Mapping the energy transition

Inga Doherty
Oxfordshire County Council

Funded by
INDUSTRIAL STRATEGY
UK Research and Innovation

Project LEO – Local Energy Oxfordshire

Using Oxfordshire to replicate the **electricity system of the future**, taking a 'whole systems' approach:

- **asset based trials**
  - *eg Oxfordshire County Library chillers*
  - *vehicle to grid charging, hydro, solar PV*
- **place based trials**
- *Smart and Fair Neighbourhoods - showing how flexibility services can sit at the heart of a smarter, low carbon, locally balanced energy system*










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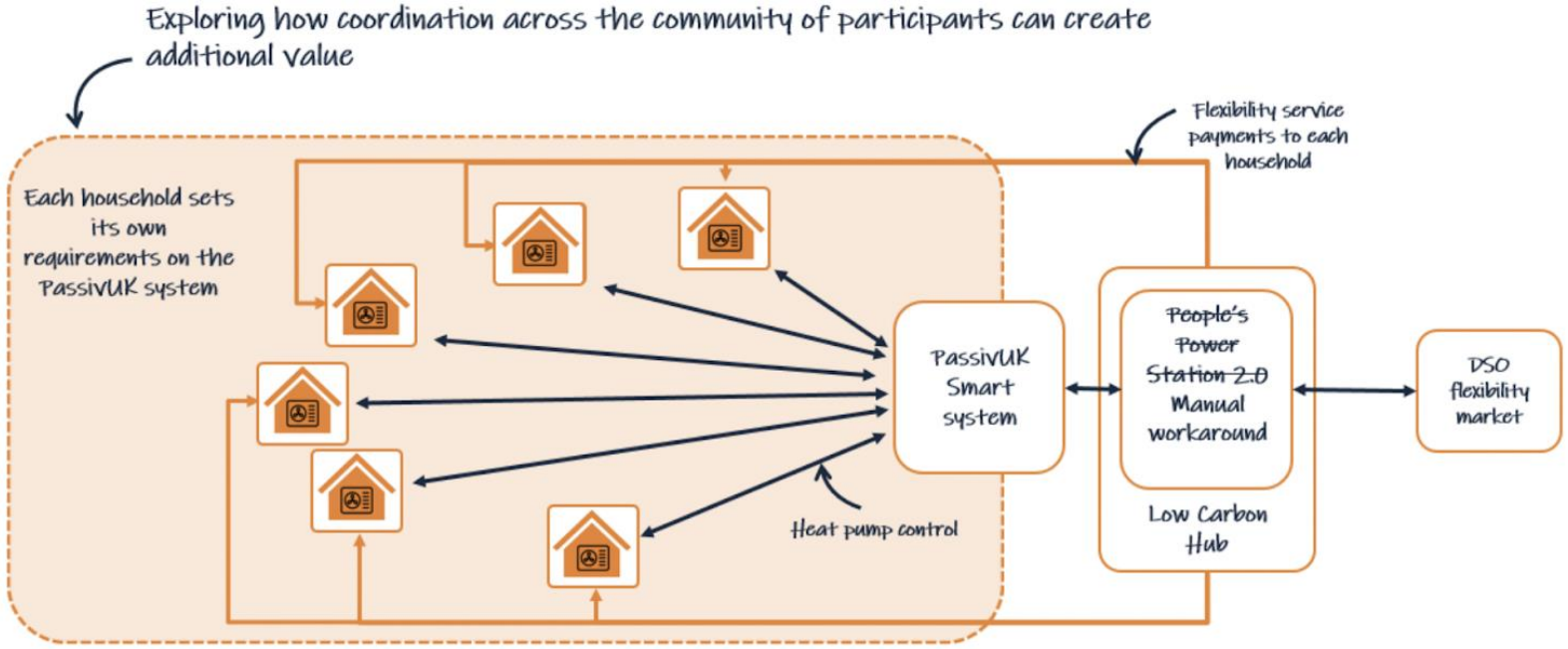
LEO's Smart & Fair Neighbourhoods

Deddington & Duns Tew HeatSaver

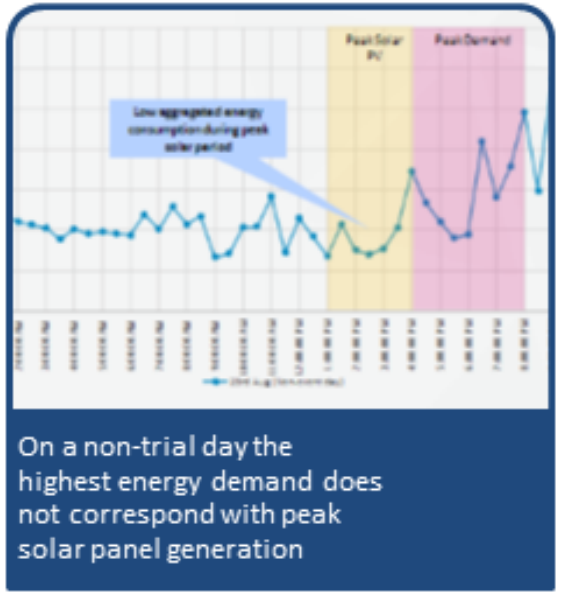
- Installing smart controls to new and existing heat pumps to enable participation in flexibility services



LEO’s Smart & Fair Neighbourhoods

Rose Hill SolarSaver

Implementation of a hyper-local Time of Use Tariff to encourage tenants to shift energy use to times of peak generation from community-owned solar



On a non-trial day the highest energy demand does not correspond with peak solar panel generation

On a trial day we saw a successful aggregated shift towards higher energy consumption during peak times

LEO's Smart & Fair Neighbourhoods

Osney Supercharge

- Coordinated monitoring and visualisation of data from multiple smart meters and Distributed Energy Resources
- Installation of 10 solar PV systems and 4 battery systems

Local pub with solar PV

Household EV charger

Street-facing solar PV

Osney Lock Hydro battery

Domestic battery

Domestic heat pump

LEO's Smart & Fair Neighbourhoods

Eynsham Smart and Fair Futures

Developing a Zero Carbon Energy Action Plan for a primary substation area where new development will double the size of the existing population and number of houses

The first pilot **CAPZero**, 'Community Action Plan for Zero Carbon Energy' is a Local Area Energy Plan that shows what is needed to balance electricity supply and demand behind the primary substation.

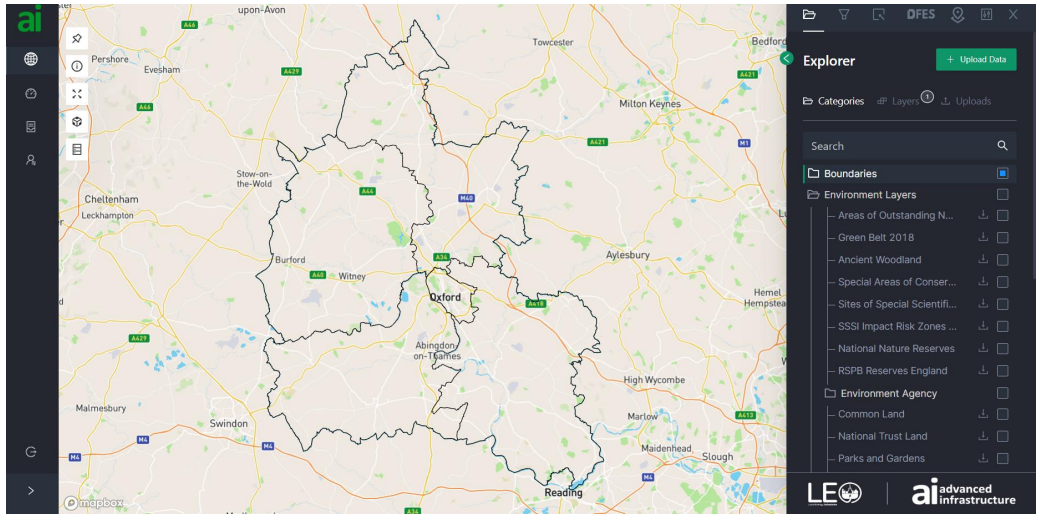
LEO's Marketplace

- Developing a local (Oxfordshire) energy flexibility marketplace.
- SSEN (Distribution Network Operator) ran regular auctions for services it would like to procure to support the operation of the network.
- Organisations also use the marketplace to make the best use of their existing connections, by buying and selling spare capacity.

