Apse Energy Event – 7th September 2018

- Insights to area energy planning

Adrian McLoughlin – Climate Change Advisor.
Newcastle City Council

Overview

- Commitments
- Climate change plans & targets – a layered approach
- Smart Systems & Heat Phase 1 – starting with the Energy Technologies Institute
- EnergyPath Networks
- Scenario Planning
- Project development
- Drilling down into neighbourhoods
- Next Steps & the Energy Systems Catapult

CABINET

Newcastle City Council

23 March 2016

A 100% clean energy City

Name of Cabinet Member	**Councillor Stephen Powers**
Director presenting this report	**Tom Warburton** Director of Investment and Development

2050 - 100% Clean Energy (scope TBC)

SCATTER (Greenhouse Gases)

- not developed

Local Area Energy Strategy & Evidence Base - using EnergyPath Networks

- covers gas & electricity

(GIS modelled)

- completed

2030 - 50% (from 2005)

Draft

Climate Change Plan - covers gas, electricity & transport

Delivery Plans

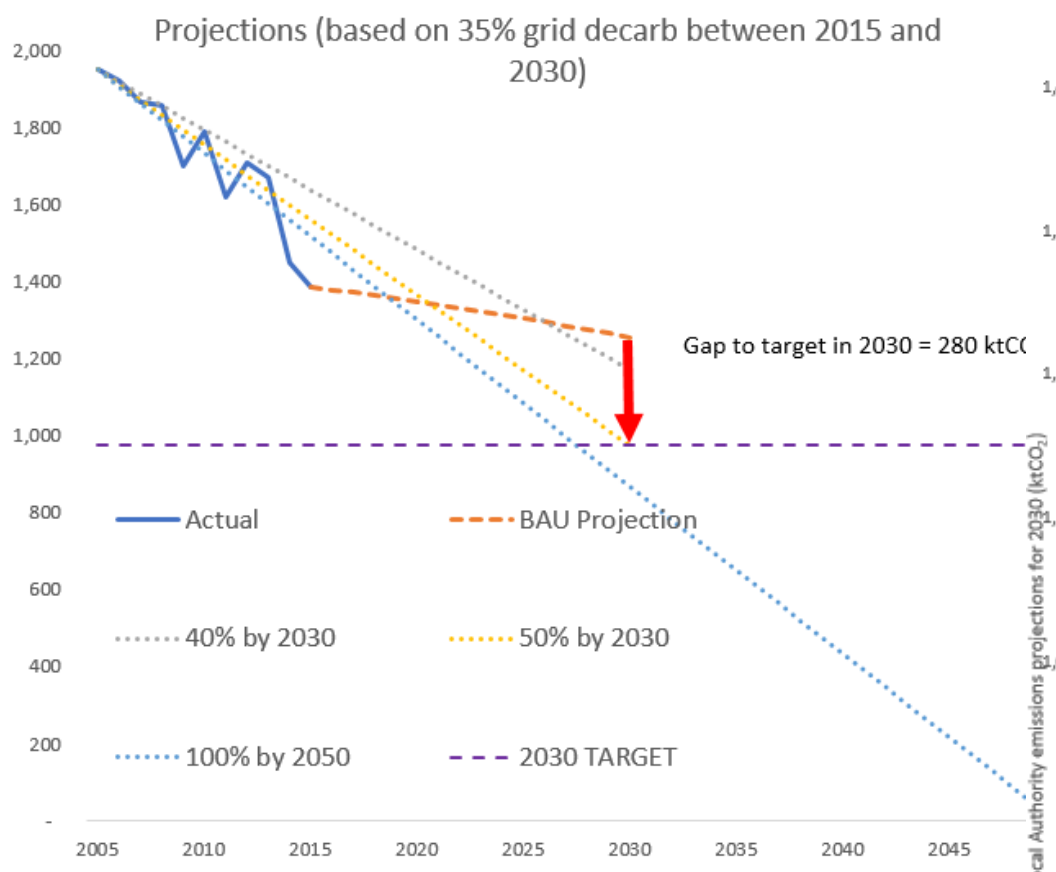
Smart Energy Plan

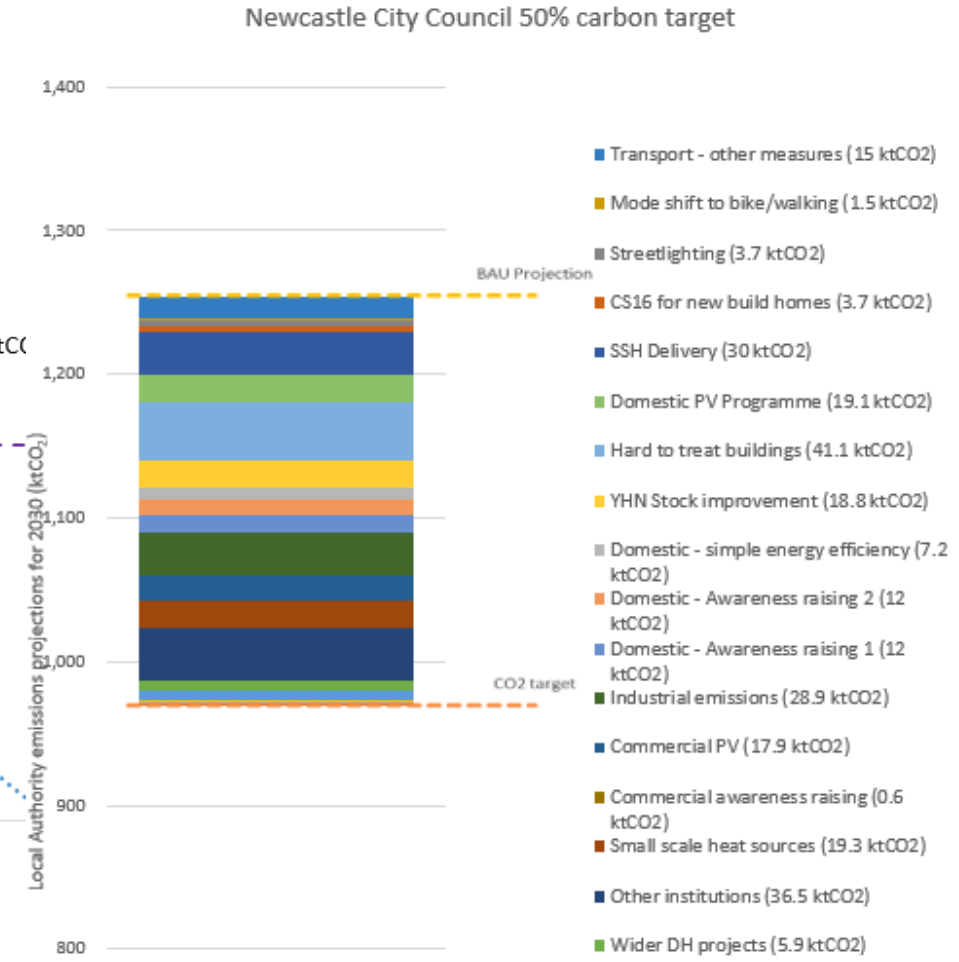
- under development

Ad hoc projects...

- ongoing

Draft Climate Change Strategy (mitigation)





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Smart Systems & Heat – Phase 1 experiences (ETI)

ETI's Smart Systems and Heat Programme

ETI members

ETI programme associate

"Creating future-proof and economic local heating solutions for the UK"

- Connecting together – the understanding of consumer needs and behaviour with the development and integration of technologies and new business models into…
- Delivering enhanced knowledge amongst industry and public sector
- Resulting in industry and investor confidence to implement from 2020 which enables a UK heat transition

The Energy Systems Catapult will deliver Phase One of the SSH programme as a supplier to the ETI following the transition of the SSH programme team to the Catapult. From 2017 the Catapult will be responsible for delivery of Phase Two of the programme independently of the ETI.

