



Local Energy **Oxfordshire**

# Mapping Oxfordshire's energy transition

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[project-leo.co.uk](http://project-leo.co.uk)



# Mapping Oxfordshire's energy transition

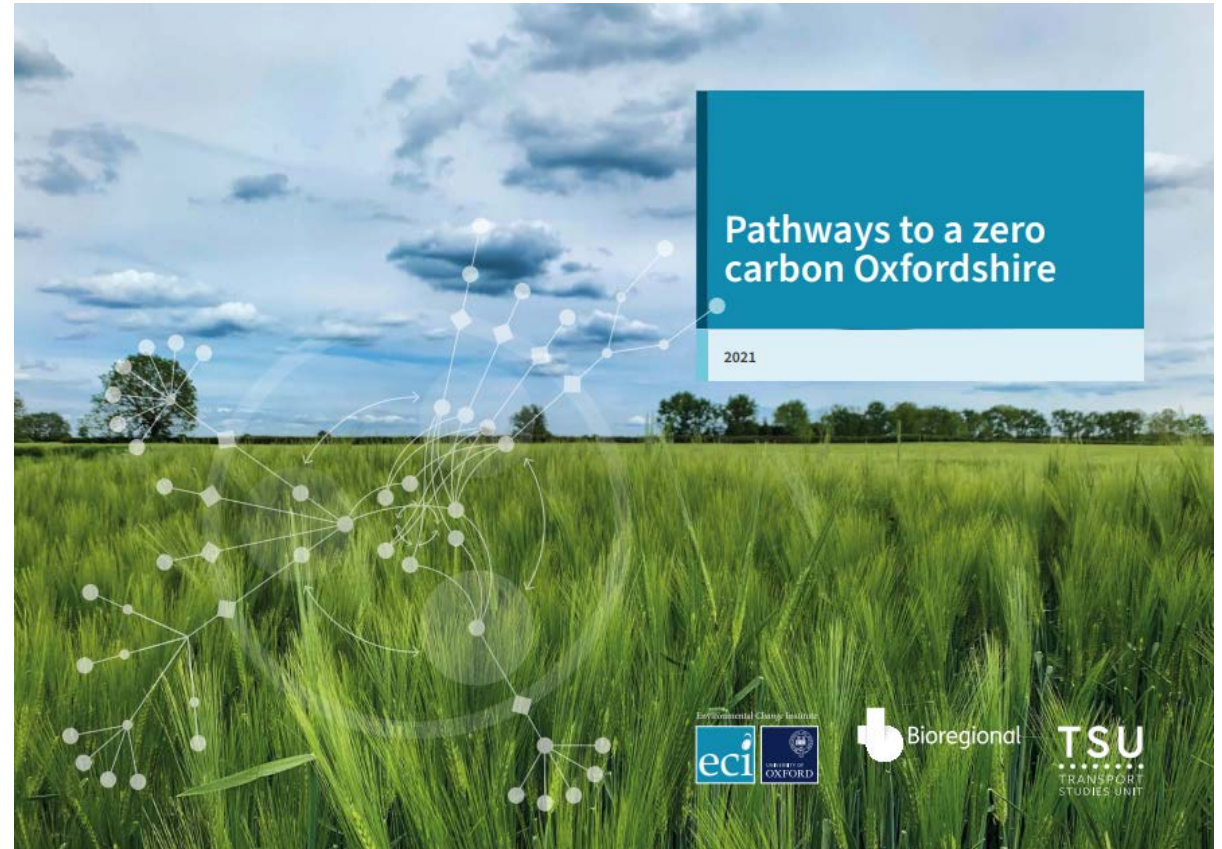
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- Background
  - Net zero carbon targets
  - Pathways to net zero
  - Introduction to Project LEO
- The data story
- Creating the story map – challenges and solutions

# Pathways to a zero carbon Oxfordshire

- IPCC Special Report: Global Warming of 1.5°C, 2018
- UK Climate Change Act, amended 2019
  - Net zero carbon by 2050
- Oxfordshire local authorities climate emergency declarations
  - Organisational targets (most net zero by 2030)
  - Area wide targets – net zero by 2050 or sooner
- Pathways to zero carbon Oxfordshire
  - Progress to date
  - Scenarios to 2050



***“To achieve net-zero carbon, transformations will be needed in the ways that energy is used, generated and delivered”***



# Project LEO – accelerating to net zero

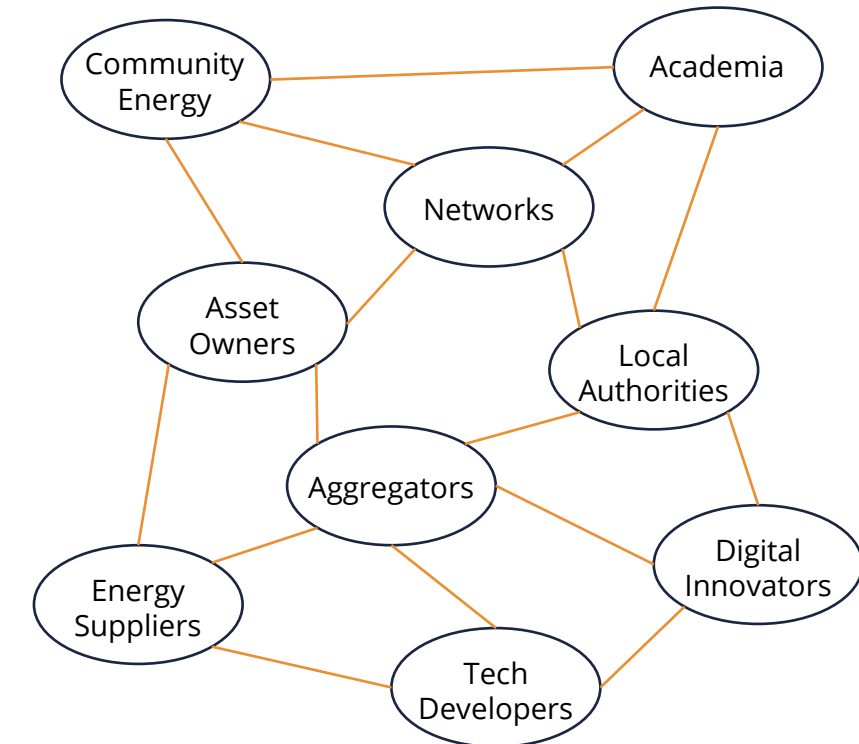


National demonstrator project – part funded by IUK

Developing local flexibility and energy markets to make best use of assets and enable innovative business models for investment in a low-carbon energy future.

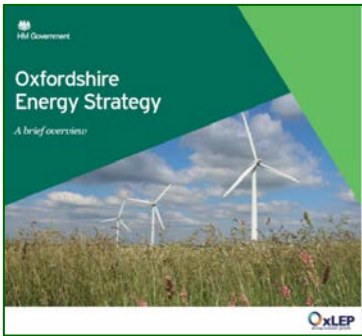
## ❑ WP4 - Future energy system planning