LEO Mapping and Data

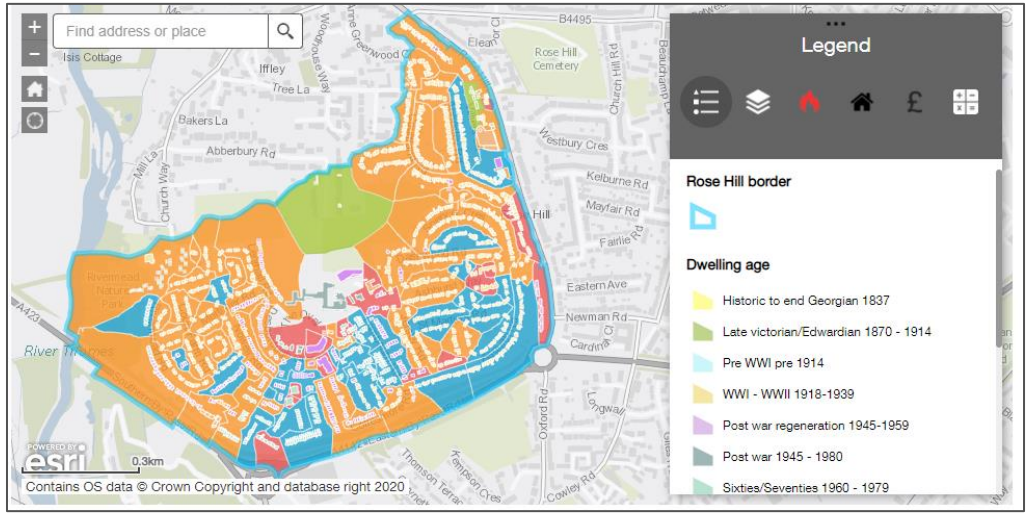
LEO Strategic Energy Mapping – LAEP+

Supporting strategic scale energy planning



LEMAP - Local Area Energy Mapping

Participatory mapping for community groups



Local Area Energy Plans are vital to achieve Net Zero

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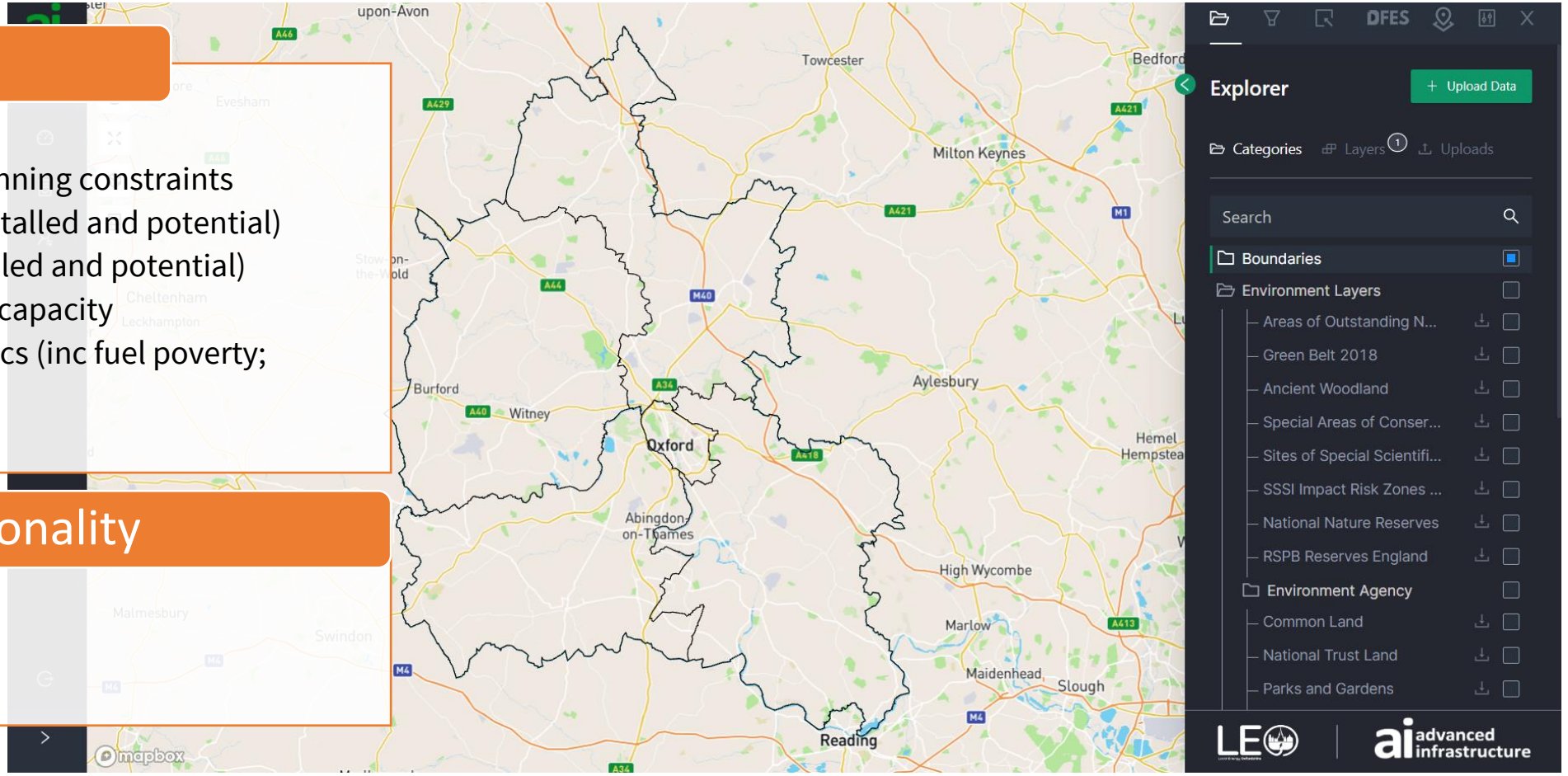
LEO energy mapping - understanding place

Data

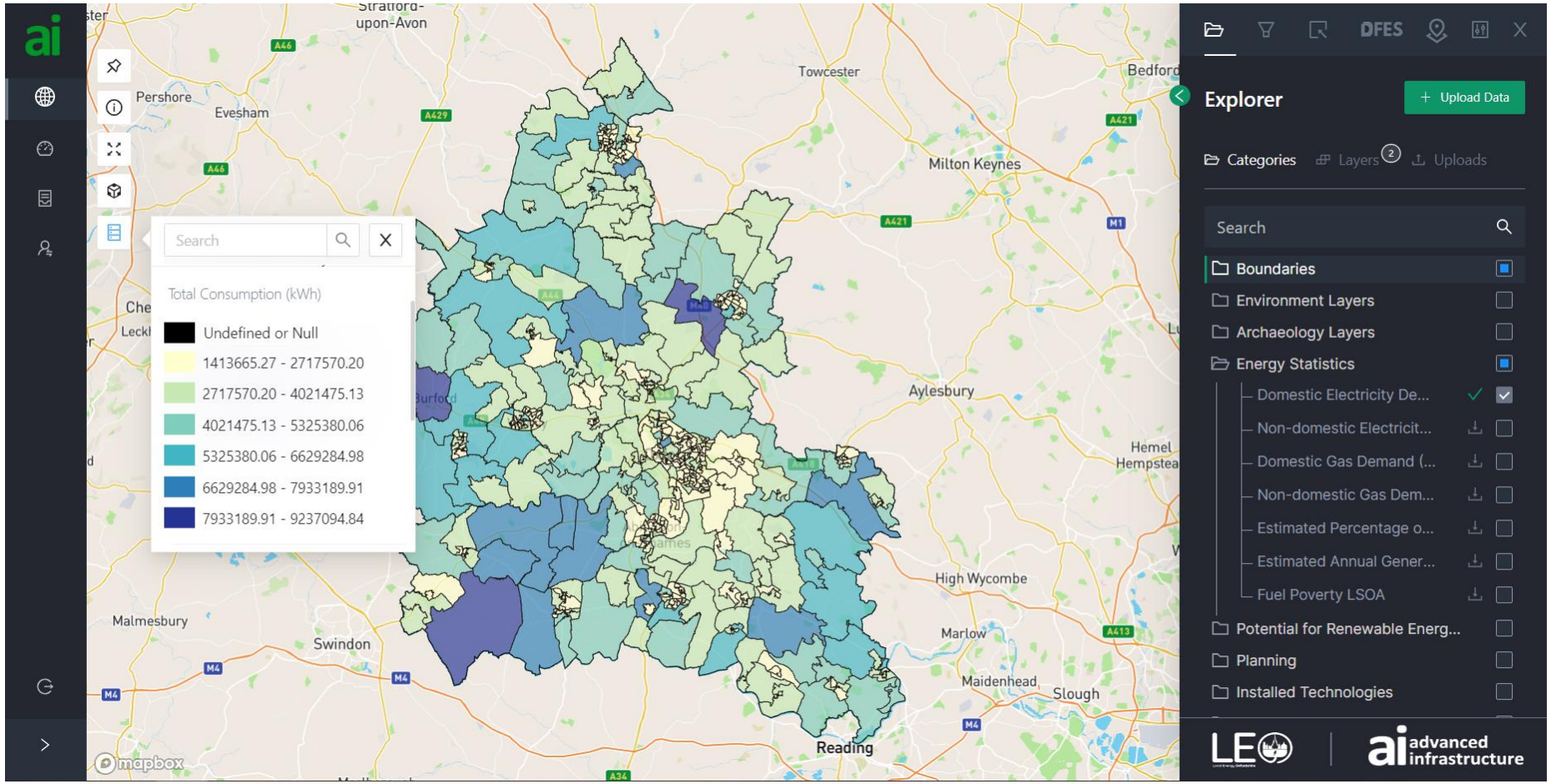
- Energy demand; generation
- Planned housing growth; planning constraints
- Low carbon technologies (installed and potential)
- Renewable generation (installed and potential)
- Network data, including grid capacity
- Socio-economic characteristics (inc fuel poverty; deprivation)
- DFES

