

# Specification Document: Detailing heat network zoning, industrial cluster and hydrogen potential data sets and their applicability within LAEP+

13 Aug 2025

## Deliverable

D2.3	Specification document detailing heat network zoning, industrial cluster and hydrogen potential data sets and their applicability within LAEP+ (i.e. how to use for planning)	Document finalised and approved by NGED project manager	Partner 1	31/07/2025
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# Overview

This specification document updates on deliverable D2.3 from the PRIDE project plan to develop or ingest datasets for heat network zoning, industrial clusters and hydrogen potential to the LAEP+ tool.

## 1. Heat network zoning data

Following long delays to the release of this data from the Department for Energy Security and Net Zero (DESNZ), West Midlands Combined Authority (WMCA) now has access to the heat network zoning data but is unable to share it. Advanced Infrastructure Technologies Limited (AITL) has reached out to DESNZ to secure permission to access the data. To work around this blocker, AITL has proposed to ingest NESTA's heat network suitability data as an interim, so that local authorities can access data that supports heat network planning via LAEP+ while we wait for final confirmation that DESNZ is happy for heat network zoning data to be shared. Alongside this, AITL has also launched district heating as an asset in the project feature in LAEP+ that further supports local authorities with planning for low carbon heating. The NESTA data has been ingested into LAEP+ as of 18 August 2025.

## 2. Industrial clusters and buildings

The industrial cluster and industrial buildings datasets have been ingested into LAEP+ and are available for local authorities to use to support planning for commercial and industrial decarbonisation. AITL undertook user research to understand what would constitute an industrial building or cluster and how local authorities would like to see them represented in LAEP+. The industrial building and clusters dataset was ingested and made available to local authorities on 30 June 2025.

## 3. Hydrogen potential

AITL has produced a methodology for a dataset to identify hydrogen potential in domestic buildings. The WMCA has highlighted that it does not see hydrogen as a priority across its region, however there may be options to explore hydrogen further into the future as the technology develops. The dataset has been ingested into LEAP+ as of 1 August 2025.

# 1. Heat network zoning data

## Overview

The release of the heat network zoning data by DESNZ has been long-delayed however reports from DESNZ and WMCA suggest that some data has now been released and WMCA has access.

However, WMCA is currently unable to share this data due to restrictions placed on it by DESNZ. AITL is currently working with DESNZ heat network zoning data for another UK local authority to review and ingest the data into LAEP+ but in order to ingest the heat network zoning data we would need the express permission of DESNZ and each WMCA local authority. While we await this approval - which could take until November 2025 as this is DESNZ's final deadline for the heat network zoning public release of the data.

To work around this delay and provide local authorities with some data via LAEP+ that can support heat network planning, AITL and WMCA identified that NESTA's low carbon heating suitability data could provide an alternative. The NESTA data provides a suitability rating by Lower Layer Super Output for the following low carbon heating solutions:

- Heat network
- Shared ground loop
- Air source heat pumps
- Ground source heat pumps

NESTA's data is open and publicly available. While not as extensive as DESNZ's heat network zones, nor as detailed from a financial modelling perspective, NESTA's suitability scores by LSOA give local authorities an indication for which heating technologies could be viable across their regions and provide a useful starting point for local authorities at the early stage of planning low carbon heating. The two datasets of NESTAs we see adding the most value are the suitability scores for heat networks and shared ground loops. AITL's proprietary datasets give an indication of the suitability of air source and ground source heat pumps to a building level, so while NESTA's data showing suitability by LSOA for air and ground source heat pumps is useful to support wider area planning, it does not go into the same level of detail as data already available in LAEP+. For the reason that it has value for wider planning purposes, we have ingested all four NESTA datasets.

## Methodology for NESTA data

NESTA's methodology is open and publicly available. [Its full GitHub repository can be accessed here. Its open dataset can be downloaded here.](#) The below information has been lifted directly from NESTA's methodology and provides the rationale for how suitability scores have been allocated for each type of low carbon technology to reach a final suitability score metric.

AITL has made clear in LAEP+ that the methodology and data is NESTA data - and not the proprietary ownership of AITL. It has been made available to support low carbon heat planning but any questions about the methodology should be addressed to NESTA as the owners of the data.

### NESTA methodology

One of the challenges in assessing heat pump suitability is to set criteria for what makes a home suitable for a particular technology. NESTA has used two sets of criteria in this project: one a "conventional" view, which reflects common consensus; and one a NESTA view, which draws on their latest research. NESTA applied this for four different technologies; air source heat pumps (ASHPs), ground source heat pumps (GSHPs), heat networks (HNs) and shared ground loops (SGLs). The assessment questions in the methodology are:

- Is the property NOT listed?
- Is the property NOT in a protected area\*?
- Is the property's EPC rating A, B or C?
- Is the property NOT a flat?
- Is the property a flat?
- Is there > 10 m<sup>2</sup> of external space at the property?
- Is there > 2 m<sup>2</sup> of external space at the property?
- Is the property off-gas?
- Is this property in a LSOA with a high property density? (> 60 households per km<sup>2</sup>)
- Is this property in an urban LSOA?
- Is this property in a LSOA with an anchor property?
- What proportion of properties in this LSOA could the electricity grid support to have HPs? (x - which is between 0 and 1)
- Maximum points per property (x=1 for these calculations)

The scores for each technology are based on the answers to each question and are first computed per property based on presence/ absence of certain characteristics of the property/area using a simple additive model – the full methodology can be found here. Scores are then averaged per property and weighted before finally aggregating to LSOA level.

## Metadata and permissions

There will be four different NESTA datasets. The below outlines the metadata and ingestion instructions for all four.

### **Dataset Name: NESTA Heat Network Suitability**

**Dataset Description:** This dataset shows NESTA's suitability rating for heat network by LSOA. It incorporates multiple parameters including if the property is a house or flat, EPC ratings, external space per property, if the LSOA is urban and if there is a potential anchor property in the LSOA. This data shows an indicative score between 0 and 1 (where 1 is the most suitable) for heat network suitability. The data is published under a creative commons license by NESTA.

### **Dataset Name: NESTA Shared Ground Loop Suitability**

**Dataset Description:** This dataset shows NESTA's suitability rating for shared ground loops by LSOA. It incorporates multiple parameters including if the property is a house or flat, EPC ratings, external space per property, property density in an LSOA and if the LSOA is urban. This data shows an indicative score between 0 and 1 (where 1 is the most suitable) for shared ground loop suitability. The data is published under a creative commons license by NESTA.

### **Dataset Name: NESTA Ground Source Heat Pump Suitability**

**Dataset Description:** This dataset shows NESTA's suitability rating for ground source heat pumps by LSOA. It incorporates multiple parameters including if the property is a house or flat, external space around the household, the EPC rating and if the LSOA is urban or rural. This data shows an indicative score between 0 and 1 (where 1 is the most suitable) for ground source heat pump suitability. The data is published under a creative commons license by NESTA.

### **Dataset Name: NESTA Air Source Heat Pump Suitability**

**Dataset Description:** This dataset shows NESTA's suitability rating for air source heat pumps by LSOA. It incorporates multiple parameters including if the property is a house or flat, external space around the household, the EPC rating and if the LSOA is urban or rural. This data shows an indicative score between 0 and 1 (where 1 is the most suitable) for air source heat pump suitability. The data is published under a creative commons license by NESTA.

