Local energy data innovation
Existing data applications

September 2020

Data is becoming more open and accessible and paves the way for innovators to build tools and develop methodologies that are addressing problems and challenges across all sectors.

Regen undertook desktop research, which was validated and enhanced by an online survey, workshop and interviews, into which data products and services are in common use, either directly or indirectly related to local energy. This included looking at health, waste, water and business as well as energy.

EXISTING DATA APPLICATIONS

Project workplan (logic)

regen
transforming energy

Desktop research

Research existing datasets related to energy (Undertaken by ESC)

Define energy data users, and stakeholders

Research existing tools and methodologies of use to users and solution providers

Design online survey

Develop 'use case' examples
(problem statements for a user or users that is related to, or informed by, energy data)

Stakeholder engagement on use cases

Online survey

Workshops

Interviews

Outputs

Final report

Webinar (w/c 21 Sept)

Project objectives:

- Demonstrate opportunity for innovators
- Identify barriers for government/regulator
- Raise awareness of local energy data opportunities for local stakeholders

Existing data applications
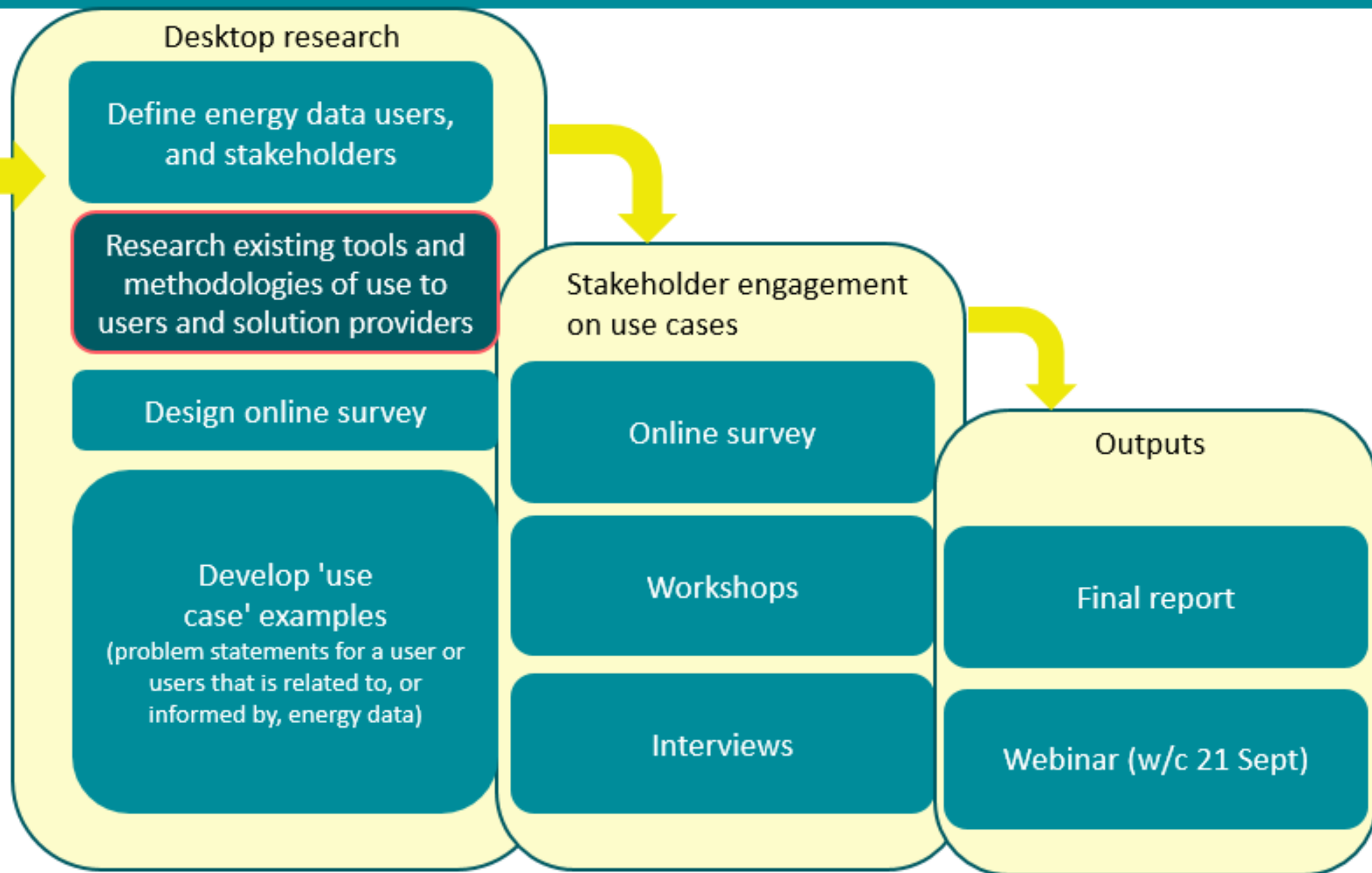
This research has focused on applications that provide analysis of data through tools and methodologies to help innovators understand the current market and opportunities.