Features and functionality

- Data filters
- Dashboards
- Data stories



Setting the baseline



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Setting the baseline – on or off-gas

Energy Networks

Off Gas Postcodes

For 339 postcodes in Oxford City, Xoserve holds no record of a gas connection. Any buildings within these postcodes are likely served by alternative heating sources such as oil, wood or electric heating. These areas represent good locations to deploy electric heating sources.

Setting the baseline – understanding communities

Fuel Poverty

In 2020, there were an estimated 13.2% of households (3.16 million) in fuel poverty in England under the Low Income Low Energy Efficiency (LILEE) metric, down from 13.4% in 2019 (3.18 million).

According to the same BEIS 2020 fuel poverty statistics (published April 2022), 11% of households in Oxford City are in fuel poverty. Oxford has a higher rate of fuel poverty than the other districts in Oxfordshire where the overall proportion of households in fuel poverty is 8.1%

Number of households	Number of households in fuel poverty	Proportion of households fuel poor (%)
60,19	6,651	11.0

Across 80 LSOAs in Oxford, 8 had fuel poverty rates of over 20%. 75% of LSOA have fuel poverty rates between 3% and 13%. LSOA Oxford 016E (LSOA code: E01028576) has the highest proportion of fuel poor households at 22.9%

The charity National Energy Action has estimated that price rises in 2021 and April 2022 will lead to an increase in the number of households in fuel poverty (under a different definition to the LILEE metric) of more than 50%.

Setting the baseline – understanding communities

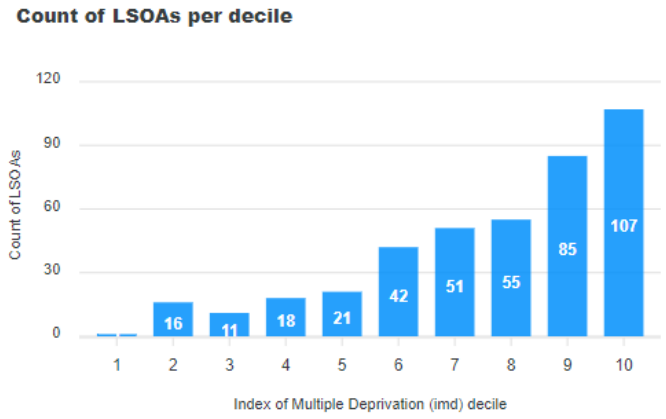
Indices of Deprivation

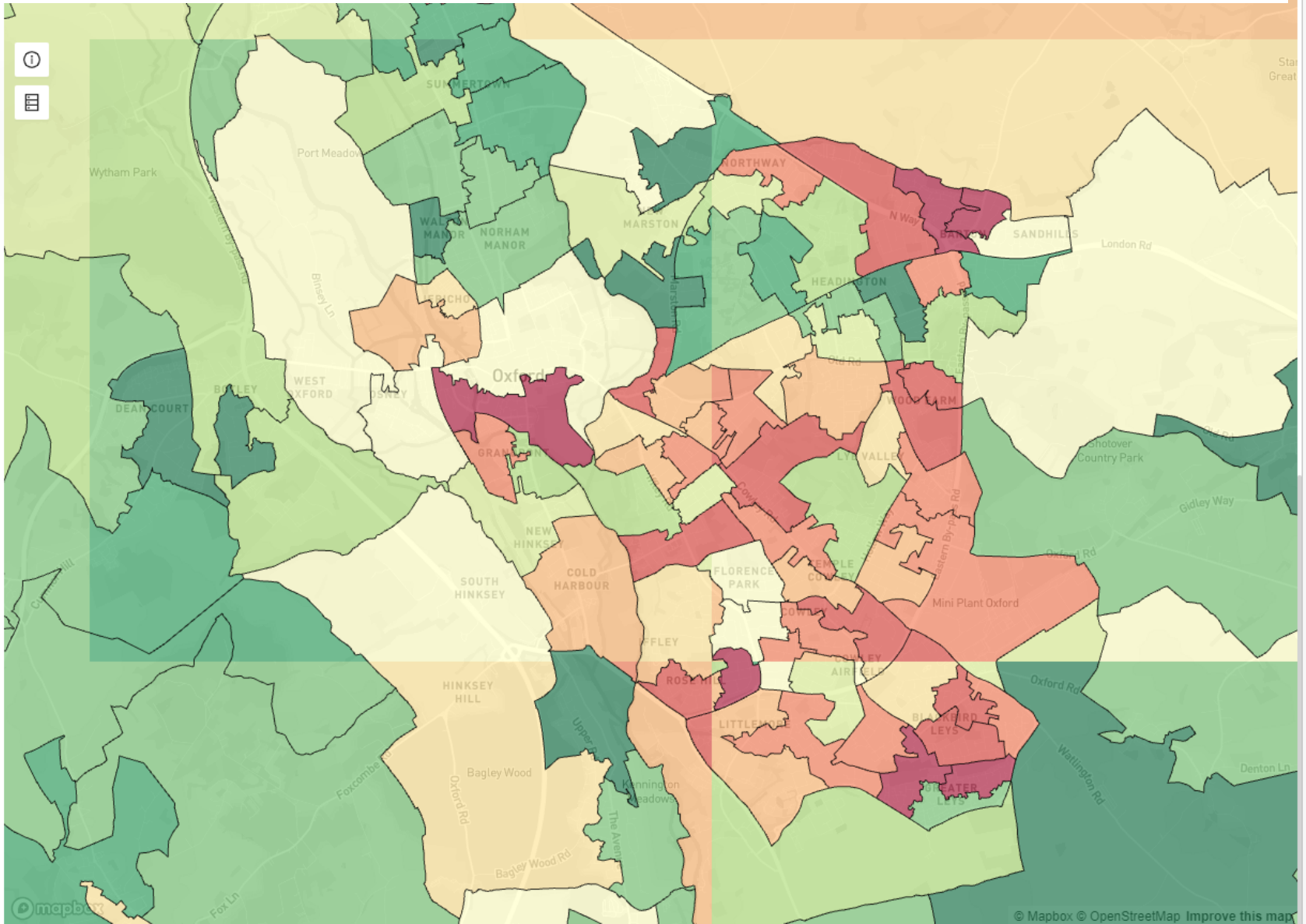
The English Indices of Deprivation measure relative deprivation across 32,844 small areas in England called lower-layer super output areas (LSOAs). The index of multiple deprivation is the most widely used of these indices

The population weighted average of the combined ranks of LSOAs in Oxford is 13634.79. This population weighted average ranks Oxford at 189 out of 317 district authorities. The nature of this measure – using all areas, and using ranks rather than scores – means that a highly polarised larger area would not tend to score highly, because extremely deprived and less deprived LSOAs will 'average out'. Conversely, a larger area that is more uniformly deprived will tend to score highly on the measure.

