

Housing Industry Leaders Cymru Decarbonisation of Housing Stock

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11th July 2023



About Energy Systems Catapult



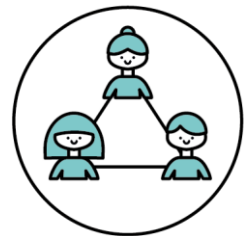
250 + Innovation experts



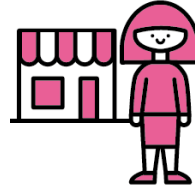
Based in Birmingham



Established, overseen and part-funded by Innovate UK. Independent from Government. Not for profit



Bridge the gap between stakeholders in the sector



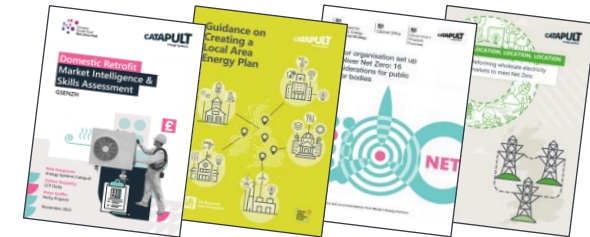
Supported over **100** SMEs and launched two challenge calls



Completed over **120 Research and Innovation Projects**



Reached c.**2000** homes (across the UK)



Published **over 45 publications** with **over 14,500+ downloads**

Our Approach: Whole Systems Thinking

Joining up the system from sources of energy to the consumer



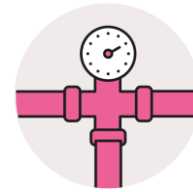
Generation

+



Transmission

+



Distribution

+



Buildings

+



Consumer

Breaking down silos between different parts of the energy system



Electricity

+



Heat

+



Transport

Joining up physical requirements of the system, with policy, market and digital arrangements



Physical System

+



Digital System

+

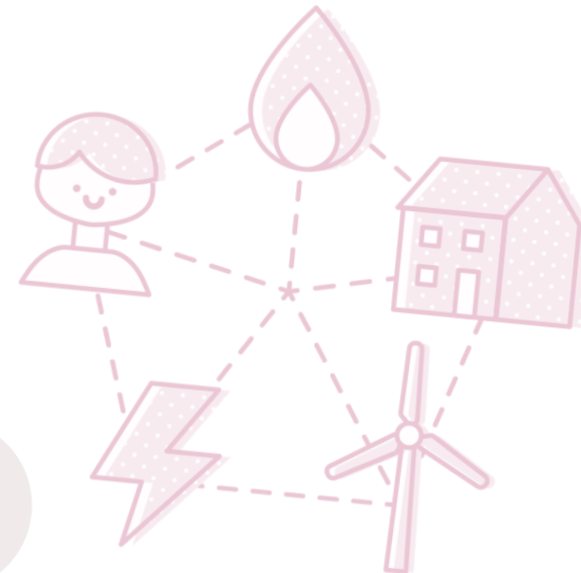


Market System

+



Policy

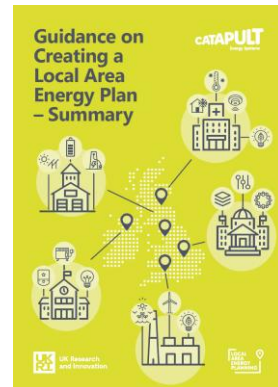
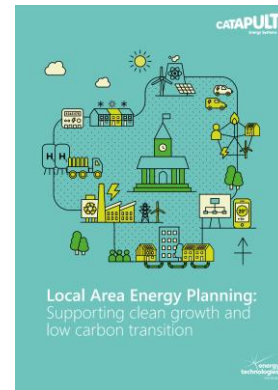


Some of our work on decarbonising domestic heat

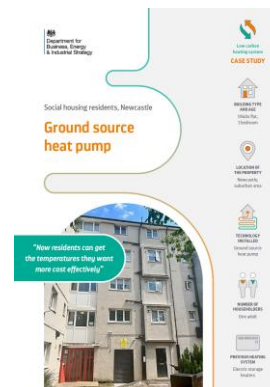
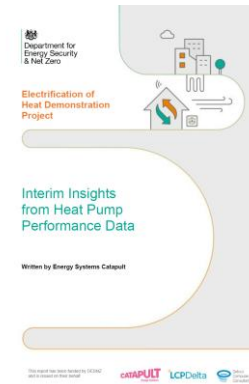
Smart Systems and Heat



Local Area Energy Planning (LAEP)