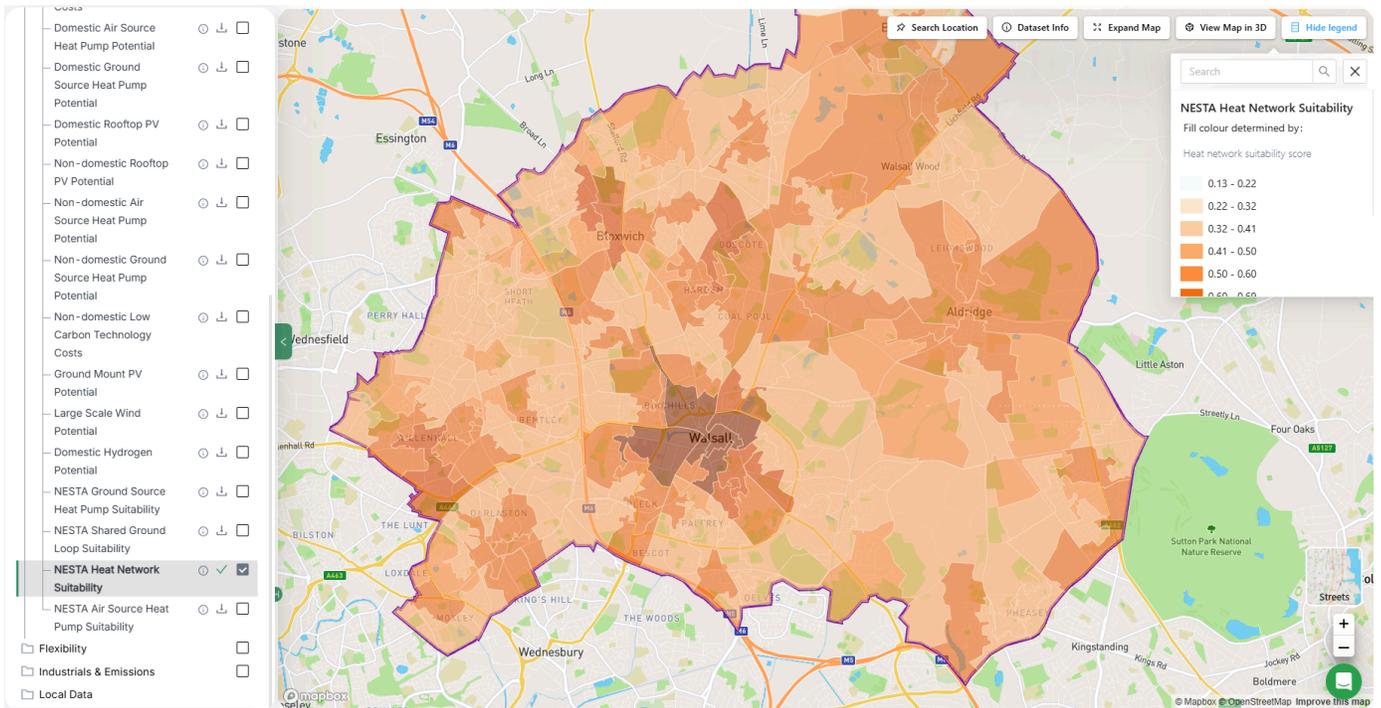
### **Permissions**

In keeping with the fact that this data has been made open source and publicly available by NESTA, the datasets and layers will be made available to all user groups in LAEP+.

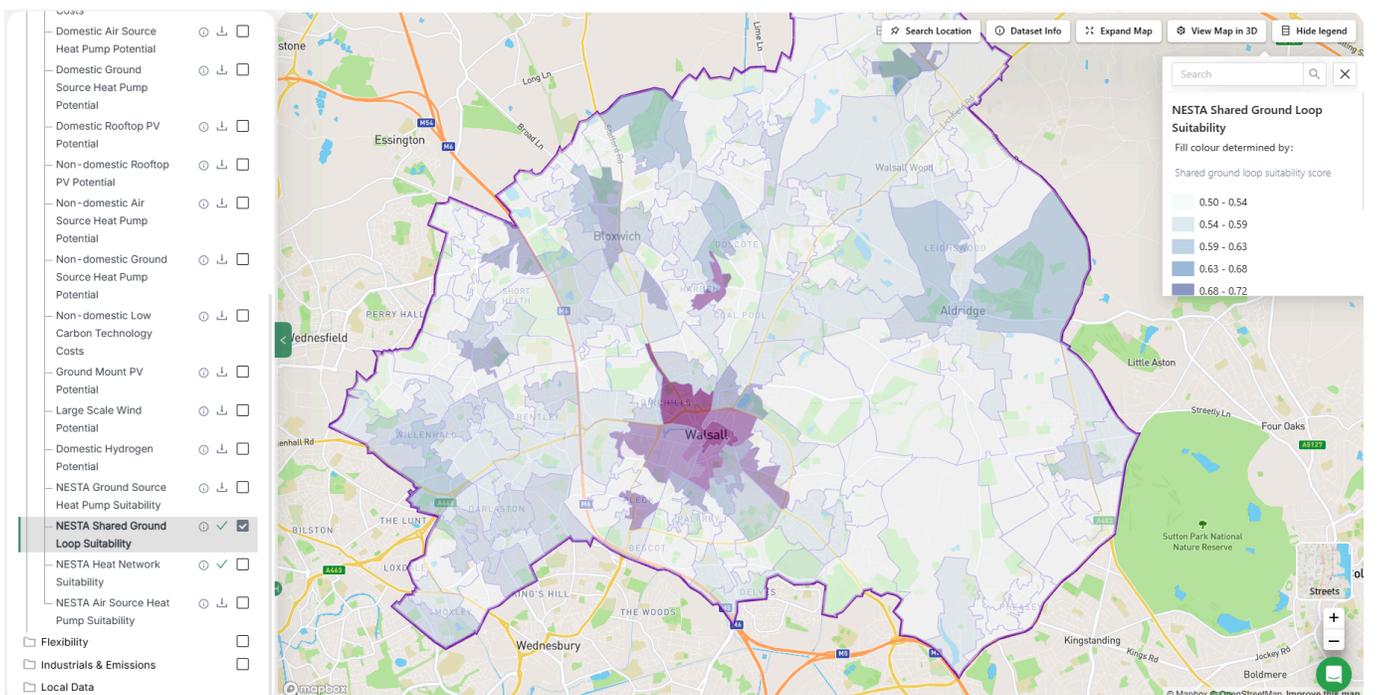
## Styling and visualisation

To further make clear that this is NESTA's data, within LAEP+ we have followed the same styling and visualisation of the different low carbon heating technologies to line up with [NESTA's own visualisation of the data](#), this will help prevent any confusion for LAEP+ users about who owns this data.

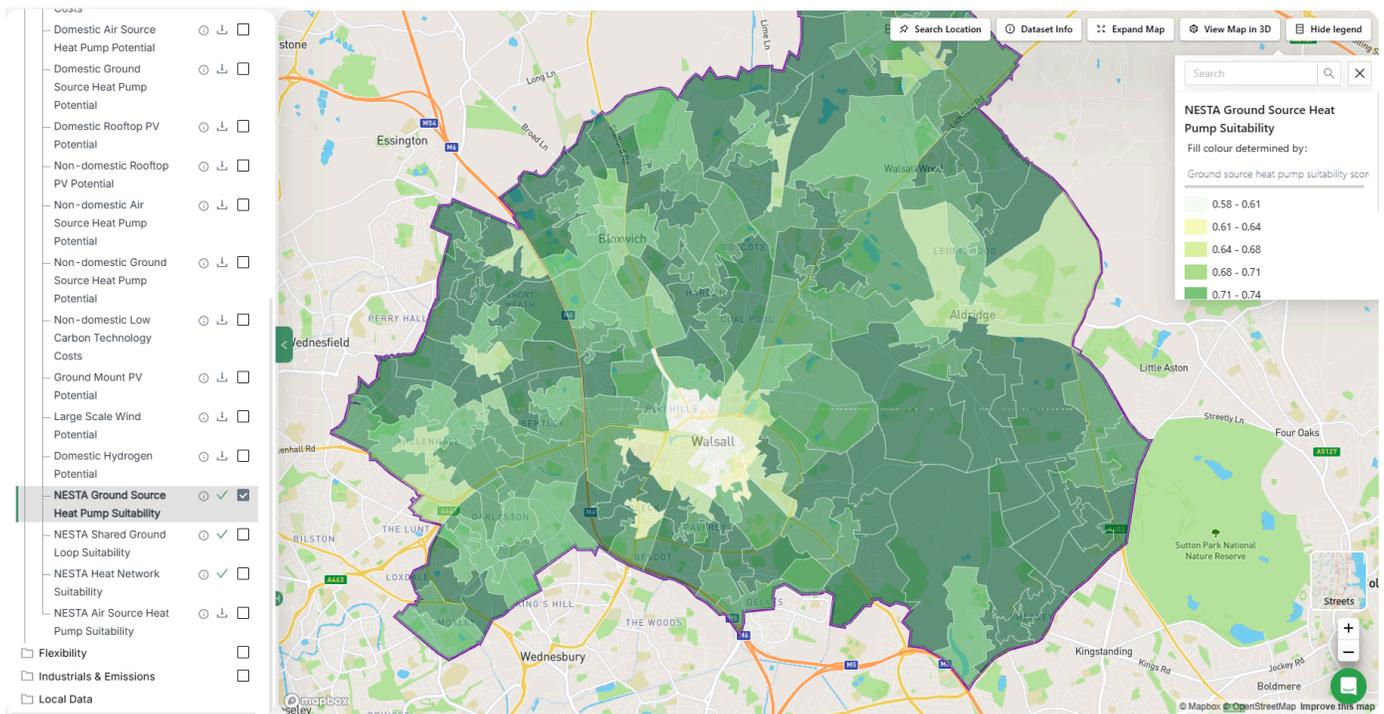
**Image 1: NESTA heat network suitability by LSOA in Walsall**