- **ETI wrote out to all local authorities (back in January 2014) we jumped at the chance to be part of it**
  - **It was the right time and a logical evolution of our work to date, we entered their selection process.**
- **Started work on Energy Planning with ETI in 2015**

Newcastle City Council

Emerging Newcastle Energy Planning reports…

energy technologies institute

Newcastle

Local Area Energy Strategy

ESC Project Number ESC00051

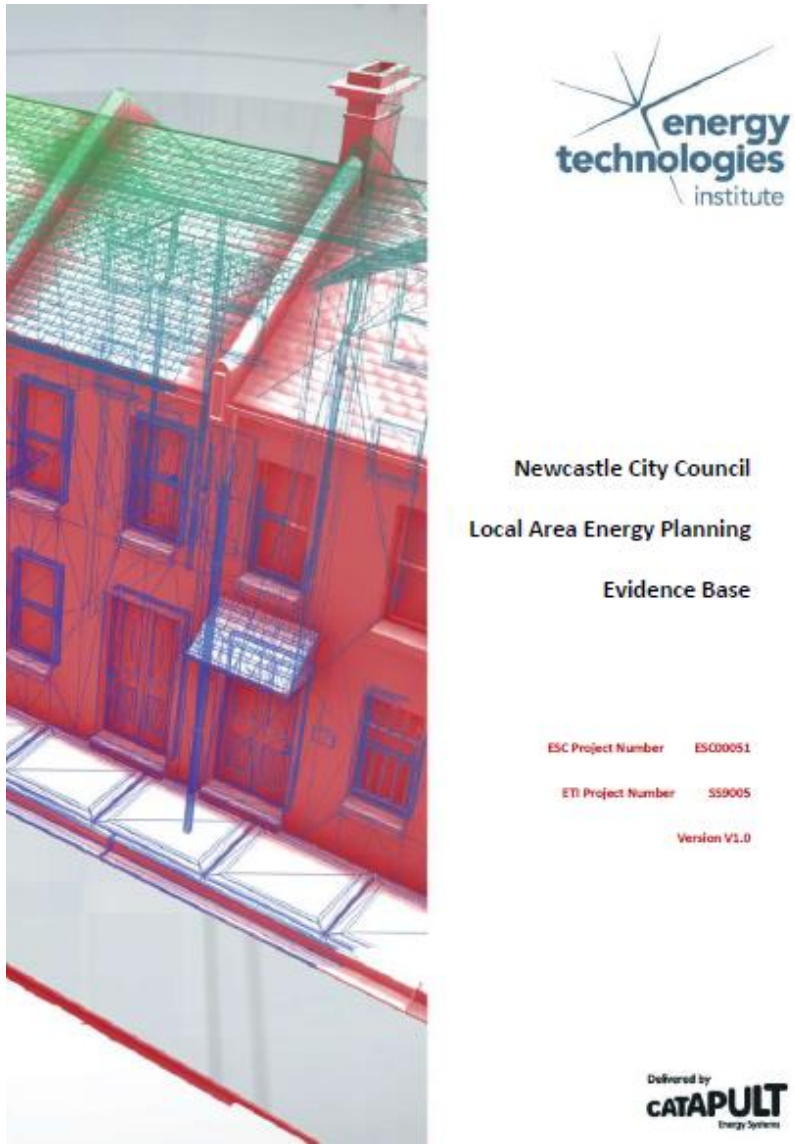
ETI Project Number SS9005

Version 1.0

Draft

Disclaimer

Delivered by CATAPULT Energy Systems



energy technologies institute

Newcastle City Council

Local Area Energy Planning

Evidence Base

ESC Project Number ESC00051

ETI Project Number SS9005

Version V1.0

Delivered by CATAPULT Energy Systems

Strategy report – for NCC to progress - 102 pages

Evidence Base – for ETI to publish - 132 pages

What does it all mean…..