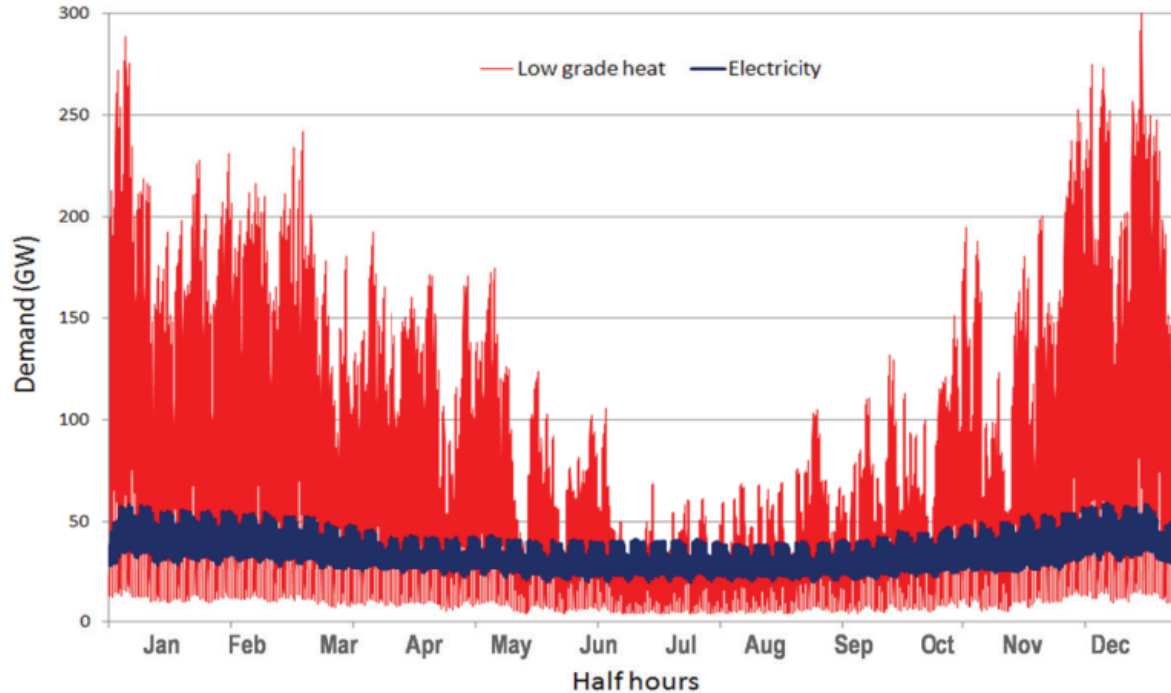
Electrification of Heat Demonstration



Living Lab



Heat Decarbonisation - Why is it So Hard?



Source: Sansome (2014) Decarbonising Low Grade Heat for a Low Carbon Future
<https://www.biee.org/resources/the-impact-of-future-heat-demand-pathways-on-the-economics-of-low-carbon-heating-systems/>

- Residential Buildings Sector accounts for 9-10% of emissions in Wales
- 11 out of 22 Welsh LAs have retained their housing stock
- At least 16 of the 22 Welsh LAs have declared a climate emergency
- c155,000 Welsh homes are in fuel poverty
- In a report for the Future Generations Commissioner, the New Economics Foundation (NEF) has estimated that:
 - £14bn of investment is required to decarbonise the Welsh Housing stock*
 - a retrofit programme across Wales could lead to energy bill savings of around £613 per household retrofitted to EPC 'A'*
 - a long-term pipeline of projects retrofitting homes can create over 26,500 new jobs in Wales*

Decarbonising Domestic Heat across Wales – a huge challenge



Consumers



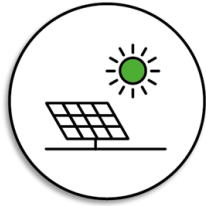
Heating systems



Control systems



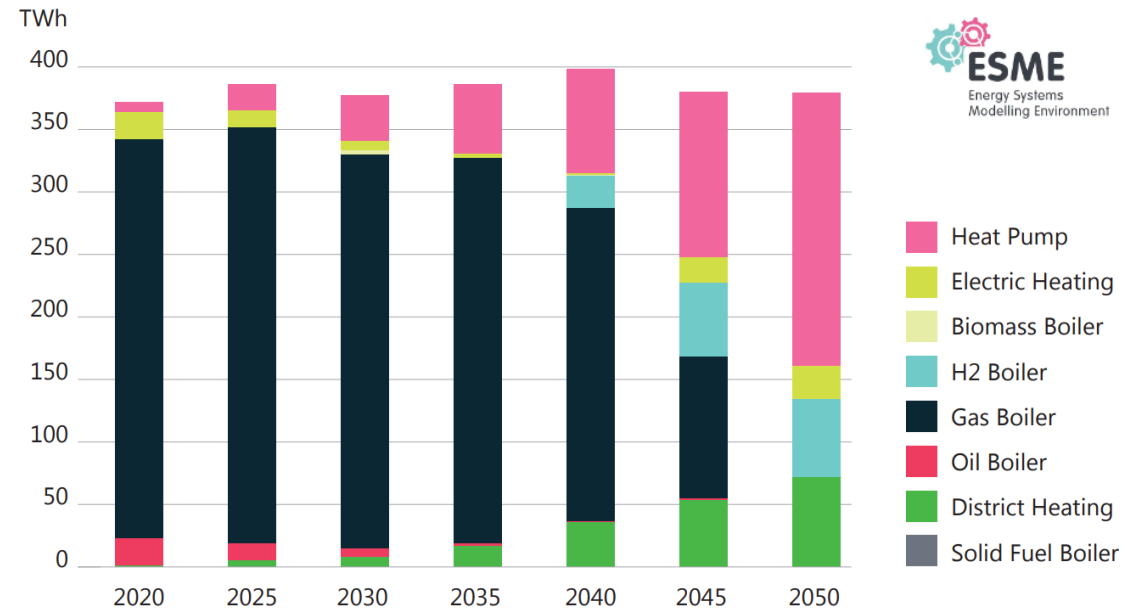
Homes and Buildings



Generation



Transmission and Distribution



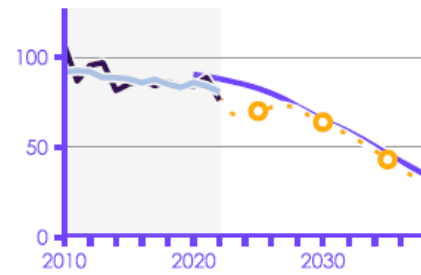
Source: Energy Technologies Institute (2018) Journey to Smarter Heat
<https://www.eti.co.uk/insights/the-journey-to-smarter-heat>

Source: ESC (2021) Innovating to Net Zero
<https://es.catapult.org.uk/report/innovating-to-net-zero/>

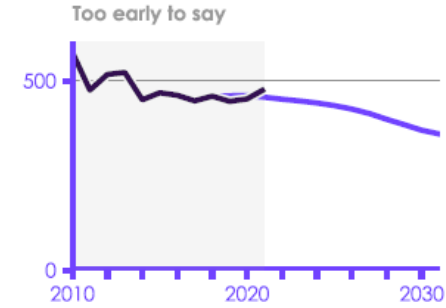
Heat Decarbonisation – Why is It So Hard?

But everything is looking good..right?