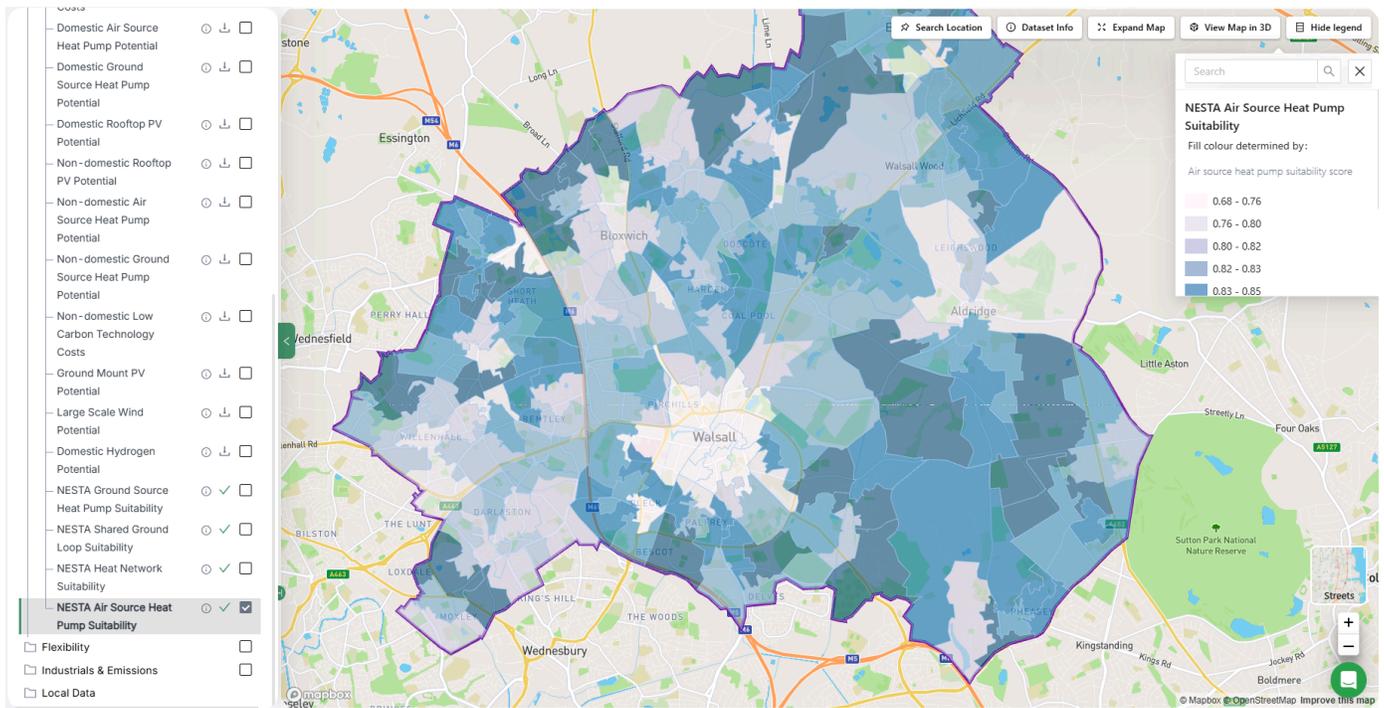
**Image 2: NESTA shared ground loop suitability by LSOA in Walsall**



**Image 3: NESTA ground source heat pump suitability by LSOA in Walsall**



**Image 4: NESTA air source heat pump suitability by LSOA**



## District heating project function

In addition to the NESTA data, which provides indicative suitability scores to help local authorities understand which areas might be suited to different low carbon technologies by LSOA, AITL has also added more functions to its project tooling - including the ability to now create district heating projects and run assessments of those projects against network capacity.

The district heating project function allows local authorities to draw a polygon around a sub-set of buildings and drop a 'district heat source'. The source is currently agnostic from a technology perspective but users can input what the MW requirements would be for that heating source and run an assessment that explores the impact of installing that technology on existing network capacity in that area. The polygon can be as small or as large as local authorities require, so can also be used to explore the potential for smaller, shared ground loop systems, as well as larger district heat networks.

The project function is currently at the 'minimum viable product' stage, however we hope to build this feature out further in future to meet local authority needs. Some of which they have described to us include:

- Exploring how to account for different waste heat sources
- Deploying different types of heating sources
- Joining up several heating sources within the same network
- Drawing potential routes for heat network pipes
- Calculating potential heat demand within polygons to estimate required heat source size

Image 5: District heating project tool in action - deploying a 1.5MW heating source in a polygon

The screenshot displays the 'Walsall' district heating project tool interface. The top navigation bar includes 'Data', 'DFES', and 'My Projects' tabs. The left sidebar shows a 'District heat' section with 'Save', 'Export', and 'Share' buttons, and a 'Summary' section with 'Results' and 'Warnings' indicators. The main map area shows a street grid with a purple polygon and a red circle representing a 'District Heating - 1 : 1.5MW' source. The right-hand panel contains a 'Summary' section with a warning icon and the text 'Overload risk: Based on the information you provided, we think that some of your substations could get overloaded.' Below this is a 'Bulk Supply Point' section with 'No Data Found' and a 'Primary Substation' table.

Substation Name	Current	New Headroom
Bustleholm 11kV Switch House	44%	41.5%

Substation Name	Current	New Headroom
Highgate Drive - Walsall	32.6%	-299968%

**Image 6: Using NESTA suitability score and district heating project function together to draw heat network and deploy heat source in a 'suitable area'**

**Walsall** Access Tutorials

Data DFES **My Projects**

← District heat Save Export Share

**Summary**

Results Warnings

We've run an assessment of your project, explore the results in the right side panel

Proceeding with a Connection Request

To access a 'Budget Estimate' for your proposed connection(s), navigate to the [National Grid - Budget estimate](#) tool.

If you choose to proceed with a connection request for your project, head over to the National Grid: [Get Connected](#).

Submitting a project on LAEP+ is not a formal connection request. However, it will be used as valuable insight into the plans of local authorities and developers. By submitting a project, you consent to National Grid Distribution using this data as part of their internal data analysis and future forecasting.

Search Location Expand Map View Map in 3D Show Legend

Summary Submit to DNO

Summary Carbon Cost Load

**⚠️ Overload risk**  
Based on the information you provided, we think that some of your substations could get overloaded.

**Bulk Supply Point**  
No Data Found. Headroom data for this substation is unavailable.

**Primary Substation**

Substation Name	Current	New Headroom
Bentley 132/11Kv dummy	47.95%	46.67%
Bustleholm 11Kv Switch House	44%	41.5%

**Secondary Substation**

Substation Name	Current	New Headroom
Alumwell Road M02 Walsall	68.12%	-124931.25%
Highgate Drive - Walsall	32.6%	-299968%

District Heating - 1 : 1MW

## 2. Industrial clusters and buildings

### Purpose

There are two datasets: 'Industrial clusters' and 'industrial buildings', they are designed to be overlaid together.

**Industrial buildings description:** The dataset shows industrial buildings located within a local authority, with insights into estimated energy consumption and greenhouse gas emissions. It provides building level data like the industrial activity of that building (informed by Standard Industrial Classification (SIC) Codes), PV potential for that building, and proximity of that building to renewable energy planning sites or parcels suitable for wind or ground mount PV potential.

**Industrial clusters description:** The dataset shows clusters of industrial sites located within a local authority, showing insights into estimated energy consumption and greenhouse gas emissions. It provides similar data to industrial buildings but at an aggregated level. The data clusters industrial buildings in close geographic proximity and provides information on the most dominant industrial activities in that cluster, alongside total renewable potential and proximity of the cluster to renewable energy sites.

The purpose of these datasets is to help local authorities understand potential for industrial and commercial decarbonisation, as well as domestic decarbonisation across their areas. The information shown in the datasets can support local authorities in conversations with industrial businesses and stakeholders in its area, as well as provide them with the ability to either create or co-create decarbonisation plans for those industrial sectors.

### User research overview

To understand the needs and challenges faced by local authorities when it came to data on industrial buildings and clusters, AITL undertook a user research exercise where we conducted 1-2-1 interviews with local authorities involved in the PRIDE project. We also spoke with stakeholders from NGED and Cadent to better understand and represent the perspectives of utility networks when it came to building datasets for industrial buildings and clusters.

In the interviews, local authorities highlighted that some of the data already provided by LAEP+ could help define and support the analysis of industrial buildings and clusters. These datasets include:

- Network capacity
- Energy demand data
- EPC records
- Roof areas suitable for PV

- Non-domestic heat pump suitability
- Fuel poverty
- Indices of deprivation
- Income estimates

Local authorities then identified the following datasets that are not currently in LAEP+ but could support their needs with regards to better understanding industrial buildings and clusters.