For the purposes of this project, we are defining a:
• 'tool' as an active analytical interface with at least one dataset. This would include online mapping interfaces,
• 'methodology' as a descriptive process of how to handle data for a desired outcome.

Our initial desktop research listed 60 data applications that use data to solve problems related to energy in some way. The survey responses added another 15 applications to the list.

We categorised the tools and methodologies in two ways; by user and by theme. These are the same categories used throughout this project. We have not aimed to test or rate these tools.
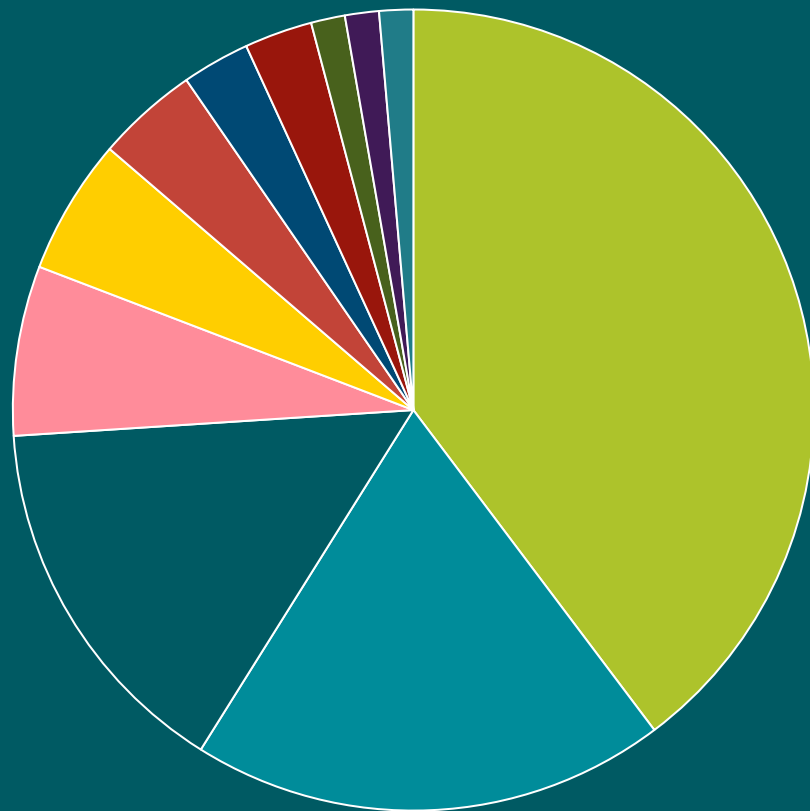
Users