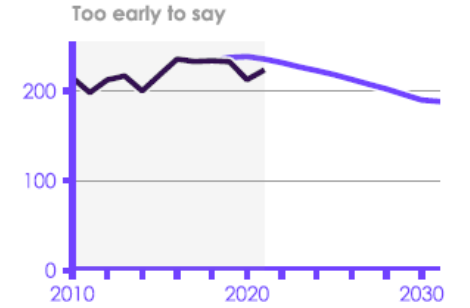
a) Buildings emissions (MtCO₂e)



b) Final energy demand in residential buildings (TWh)

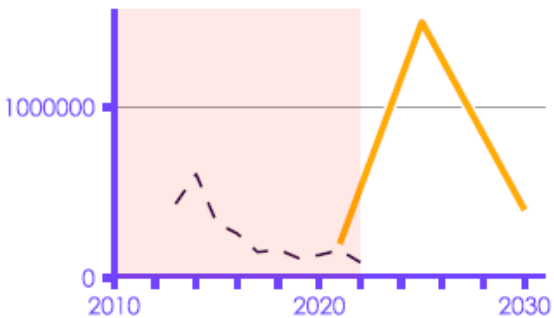


c) Final energy demand in non-residential buildings (TWh)



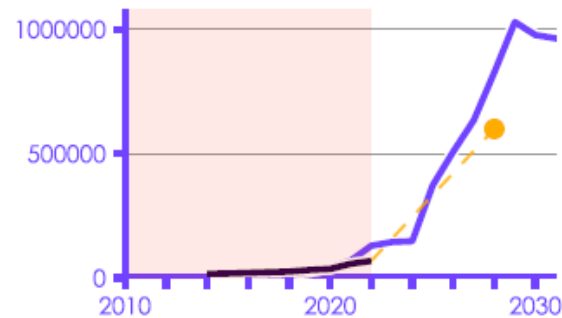
g) Households receiving energy efficiency measures

Significantly off track



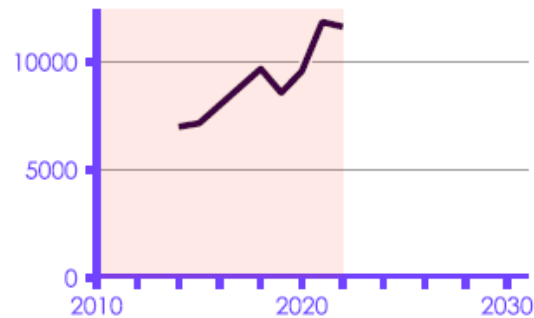
h) Heat pump installations (residential)

Significantly off track



i) Average cost of heat pump installation (total) (€)

Significantly off track



.....maybe not

Moving Welsh Homes Away from Gas & Oil

turning the challenge into a massive opportunity

Britain's reliance on gas will continue to grow, driven substantially by domestic heating; the country's second largest use of energy and the largest component of gas consumption.

Gas is the largest domestic heating source until at least 2032, with households in Wales currently consuming a combined **25.6 TWh** of gas annually.

Offshore Energies UK (OEUK) Business Outlook Report April 2023

Household heating accounts for 60% of gas use in Wales so there are **huge opportunities** to drive forward decarbonisation in the housing sector.... will require **innovation in technology, delivery and public engagement**.

Heat pumps are currently the best available low-carbon alternative to a gas boiler. The heat pump market and skills sector is less developed in Wales and the UK than other nations in Europe.

HOWEVER....

Some of these challenges can benefit from **'made-in-Wales' solutions** and we should be ambitious for Wales to have a thriving low-carbon heating sector in the long term.

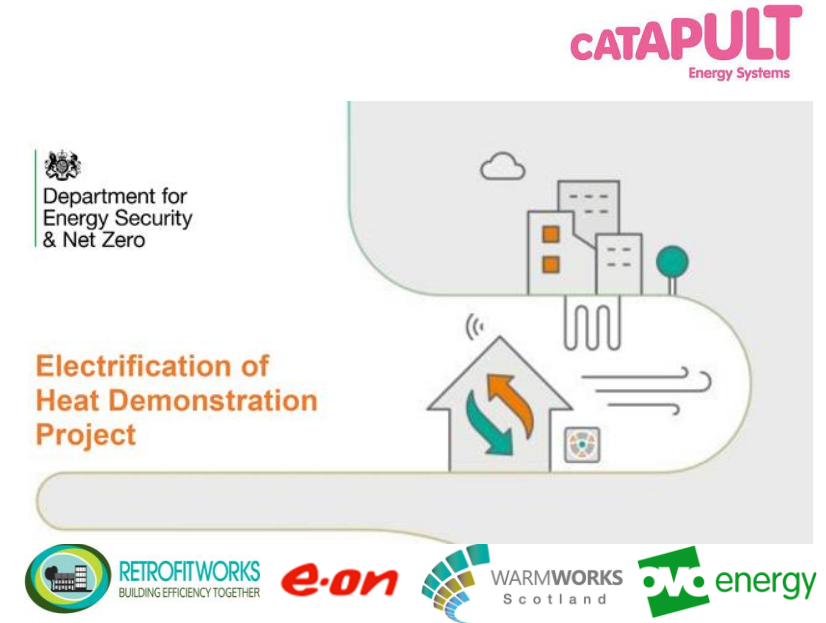
Nesta January 2023

DESNZ Electrification of Heat project managed by ESC

742 Heat Pumps installed

- Large scale rollout of heat pumps in UK homes is technically and practically feasible
- Variation in quality and performance indicates supply chain development needs to really accelerate uptake
- Number of innovation opportunities are required to overcome barriers
 - *Time to install*
 - *Complexity for customer*
 - *Disruption to household*
 - *DNO grid connection process*
 - *Planning permitting*

Source: ESC (2023) Electrification of Heat Demonstration Project
<https://es.catapult.org.uk/project/electrification-of-heat-demonstration/>