**Table 1: requested data sources and inputs**

Request	Status	Detail
Geospatial clusters of high-energy and industrial energy users to identify their location and characteristics	New	Several interviewees cited the importance of being able to both identify and quantify the impact of high-energy users. Several noted the particular importance of industrial clusters. This was defined slightly differently by different interviewees. A common definition was: multiple businesses of similar types clustered in similar geographic locations.
Emissions data, especially for businesses and large energy consumers	New	To support emissions tracking and quantification across the local area, a view of local emissions sources was cited by several as an important data source.
Locations of businesses and large enterprises - especially ones with significant emissions or waste heat	New	Most interviewees noted that large businesses do consider decarbonisation plans as part of their BAU, however, SMEs generally don't have the same focus. Identifying locations and characteristics of businesses was seen as a potential first step that would support councils to engage businesses. Those with large amounts of waste heat, for example, might be a good source for a heat network.
Land ownership data, including both council owned and private ownership	New	This was cited as a useful input in order to support engagement with landowners and identification of sites that may be easier to develop/redevelop compared to others. Council owned land can sometimes represent a particularly good opportunity as it is within the council's direct sphere of control.
Area topology (Trees planted, canopy of trees, etc)	Out of Scope	Users need tree canopy and green infrastructure data to assess urban cooling, biodiversity, and integration with energy planning. This is not something that currently falls directly within the scope of PRIDE. However, it is something users could upload to LAEP+ themselves if the data is obtained by users.

Local authorities were then asked about what new functions could support their work in LAEP+. The below table outlines their responses.

**Table 2: requested functionality in LAEP+**

Request	Status	Status - Detail
KPI tracking in a digital tool (e.g. fuel poverty, EV chargepoint deployment, renewable generation)	Roadmap	The upcoming 'Masterplan' functionality will allow users to track progress against their targets taking into account projects/scenarios planned in LAEP+ as well as those registered on the MCS register.
Displaying carbon emissions and savings in planning tools	Backlog	Visualising local emissions by vector is an item noted by interviewees and already logged on the LAEP+ backlog by a number of existing users.
Tools to identify businesses and support their decarbonisation planning	New	Several interviewees noted some larger businesses are thinking about decarbonisation but many are not. They would find it helpful to have the data to identify these businesses and model potential routes to decarbonise them as a means to engage the local business - especially industrial clusters. This includes modelling things like heat networks and PV.
Modelling of hydrogen feasibility	New	Whilst not anticipated to be widespread there was some interest in understanding feasibility, cost, energy inputs and carbon intensity compared with alternatives.
Dynamic updates as data and plans evolve	New	Local authorities need regular updates to any data developed through PRIDE. This helps adjust strategies, secure funding, and support investment delivery over time. One interviewee remarked: "We'd like to use the tool as a pathway in real-time to know how we are performing."

*The full user research insights report is documented in Annex 1.1*

## Methodology overview

The objective of the methodology is to estimate the annual energy consumption (in kilowatt-hours, kWh) and greenhouse gas (GHG) emissions (in kilograms of CO<sub>2</sub> equivalent) at the individual ‘commercial industrial’ building level. This estimation leverages a combination of building-specific and industry-level data, and is primarily based on the following inputs:

- **Industry classification:** Standard Industrial Classification (SIC) codes at the 3-digit level, representing the type of economic activity carried out in each building.
- **Building floor area (m<sup>2</sup>):** Floor area derived from building footprint.
- **National energy expenditure and pricing data:** Government-reported data on average energy spending per industry sector (SIC) and unit prices by energy type to infer energy intensity by SIC code.

This approach enables the bottom-up estimation of energy demand and emissions at the building scale, supporting local decarbonisation planning.

### Data sources

The table below outlines the datasets used to estimate annual energy consumption and GHG emissions for commercial and industrial buildings. These sources provide information on energy expenditure by industry type, fuel mix, energy prices, emissions factors, and building classifications.

**Table 3: Data sources required for estimating energy use and greenhouse gas emissions for commercial and industrial buildings.**

Data	Description	Source
ONS Energy Spending Data (2018-2019)	Mean annual energy expenditure by 3-digit SIC code	<a href="https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/adhocs/14332estimatesofbusinessenergyexpenditurefromtheannualbusinesssurveybysic2007groupsandclasses2018and2019">https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/adhocs/14332estimatesofbusinessenergyexpenditurefromtheannualbusinesssurveybysic2007groupsandclasses2018and2019</a>
ONS Energy Type Breakdown (2018)	% of energy expenditure split by Gas, Electricity, Petrol & Diesel, Other	<a href="https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/adhocs/14688estimatesofbusinessenergyexpenditurefromtheannualpurchasesurveybyenergytypeand23and4digitstandardindustrialclassificationsic">https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/adhocs/14688estimatesofbusinessenergyexpenditurefromtheannualpurchasesurveybyenergytypeand23and4digitstandardindustrialclassificationsic</a>

Energy Prices (Non-domestic) (2024)	i) Average £/kWh for electricity & gas ii) Average £/kWh for Petrol/ diesel & other	i) <a href="https://www.gov.uk/government/statistical-data-sets/gas-and-electricity-prices-in-the-non-domestic-sector">https://www.gov.uk/government/statistical-data-sets/gas-and-electricity-prices-in-the-non-domestic-sector</a> ii) <a href="https://assets.publishing.service.gov.uk/media/6762955acdb5e64b69e30703/quarterly-energy-prices-december-2024.pdf">https://assets.publishing.service.gov.uk/media/6762955acdb5e64b69e30703/quarterly-energy-prices-december-2024.pdf</a>
Greenhouse Gas Emission Factors (kg CO <sub>2</sub> e per kWh)	Emission factors by Electricity, Natural Gas, Oil & Solid fuel	<a href="https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024">https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024</a>
2.10_standardised_buildings	Map 2.10 building classification to SIC code (3 digit).	<a href="#">aitl-data-bucket-backup - S3 bucket   S3   eu-west-2</a>

**Methodology steps**

The following steps represent a high level summary of the methodology that AITL took to generate the data for industrial buildings and clusters:

1. Match buildings to Standard Industrial Classification (SIC) codes
2. Estimate average floor area by SIC
3. Convert energy spend to energy use (kWh) per SIC
4. Estimate energy use intensity (kWh/m<sup>2</sup>) per SIC code
5. Estimate annual energy use per building
6. Estimate GHG emissions per building
7. Clustering - commercial industrial buildings are grouped by geographic proximity
8. Decarbonisation potential attributes - including proximity to ground mount PV and large scale wind, and proximity to brownfield sites and planned locations of renewables

## Metadata and permissions

Metadata is clear, structured in line with Dublin Core Metadata standards and easily accessible to ensure users know the source, update frequency and other key metadata items.

The metadata for the industrial buildings datasets are:

### Dataset Name: Industrial Buildings

**Dataset Description:** This dataset highlights industrial buildings located within a Local Authority, showing insights into estimated energy consumption and greenhouse gas emissions. It also presents opportunities for renewable energy integration such as Rooftop PV, to support decarbonisation planning and sustainable development efforts.

### Dataset name: Industrial Clusters

**Dataset Description:** This dataset highlights clusters of industrial sites located within a Local Authority, showing insights into estimated energy consumption and greenhouse gas emissions. It also presents opportunities for renewable energy integration to support decarbonisation planning and sustainable development efforts.

### Permissions

As proprietary datasets produced by AITL, the only groups with full permissions to view and export data are default users (which includes local authority government and DNO), and users assigned Contracted Collaborator status.