- 4.1 Spatial Mapping
- 4.2 Temporal data
- 4.3 Insights



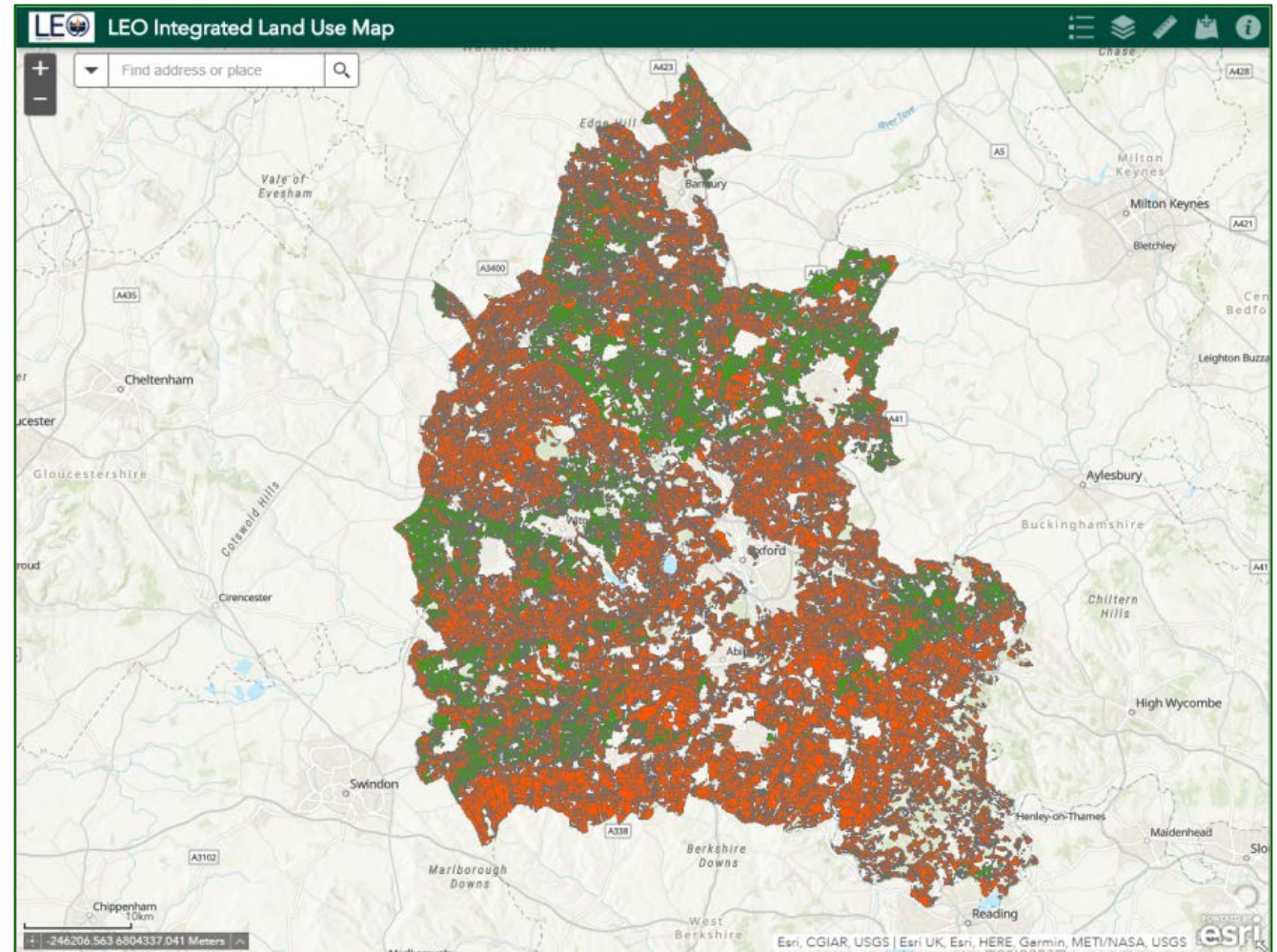
# LEO energy mapping

## Spatial data for strategic planning



## LEO Integrated land use map

- Single application
- Over 40 data layers in 4 categories
  1. Energy networks
  2. Energy (& related) statistics
  3. Planning constraints & growth
  4. Renewable generation
- + Aerial imagery







# Mapping Oxfordshire's Energy Transition

Energy Insights Team, Oxfordshire County Council

**Story Map developed in conjunction with OCC IT Services GIS Team**

2 July 2021

# Four scenarios to 2050 – three reach net zero carbon

## 1. *Steady Progression*

- falls well short of climate targets

## 2. *Societal Transformation*

- led by householders and community groups

## 3. *Technological Transformation*

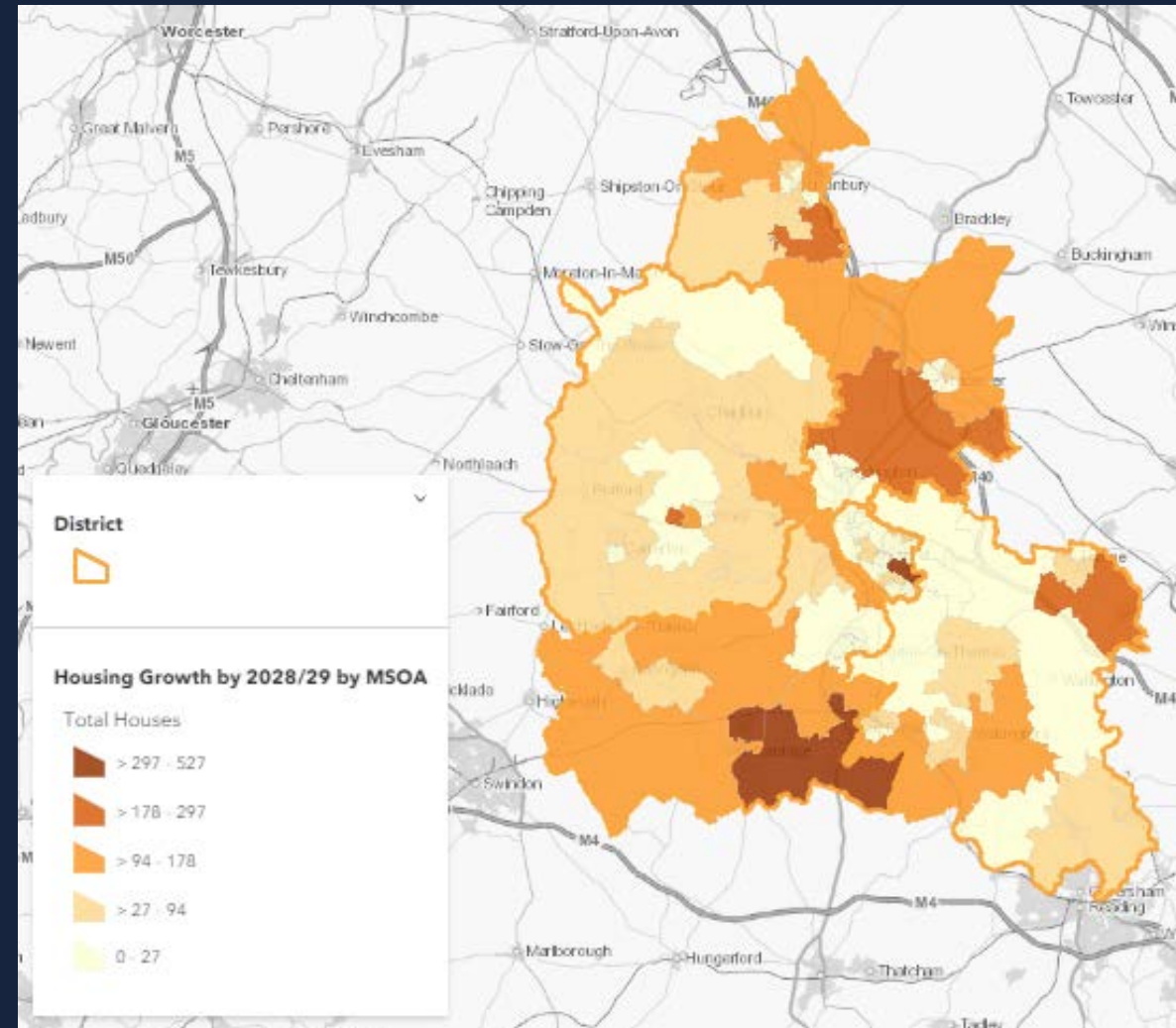
- relies on systemic changes driven at the national level

