestic Demand (GWh / year)	3.5
Domestic Connections	43
Non-domestic Connections	42
Wind Annual Yield (GWh / year)	3.4
Wind Cable Length (m)	1000
Solar Annual Yield (GWh / year)	0
Solar Cable Length (m)	1000
Network Area (ha)	11
Annual Mean Air Temperature (degC)	10.51
Loan Interest Rate (%)	5.161
Heat Tariff (p/kWh)	9.5



To this:



# Techno-Economic Screening Model



...now published on our website

# Techno-Economic Screening Model

## Hourly profiles:

- Domestic and non-domestic demand profiles
- Solar and wind generation profiles
- Air temperature profiles
- COP profile

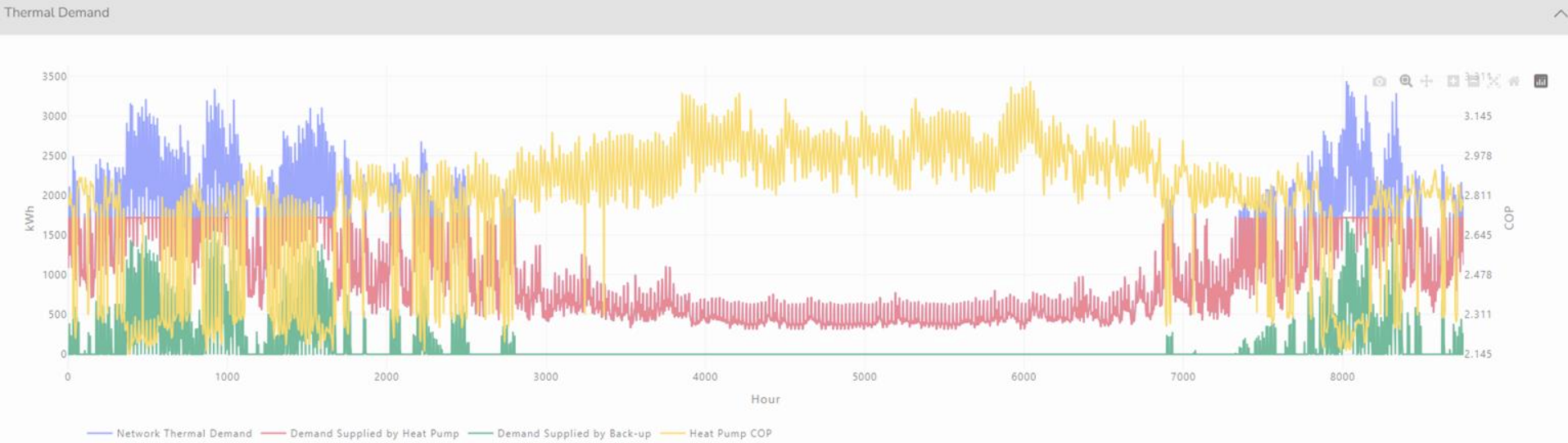
## Cost estimates:

- Pipework and trenching
- Network length estimation
- Heat pumps and network pumps
- Building connections
- Renewables and grid connection
- Thermal storage (modelled using PyLESA)