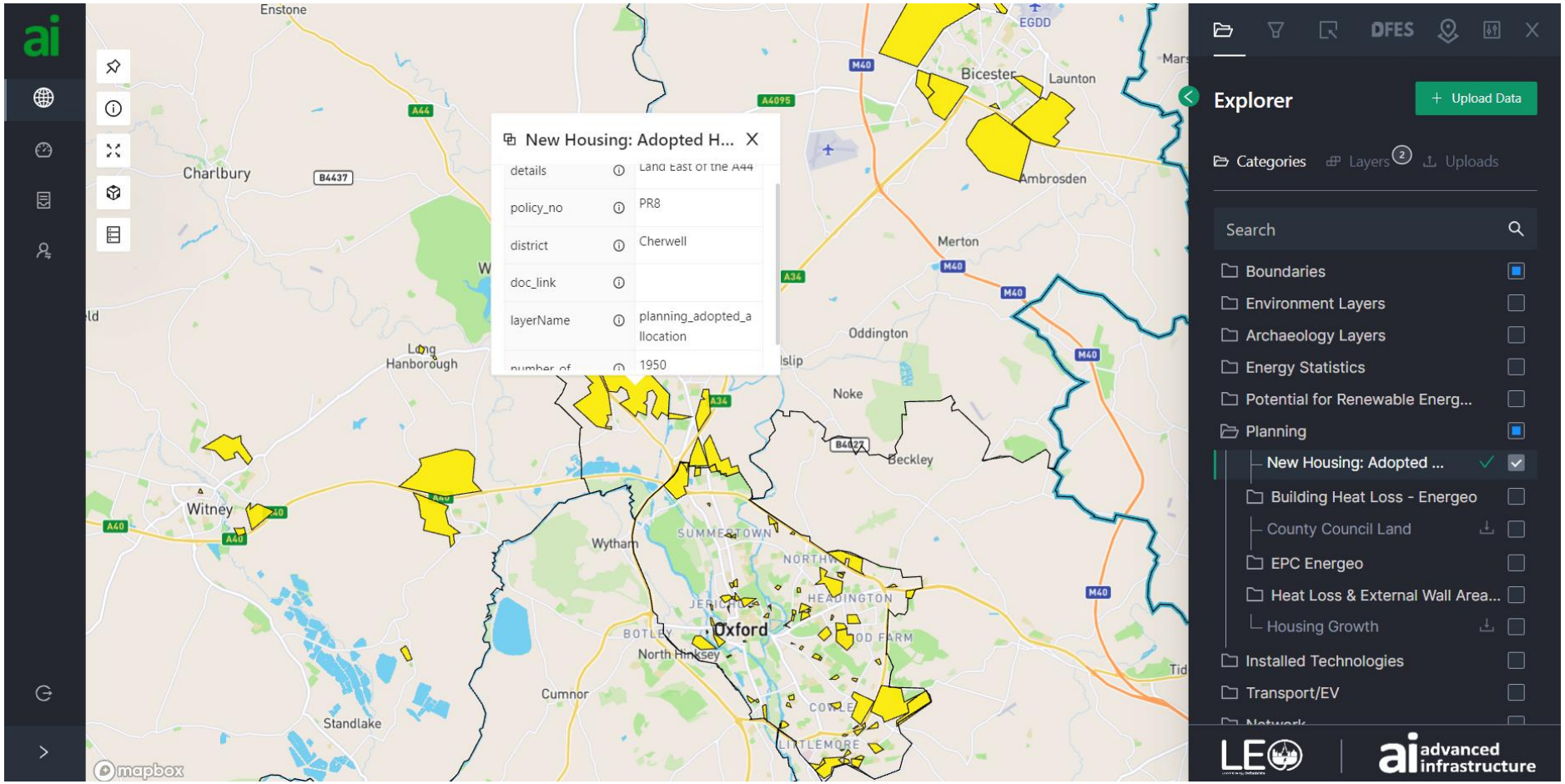
In addition to overall rank, the English Indices of Deprivation divides English LSOAs into 'Deciles'. All 32,844 LSOAs are grouped into 10 bands (deciles), each containing 10% of the LSOAs. Decile 1 contains the 10% most deprived LSOAs in England.

Oxford City has one of the top 10% most deprived LSOAs in England and eleven of the 10% least deprived LSOAs in the country.





Planning for change - growth



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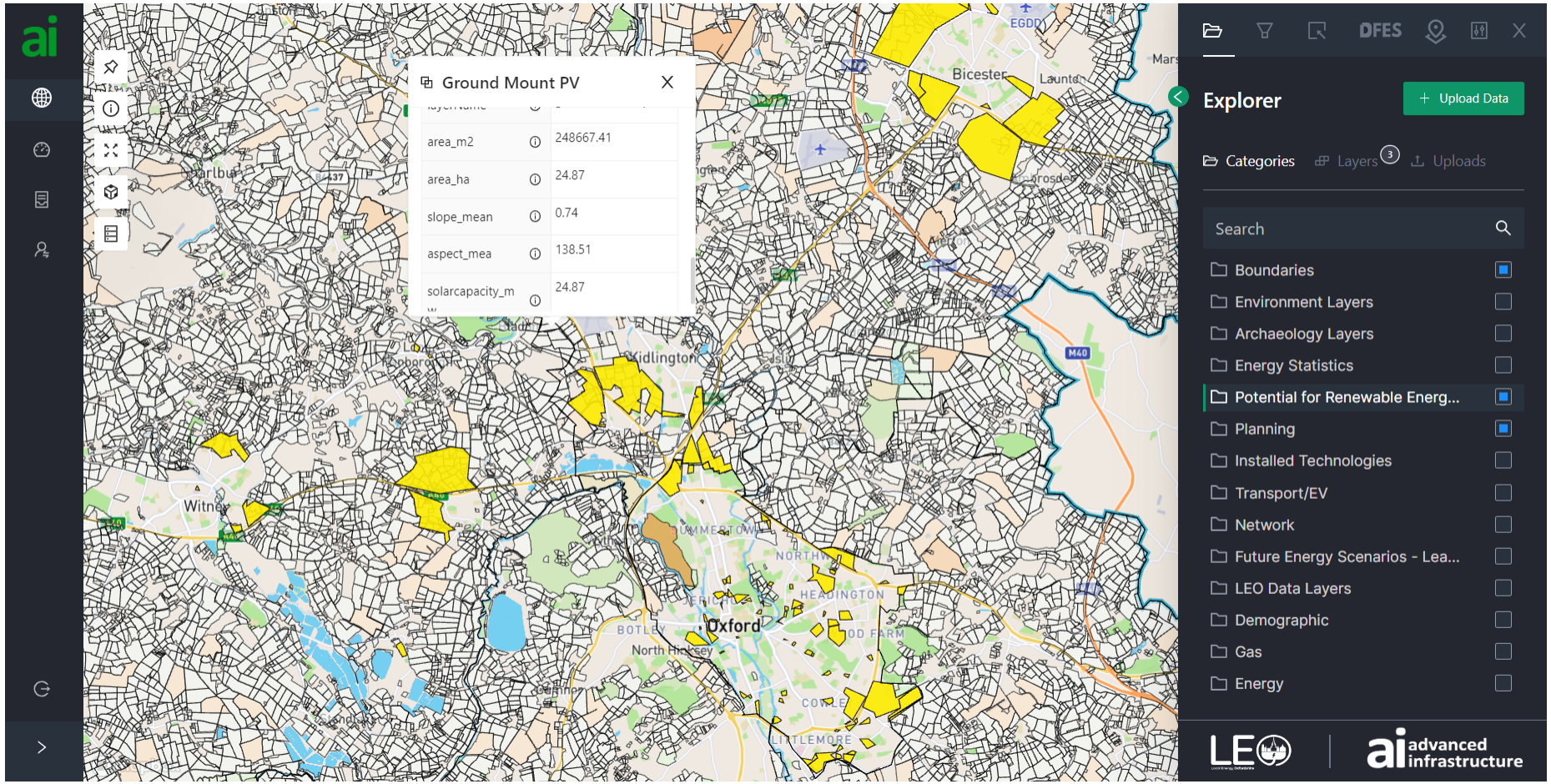
Planning for change – increasing renewables