## 4. *Oxfordshire Leading the Way*

- mirrors *Societal Transformation* + high deployment of solar photovoltaics

### Key data

- National Grid Future Energy Scenarios
- Oxfordshire planned housing growth



# Baselining energy use

Total final energy consumption by district and sector, 2008 and 2018

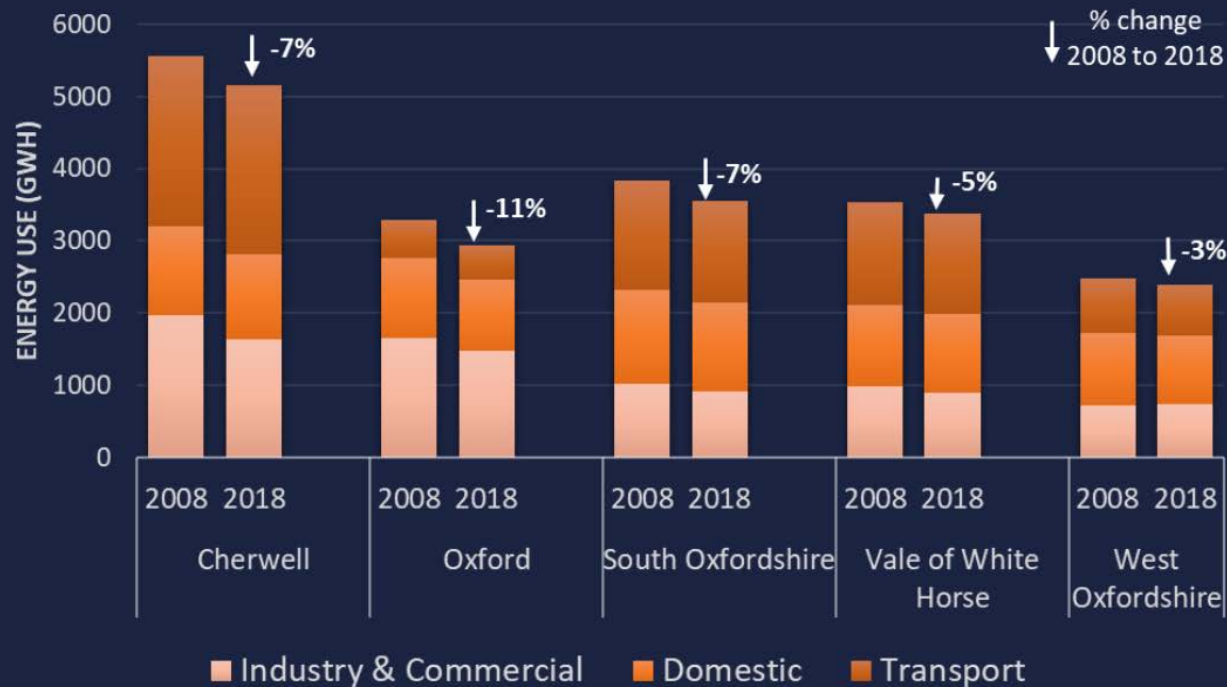
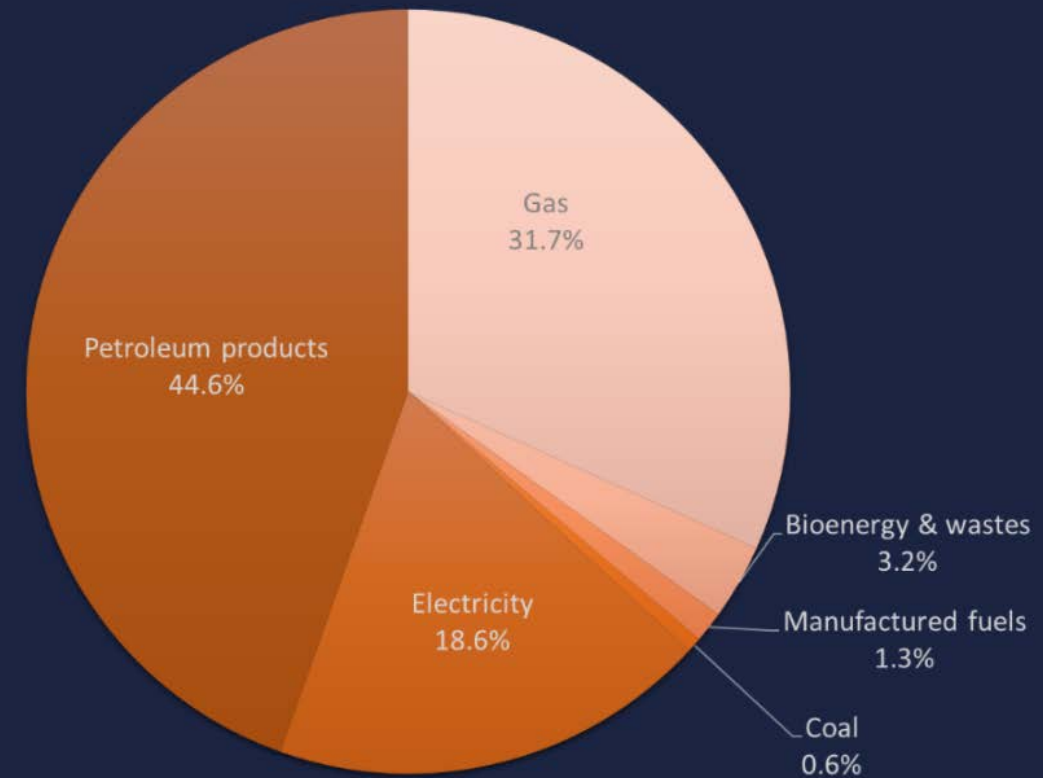


Chart showing energy use by Oxfordshire district and broad sector in 2008 and 2018.

Source: BEIS; Sub-national Total Final Energy Consumption Statistics 2005-2018

Total final energy use by fuel, Oxfordshire 2018



e: BEIS; Sub-national Total Final Energy Consumption Statistics 2005-2018



# Identifying areas of high energy use

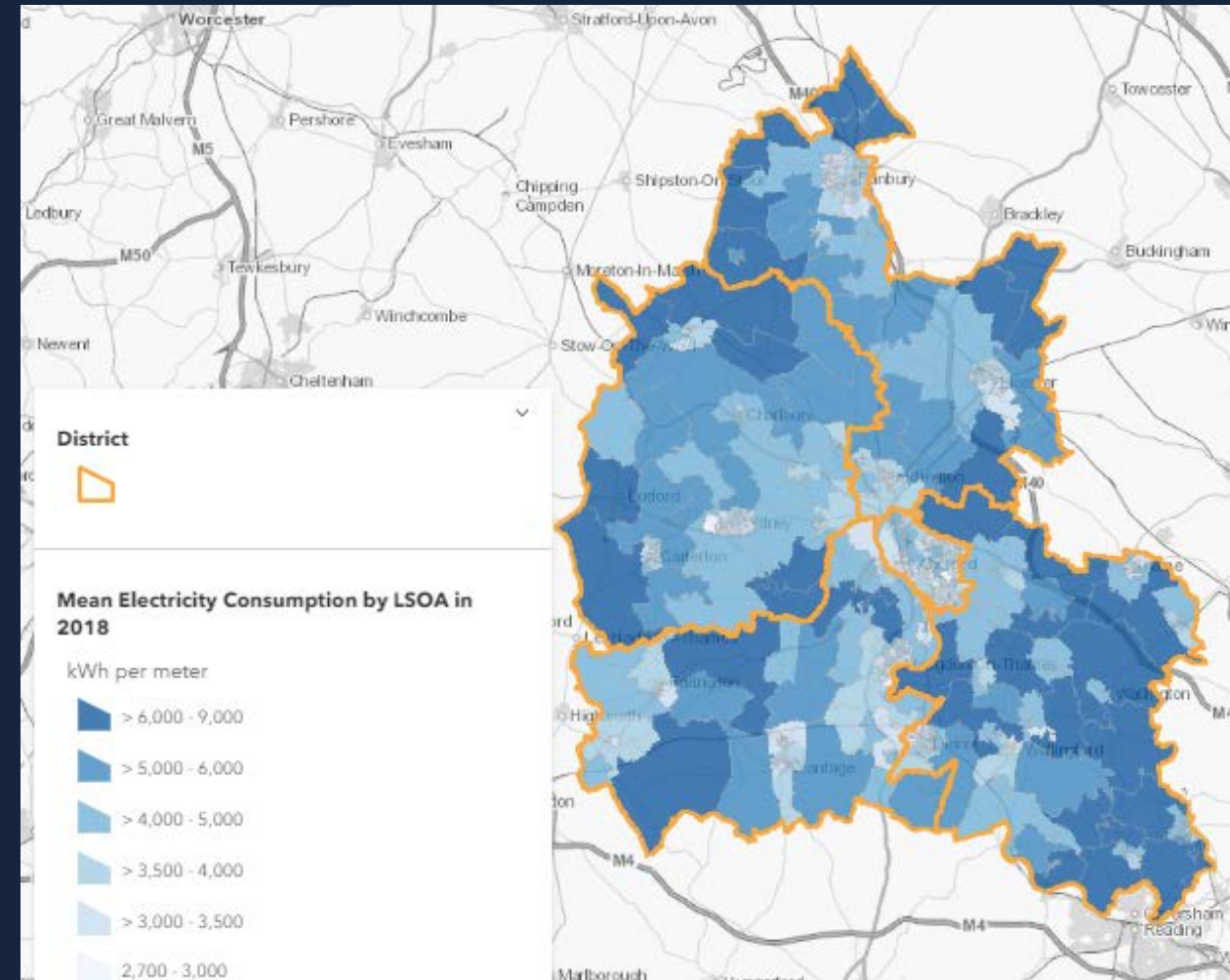
- Use of electricity and gas by households has decreased across all district council areas in Oxfordshire since 2008
- In 2018 average domestic electricity use per meter was above the national average (England) in the rural districts, below the national average in Oxford