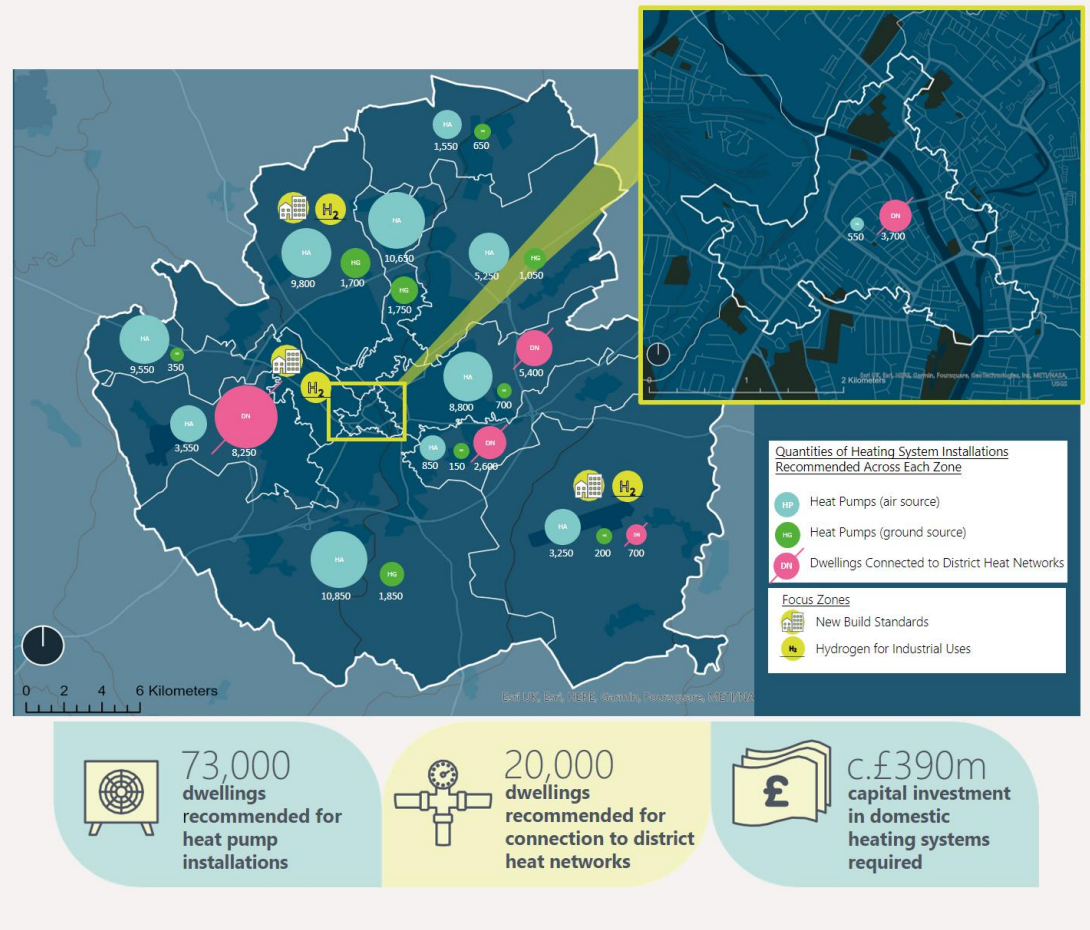
No geographical area is the same ...
(the) share of different low carbon technologies
is different for each due to housing stock variation (etc)...

Zero 2050 South Wales Project – UKERC & National Grid



Plan for heat decarbonisation as part of wider local energy systems : Local Area Energy Plans (LAEPs)

- Electricity Networks
- Gas Networks
- Fabric Retrofit
- Heat Networks
- Heat Pumps
- EV Charging
- Hydrogen Infrastructure
- Generation and Storage Assets



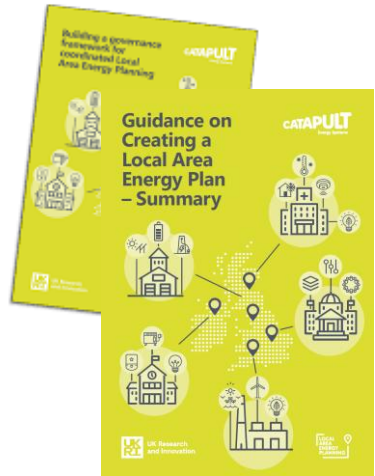
Local Area Energy Planning provides the 'what, where, how many, by who and when'. It considers the views and objectives of a wide range of stakeholders to provide a common reference point which can direct and align investment across separate sectors.