# Techno-Economic Screening Model

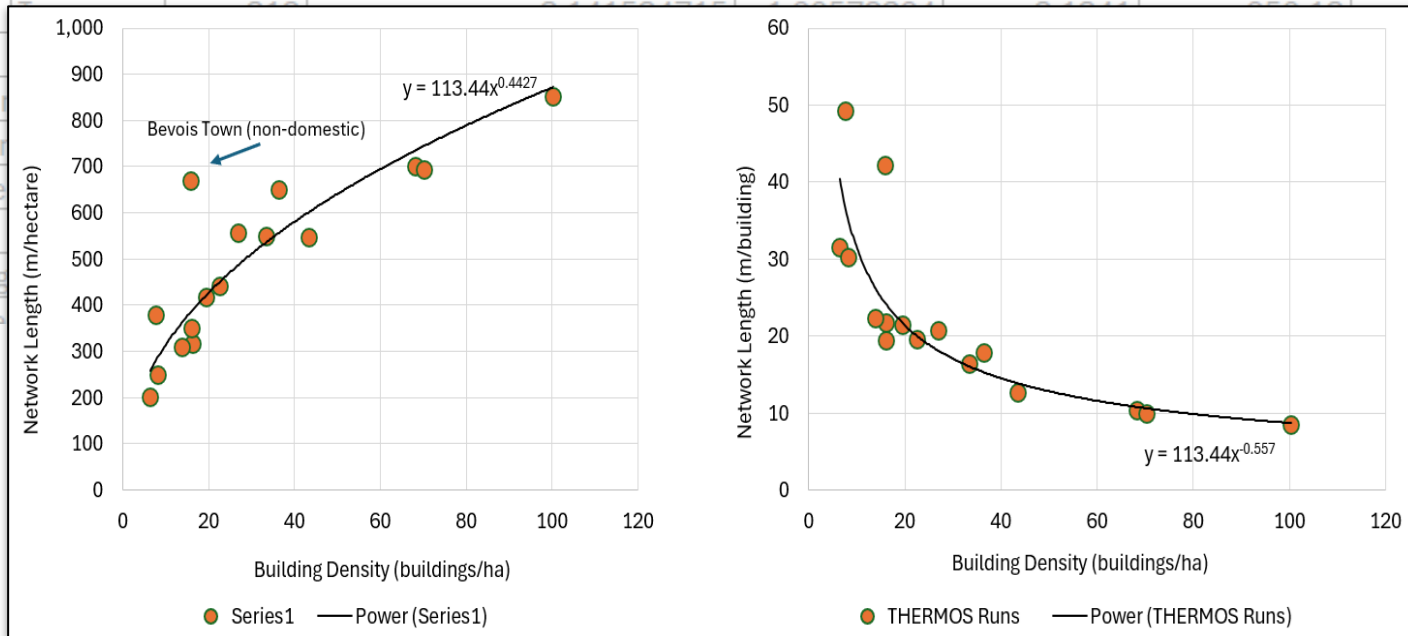
Examples of modelling work:

- Wind and solar generation profiles
- Aggregated = less peaky



# Techno-Economic Screening Model

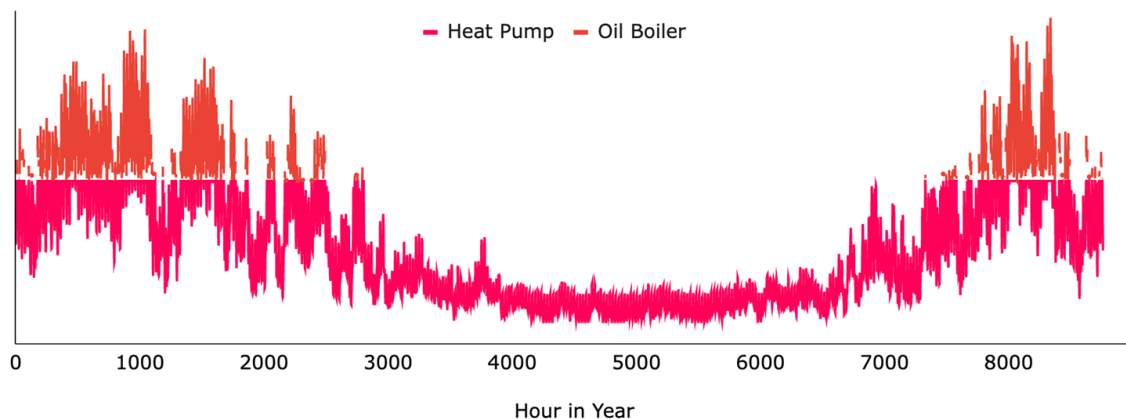
Project	Type	Buildings	Thermos Demand (GWh/year)	Length (km)	Area (ha)	Length/ha (m)	Density (building / ha)
Brassington	Village	271	4.19	5.26	16.69	315.43	16.24
Cov1900-29	Terrace	613	4.99	6.30	8.98	700.90	68.23
FlorencePark	Terrace	553	4.992520655	9.03990901	16.4835	548.42	33.55
Harehills							100.28
Manchester							70.35
Southampton							6.39
Bevois Town of							15.91
BishopsCastle							8.22
Cramlington							16.08
Old Humshaug							7.68
Rose Hill 24 Fa							26.11