Total Annual Electricity Use by LSOA

Annual Electricity consumption per meter

Total Annual Gas Use by LSOA

Annual Gas consumption per meter



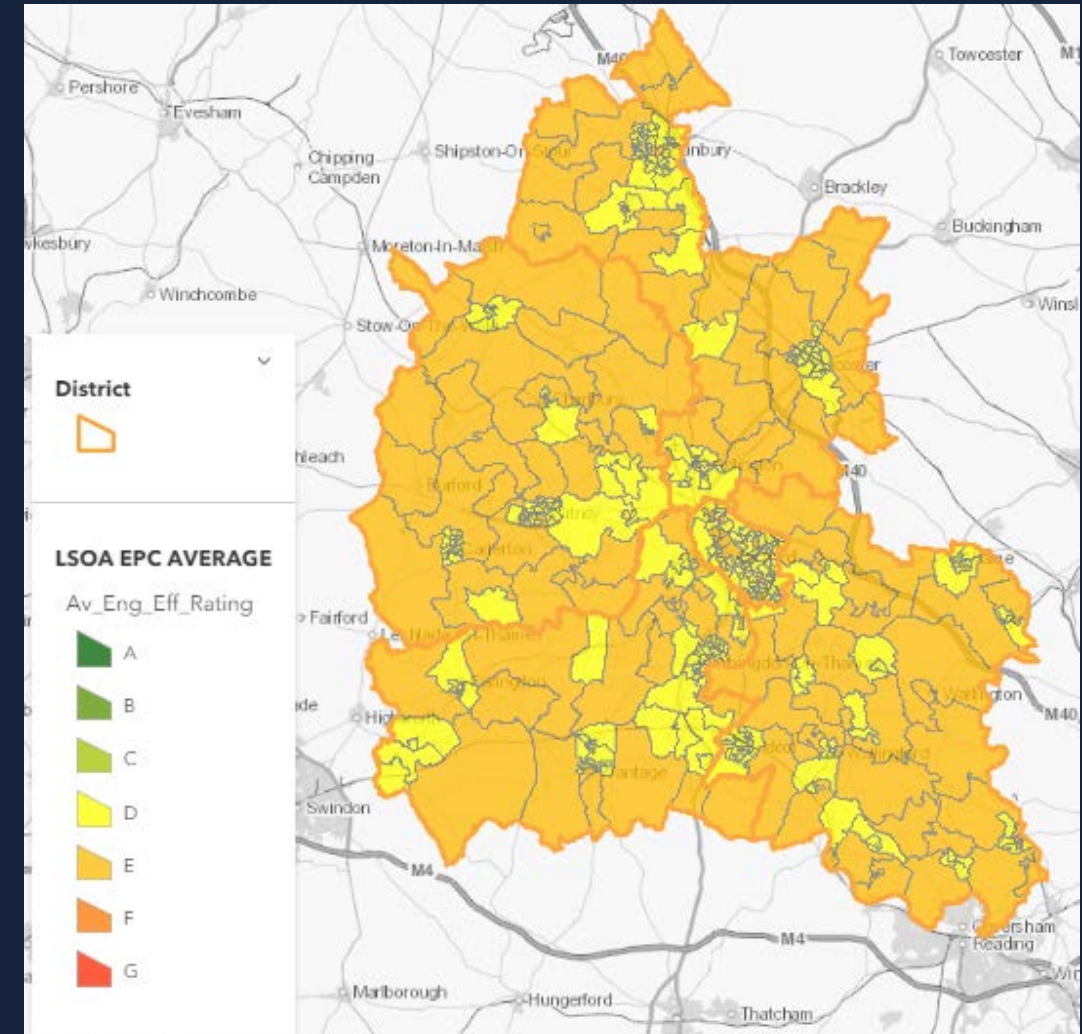
# Reducing energy demand - buildings

Over 75% of Oxfordshire's housing stock currently have an EPC rating between C-E

By 2050 - the *Societal Transformation* and *Oxfordshire Leading the Way* scenarios require all pre-2020 homes to achieve an average EPC rating of B



Aerial thermal imaging gives an area-wide snapshot of heat loss from buildings and can help identify opportunities for targeted energy efficiency projects. Source: Energeo Ltd for Project LEO, 2020



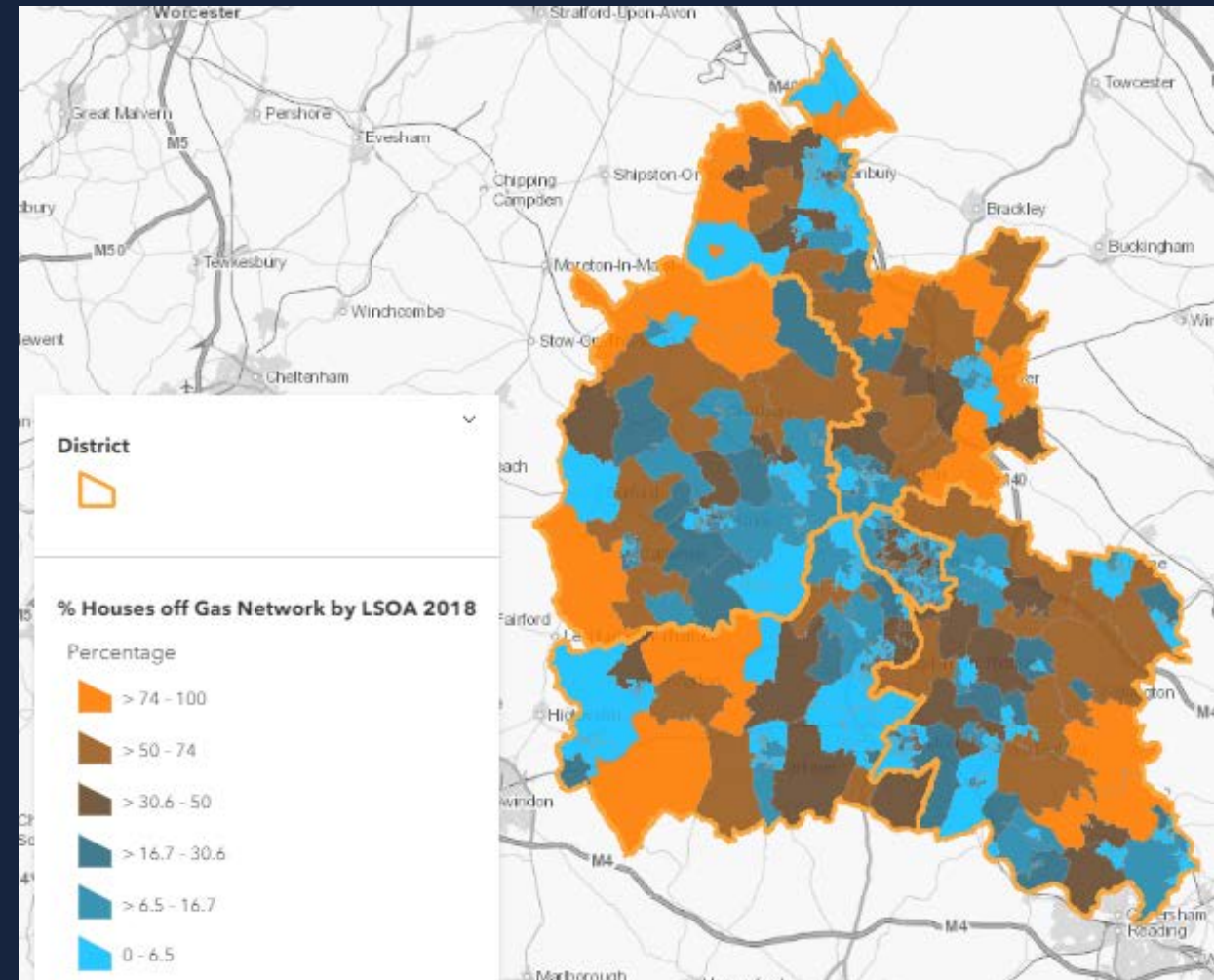


# Identifying 'easy targets'

Almost one in five properties across Oxfordshire are not connected to the gas network

District	Estimated number of properties not connected to the gas network (off-gas)	Total number of properties in district	% of properties off-gas
Cherwell	14,866	65,450	23%
Oxford	10,326	61,260	17%
South Oxfordshire	11,017	60,920	18%
Vale of White Horse	8,852	57,170	15%
West Oxfordshire	12,100	48,610	25%
<b>Total</b>	<b>57,161</b>	<b>293,410</b>	<b>19%</b>

Properties not connected to the gas network, 2019. Source: BEIS, 2020





# Reducing emissions from transport

**130,000 and 370,000 battery electric vehicles (EVs)** by 2030 450,000 and 600,000 by 2050.

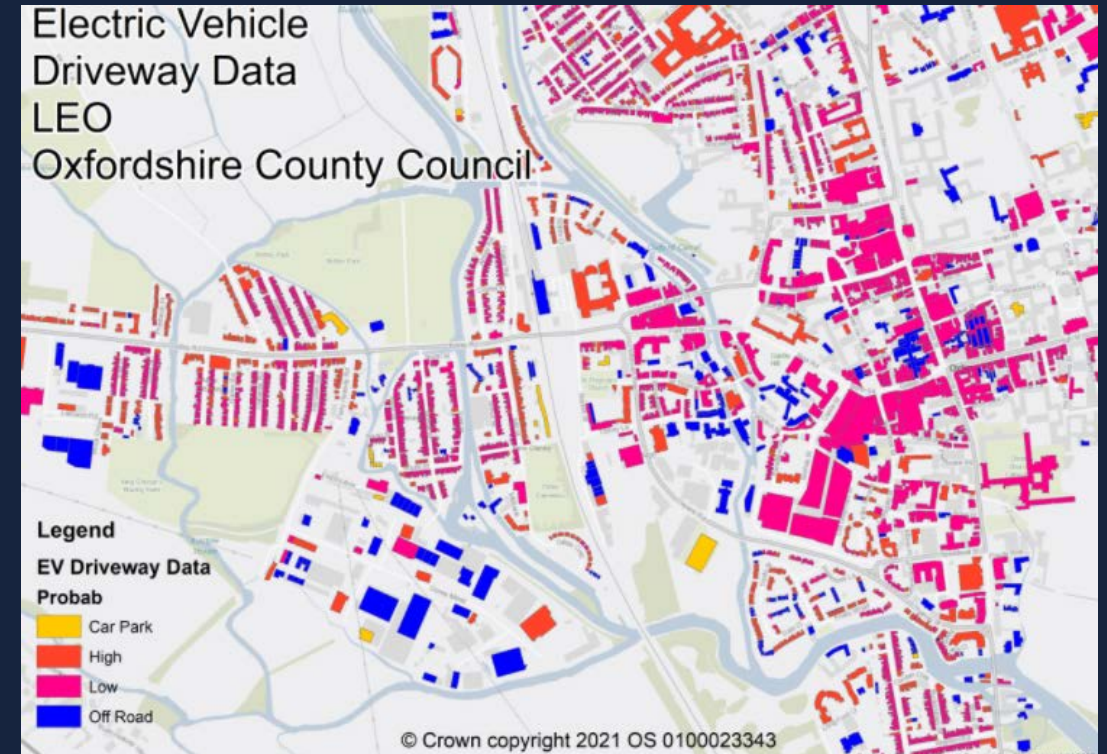
= 792 - 1,056 GWh/year **increased electricity demand**

= **87,000 - 148,000 charge points by 2030**

= 186,000 - 218,000 by 2050-  
most (87%) are likely to be off-street.