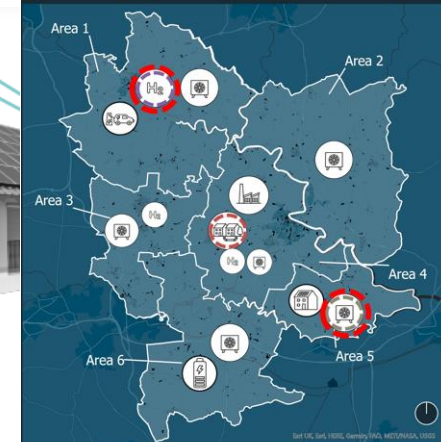
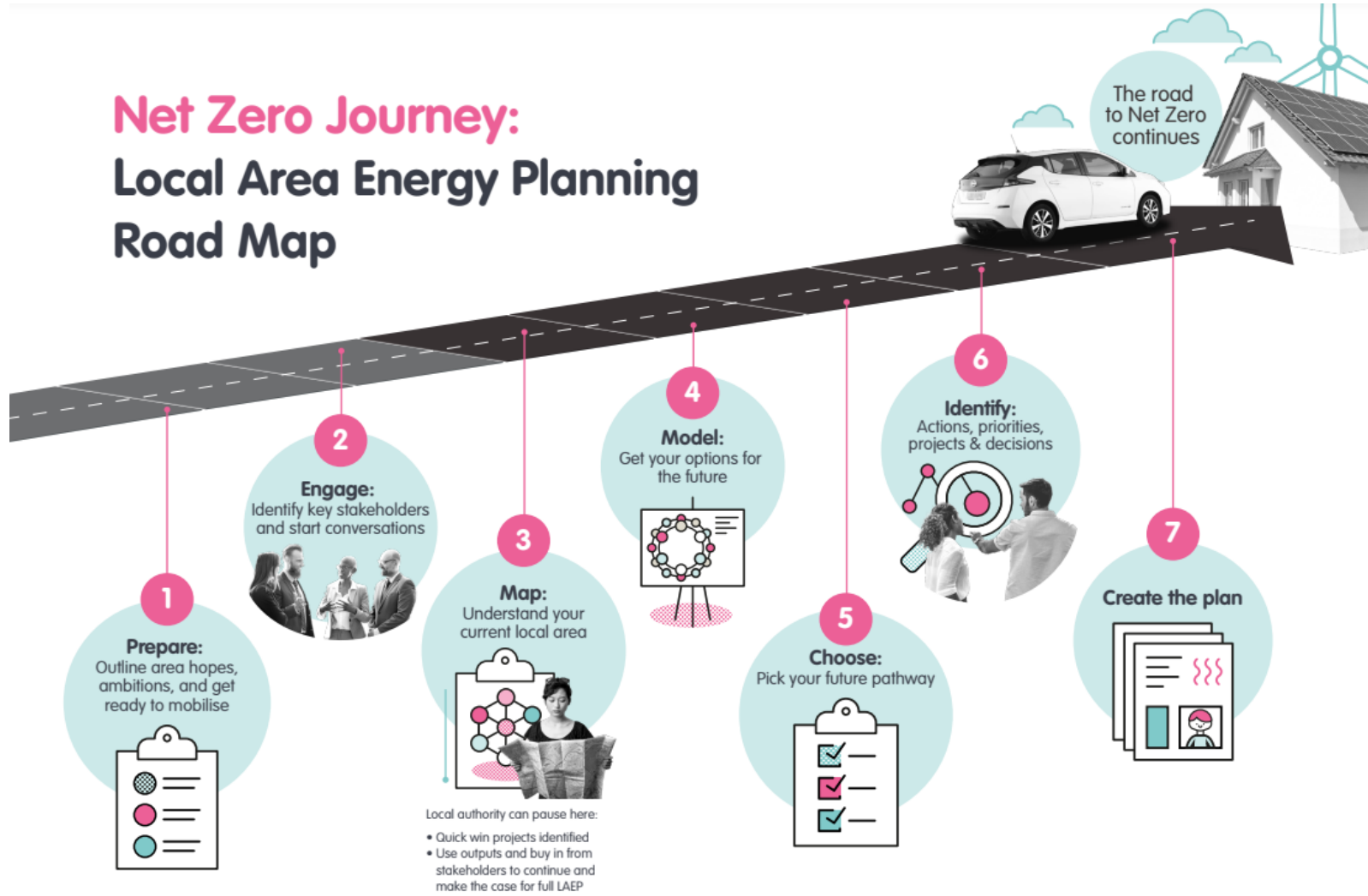
The Journey to Local Net Zero