# Techno-Economic Screening Model

Examples of modelling work:

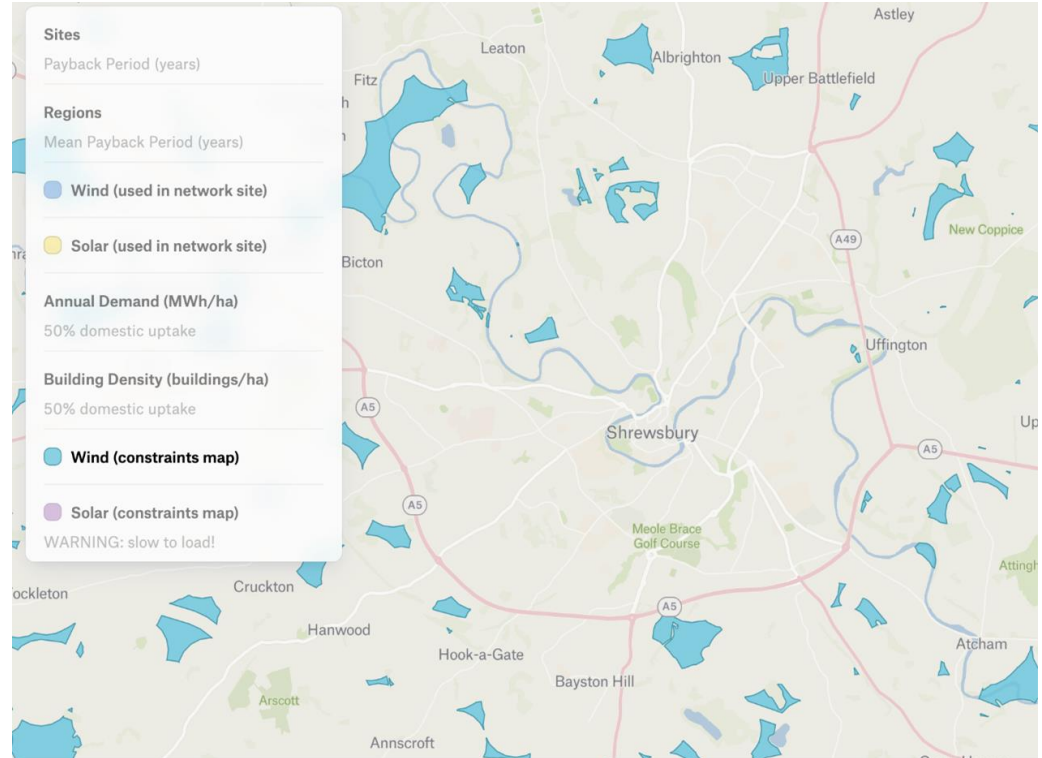
- Heat demand profiles
- Domestic - mix of archetypes in 200 house network - PyLESA
- Non-domestic - mix of building use types e.g. school / swimming pool / offices - nPro and gas usage data



# Nationwide Site Search

## Wind constraints mapping:

- Filter based on land use (agri, protected areas etc), buffers for building types, roads...
- Annual energy yield using Global Wind Atlas capacity factors
- Number of 1MW turbines estimated (max of 3)