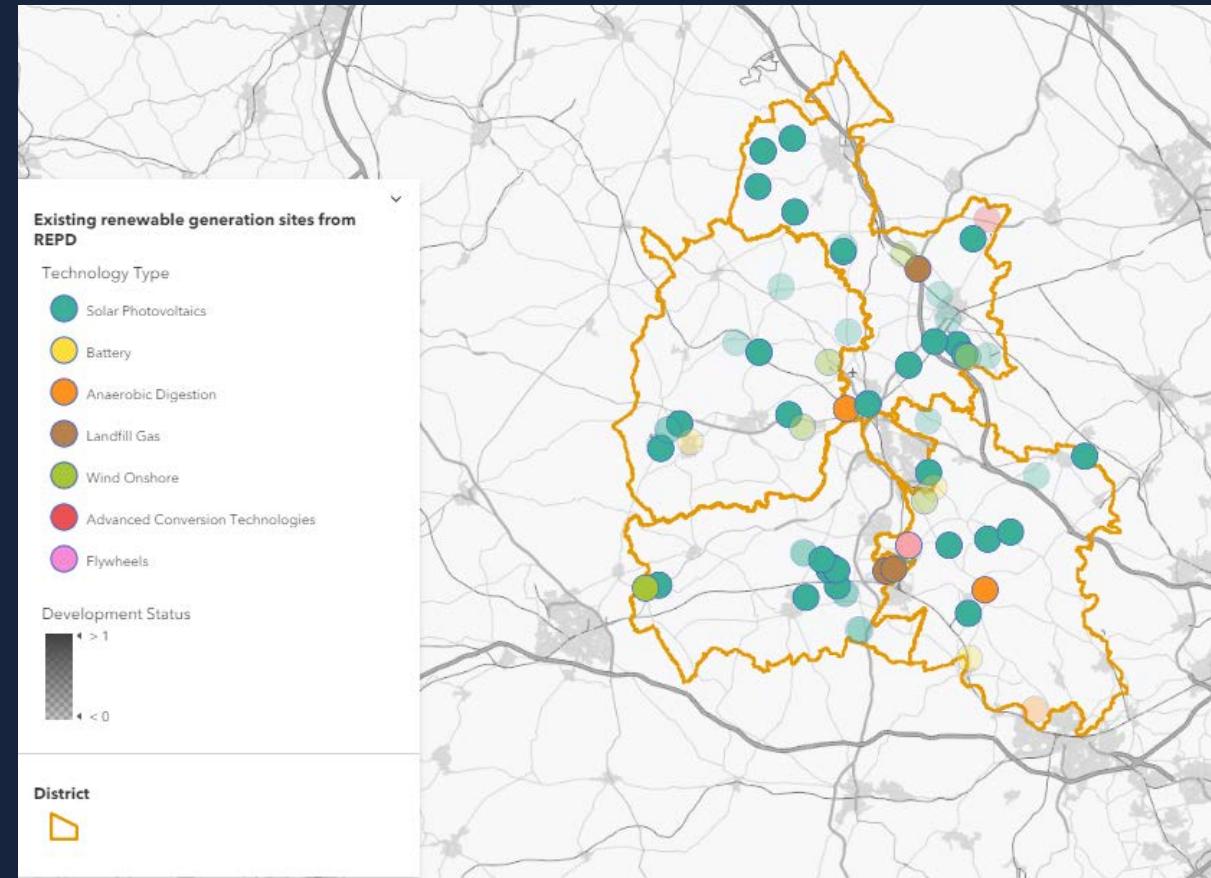
Some transport will be hydrogen based, particularly HGVs  
estimate in the range of 9,000 and 28,000 hydrogen vehicles

= 400 GWh to 700 GWh additional electricity demand



# Scaling up local renewable generation - baseline

- Installed capacity = 453 MW
- Total annual generation (2019) = **533 GWh**
- **Solar PV** = 72% (85% of capacity) - generating 382 GWh of energy in 2019
- more than 10,000 registered installations, ranging in size from <10 kW domestic rooftop solar to large 35 MW ground mount installations.
- **Landfill Gas** = 16.5% ; 15 MW of installed capacity
- Six **Anaerobic Digestion** (AD) facilities = 7.5% of Oxfordshire's renewable generation
- **onshore wind** - 6.5 MW Westmill Wind Farm, around 11 GWh per year.
- **hydro** contributes 3.3 GWh per year
  - includes the community owned 49 kW Osney Lock Hydro, a 400 kW privately owned plant at Culham Weir, and the community owned 400 kW Sandford Lock Hydro completed in 2017.









# Scaling up local renewable generation

- Installed rooftop PV provides around 20% of total renewable capacity in Oxfordshire (99% of installations)
- Potential to meet 57% of current electricity demand
- And 25-31% of demand projected in 2050 scenarios.

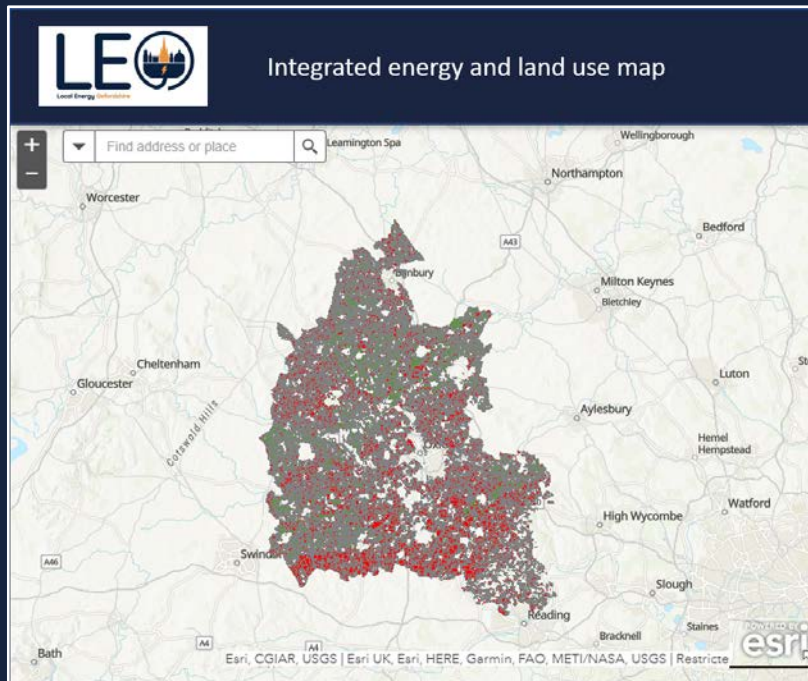


# Next steps

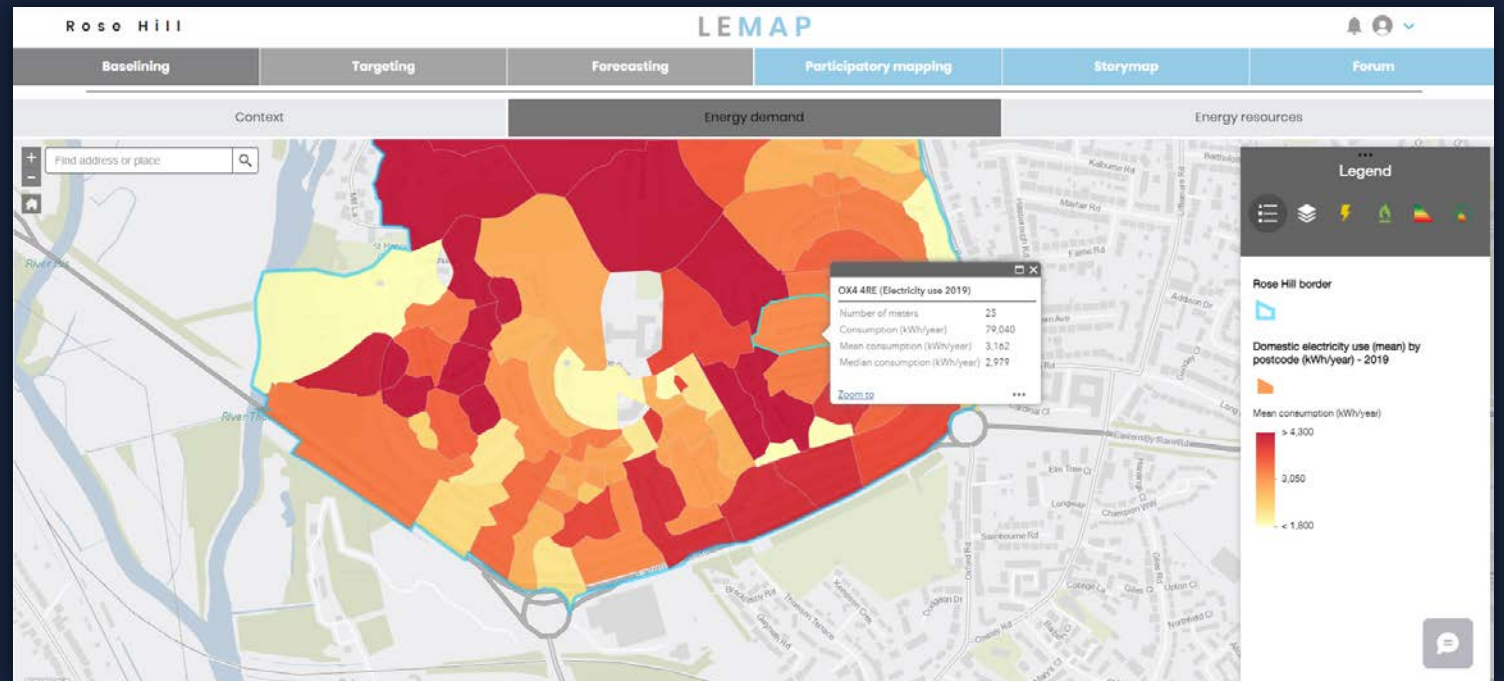
LEO energy mapping tools will:

- Support planning to make best use of electricity network
- Identify areas for targeted energy demand reduction programmes
- Identify areas for strategic, community and household renewables or storage

LEO integrated energy and land use mapping tool



Oxford Brookes University 'LEMAP'



# What is a Story Map?

ArcGIS StoryMaps is a **story authoring web-based application** that enables you to share your maps in the context of narrative text and other multimedia content.