All

Community or campaigning organisation

Consultancy

Energy efficiency or heating provider

Energy network operator

Energy supplier or service provider

EV or storage provider

Generation developer

Healthcare provider

Housing provider

Large energy user

Local authority

Non-energy utility

Researcher

Themes

Joining up utilities

Achieving net zero and local decarbonisation

Public health

Domestic energy and bills

Large energy users

Consumer vulnerability and fuel poverty

Electric vehicles

Energy services and supply arrangements

Energy network operation

Energy generation

Flexibility services

This work is not aiming to provide a complete list of tools, but to give innovators an indication of the market.
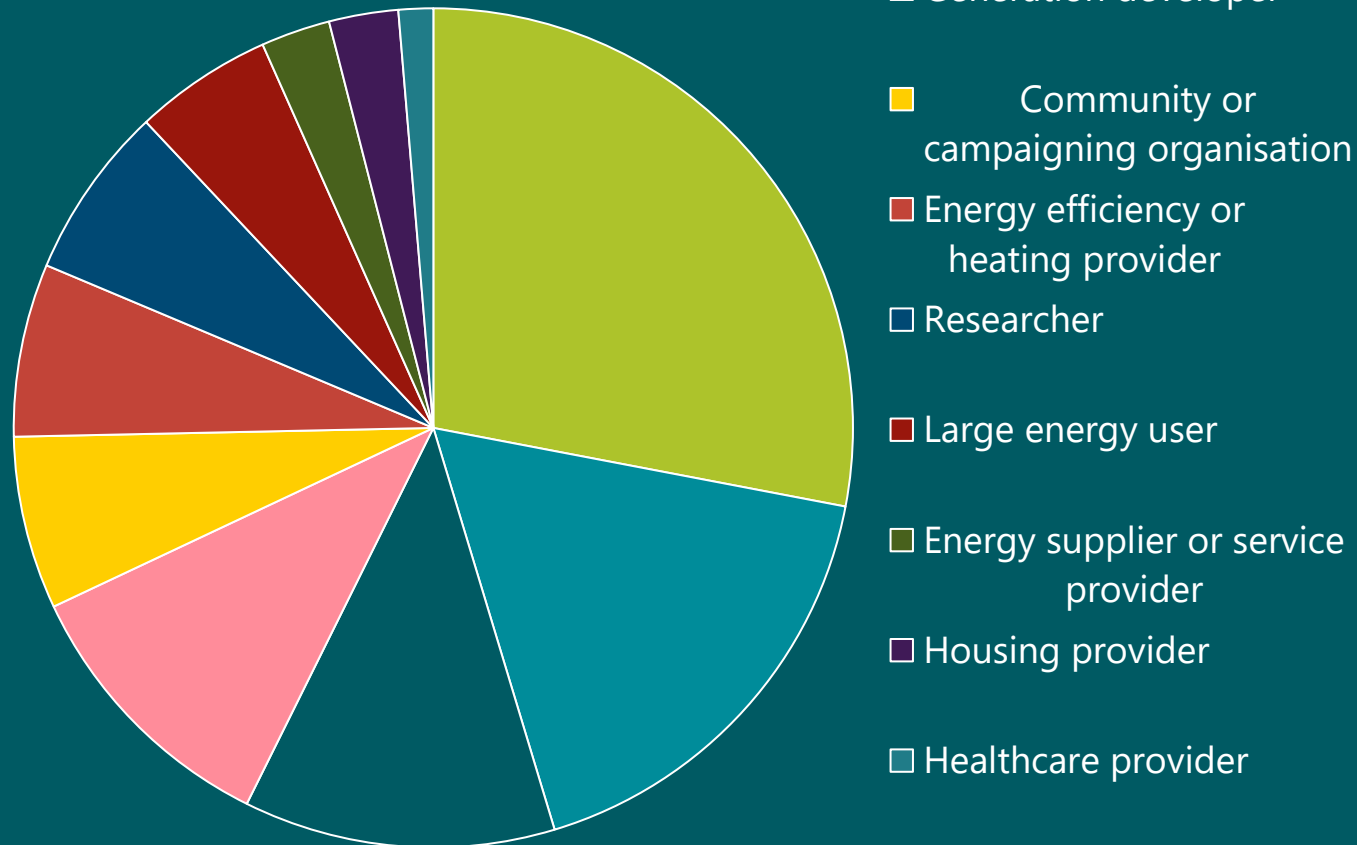
Existing data apps by theme