**Table 4: LAEP+ permission groups**

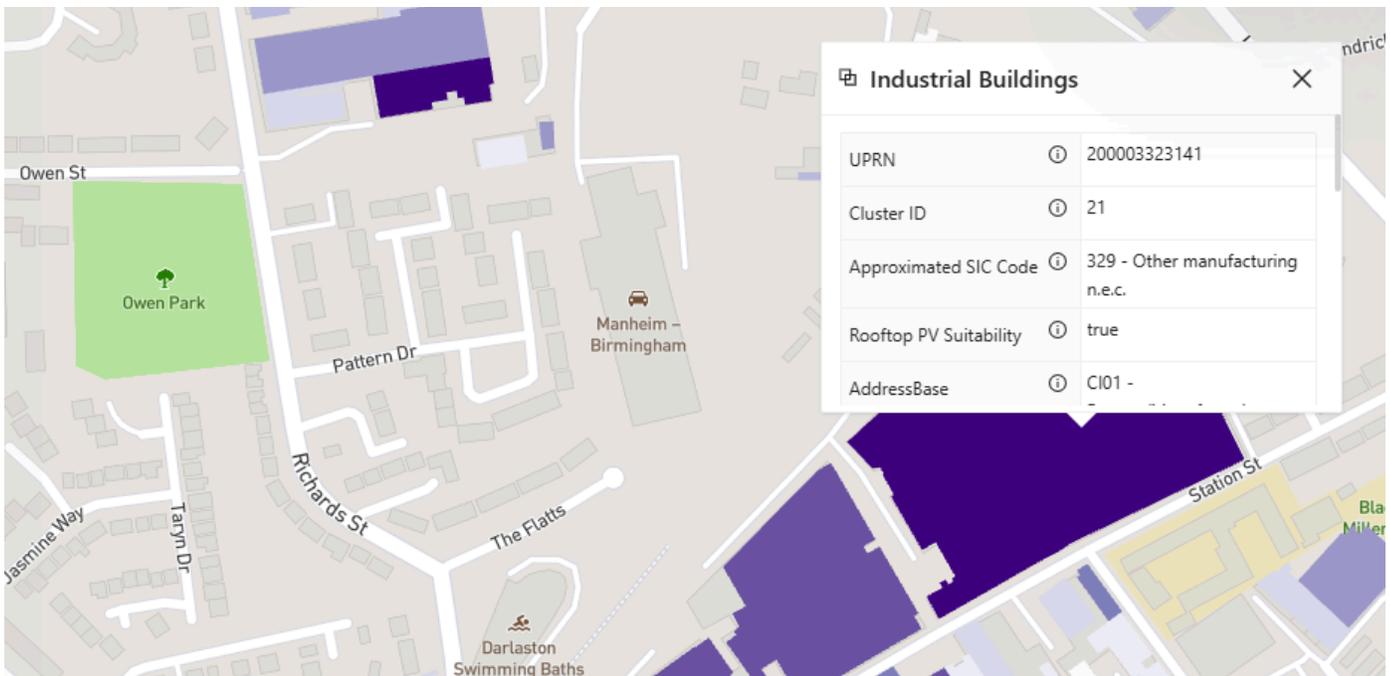
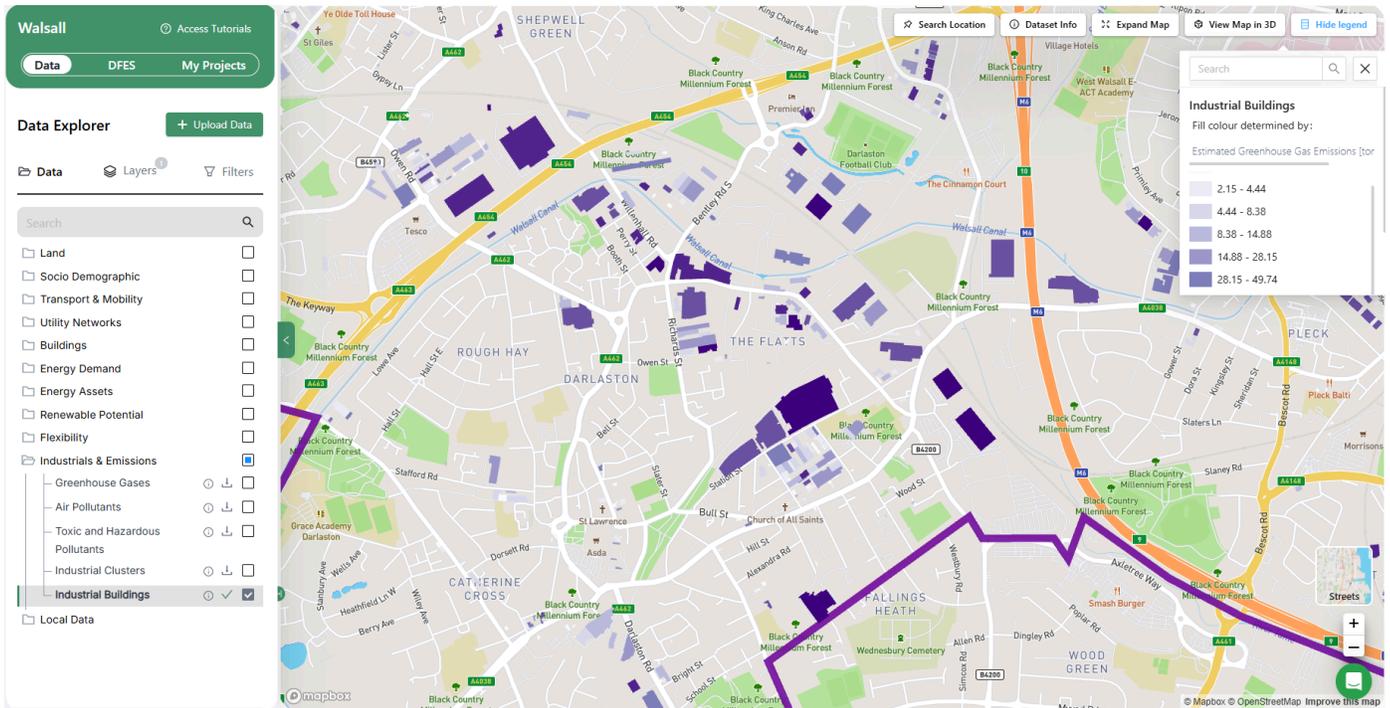
Permission group name	Description of users in permission group
<b>Default (government and DNO)</b>	The user is a local authority or works at the DNO
<b>Approved Commercial Collaborator</b>	Commercial business with an approved collaboration status with the LA
<b>LAEP Collaborator</b>	Third Party with no conflict of interest, no contract with LA, and LAEP purpose
<b>Contracted Collaborator</b>	Third Party with no conflict of interest, under contract with LA, and LAEP purpose
<b>End User / Stakeholder</b>	Third Party with no conflict of interest, an End User License Agreement between OS and LA and a LAEP purpose

# Styling and visualisation

## Industrial buildings

Industrial buildings are shown in indigo on the map, with the default colour configuration based on estimated greenhouse gas emissions.