ArcGIS Desktop



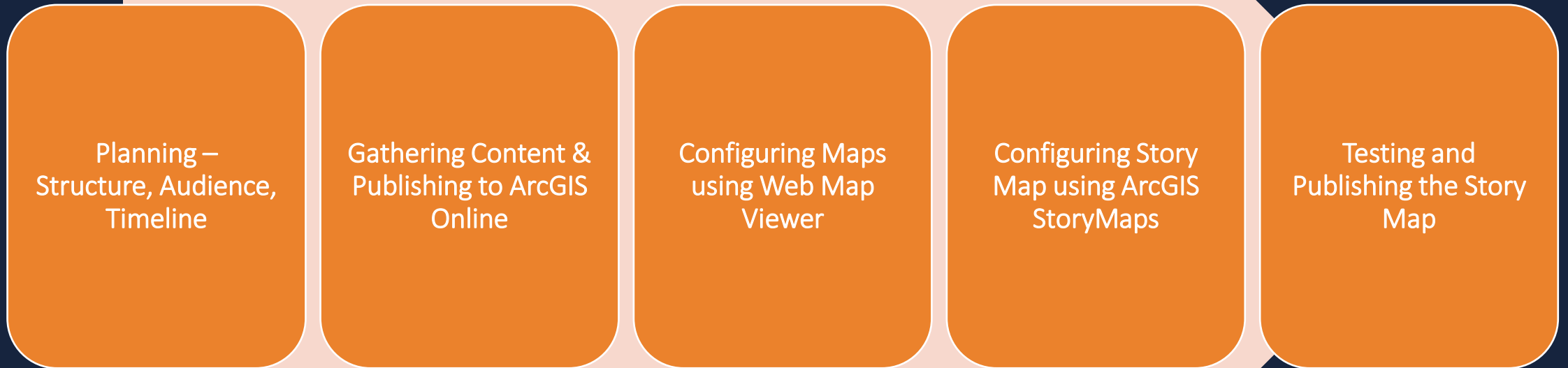
ArcGIS Online



ArcGIS StoryMaps

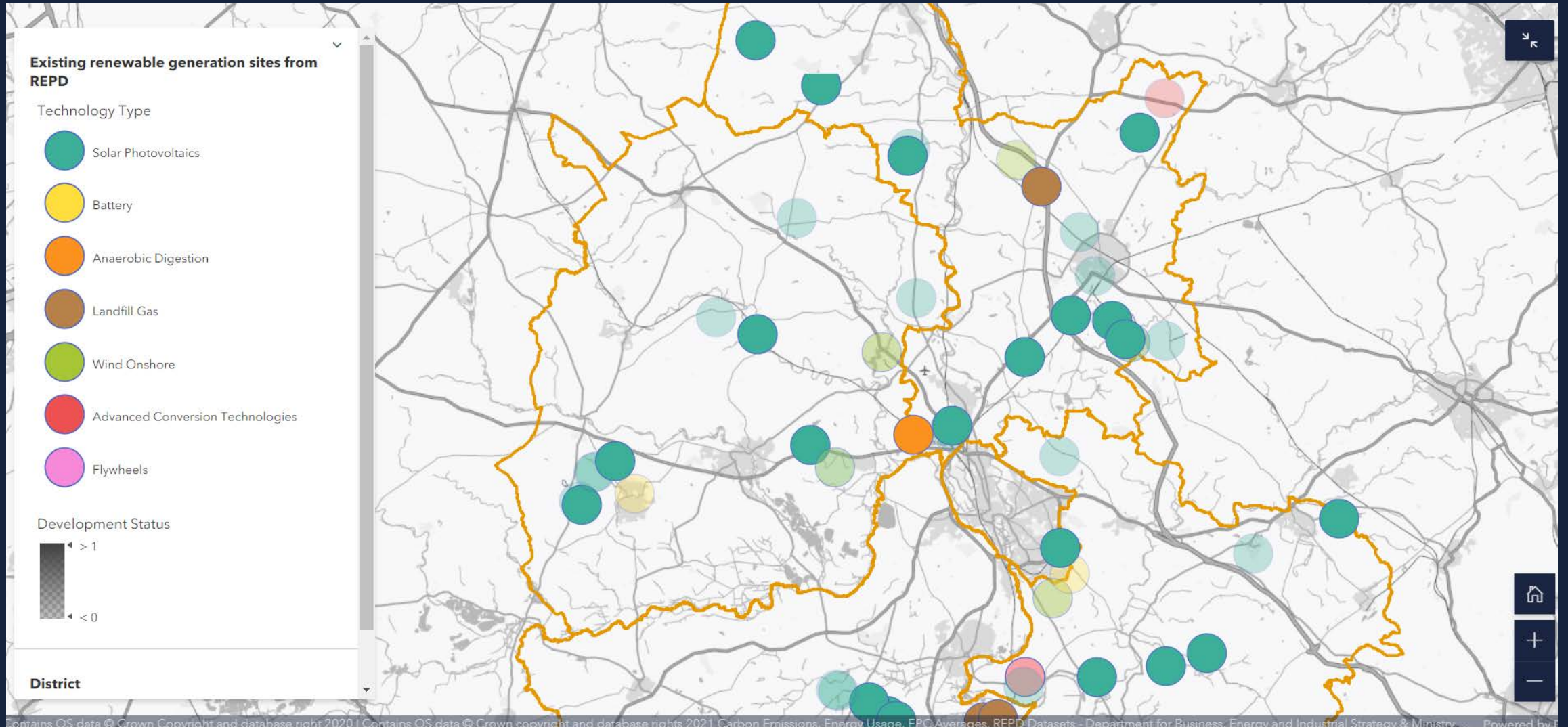


# How to build a Story Map...



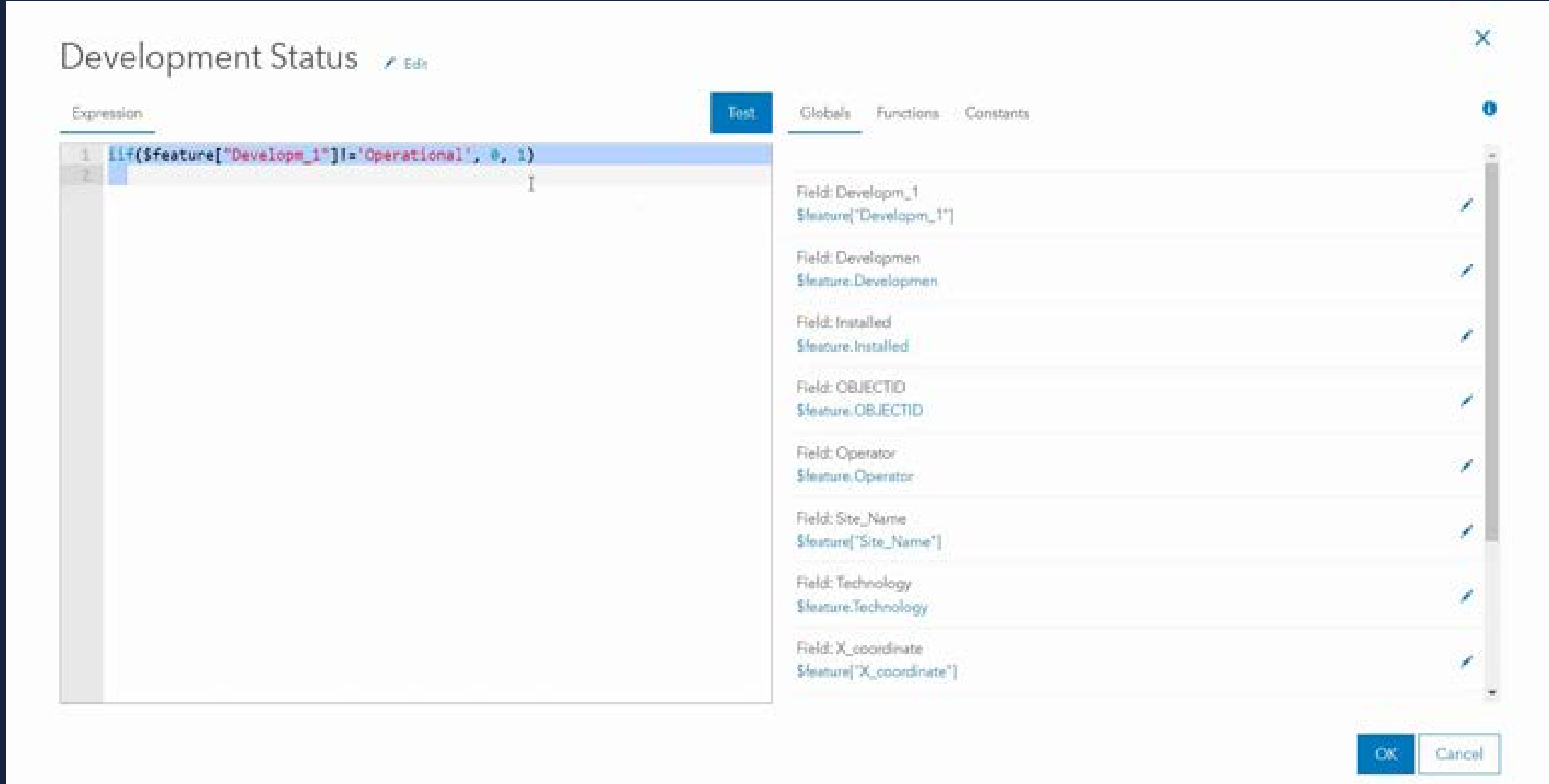