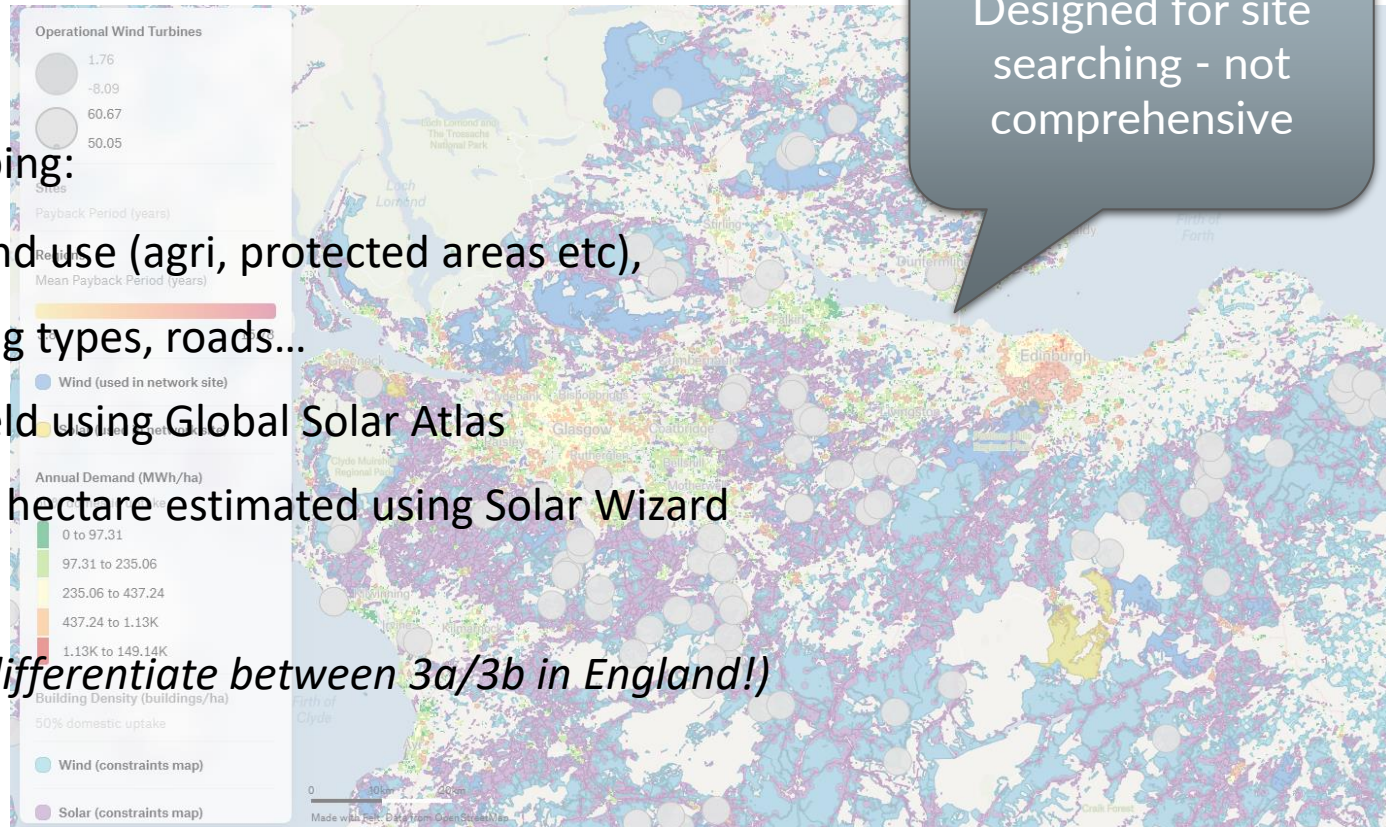
<https://communityheat.org.uk/interactive-map/>