Images 7 and 8: Industrial buildings dataset in LAEP+

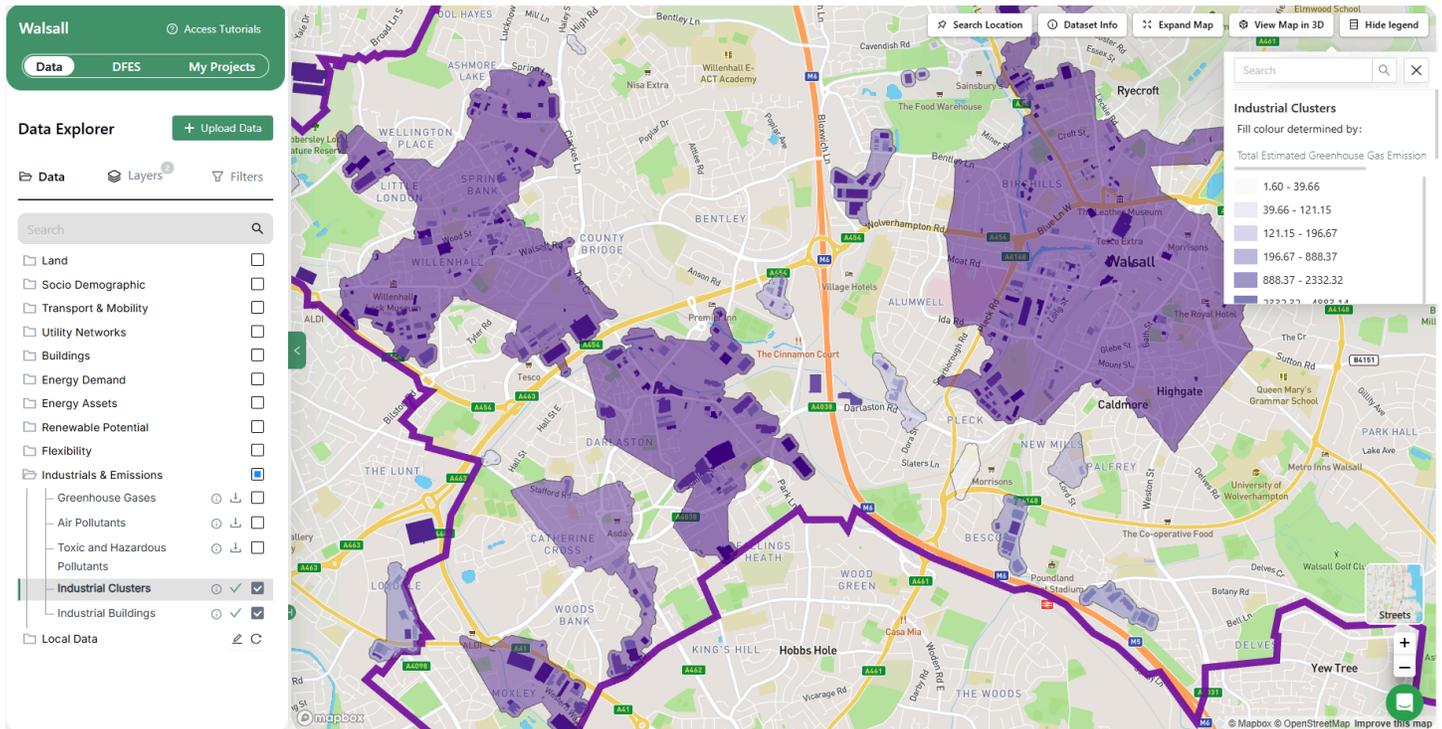


2. **Cluster ID** - An identification code unique to this cluster
3. **Approximated SIC Code** - The approximated SIC Code for this industrial building.
4. **Rooftop PV suitability** - the overall suitability of the property for rooftop PV.
5. **Addressbase Classification Code** - Ordnance Survey Classification Code Description
6. **Proximity to Brownfield Site** - If the building is within 1km of a Brownfield Site
7. **Proximity to Ground Mound PV Potential** - If the building is within 1km of a land parcel suitable for Ground Mount PV.
8. **Proximity to Large Scale Wind Potential** - This cluster is within 1km of a land parcel suitable for Large Scale Wind.
9. **Proximity to Renewable Planning Site** - This cluster is within 1km of a Renewable Energy Planning Site.
10. **Estimated Annual Energy Usage (kWh/yr)** - The estimated annual energy usage by this building.
11. **Estimated Greenhouse Gas Emissions (tonnes CO<sub>2</sub>e)** - The estimated greenhouse gas emissions for this building.
12. **Rooftop Area suitable for PV (m<sup>2</sup>)** - The estimated area of the roof suitable for a PV array.
13. **Rooftop PV Annual Generation (kWh/yr)** - The expected annual electricity generation of the PV arrays deployed on this building.

## Industrial clusters

The industrial clusters visualisation created polygons around clustered industrial buildings that are grouped by geographic proximity.

Image 9: industrial cluster dataset in LAEP+



When clicking on industrial clusters, users can see the following attributes:

1. **Cluster ID** - An identification code unique to this cluster
2. **Number of Buildings** - The total count of commercial industrial buildings in this cluster.
3. **Most Common Approximated SIC Code** - The most common approximated Standard Industrial Classification (SIC) Code across all Industrial buildings within this cluster.
4. **Second Most Common Approximated SIC Code** - The second most common approximated Standard Industrial Classification (SIC) Code across all Industrial buildings within this cluster.
5. **Third Most Common Approximated SIC Code** - The third most common approximated Standard Industrial Classification (SIC) Code across all Industrial buildings within this cluster.
6. **Total Estimated Greenhouse Gas Emissions (tonnes CO<sub>2</sub>e)** - The total estimated greenhouse gas emissions for this cluster.
7. **Total Estimated Annual Energy Usage (kWh/yr)** - The total estimated annual energy usage of all commercial industrial buildings in this cluster.

8. **Total Rooftop Area suitable for PV (m<sup>2</sup>)** - The sum of the roof areas of all industrial buildings in this cluster that are suitable for PV installation.
9. **Total Rooftop PV Annual Generation (kWh/yr)** - The total expected annual electricity generation of the PV arrays deployed on buildings suitable for PV in this cluster.
10. **Proximity to Ground Mound PV Potential** - This cluster is within 1km of a land parcel suitable for Ground Mount PV.
11. **Proximity to Large Scale Wind Potential** - This cluster is within 1km of a land parcel suitable for Large Scale Wind.
12. **Proximity to Brownfield Site** - This cluster is within 1km of a Brownfield Site
13. **Proximity to Renewable Planning Site** - This cluster is within 1km of a Renewable Energy Planning Site.

## 3. Hydrogen potential

### Purpose

AITL has produced a methodology and dataset for a Hydrogen Potential Data Layer - which identifies areas suitable for hydrogen boilers or a full transition to hydrogen in the future. Local authorities in the West Midlands Combined Authority area, and the WMCA itself has highlighted that it does not see hydrogen as a priority across its region, however there may be options to explore hydrogen in non-domestic settings as the technology develops.

With this data layer, local authorities can explore the potential for hydrogen technologies when considering low carbon heating options - this can support the development of heating decarbonisation plans.

### User research

AITL undertook user research for the Hydrogen Potential dataset at the same time as the industrial buildings and clusters user research. The primary goal for the hydrogen user research was to understand:

- Attitudes towards hydrogen technologies
- Any current processes used by businesses and local government take to consider hydrogen in energy plans such as decarbonisation strategies
- Existing data available to support analysis of hydrogen
- What new or enhanced LAEP+ features and/or data could address pain points or needs identified.

**The main takeaway from the user research was that hydrogen technologies were not considered to be an important route to decarbonise the West Midlands region, according to the majority of interviewees.**

In the interviews, local authorities highlighted that some of the data already provided by LAEP+ could help define and support the analysis of hydrogen potential. These datasets include:

- Energy demand data
- EPC data

Local authorities also identified the following datasets that are not in LAEP+ but could support their needs with regards to better understanding hydrogen.

**Table 5: user-identified datasets**

Request	Detail
Gas infrastructure data & hydrogen potential	The locations of where existing gas infrastructure is, as well as where potential hydrogen pipelines, storage or transport routes could exist

Local authorities were then asked about what new functions could support their work in LAEP+. The below table outlines their responses.

**Table 6: requested functionality in LAEP+**

Request	Status	Status - Detail
Modelling of hydrogen feasibility	New	Whilst not anticipated to be widespread there was some interest in understanding feasibility, cost, energy inputs and carbon intensity compared with alternatives.

*The full user research for hydrogen potential can be found in Annex 1.2*

## Methodology overview

### Domestic hydrogen potential

This methodology identifies domestic buildings that are theoretically suitable for hydrogen heating systems and estimates their associated annual gas demand, peak heat demand, and boiler size requirements. Suitability is determined using off-gas postcode records. The output supports strategic planning for hydrogen rollout across Local Authority (LA) areas in the UK.

**Table 7: Data inputs for domestic hydrogen potential dataset**

Source	Description
LA_boundary.gpkg	Boundary file defining the area of interest (e.g. a Local Authority)
off_gas_postcodes.parquet	Postcode polygons with a gas supply flag to identify buildings with access to the gas grid
LA_2_10_v3.parquet	Building stock dataset with classification, footprint area, and eaves height

uk_epc_raw_domestic_certificates.csv	Domestic EPC dataset containing UPRN and main heating fuel type
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### Methodology steps

The following steps represent a high level summary of the methodology that AITL took to generate the data for industrial buildings and clusters:

1. Filter Suitable Buildings
2. Identify Buildings with Gas Supply
3. Estimate Number of Floors
4. Calculate Total Floor Area
5. Estimate Floor Area per Premise
6. Assign Load Factor and Energy Intensity
7. Calculate Annual Gas Demand (kWh/m<sup>2</sup>)
8. Calculate Peak Heating Demand (kW)
9. Recommend Boiler Size
10. Estimate Boiler Installation Cost (refer to below linear regression cost model ) - from 185 boilers
11. Assign Main Heating Type
12. Rank by Gas Demand

## Metadata and permissions

Metadata is clear, structured in line with Dublin Core Metadata standards and easily accessible to ensure users know the source, update frequency and other key metadata items.

The metadata is as follows:

### Dataset name: Domestic Hydrogen Potential

**Dataset Description:** This dataset identifies whether a domestic property may be suitable for adopting a hydrogen gas boiler for heating and hot water, if located within a postcode currently served by the gas network - signifying potential future access to hydrogen supply. It includes modelled boiler size recommendations and cost estimates for each property, calculated from estimated gas consumptions based on building archetype and floor area.