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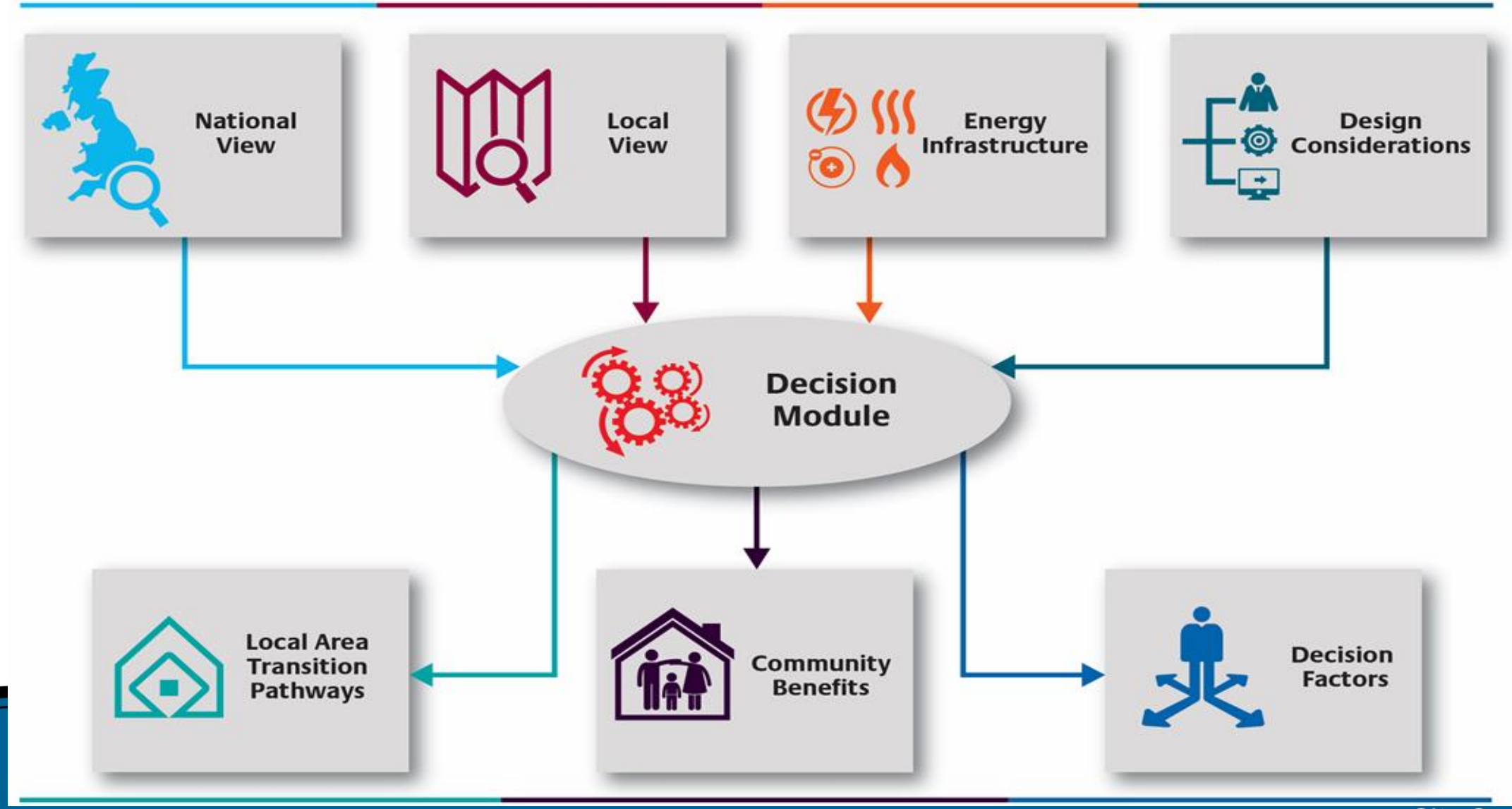
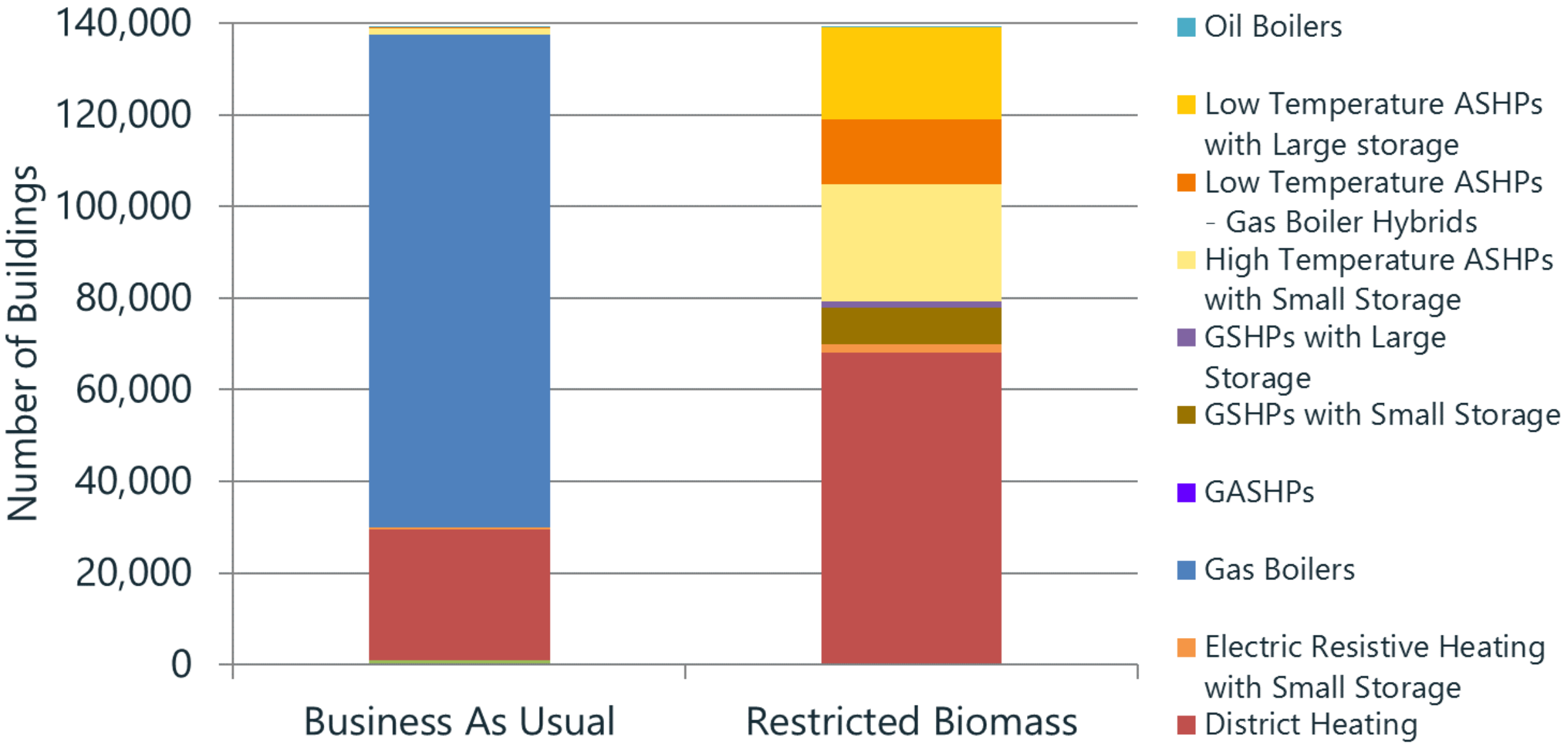
Overview of EnergyPath Networks




140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Number of Buildings
Business As Usual
Restricted Biomass
Oil Boilers
Low Temperature ASHPs with Large storage
Low Temperature ASHPs - Gas Boiler Hybrids
High Temperature ASHPs with Small Storage
GSHPs with Large Storage
GSHPs with Small Storage
GASHPs
Gas Boilers
Electric Resistive Heating with Small Storage
District Heating

Energy Centres for District Heating

Areas of New Build Growth

Annual Net Heat Network Transmission (MWh/year)

- 150,000 - 250,000
- 75,000 - 150,000
- 15,000 - 75,000
- 10 - 15,000

Predominant Heating System

District Heating

20% - 40% | 41% - 60% | 61% - 80% | 81% - 100%

High Temperature ASHP

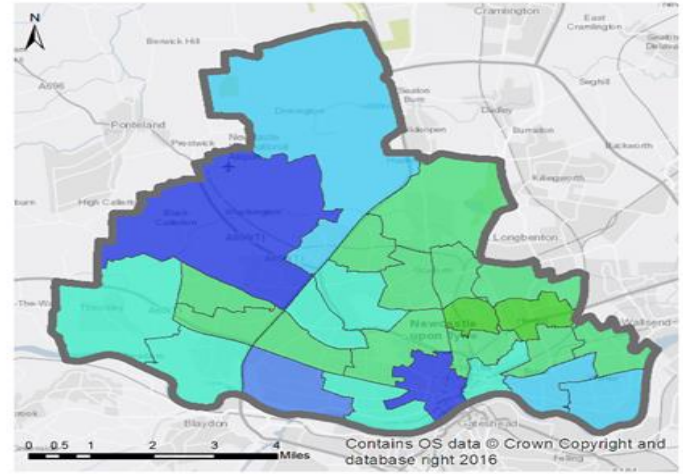
20% - 40% | 41% - 60% | 61% - 80% | 81% - 100%