<https://es.catapult.org.uk/guide/guidance-on-creating-a-local-area-energy-plan>

Net Zero Journey: Local Area Energy Planning Road Map



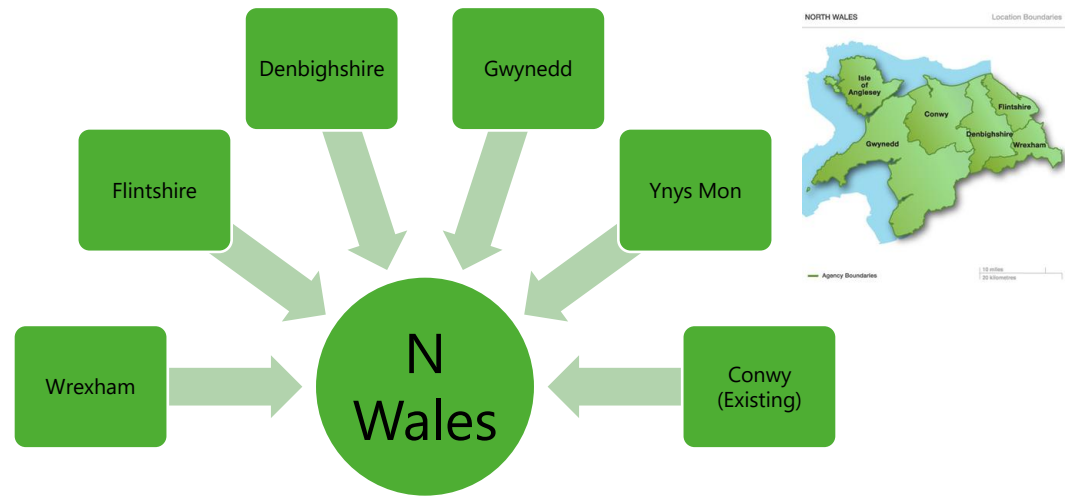
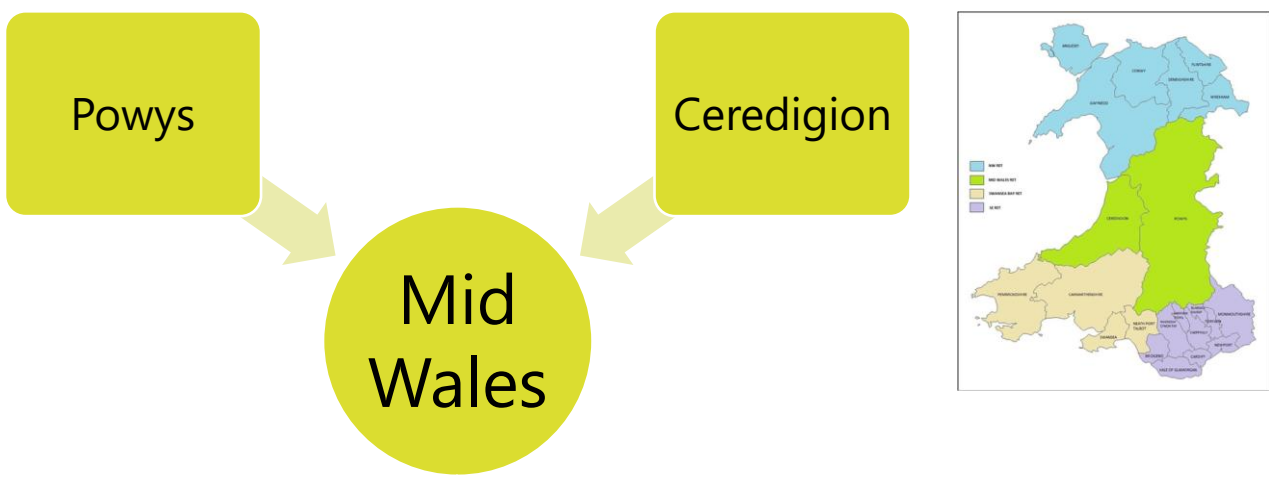
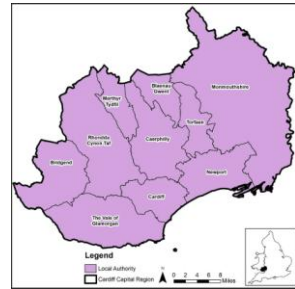
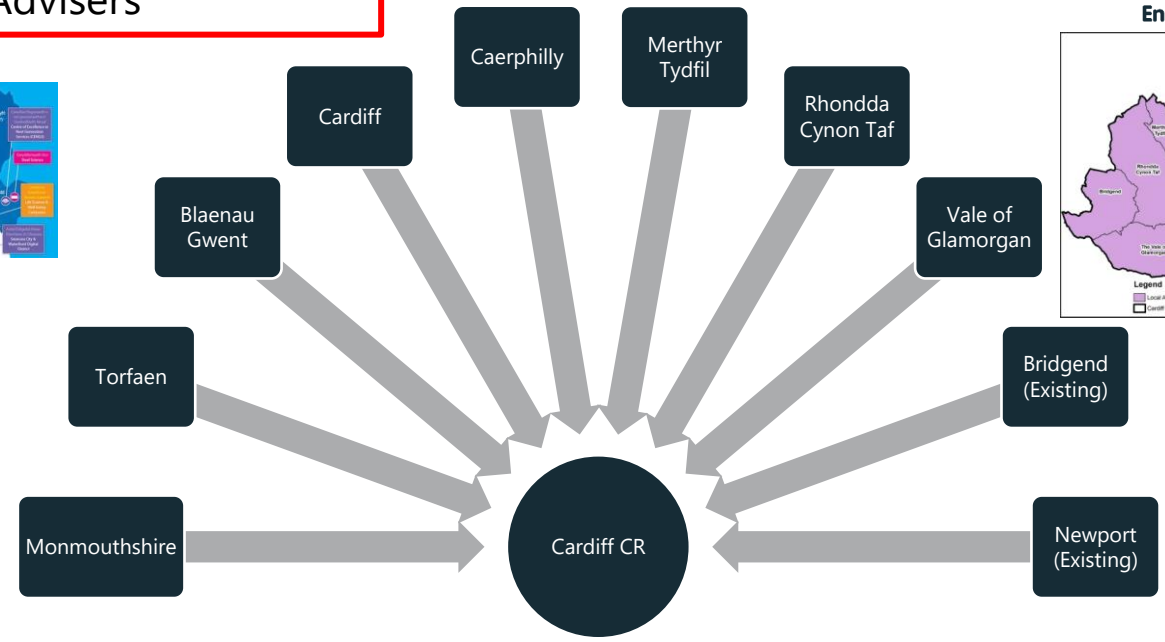
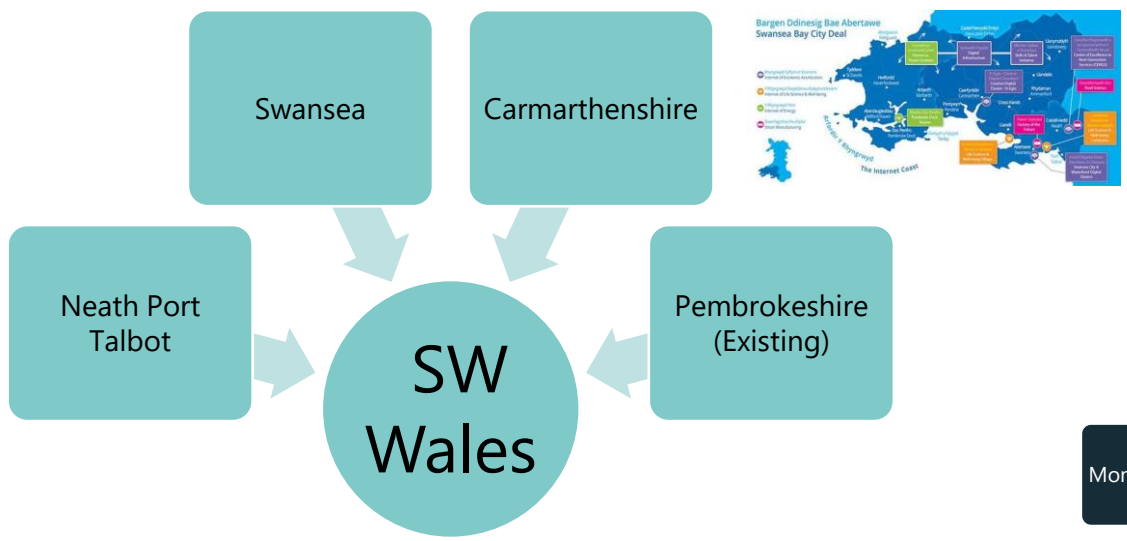
**Guidance
&
Governance
for
Local
Authorities**