# Symbology

- Challenge: Symbolizing layers by multiple attributes



# Symbology

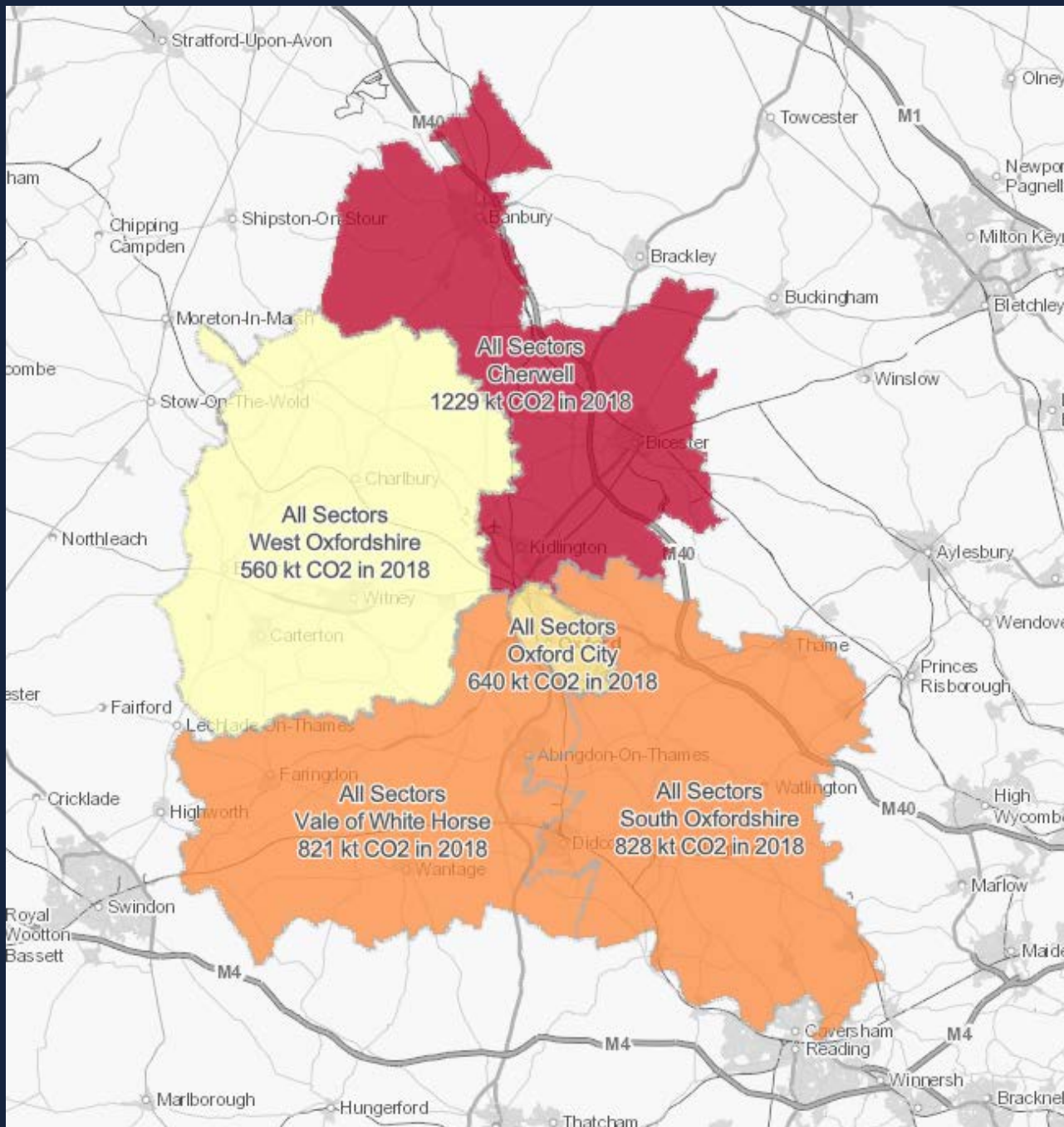
- Solution: Use the out of the box symbology tools and a short Arcade expression