Low Temperature ASHP

20% - 40% | 41% - 60% | 61% - 80% | 81% - 100%

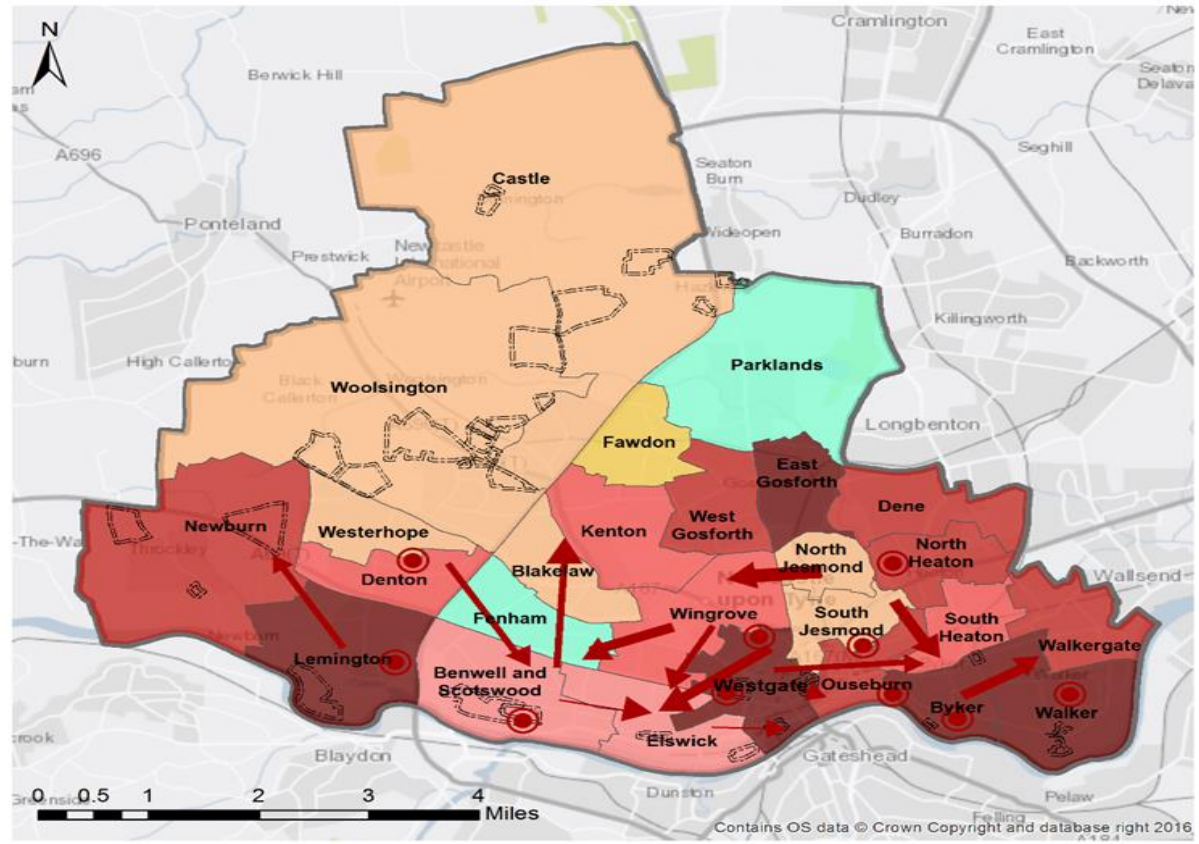
Hybrid Heat Pump

20% - 40% | 41% - 60% | 61% - 80% | 81% - 100%



Number of Homes

- 8,000 - 9,000
- 7,000 - 8,000
- 6,000 - 7,000
- 5,000 - 6,000
- 4,000 - 5,000
- 3,000 - 4,000



Newcastle City Council Local Area Energy Plan - Domestic Building Transitions (Deep Dive)

Delivered by CATAPULT Energy Systems

Select ward(s) of interest: (Ctrl - click for multiple selections)

Ward Name

Benwell and Scotswood	Blakelaw	Byker	Castle	Dene
Denton	East Gosforth	Elswick	Fawdon	Fenham
Kenton	Lemington	Newburn	North Heaton	North Jesmond
Ouseburn	Parklands	South Heaton	South Jesmond	Walker
Walkergate	West Gosforth	Westerhope	Westgate	Wingrove
Woolsington				

Select properties of interest: (Ctrl - click for multiple selections)

Property Type

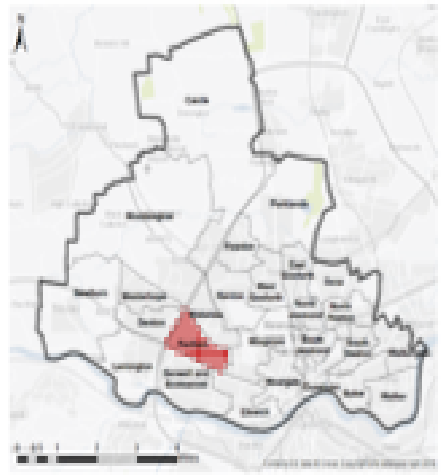
Detached	End Terrace	Flats
Mid Terrace	Semi-Detached	

Age Band

1914-1944	1945-1964	1965-1979
1980-present	Pre-1914	New Build

Final Heating System

- District Heating
- Electric Resistive Heating with 300 litre Storage
- GSHPs with 200 litre Storage
- GSHPs with 400 litre Storage
- High Temperature ASHPs with 500 litre Storage
- Low Temperature ASHPs - Gas Boiler Hybrids
- Low Temperature ASHPs with 500 litre storage
- Oil Boilers



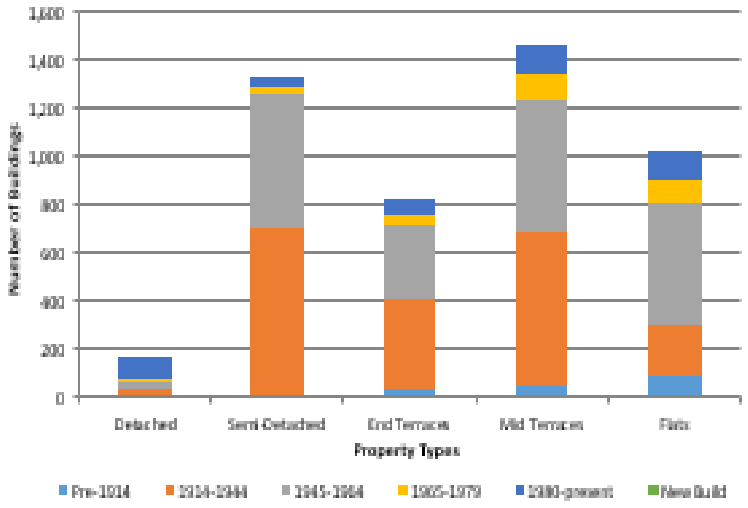
By 2050, in Fenham, the most predominant heating system for all properties is likely to be Low Temperature ASHPs - Gas Boiler Hybrids (26% of buildings).

For the remaining buildings, a further 25% will move to High Temperature ASHPs with 500 litre Storage

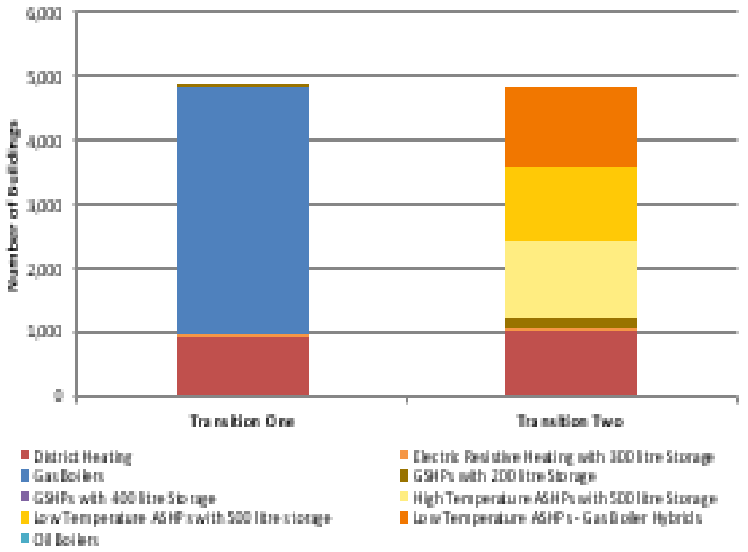
The majority (85%) of buildings will have No Insulation and a further 15% will receive Cavity Wall & Loft Insulation

Transitioning the selected buildings will cost approximately £6.9 million per year from 2035 onwards (including some expected 'business as usual' costs), or an average of £1474 per building per year.