Resulting in a **long-term evidence-based plan to decarbonise LA areas**

with data and insight to deliver **net-zero innovation and deployment**

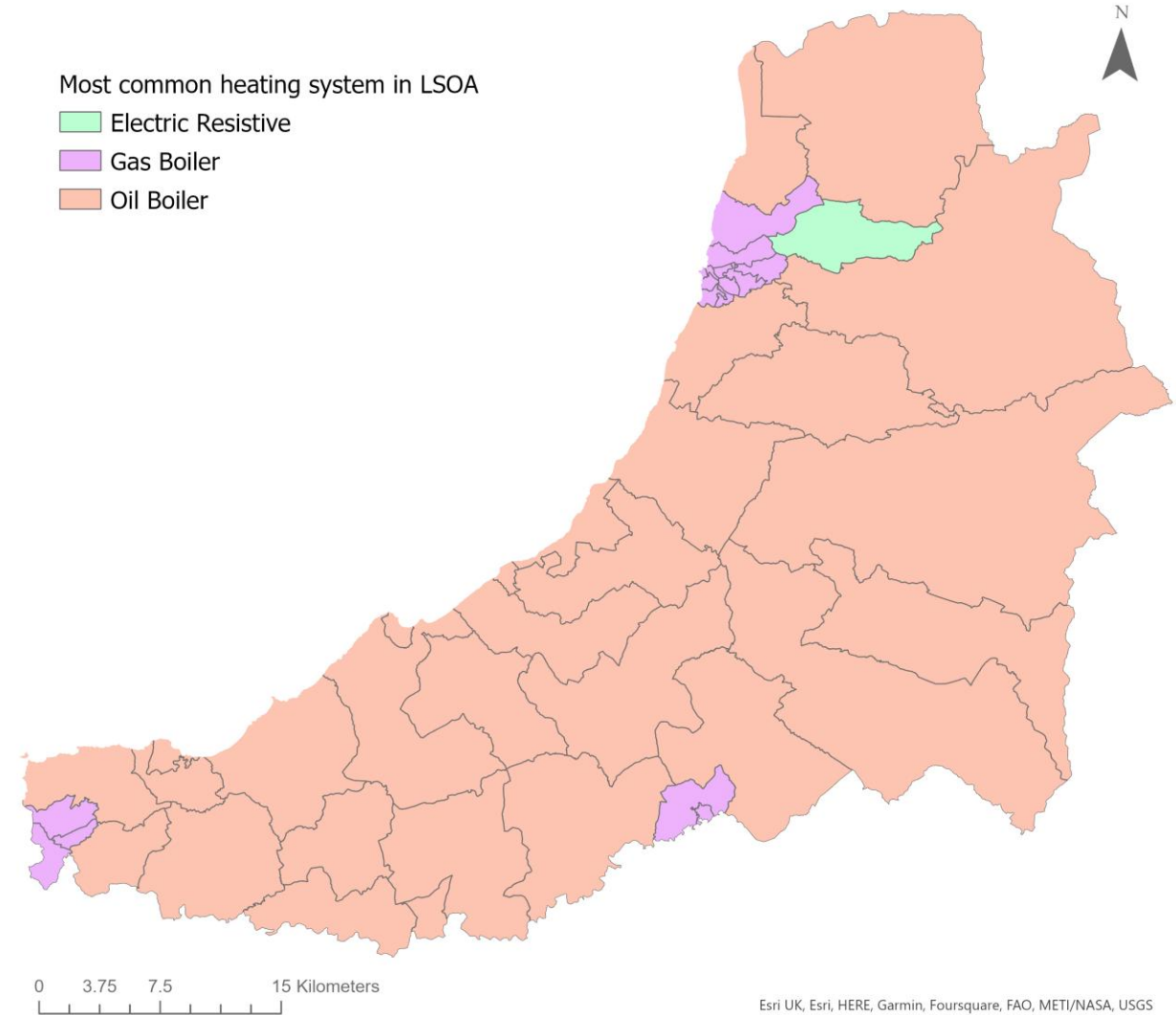
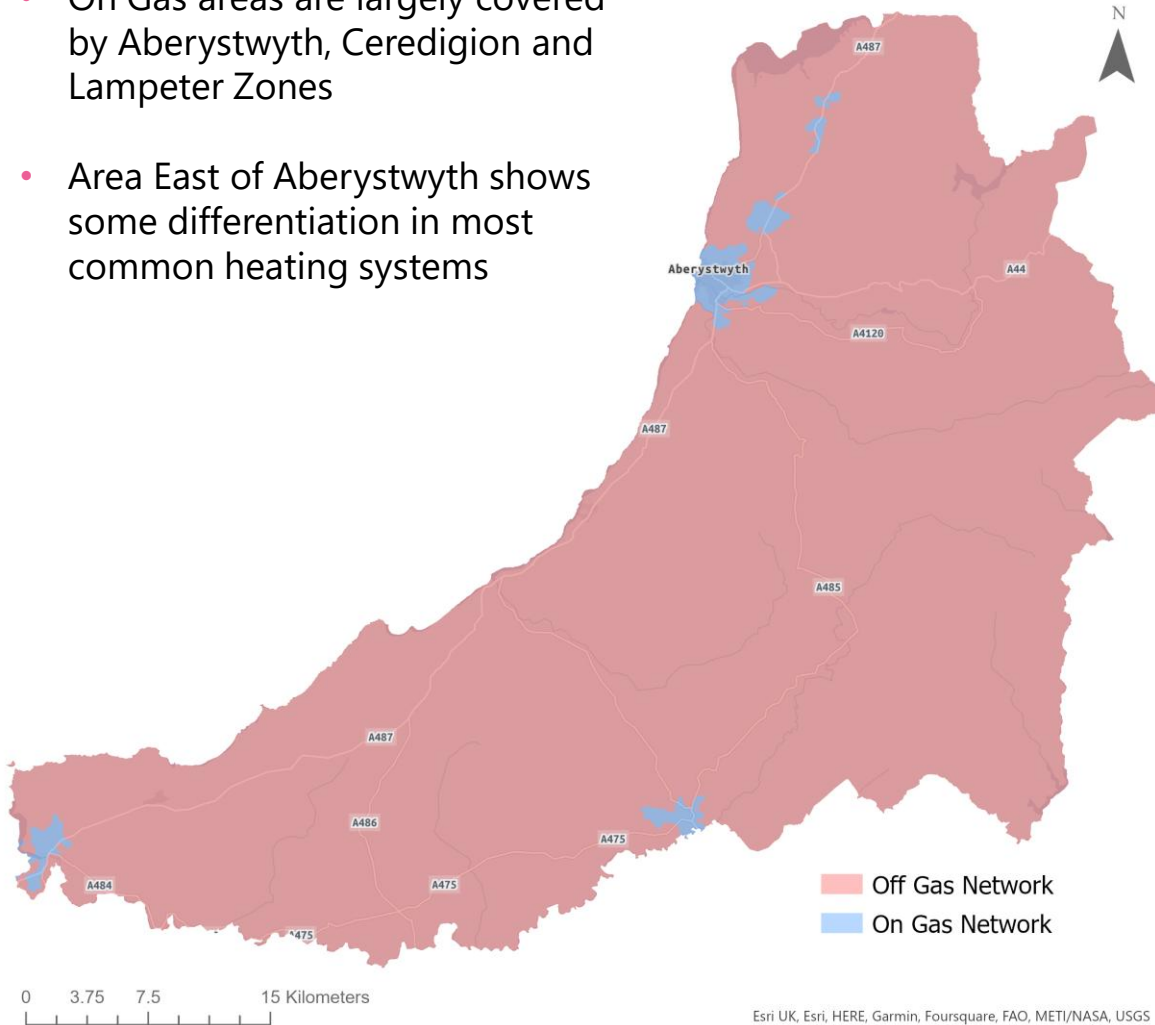
- The programme is providing 18 Local Area Plans (LAEPs), in addition to 4 that already exist.
- Energy Systems Catapult – Technical Advisers