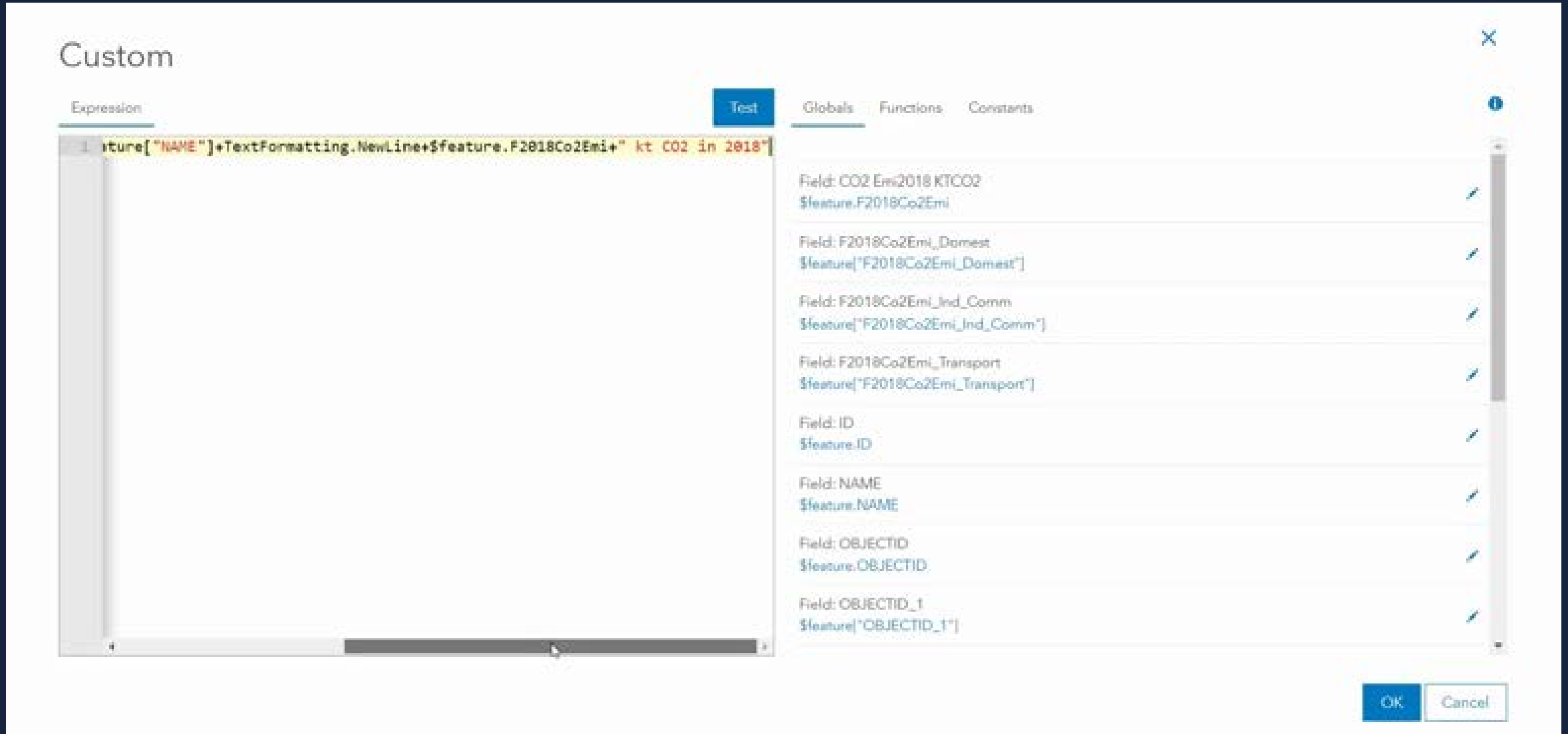
# Labelling

- Challenge: Labelling using multiple attributes on multiple lines



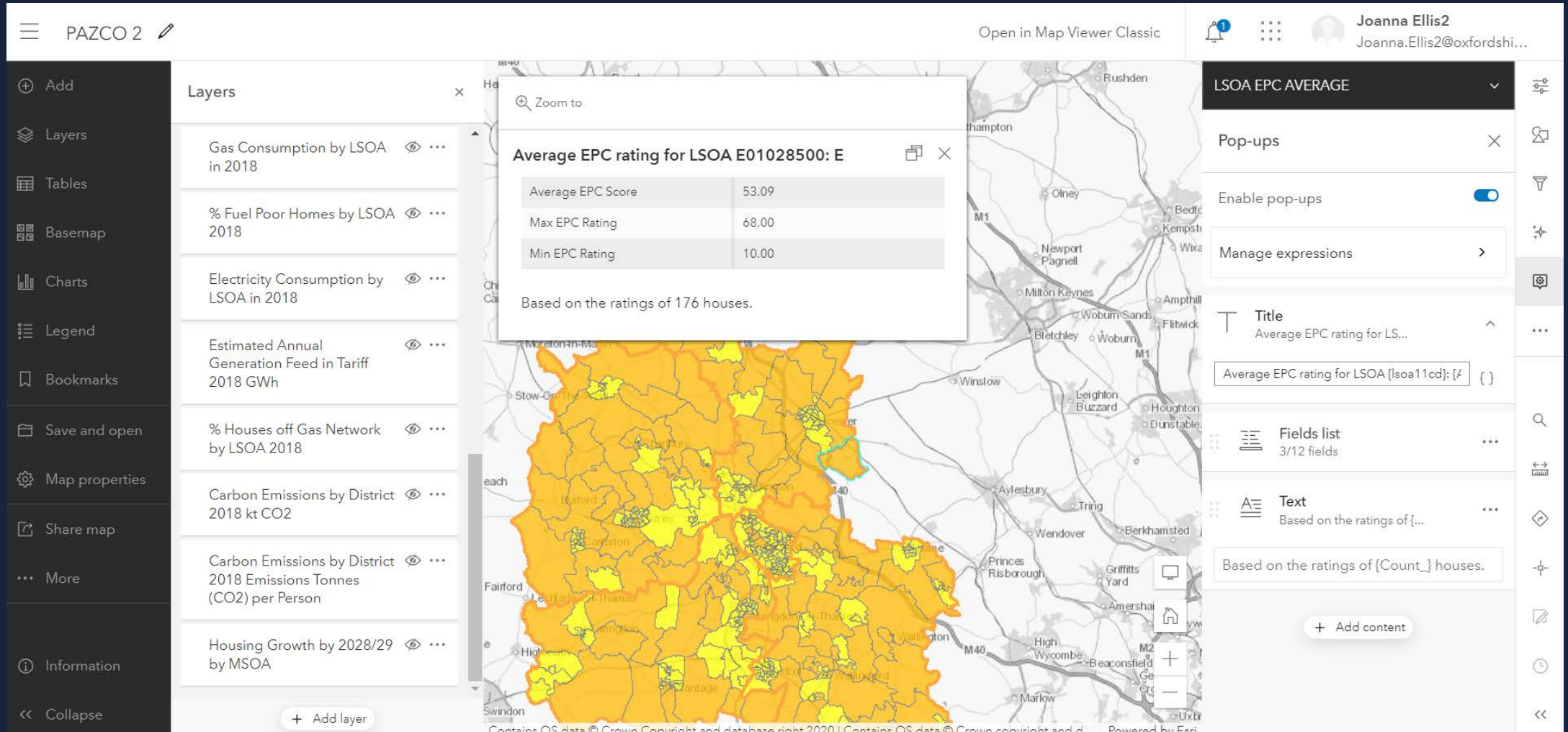
# Labelling

- Solution: Custom labelling using Arcade.



# Pop-ups

- Challenge: Conveying information in pop-ups that is easily understood
- Solution: Using out of the box multi-element pop-ups and embedding attribute information in written text





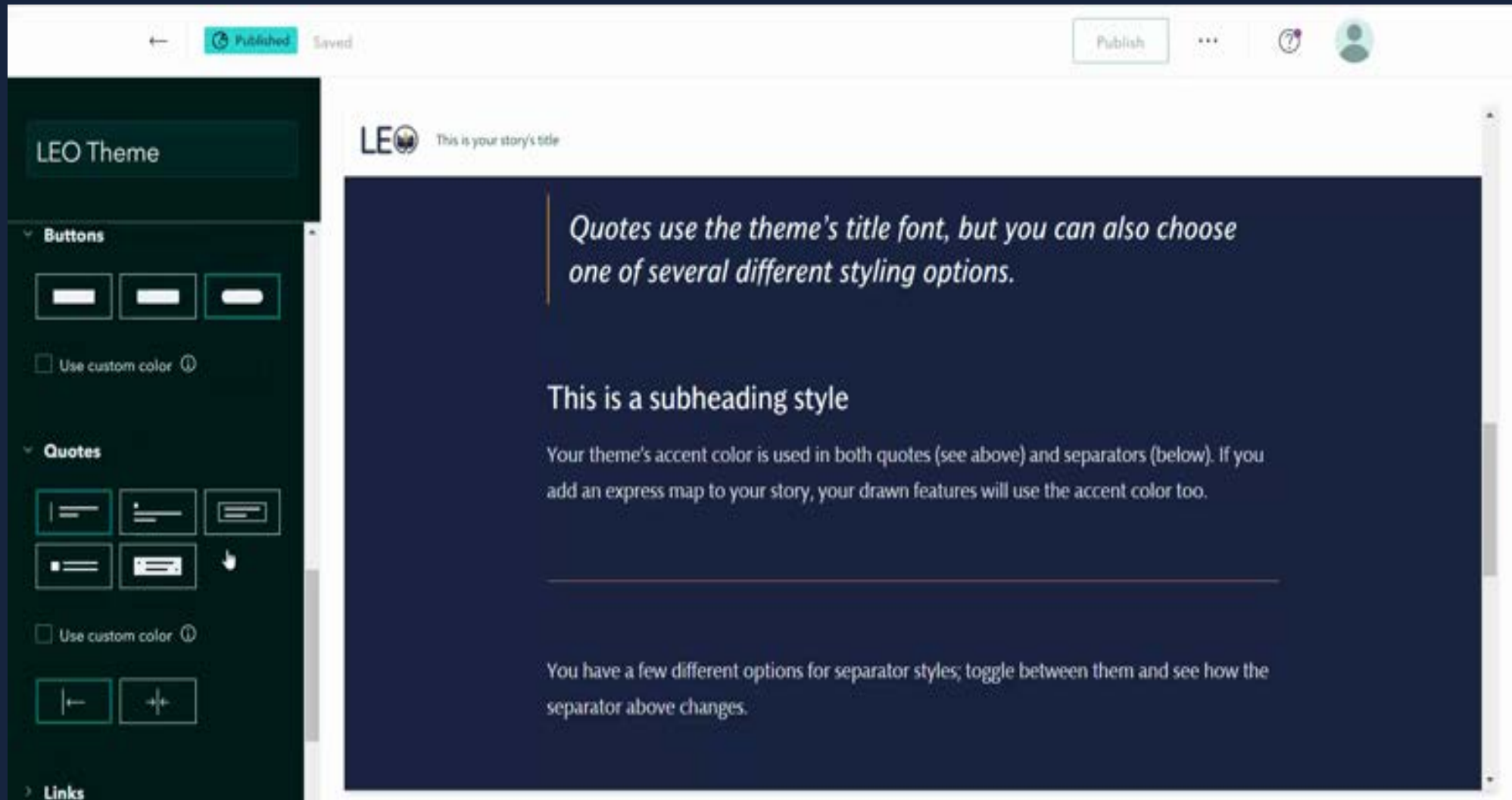
# Story Map Sections

- Switch between text and map Sections as you scroll through the story
- Quick navigation using the section headings in the navigation bar



# Styling the Story Map using Themes

- Creating a "LEO" Theme
- Matching colours exactly using Hex Codes



## For more information

On Project LEO - [Project LEO \(project-leo.co.uk\)](https://project-leo.co.uk)

To keep up to date with the project -  
[Stay Connected | Project LEO \(project-leo.co.uk\)](https://project-leo.co.uk)

Mapping queries to [inga.doherty@oxfordshire.gov.uk](mailto:inga.doherty@oxfordshire.gov.uk)

GIS queries to [joanna.ellis2@oxfordshire.gov.uk](mailto:joanna.ellis2@oxfordshire.gov.uk)

Gupta, R, Jimenez-Moreno, P, Donastorg-Sosa, A and Devine-Wright P (2021) Spatio-temporal mapping of local areas for engaging communities in the planning of smart local energy initiatives, *Proceedings of ECEEE 2021 summer study (virtual)*, 6-11 June 2021



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# Thank You

## Any Questions?



Local Energy Accelerating Net Zero

Funding is provided through the Government's Modern Industrial Strategy by Innovate UK, part of UK Research and Innovation.