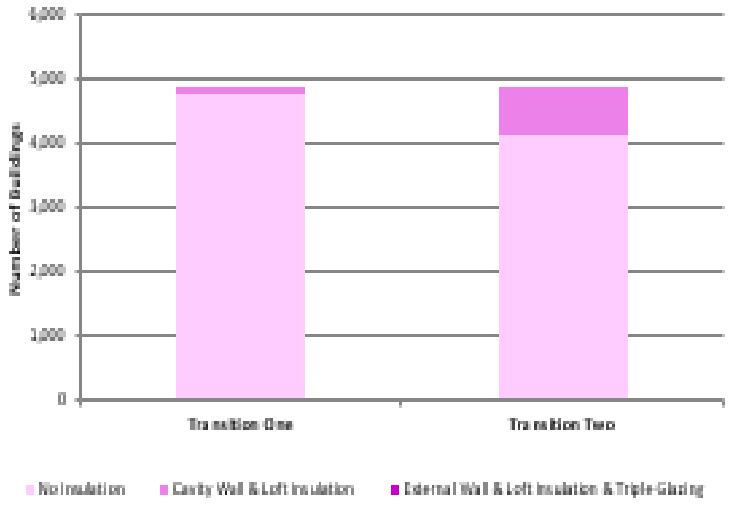
Building Stock



Heating System Transitions



Fabric Retrofit Transitions



Themes identified for further development…

Deployment Project 1 – District heat network to social housing near the city centre

Deployment Project 2 – Fabric retrofit of targeted buildings across Newcastle

Data Gathering & Systems Analysis Project 1 – Identification of local heat sources to serve heat networks

Data Gathering & Systems Analysis Project 2 – Develop a detailed and robust data set for non-domestic buildings in Newcastle

Development & Demonstration 1 – DHN to existing low rise residential areas

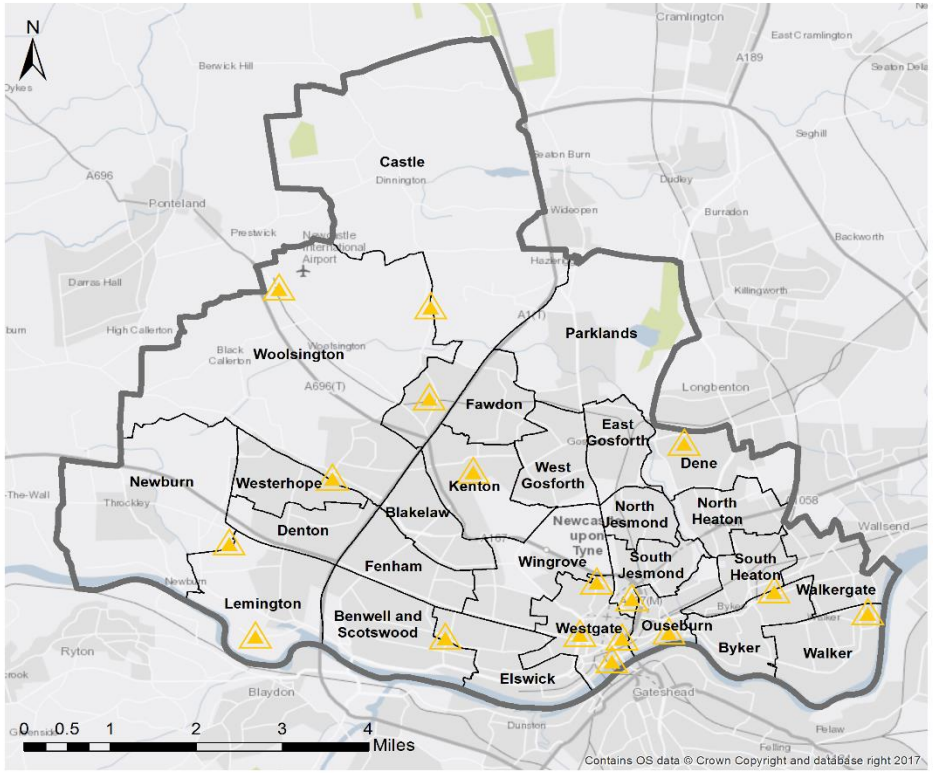
Development & Demonstration 2 - The electrification of heat using individual building electric heat pump based solutions

Development & Demonstration 3 – Fitting biomass boilers to off-gas grid properties on the Rural Fringe

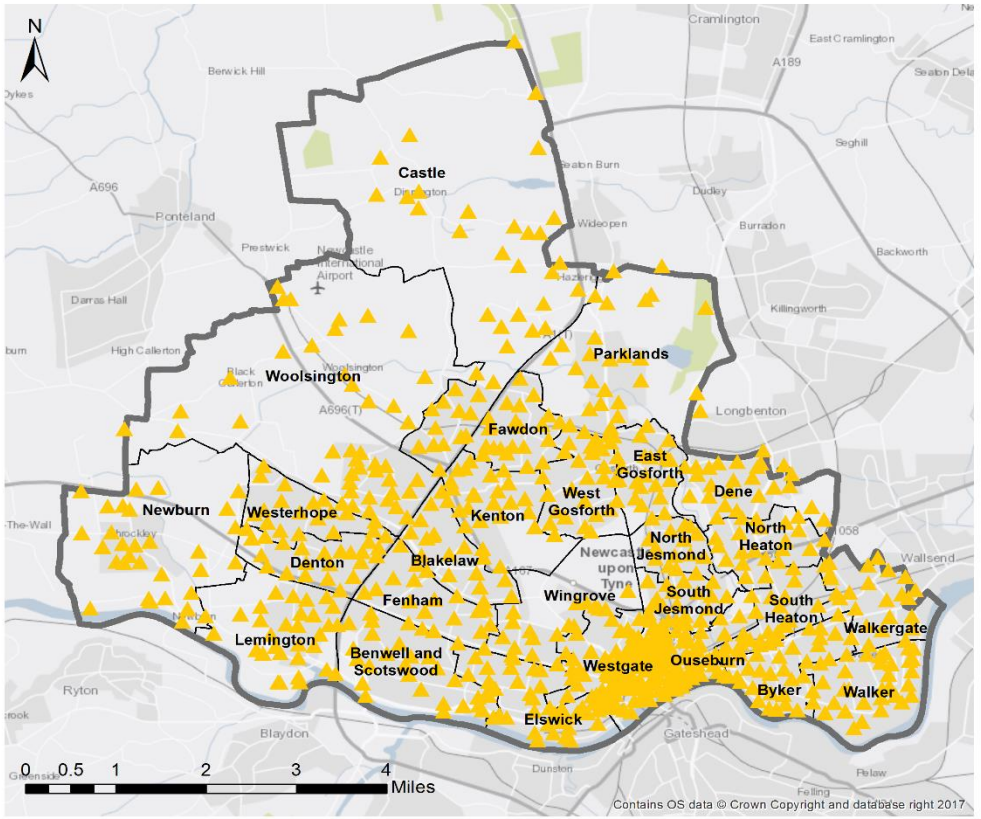
Research Project – Options to provide zero carbon heat to heat networks.

BUT…its certainly not the end game…. continuing Energy Planning…

More detailed planning…..