# Overview of Progress - mapping

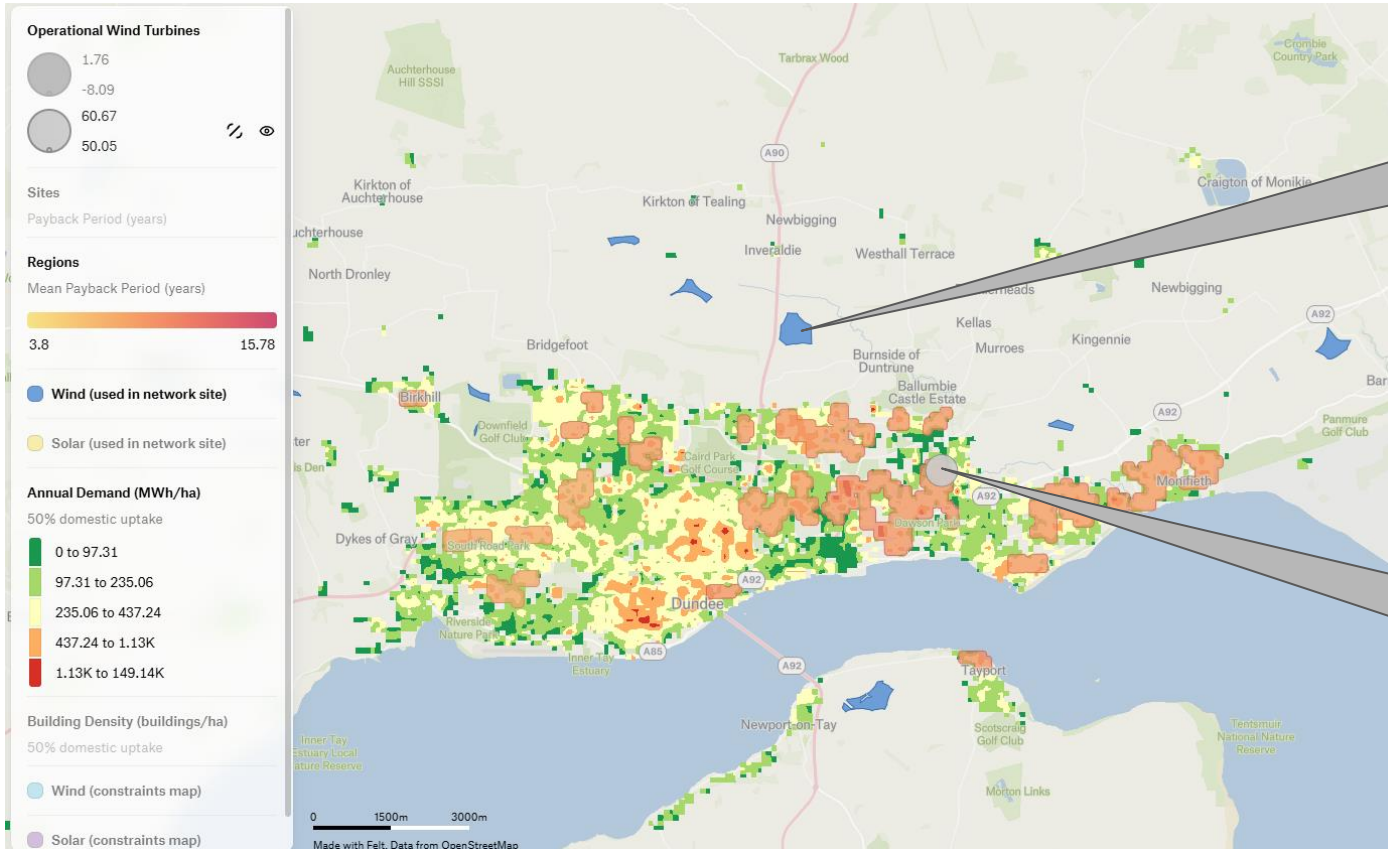
Designed for site searching - not comprehensive

## Solar constraints mapping:

- Filter based on land use (agri, protected areas etc),
  - Buffers for building types, roads...
  - Annual energy yield using Global Solar Atlas
  - Installed kWp per hectare estimated using Solar Wizard
  - Max 3MW array
- (missing data to differentiate between 3a/3b in England!)*