### Permissions

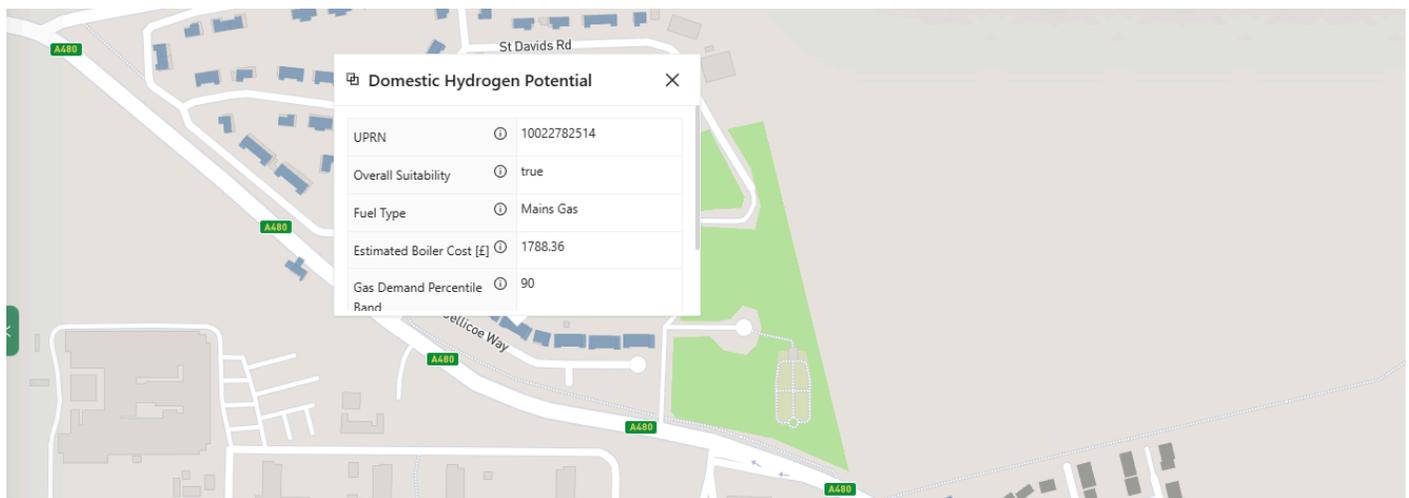
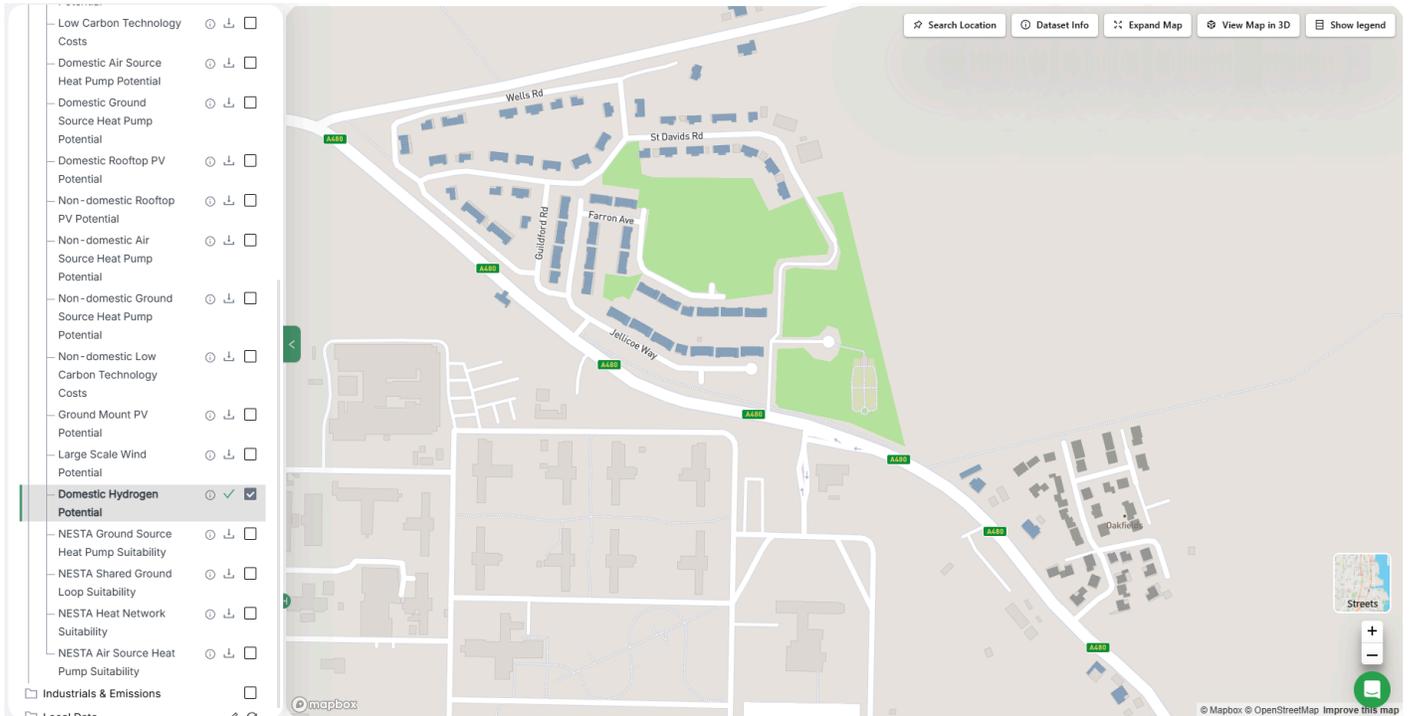
As proprietary datasets produced by AITL, the only groups with full permissions to view and export hydrogen potential data are default users (which includes local authority government and DNO), and users assigned Contracted Collaborator status.

**Table 8: LAEP+ permission groups**

Permission group name	Description of users in permission group
<b>Default (government and DNO)</b>	The user is a local authority or works at the DNO
<b>Approved Commercial Collaborator</b>	Commercial business with an approved collaboration status with the LA
<b>LAEP Collaborator</b>	Third Party with no conflict of interest, no contract with LA, and LAEP purpose
<b>Contracted Collaborator</b>	Third Party with no conflict of interest, under contract with LA, and LAEP purpose
<b>End User / Stakeholder</b>	Third Party with no conflict of interest, an End User License Agreement between OS and LA and a LAEP purpose

## Styling and visualisation

### Images 10 and 11: Domestic hydrogen potential in LAEP+



Homes that meet the criteria for domestic hydrogen are shown in blue. The default colour configuration is based on whether the overall suitability is true or false - with buildings that are false and therefore not suitable for hydrogen being shown in grey.

**When clicking on buildings in the domestic hydrogen potential dataset, users can see the following attributes:**

1. **UPRN** - Unique Property Reference Number
2. **Overall suitability** - The overall suitability of the property for a hydrogen boiler
3. **Fuel type** - The current main fuel type serving this property
4. **Estimated boiler cost (£)** - The estimated cost of a hydrogen boiler at the recommended size
5. **Gas demand percentile band** - Shows how a property's gas demand compares to others in the same local authority, grouped by percentile (10th to 100th) to reflect relative consumption levels.
6. **Recommended boiler size** - The recommended boiler size for this property, considering peak demand

# Annex 1.1 - Industrial Cluster user research insights summary

To understand the needs and challenges faced by local authorities when it came to data on industrial buildings and clusters, AITL undertook a user research exercise where we conducted 1-2-1 interviews with local authorities involved in the PRIDE project. We also spoke with stakeholders from NGED and Cadent to better understand and represent the perspectives of utility networks when it came to building datasets for industrial buildings and clusters.

The goal of the user research was to understand:

1. How prospective users define industrial clusters
2. Any current processes used by businesses and local government to consider industrial clusters in energy plans such as decarbonisation strategies
3. Existing data available to support analysis of industrial buildings and clusters
4. What new or enhanced LAEP+ features and/or data could address pain points or needs identified

## How prospective users define industrial clusters

Industrial clusters were defined slightly differently among interviewees:

1. Businesses involved in manufacturing, using SIC codes for grouping.
2. "Industrial hubs" where businesses are close together and involved in similar activities, presenting opportunities due to shared energy usage and vulnerabilities.
3. A third interviewee saw industrial clusters as specific areas within a business park, where businesses could coordinate energy use based on their needs at different times.

A common definition many aligned on was: Multiple businesses of similar types clustered in similar geographic locations.

## Current processes used by businesses and local government to consider industrial clusters in energy plans such as decarbonisation strategies

The responses here were mixed. While engaging businesses and industry in energy plans and strategies would provide local authorities with opportunities with regards to net zero and wider strategic energy planning, in reality the ability to engage in a meaningful and consistent way can be challenging.

Users said:

- *“For large businesses, decarbonisation is already on their radar. But SMEs struggle with expertise and funding. They might want to engage but lack the means or knowledge.”*
- *“A way to identify high-energy users and actively target them would be useful. Right now, we just promote available grants and see who comes to us.”*
- *“If we had a way to match what businesses require with what is actually available in terms of funding and support, that would be really helpful.”*
- *“It would help if we had better ways to visualise and quantify the benefits of shared infrastructure projects, like industrial heat networks or shared solar, and then show businesses how they could collaborate.”*

Users saw that there was an opportunity in having clear data about industrial buildings and clusters in LAEP+ as it would help them to visualise industry and commercial stakeholders in line with wider areas and understand how their energy planning processes could interact with other decarbonisation planning processes. They also highlighted that the ability to view and manipulate this data in LAEP+ would improve engagement and collaborative decarbonisation planning and decision making.