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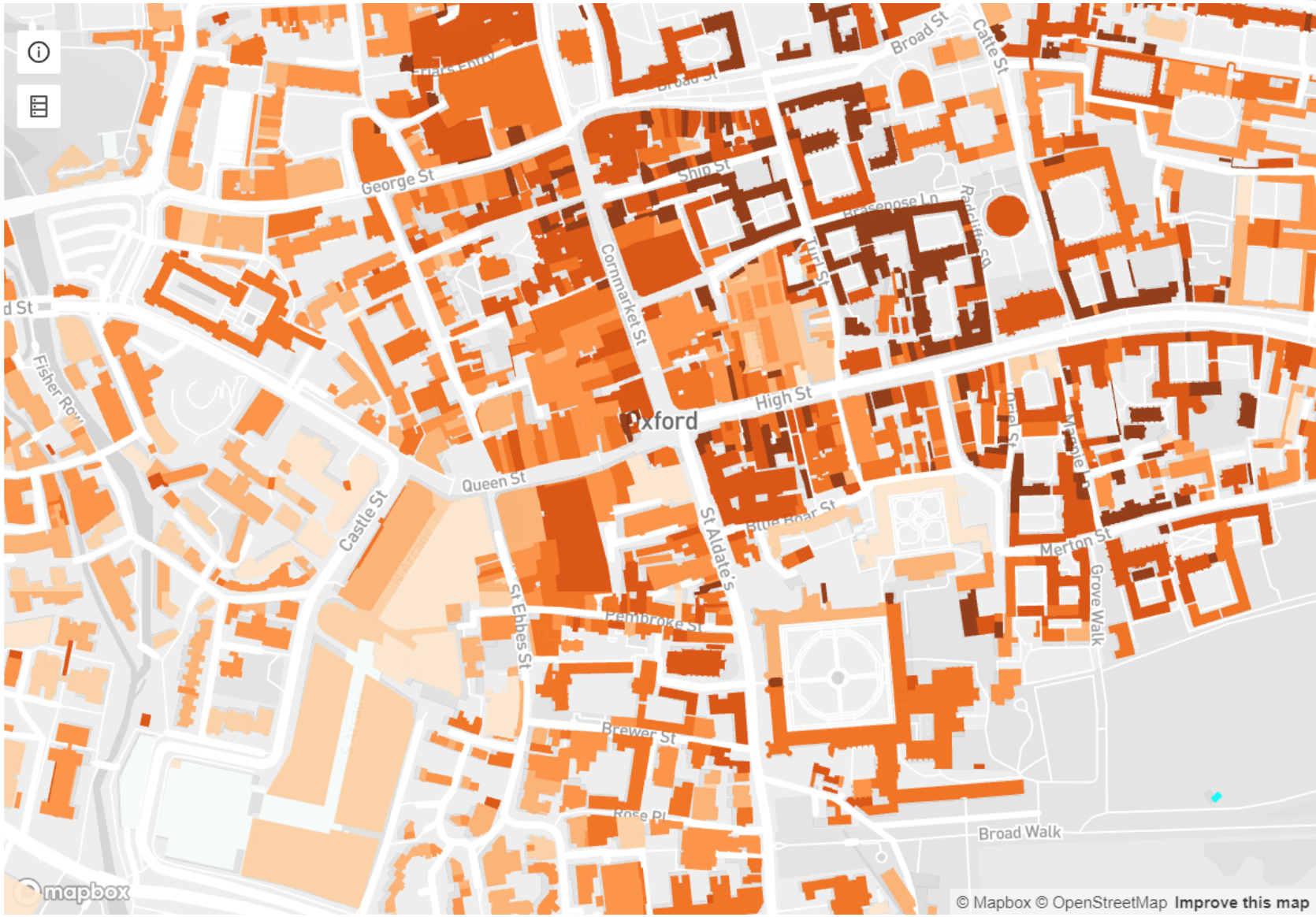
Planning for change –reducing demand

Buildings

Heat Loss

Detailed surveys of building heat loss can help identify opportunities to improve energy efficiency by highlighting particularly inefficient buildings.

This Energeo dataset, shown on the map opposite, uses aerial thermal imaging taken in 2020 to provide an overview of heat loss across Oxfordshire's market towns, including Oxford City.



Planning for change – building decarbonisation

Retrofit Potential

Low Carbon Heating Potential

Low carbon heating sources like heat pumps, district heating and hydrogen will be required to hit net zero targets.

The LEO-LAEP+ platform includes data on the existing gas network, including the gas pipe topology and material, as well as off gas home records. There are 339 postcodes with no gas connection in Oxford

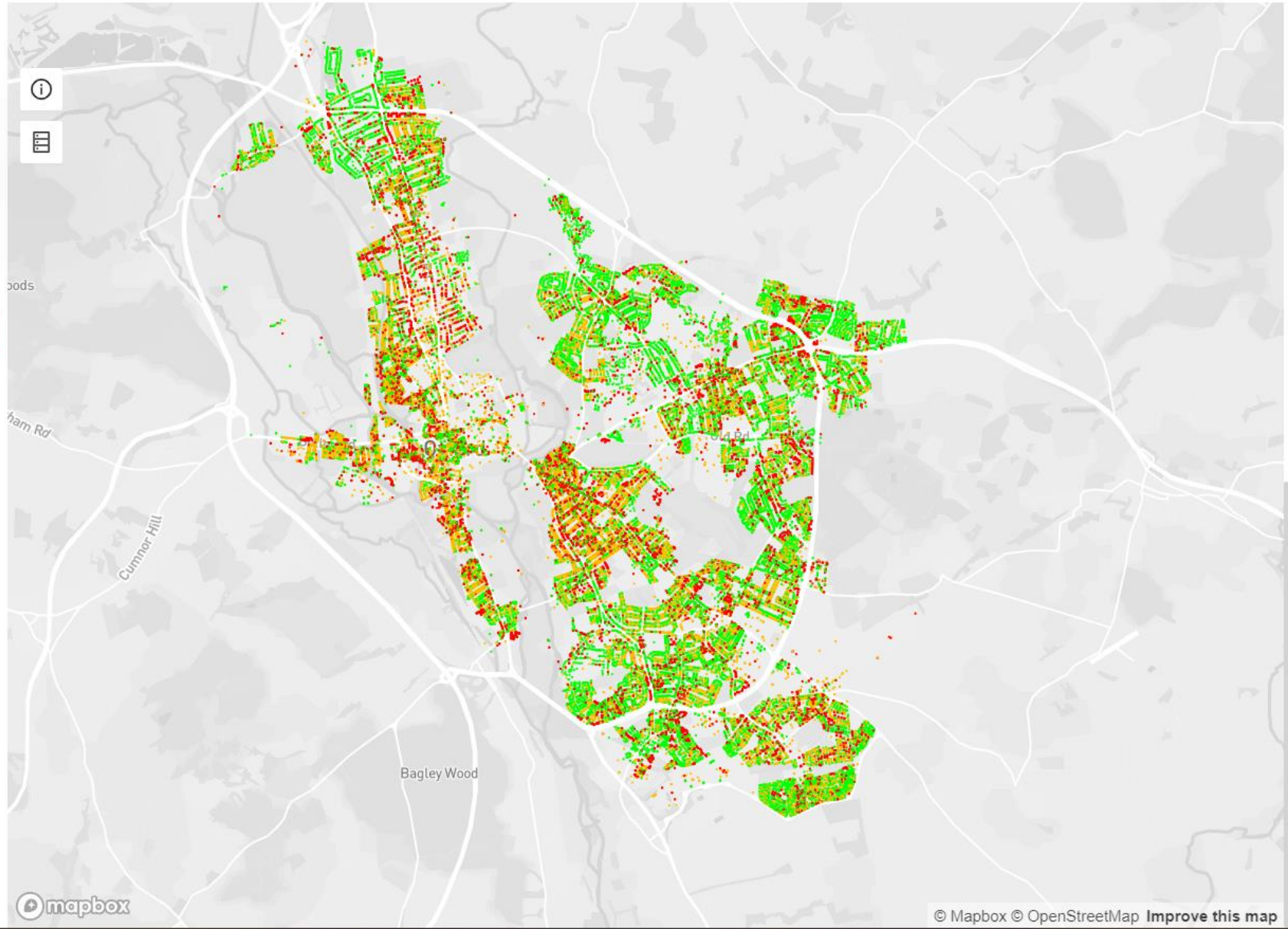
Desktop studies of low carbon heating potential for domestic properties across Oxfordshire have been provided by Energeo and the Energy Systems Catapult (ESC) for project LEO. These include:

1. ESC, Potential for air source heat pumps
2. ESC, Potential for ground source heat pumps
3. Energeo, Potential for ground source heat pumps

The map opposite shows the potential for air source heat pumps within Oxford City.