- Energy network operation
- Achieving net zero and local decarbonisation
- Domestic energy and bills
- Large energy users
- Flexibility services
- Public health
- Joining up utilities
- Electric vehicles
- Consumer vulnerability and fuel poverty
- Energy services and supply arrangements
- Energy generation

We found the 75 methodologies addressed three main areas:

- Energy network operation
- Decarbonisation
- Domestic energy and bills

Existing data applications

Existing data apps by user group

Legend:
- All
- Local authority
- Energy network operator
- Generation developer
- Community or campaigning organisation
- Energy efficiency or heating provider
- Researcher
- Large energy user
- Energy supplier or service provider
- Housing provider
- Healthcare provider

Of the 75 tools we explored:

- Many did not have a specific audience but were aimed at serving the largest number of users possible
- Local authorities and developers were the best served with tools that addressed specific needs, such as network capacity, flexibility calculators and carbon footprinting.

Existing tools and methodologies

Local decarbonisation strategy	Source
Carbon targetter	Tyndall Centre
SCATTER tool	Anthesis
DECC 2050 carbon calculator (Web or Excel)	DECC (now BEIS)
Local area energy planning tool	Energy Technologies Institute
Carbon intensity tool	National Grid ESO
Global renewable energy resource data (e.g. solar PV atlas, wind atlas)	SWERA
Defra's Magic map	Defra / Magic
Local authority CO2 maps	NAEI
EnergyPath Networks Toolkit	Energy systems catapult
Zero Carbon Communities Hub	SPEN
RETSCreen	Government of Canada
BCC solar potential map	CSE
Place based climate action network	University collaboration

Public health	Source
Public Health Outcomes Framework	Public Health England
London data store (700 datasets on health, environment, jobs, transport, communities)	Mayor of London
Emissions tool (atmospheric emissions, particulates concentrations)	NAEI

Energy services and supply arrangements	Source
Genstar4 Forecast and Profile Manager	Enegen

Home energy and bills	Source
Pathways tool	Parity Projects
Programme builder	Parity Projects
Portfolio	Parity Projects
Home Analytics	Energy Savings Trust
London energy map (domestic energy database tool)	Voluntary collaboration
Smart Energy calculator	UK Power
Data finder (PDF linked to data sets)	National Grid ESO
BRE U-Value calculation tool	BRE
SAP	BRE
PHPP	The passiv house institute
EPC database	MHCLG

Commercial energy and bills	Source
Energy Efficiency Advice Tool	Energy Savings Trust
Energy, water and waste carbon reporting tool (Greenpath)	Veolia
Carbon footprint calculator	Carbon Trust
Carbon tool	Highways England
Environment Agency carbon calculator tool (might be archived)	Environment Agency

Energy generation	Source
CARES toolkit	Local energy Scotland

Existing tools and methodologies

Fuel poverty and fairness	Source
Fuel poverty methodology handbook	BEIS

Electric vehicles	Source
Basic transport carbon tool	Department for Transport
Autodesign	Northern Powergrid

Flexibility services	Source
Flexibility in the energy transition – A Toolbox for Electricity DSOs	E. DSO
Flexibility ready reckoner	Regen
Pro Low Carbon: Carbon Assessment methodologies	Everoze / WPD
Sustain-H value calculator	Everoze / WPD

Joining up utilities	Source
Is it Waste? Tool	Environment Agency
Open Geography portal	ONS

Energy network operation	Source
Electric Insights (snapshot look at the UK's electricity system KPIs)	Drax / Imperial College
Network capacity map	WPD
ConnectNow research assistant	National Grid
Generation availability map	SSEN
How data can inform the deployment of renewable energy	Eunomia
Day ahead constraint limit and flow + Outturn System costs	National Grid ESO
DG mapping tool	UKPN
DG Heat maps	SPEN
Heatmap tool	ENW
https://open-power-system-data.org/	Collaboration project
https://www.electralink.co.uk/open-data/	Electralink
CREST demand model (model of domestic thermal and electricity demand)	Loughborough University
DFES scenario modelling	DNOs (Regen, Element Energy)
NG FES scenario modelling	National Grid
NPG DFES 2019	Data Mill North
Thermos (heat network optimisation tool)	CSE
Gas demand modelling methodology	National Grid
Average cold spell methodology	National grid
Electricty demand profile tool	Strathclyde University
Heating demand profile tool	Strathclyde University
Planning portal	DMHCLG
Irena Flextool	IREA
OSeMOSYS	
Markal/TIMES	ETSAP
POLES	Enerdata
HOMER	HOMER ENERGY LLC
Pathfinder plus	WWU
Energy System Modelling Environment (ESME)	Energy System Catapult