In particular, Interviewees were interested in locations, emissions and energy demand data to help them locate and quantify emitters in order to identify opportunities to collaborate, facilitate energy sharing and decarbonisation planning. This included data on:

- Large emitters of emissions or waste heat
- Businesses and enterprises - especially large ones with significant emissions or waste heat
- Waste collection and processing sites
- Greenfield / Brownfield development sites
- Industrial energy generation facilities (e.g. turbines, gas turbines, solar arrays, energy from waste plants)

## **Existing data available to support analysis of industrial buildings and clusters**

In the interviews, local authorities highlighted that some of the data already provided by LAEP+ could help define and support the analysis of industrial buildings and clusters. These datasets include:

- Network capacity
- Energy demand data
- EPC records
- Roof areas suitable for PV
- Non-domestic heat pump suitability
- Fuel poverty
- Indices of deprivation
- Income estimates

Local authorities then identified the following datasets that are not currently in LAEP+ but could support their needs with regards to better understanding industrial buildings and clusters.

## What new or enhanced LAEP+ features and/or data could address pain points or needs identified?

In the interviews, local authorities identified the following datasets that are not in LAEP+ but could support their needs with regards to better understanding industrial buildings and clusters.

**Table 1: requested data sources and inputs**

Request	Status	Detail
Geospatial clusters of high-energy and industrial energy users to identify their location and characteristics	New	Several interviewees cited the importance of being able to both identify and quantify the impact of high-energy users. Several noted the particular importance of industrial clusters. This was defined slightly differently by different interviewees. A common definition was: multiple businesses of similar types clustered in similar geographic locations.
Emissions data, especially for businesses and large energy consumers	New	To support emissions tracking and quantification across the local area, a view of local emissions sources was cited by several as an important data source.
Locations of businesses and large enterprises - especially ones with significant emissions or waste heat	New	Most interviewees noted that large businesses do consider decarbonisation plans as part of their BAU, however, SMEs generally don't have the same focus. Identifying locations and characteristics of businesses was seen as a potential first step that would support councils to engage businesses. Those with large amounts of waste heat, for example, might be a good source for a heat network.
Land ownership data, including both council owned and private ownership	New	This was cited as a useful input in order to support engagement with landowners and identification of sites that may be easier to develop/redevelop compared to others. Council owned land can sometimes represent a particularly good opportunity as it is within the council's direct sphere of control.
Gas infrastructure data & hydrogen potential	New	The locations of where existing gas infrastructure is, as well as where potential hydrogen pipelines, storage or transport routes could exist.

Area topology (Trees planted, canopy of trees, etc)	Out of Scope	Users need tree canopy and green infrastructure data to assess urban cooling, biodiversity, and integration with energy planning. This is not something that currently falls directly within the scope of PRIDE. However, it is something users could upload to LAEP+ themselves if the data is obtained by users.
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Based on the conversations, we identified the following data sources to support local authorities in LAEP+:

**Table 2: potential data sources and inputs**

#	Data source	Description
1	<a href="#">Pollution Inventory, Environment Agency.</a>	This contains ~32,000 output emission readings nationally which are reported under UK legislation to the Environment Agency. It is the largest accessible sample of data from industrial businesses. However, only ¼ contains quantified emissions as most of the rest fall 'below reporting threshold' so are noted but not quantified.
2	<a href="#">National Atmospheric Emissions Inventory.</a> Incl. the 'Large Point Sources Emissions Data' and/or 'Gridded Emission Data'	Comprises metered and modelled emissions broken down by sector including 'industrial processes and other product use'. It is published by DEFRA and DESNZ on an annual basis
3	<a href="#">UK Business: activity, size and location, Office for National Statistics</a>	This is reportedly one of the best sources of the count of businesses by type/SIC code. However, the highest granularity appears to be totals by SIC code at the local authority level which doesn't help local authorities identify exact locations.
4	Addressbase premium, Ordnance Survey	This dataset (already available in LAEP+) contains data collated and regularly updated by Ordnance Survey. It includes building use and ownership which can be used to inform a spatial view of local business. It does, however, contain some gaps and it is expensive for any users who are not covered by a PSGA license.
5	Energy Savings Opportunity Scheme (ESOS) Audit Data and Energy Consumption Data	This data source could provide insights into energy-saving opportunities and potential for collaboration among businesses. However, it is not comprehensive.

Local authorities also noted that the following new features and functionality could support their work with LAEP+. Some of which are already being developed and others will be explored at future dates.

**Table 3: requested functionality in LAEP+**

Request	Status	Status - Detail
KPI tracking in a digital tool (e.g. fuel poverty, EV chargepoint deployment, renewable generation)	Roadmap	The upcoming 'Masterplan' functionality will allow users to track progress against their targets taking into account projects/scenarios planned in LAEP+ as well as those registered on the MCS register.
Displaying carbon emissions and savings in planning tools	Backlog	Visualising local emissions by vector is an item noted by interviewees and already logged on the LAEP+ backlog by a number of existing users.
Tools to identify businesses and support their decarbonisation planning	New	Several interviewees noted some larger businesses are thinking about decarbonisation but many are not. They would find it helpful to have the data to identify these businesses and model potential routes to decarbonise them as a means to engage the local business - especially industrial clusters. This includes modelling things like heat networks and PV.
Modelling of hydrogen feasibility	New	Whilst not anticipated to be widespread there was some interest in understanding feasibility, cost, energy inputs and carbon intensity compared with alternatives.
Dynamic updates as data and plans evolve	New	Local authorities need regular updates to any data developed through PRIDE. This helps adjust strategies, secure funding, and support investment delivery over time. One interviewee remarked: "We'd like to use the tool as a pathway in real-time to know how we are performing."

# Annex 1.2 - Hydrogen Potential data user research insights summary

AITL undertook user research for the Hydrogen Potential dataset at the same time as the industrial buildings and clusters user research. The primary goal for the hydrogen user research was to understand:

- Attitudes towards hydrogen technologies
- Any current processes used by businesses and local government take to consider hydrogen in energy plans such as decarbonisation strategies
- Existing data available to support analysis of hydrogen
- What new or enhanced LAEP+ features and/or data could address pain points or needs identified.

## Attitudes towards hydrogen technologies

Hydrogen was not considered to be an important route to decarbonise the West Midlands region, according to the majority of interviewees.

## Current processes used by businesses and local government to consider hydrogen in energy plans such as decarbonisation strategies

Generally local government interviewees were less interested in hydrogen, however:

- Some thought it would be useful to understand the spatial characteristics of the existing gas network and potential future transition plans (to decommission or convert to hydrogen).
- Many felt hydrogen would not be a practical large scale solution outside industrial processes.
- The gas network operator Cadent do see hydrogen as a potential route to net zero across the UK, but note this is highly dependent on government policy and the characteristics of local areas.

The following direct quotes from two different interviewees are representative of the views of the local authority interviewees. The final quote is from the gas network operator Cadent.

- *“We estimate that maybe 3–5% of our industrial cluster might still need hydrogen, but that’s a niche market [...] We have very limited capacity to generate renewable energy in the West Midlands, so we’d have to import green hydrogen—and that will be expensive.”*
- *“The problem is that in the Midlands, we’re not on the coast. We don’t have easy tanker access like places near ports. That makes storage and distribution much harder.”*
- *“For vehicles, we’d rather prioritise electric charging infrastructure instead of hydrogen, because you skip the inefficiency of converting electricity into hydrogen first.”*

- *“I don’t really do much work on hydrogen. I understand it has potential, but I don’t have much knowledge of it.”*
- *“Many people don’t know much about how the gas network works [...] we would find it useful to provide users with insight into what is possible.”*

### Existing data available to support analysis of hydrogen

In the interviews, local authorities highlighted that some of the data already provided by LAEP+ could help define and support the analysis of hydrogen potential. These datasets include:

- Energy demand data
- EPC data

### What new or enhanced LAEP+ features and/or data could address pain points or needs identified?

In the interviews, local authorities identified the following datasets that are not in LAEP+ but could support their needs with regards to better understanding hydrogen.

**Table 1: user-identified datasets**

Request	Detail
Gas infrastructure data & hydrogen potential	The locations of where existing gas infrastructure is, as well as where potential hydrogen pipelines, storage or transport routes could exist

Local authorities were then asked about what new functions could support their work in LAEP+. The below table outlines their responses.

**Table 2: requested functionality in LAEP+**

Request	Status	Status - Detail
Modelling of hydrogen feasibility	New	Whilst not anticipated to be widespread there was some interest in understanding feasibility, cost, energy inputs and carbon intensity compared with alternatives.