Across Oxford, ESC categorised 80,639 buildings according to likely suitability for an air source heat pump based on garden size, distance from neighbours and potential noise disruption

Likely suitable (green)	Uncertain (amber)	Likely unsuitable (red)
30848	22220	27571



Planning for change – electric vehicles

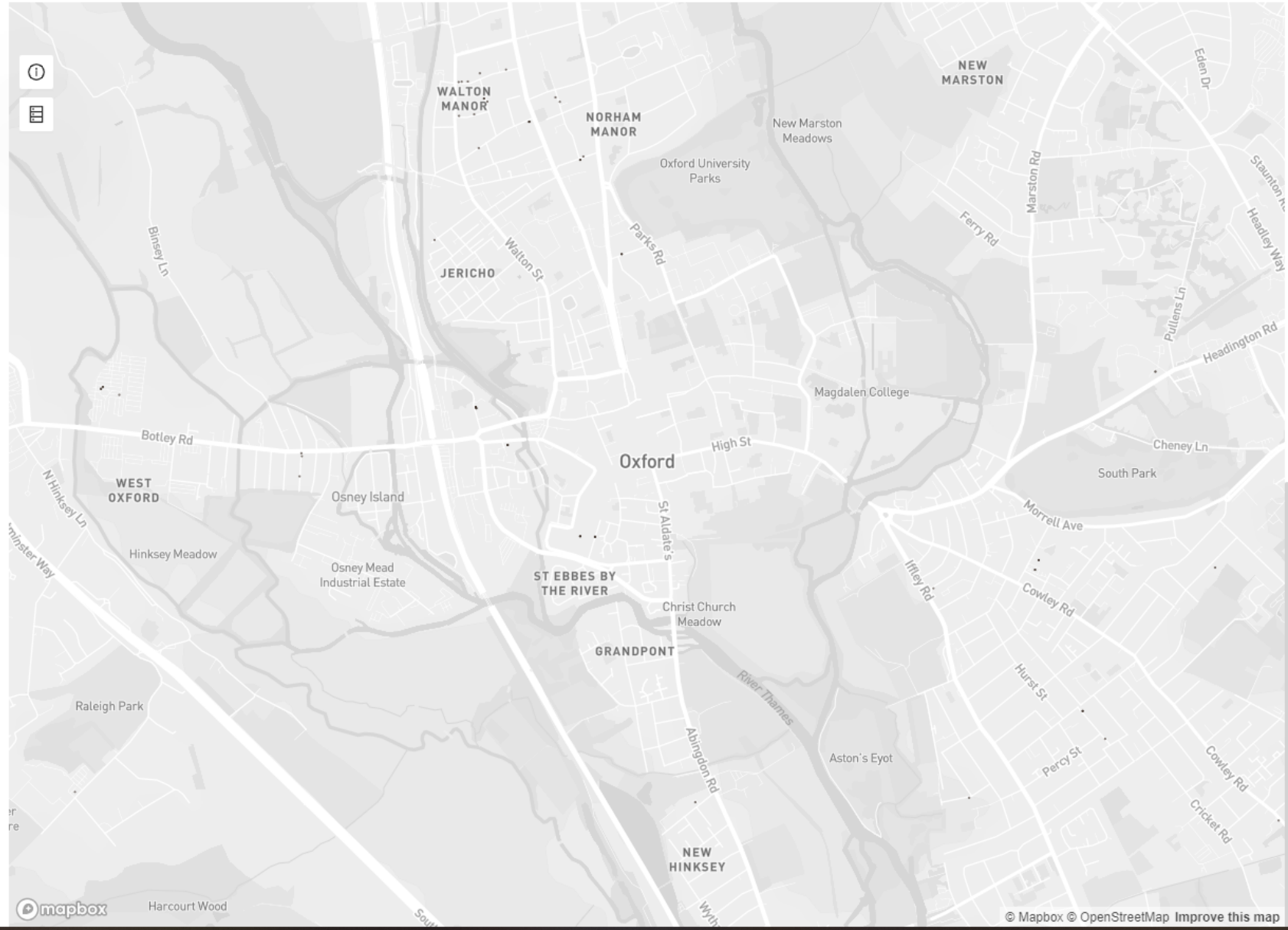
Transport

Existing EV Charge Points

As of 1 October 2022, Oxford City has 141 charging devices.* This is equivalent to 93 devices per 100,000 people. 31 of those devices are rapid chargers or higher. This puts Oxford in the top 20% of local authorities for charging infrastructure in the UK. These statistics are provided by DfT, using data on charging infrastructure from ZapMap and population statistics from the ONS.

As of Q3 2022, there are a total of 794 plug-in cars registered in Oxford City and 468 hybrid plug-in cars. Across Oxfordshire, there were 8,550 plug-in cars and 4,461 hybrid plug-in cars (24 May 2022, DfT and DVLA).

Note: A charging device may have more than one charging connector and be able to charge more than one vehicle at a time, therefore these figures do not reflect overall charging capability.