# Overview of Progress - mapping renewables



Untapped wind resource

Operational wind turbine

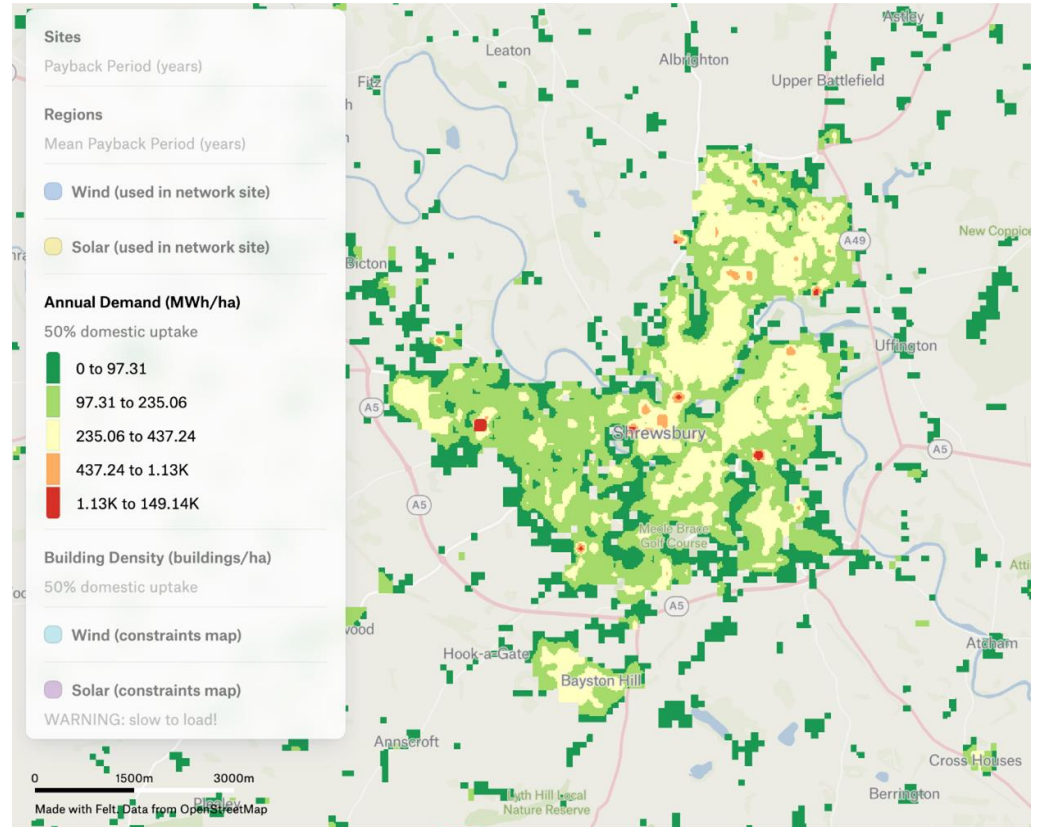
<https://communityheat.org.uk/interactive-map/>



# Mapping heat

Heat demand:

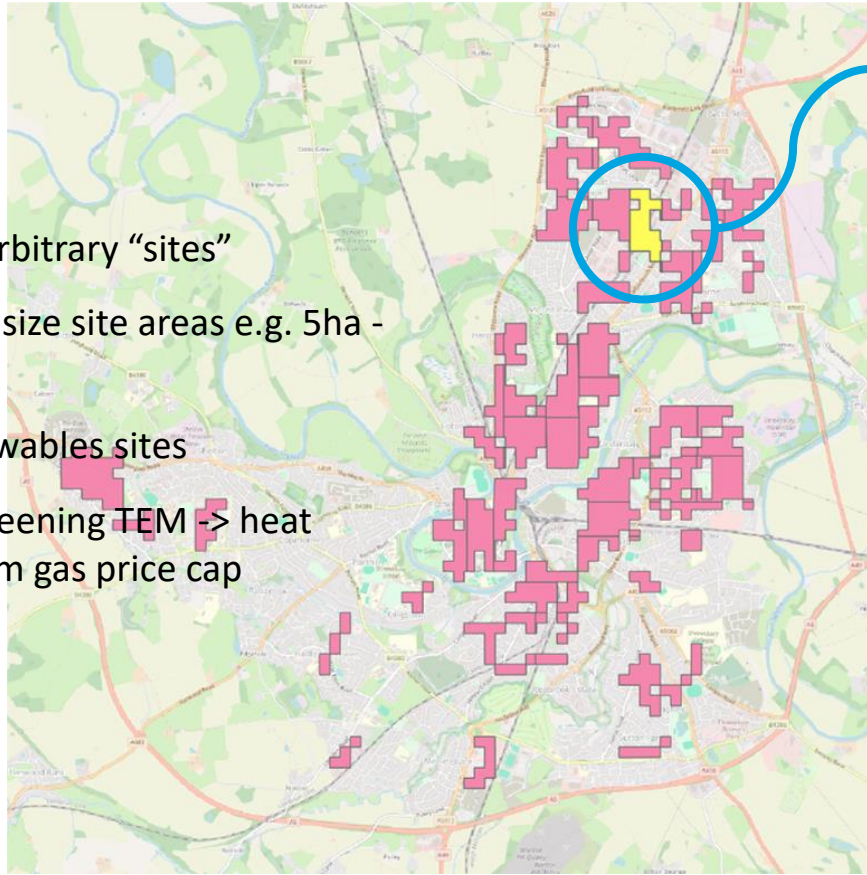
- Housing from HOTMAPS
- DEC heat demand data (available in England and Wales)
- Domestic demand reduced by 50% to represent 50% domestic uptake within an area



# Nationwide Site Search

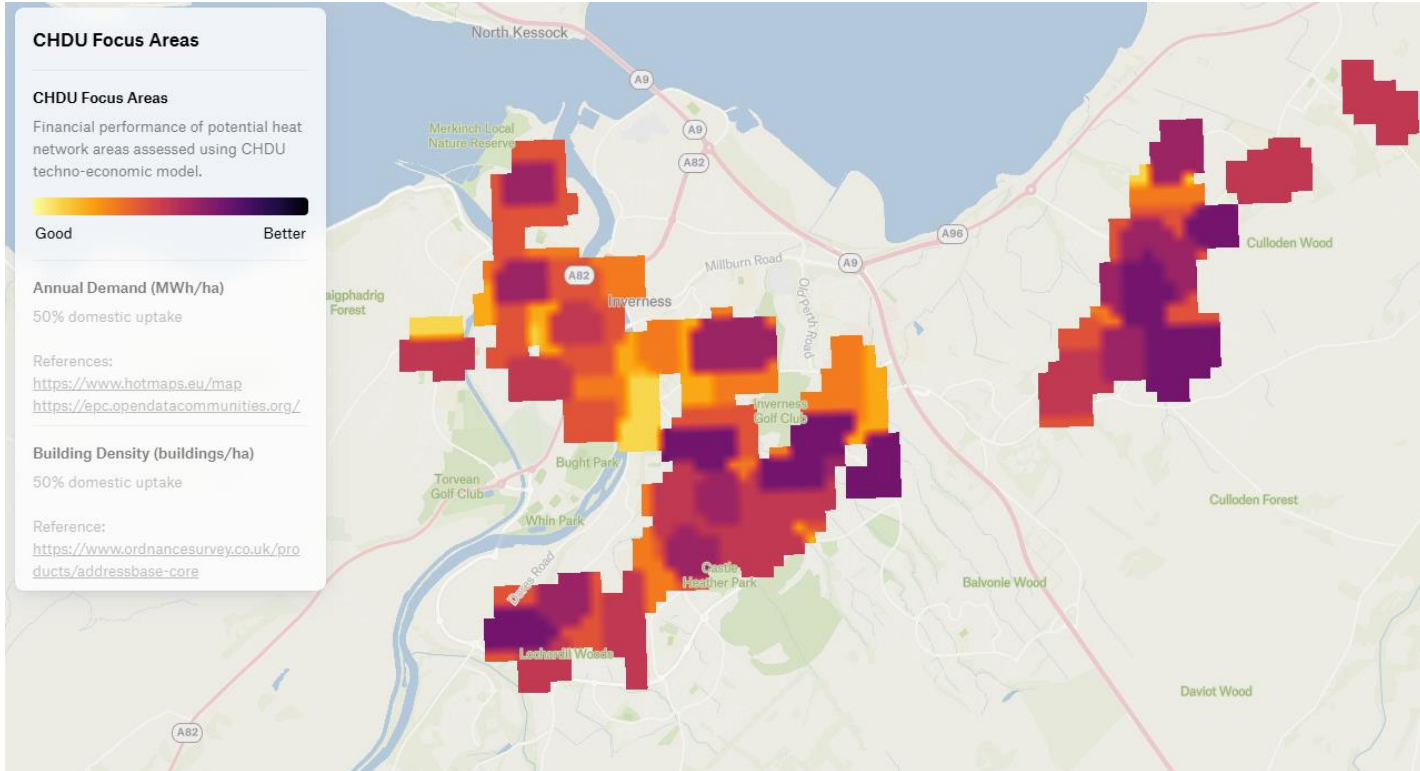
## Process:

- Split into different arbitrary “sites”
- Repeat for different size site areas e.g. 5ha - > 30ha
- Associate with renewables sites
- Assess site using screening TEM -> heat tariff targeting Ofgem gas price cap (7.4p/kWh)



Can it afford loan repayments?

# Resources - map of focus areas

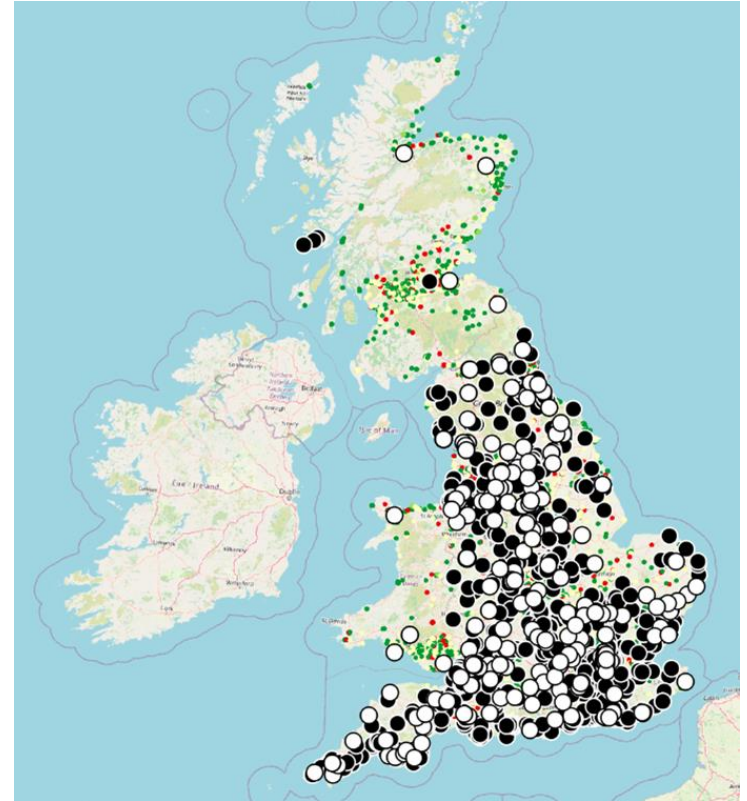


Definition of good and better

<https://www.communityheat.org.uk/interactive-map/>

# Next Steps / Ongoing Work

- Contact community energy organisations in close proximity to most viable sites.
- Develop feasibility studies at four locations working with local community energy organisation (or other community org).
- Work required to homes to change network operating temperatures?
- Business plans for CHDNs and CHDU
- Legals commentary
- Zoning!



# For the future:

**A template business plan and governance structure**

**Practical support:**

**Feasibility studies**

**Financial modelling**

**Fund raising**