UNDERLYING DATA

Limited information on data

Most tools did not specify which data sets had been used or if they did, omitted information about the edition or year. This drastically limits the longevity and usefulness of a tool, as without confidence that relevant data has been used, the outputs become less valuable. This was particularly noticeable for carbon footprinting and assessment tools, of which there are a large number (11 out of the 60 in our initial desktop research).

Lots of maps

Mapping provides a powerful user interface but is limited in use for innovators, unless the source data or shape files can be accessed.

Data stores and hubs

There is no shortage of repositories of data. Many public bodies are committed to publishing and hosting datasets. Most of these hubs probably hold valuable information but are difficult to navigate and often the data is unprocessed which makes it less valuable to innovators.

POTENTIAL COMPLEMENTARY DATASETS

COMPLEMENTARY DATA

Research existing datasets related to energy (Undertaken by ESC)

Research existing tools and methodologies of use to users and solution providers

Energy data	Sources
Transport data	IM data hub, transport data initiative, DfT datasets
Air Quality data	DEFRA data archive, NAEI emissions map, London air quality network
Health data	SHAPE Atlas, Health data research UK
Weather data	The met office, British Atmospheric data center, MIDAS open (CEDA)
Buildings data	EPC data (England and Wales), Gov't data (Cabinet office)
Socio-economic data	ONS, UK Data service
Infrastructure data	DAFNI.ac.uk
Technology performance data	UKERC
Education data	ONS, HESA, UK data service

SUMMARY

Existing tools tell us where the current data needs are…..

regen
transforming energy

A substantial proportion of the tools were variants of three types of use case:

Housing stock assessment, or how to target energy efficiency measures

There are several tools that claim to provide detailed housing stock analysis to social landlords, local authorities or even installers and manufactures. These tools are all likely to mix EPC data (freely available to address level) with detailed cost data and in-house analysis of energy performance per archetype.

These tools are often £2,500 - £4,000+ and are increasingly marketing themselves as critical in targeting retrofit activity.

Carbon footprint, carbon budgeting, carbon impact

There is a large array of old, new, high-level and detailed carbon tools available. Many of these are either aimed at local authorities or SMEs. There have been attempts to produce carbon tools for specific sectors, such as transport or construction, but these appear to be out of date and of limited value. Very few tools publish companion documents that outline methodology. Without such a document, tools exploring specific aspects of carbon emissions are of limited value.

Network capacity and flexibility

Network constraints are now a key factor for new generation projects and can determine site selection. Flexibility markets are also growing as a result and there are a host of tools dedicated to estimating revenues.
Each DNO has been instructed to publish data on the capacity and constraints of their network, which has led to each licence area producing online mapping services. These are useful, but do not permit download of the underlying data and can be difficult to navigate.

Summary

- Our assessment was desk-based and took high level information about tools and methodologies that could be relevant to local energy challenges. We did not review each tool/methodology in detail

- We found 75 tools and methodologies that related to energy in some way

- Although still 'live' and available to download and use, many of these tools are using old data or old assumptions that limit their value for contemporary analysis

- Most of the online tools and methodologies we identified focus on network operation in some way, such as accessing flexibility markets or identifying network constraints (37%)

- The second most popular tool was carbon footprinting (19%)

- There were very few tools that combined sources of data together from different sectors, although there are a number of data 'hubs' that provide access to cross-sector data

- Other than tools that were intended for a very wide audience ('All', 28%), the most common target audience for the tools we looked at were local authorities (19%)

- Half of the tools and methodologies appeared to be continually updated (30), a further 14 tools were older than 2010 or of unknown date of revision