Planning for change – electric vehicles

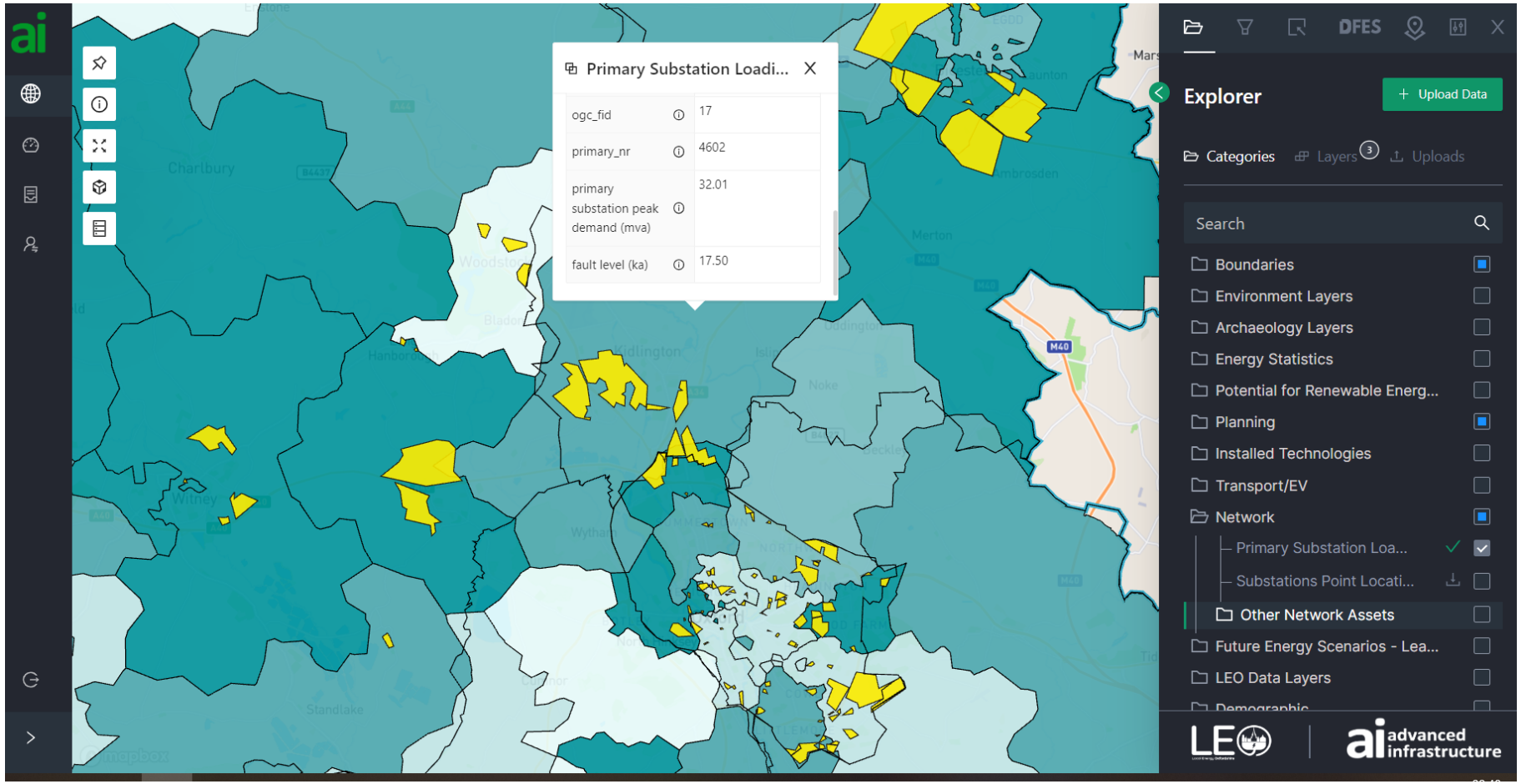
Transport

Space for Off Street Parking

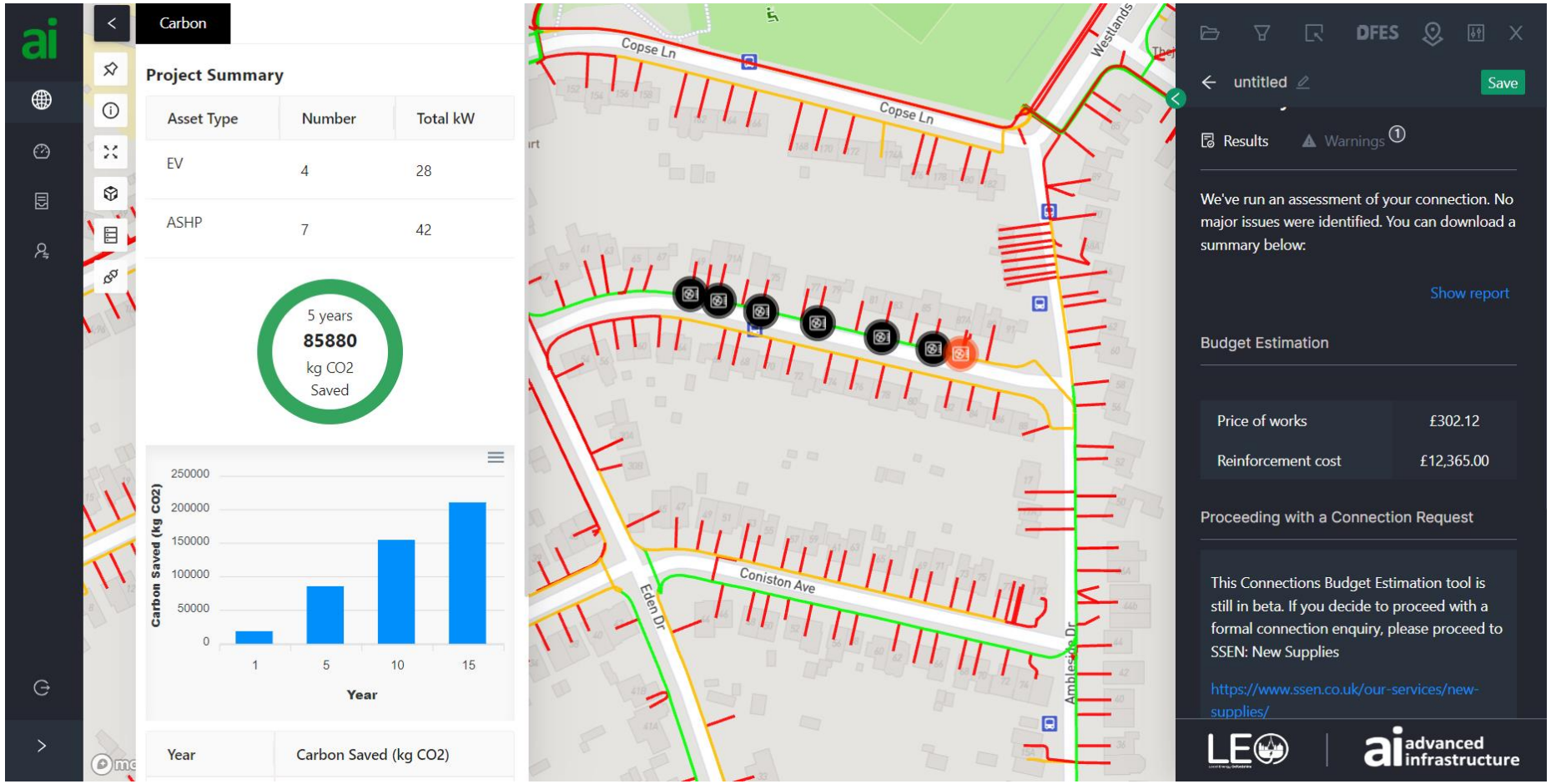
Energy Systems Catapult provided Project LEO with a desktop study assessing the probability that domestic properties have space to park an average size vehicle within the property boundaries

Based on an assessment of available space at 31,553 domestic properties: 26,977 domestic properties were deemed to have space the park at least one car off-street. 4,576 domestic properties were ruled as unsuitable for off-street parking due to lack of available space. These homes likely use on-street parking or local car parks and will require access to some form of public or on-street EV charging infrastructure in future.

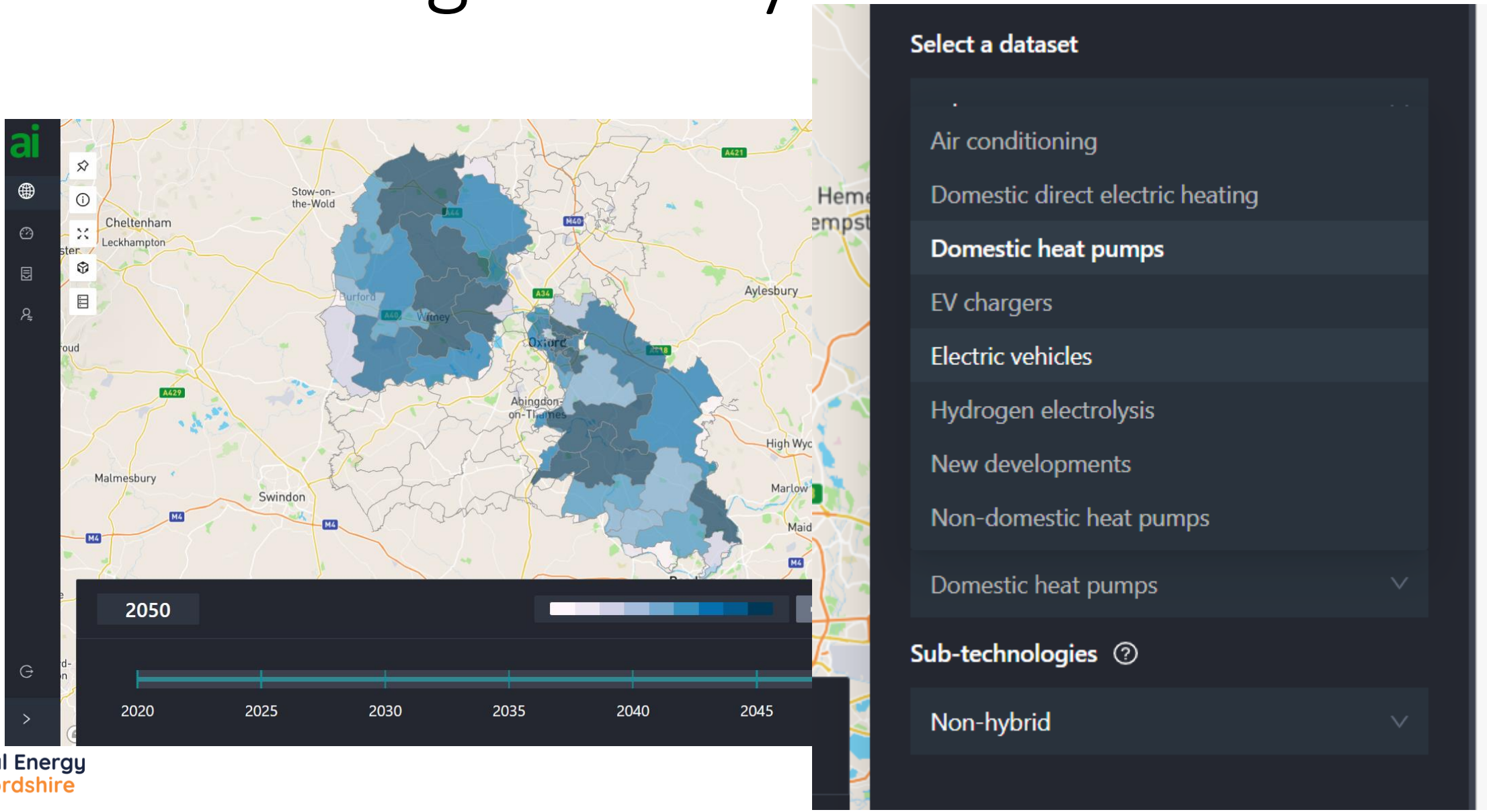
Network capacity (primary)