33 kV / 11 kV Substations



11 kV / 400 V Substations

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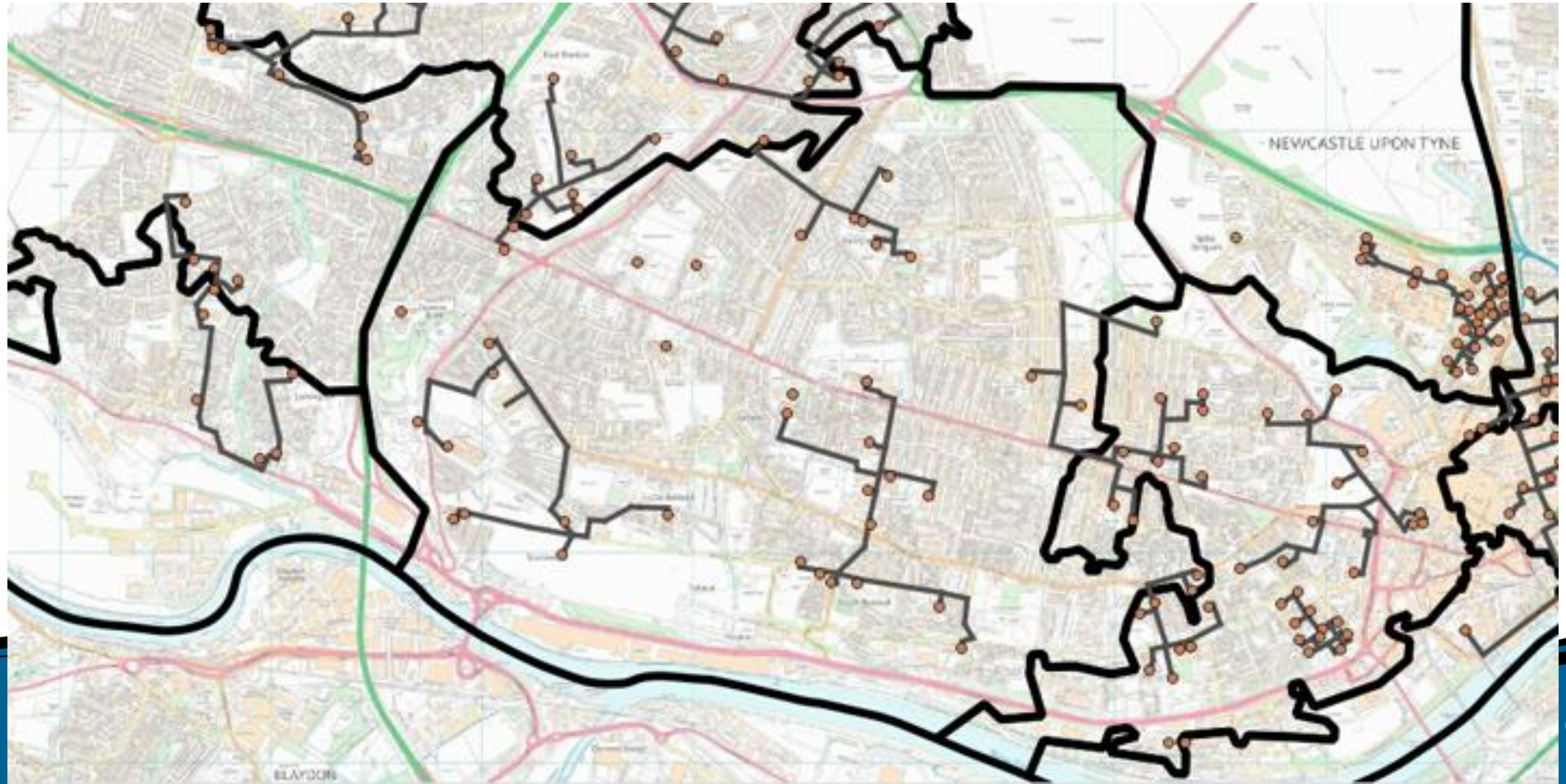
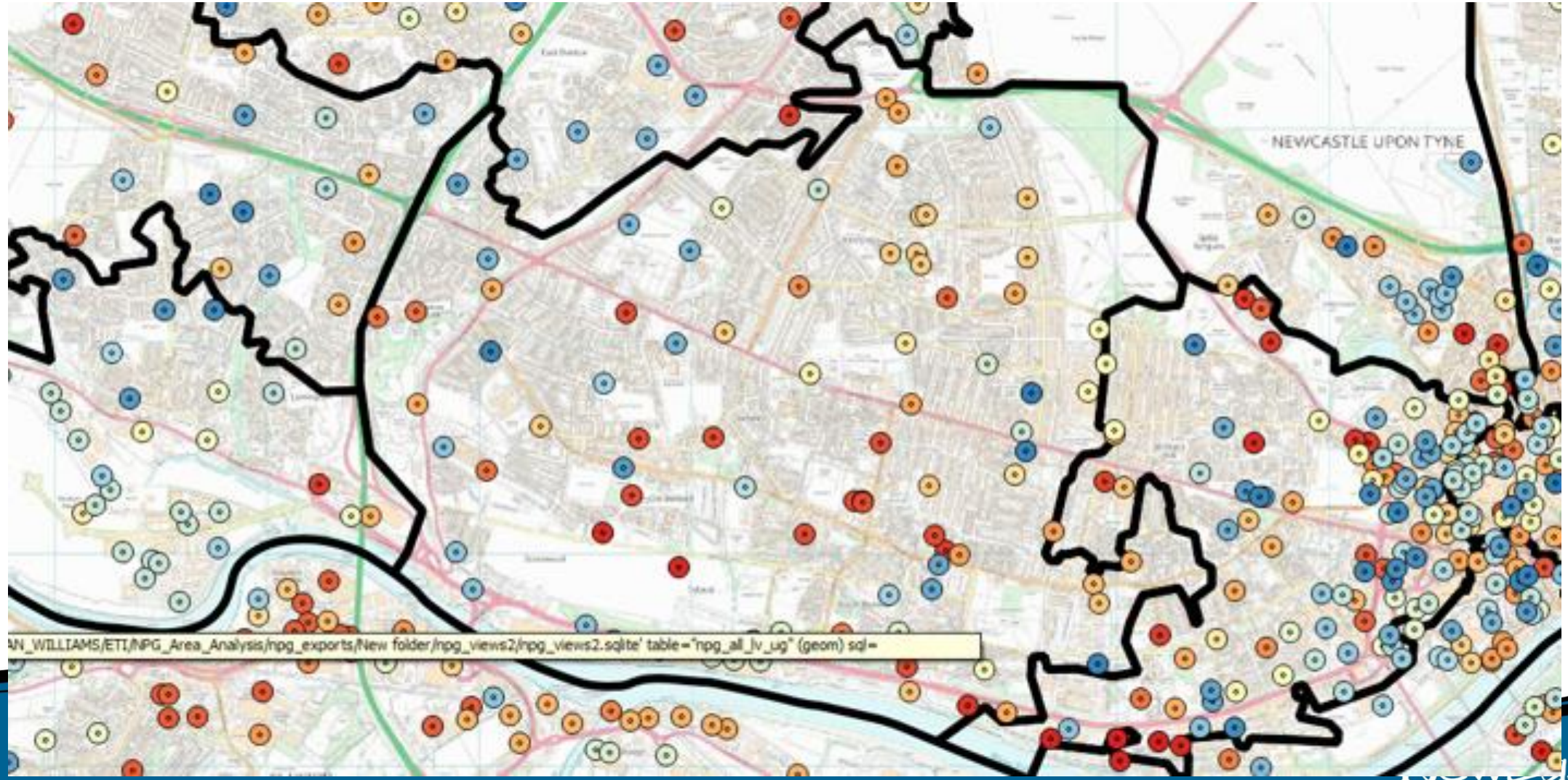
Integrating HNDU studies