Identifying projects and network capacity



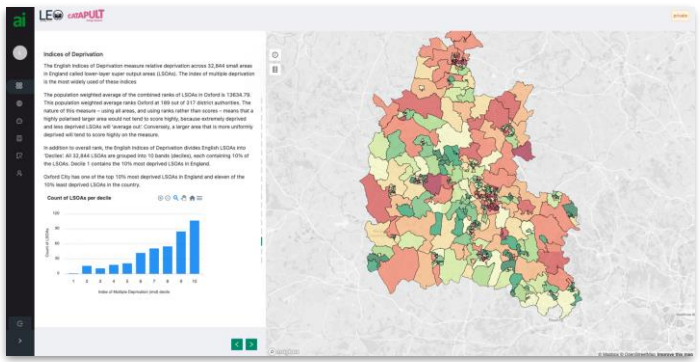
DFES – leading the way

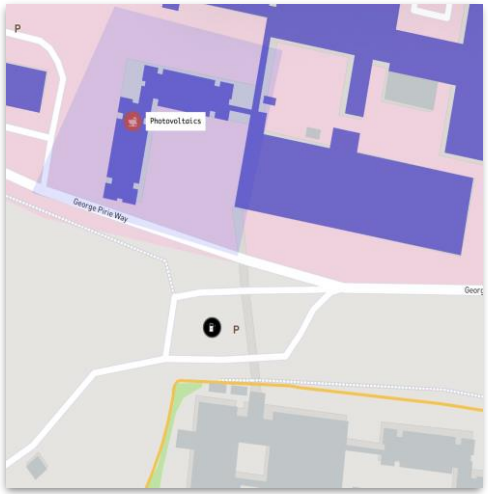


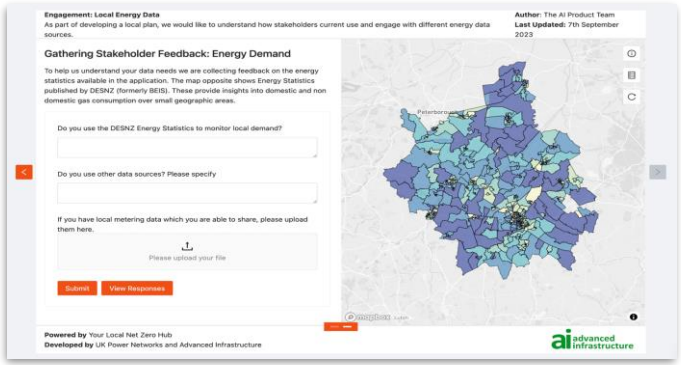
Local Energy Oxfordshire

Ongoing development – LAEP+

- Advanced Infrastructure also working directly with SSEN (RESOP, LENZA) UKPN (Project CLEO) and NGED
- Enhanced functionality - optioneering, carbon & cost estimation, scenario analysis and connection assessments.

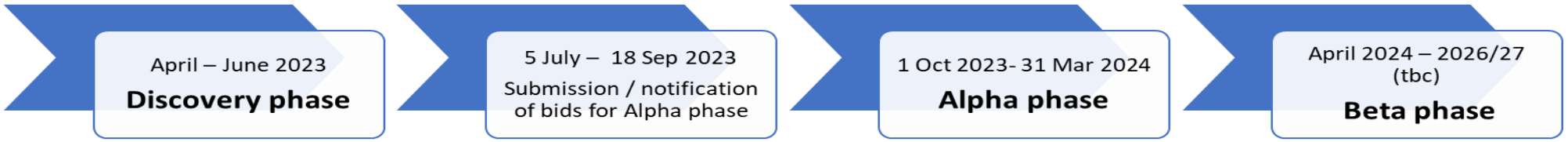






LEON
(Local Area Oxfordshire- Scaling the Neighbourhood)

- Funded by Ofgem STRATEGIC INFRASTRUCTURE FUND – SIF



Scottish & Southern Electricity Networks

low carbon hub
WORKING TOGETHER TO MAKE A MASSIVE CHANGE IN THE ENERGY SYSTEM

OXFORD CITY COUNCIL

LEO

UNIVERSITY OF OXFORD

OXFORDSHIRE COUNTY COUNCIL

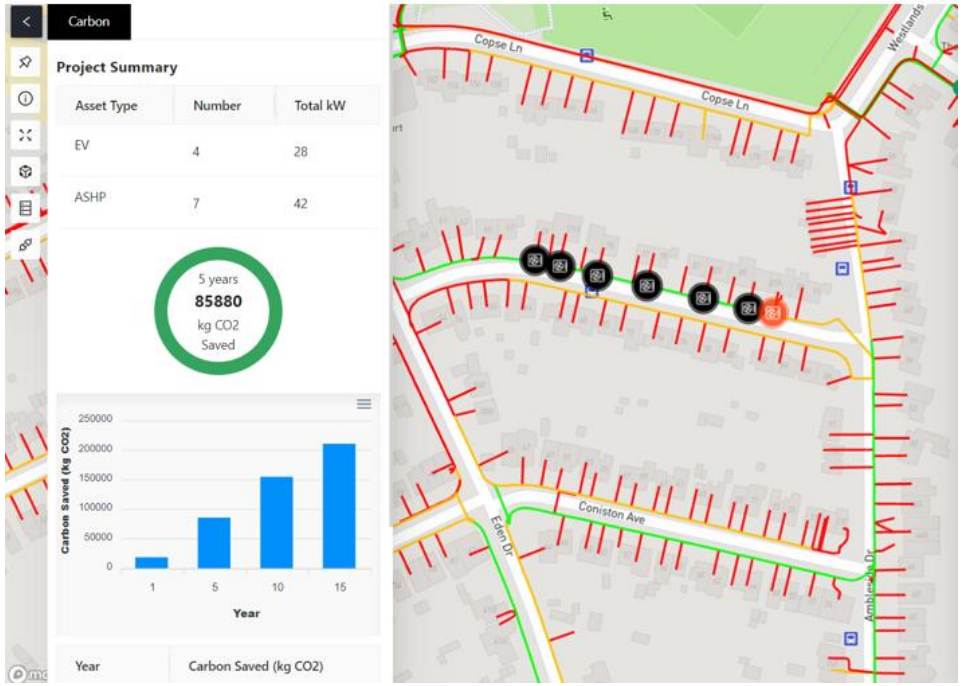
Baringa
Brighter together

LEO – accelerating the transition to net zero

Smart local energy systems

Local energy market

Mapping for
Local area energy planning



LEO – Toolkit for Net Zero

- DSO market development
- Investable business models
- Skilled community of people
- Trialling flexibility
- Mapping for Local Area Energy Plans

Local Energy Oxfordshire

[Project LEO Final Report: A digest of key learnings - Project LEO (project-leo.co.uk)]

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Reflections on Project LEO

Through collaborative, cross-sector working, LEO has demonstrated some of the ways changes to our energy system can accelerate our transition to Net Zero, bringing about social, economic, and environmental benefits for all.

Partners' Reflections | Project LEO – YouTube

Smart & Fair Neighbourhoods

Thank You

To find out more visit us

https://project-leo.co.uk/

Contact us at:
inga.doherty@oxfordshire.gov.uk