Northern Powergrid data – LV Subs



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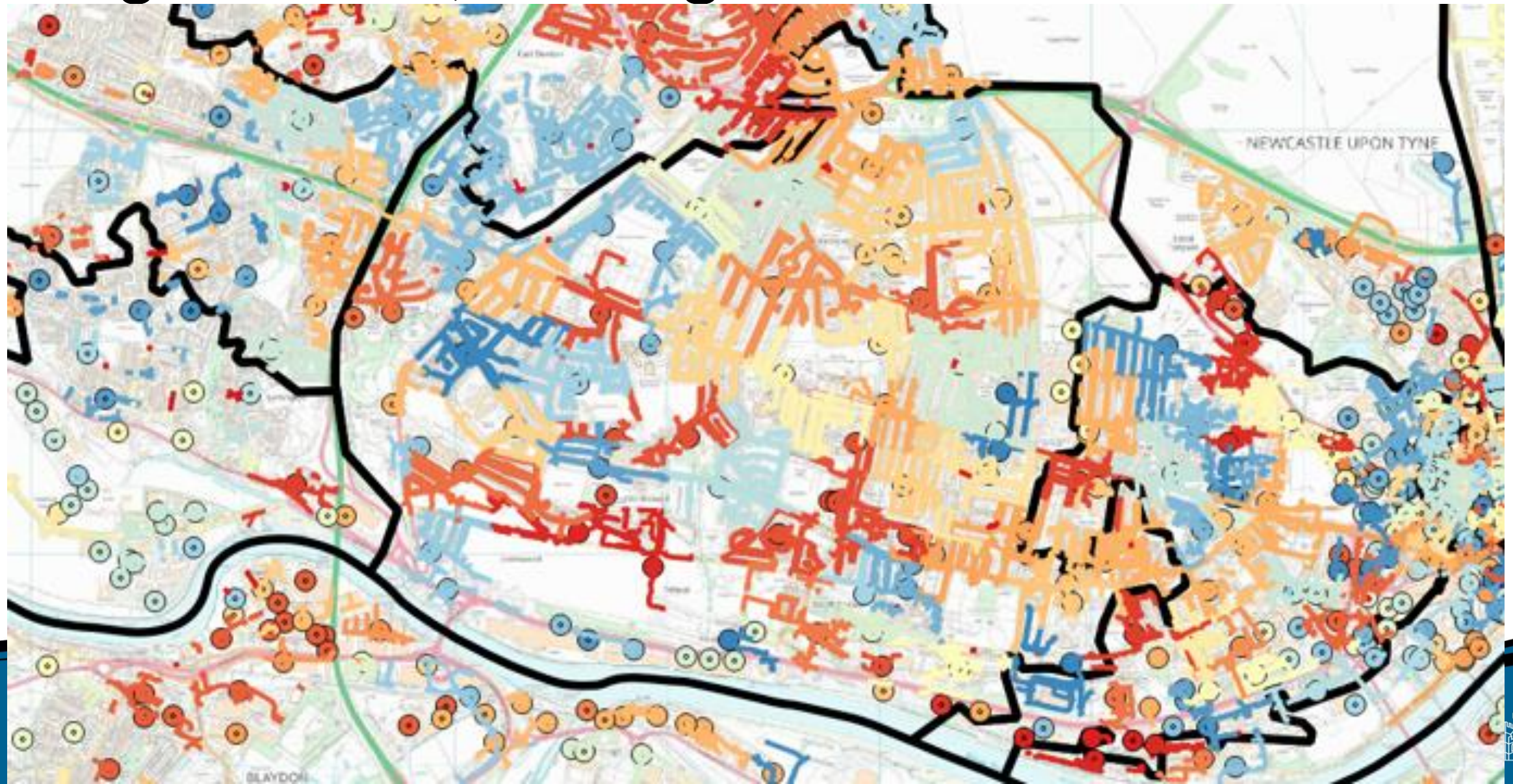
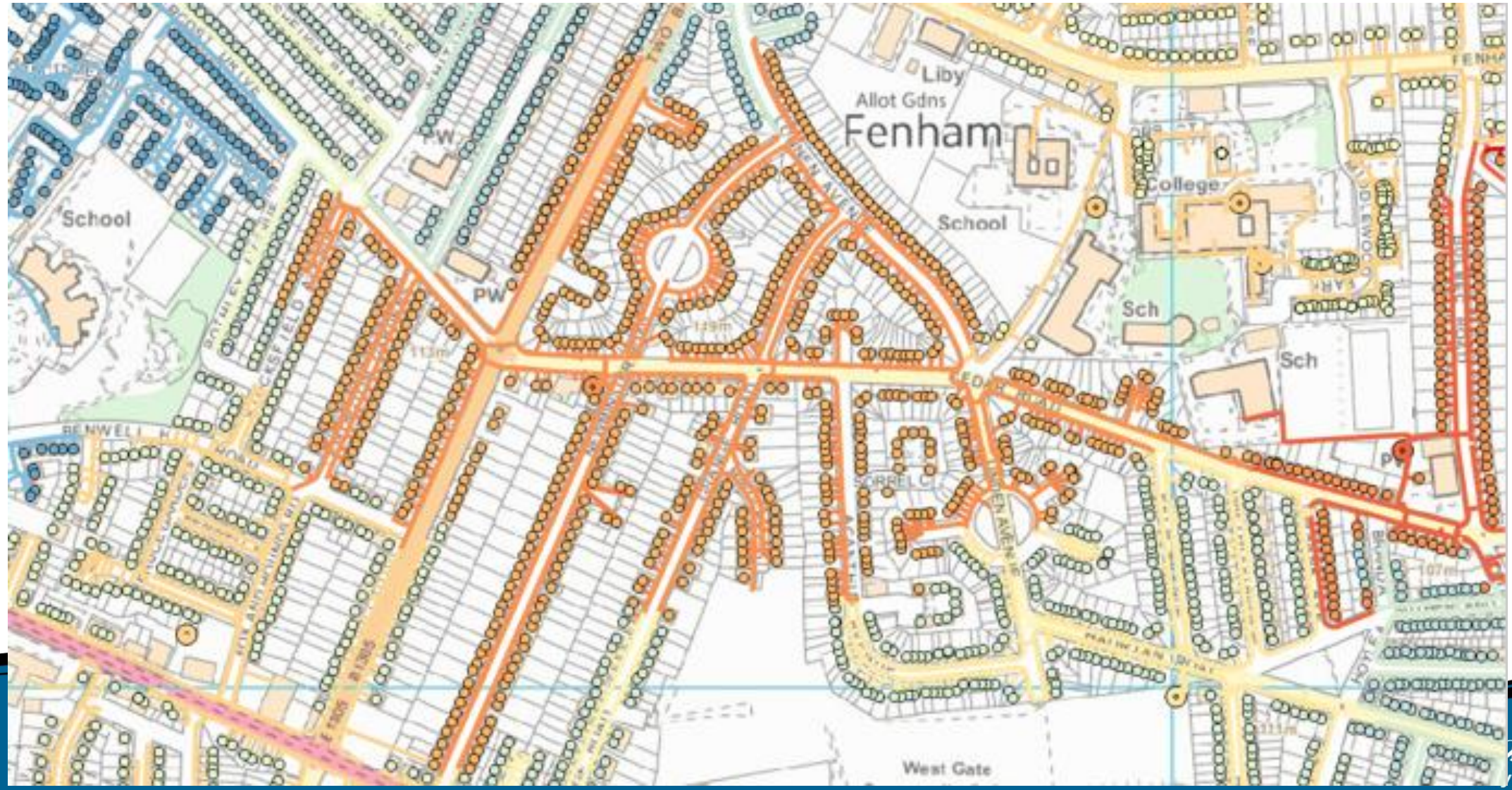
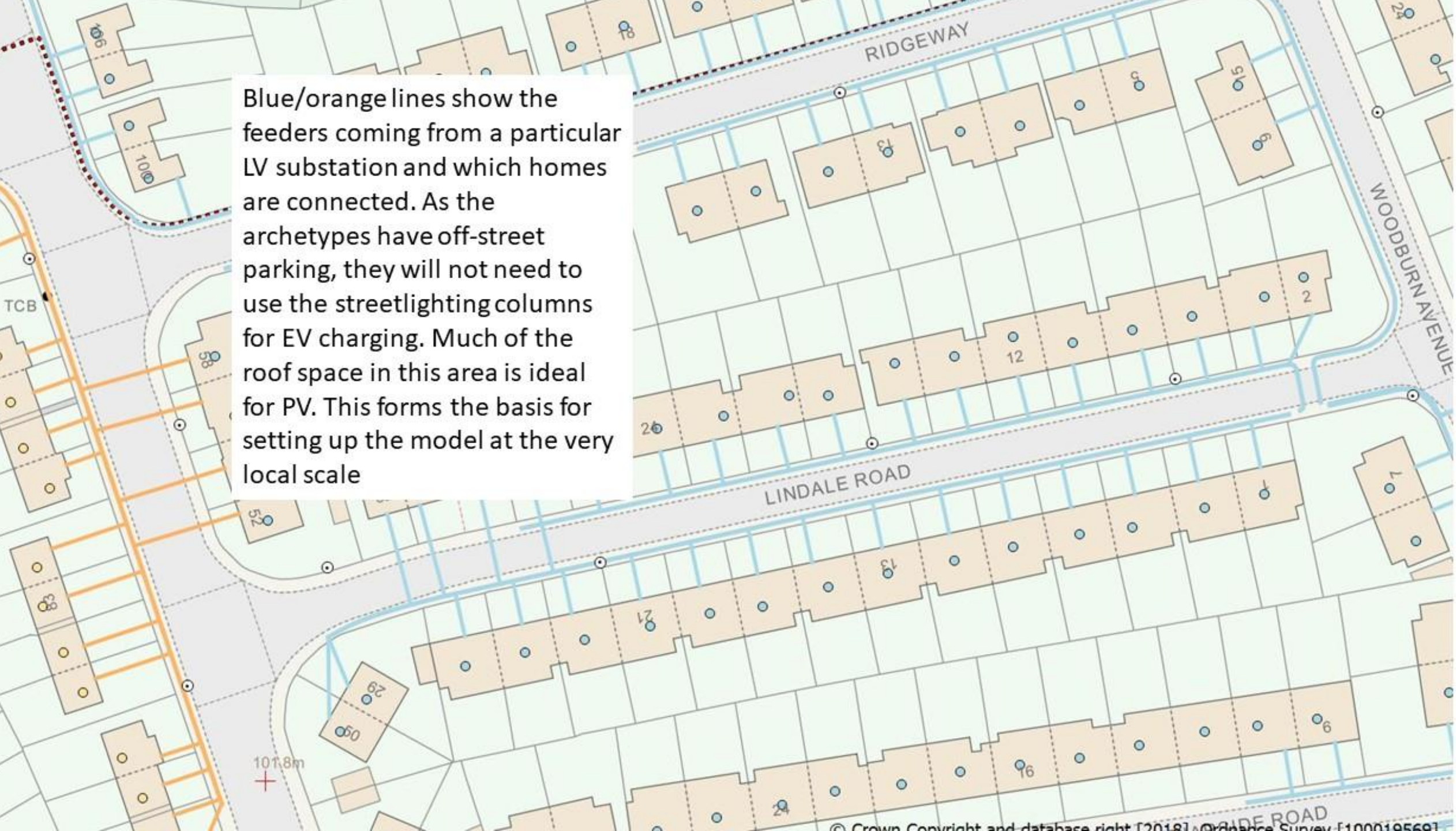
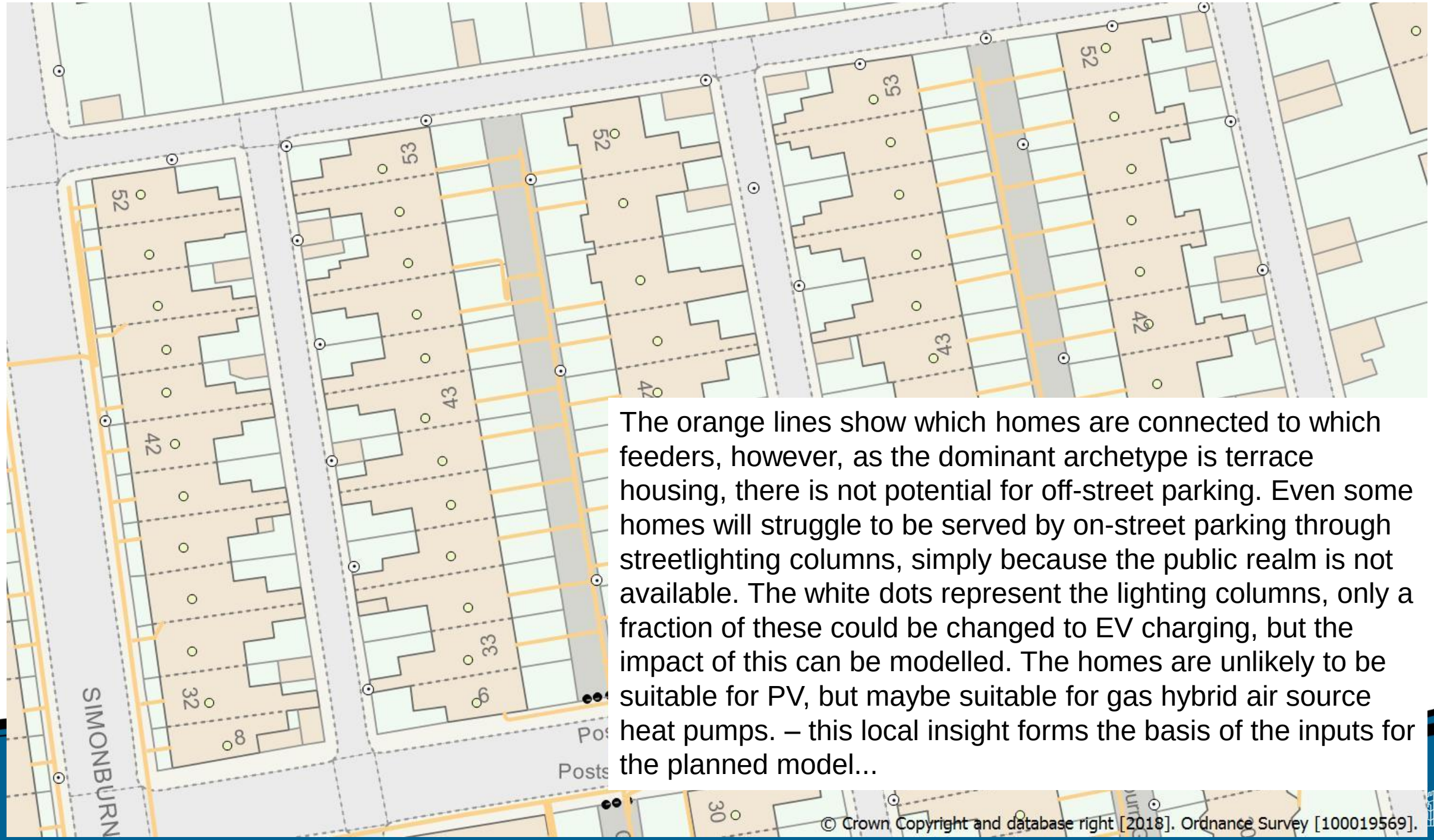
NPg LV Subs, underground and services…



Northern Powergrid data linked with UPRNs…




Blue/orange lines show the feeders coming from a particular LV substation and which homes are connected. As the archetypes have off-street parking, they will not need to use the streetlighting columns for EV charging. Much of the roof space in this area is ideal for PV. This forms the basis for setting up the model at the very local scale
RIDGEWAY
WOODBURN AVENUE
LINDALE ROAD
TCB
101.8m
© Crown Copyright and database right [2018] Ordnance Survey [100019569]



The orange lines show which homes are connected to which feeders, however, as the dominant archetype is terrace housing, there is not potential for off-street parking. Even some homes will struggle to be served by on-street parking through streetlighting columns, simply because the public realm is not available. The white dots represent the lighting columns, only a fraction of these could be changed to EV charging, but the impact of this can be modelled. The homes are unlikely to be suitable for PV, but maybe suitable for gas hybrid air source heat pumps. – this local insight forms the basis of the inputs for the planned model...

Moving into Smart Systems & Heat Ph2…

Built on the strong foundations to plan for interventions

Real world, ‘living lab’…in owner occupied homes

Preparing for future regulations and a world with 4 Ds (not just 3)

- decarbonise
- decentralise
- digitalise
- **democratise…the searching question of a local authority role**