Example : Modelling

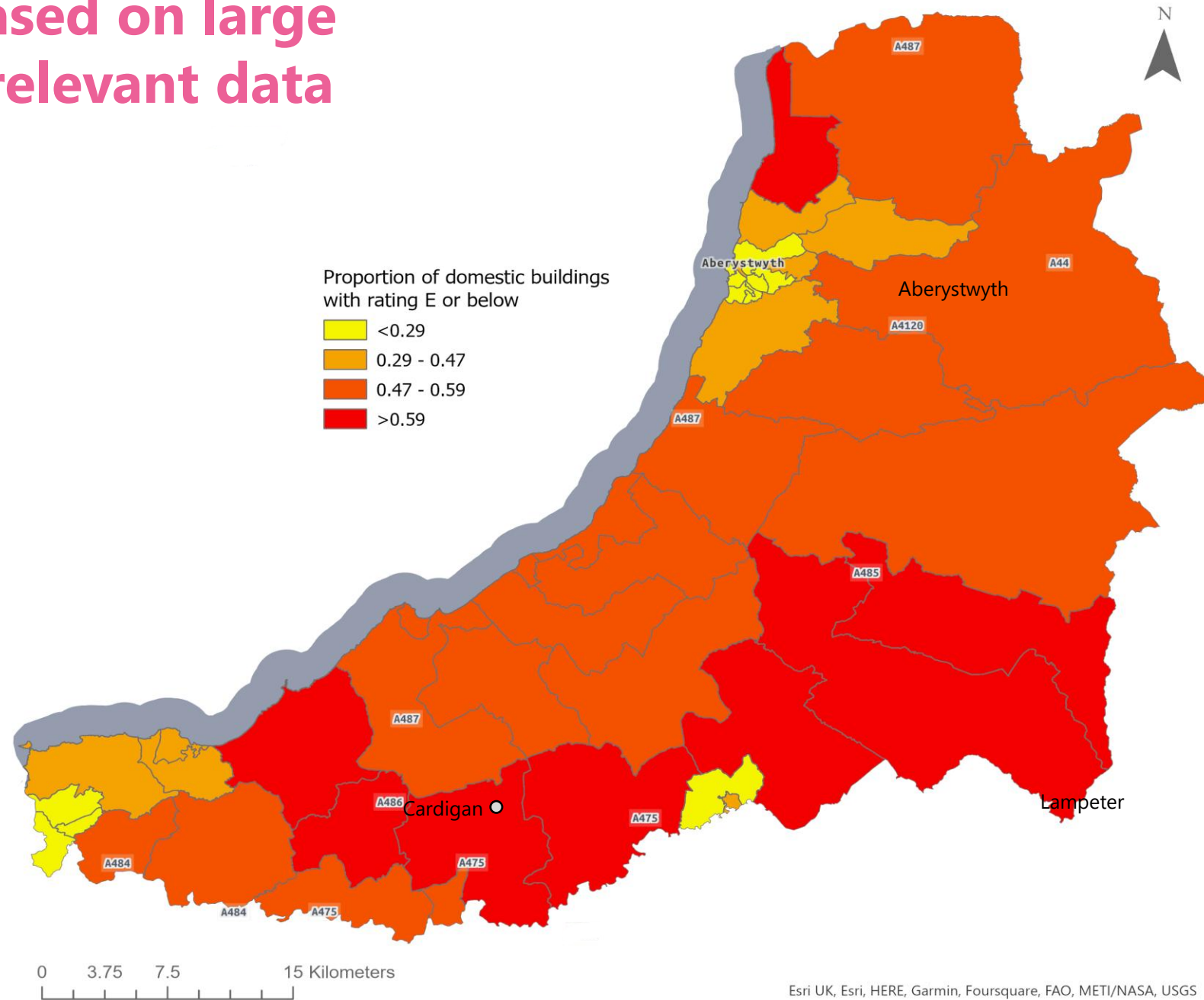
Creating the zones: 3/6: Gas Grid and Heating Systems

- On Gas areas are largely covered by Aberystwyth, Ceredigion and Lampeter Zones
- Area East of Aberystwyth shows some differentiation in most common heating systems



LAEPS are based on large amounts of relevant data

EPCs are just one example



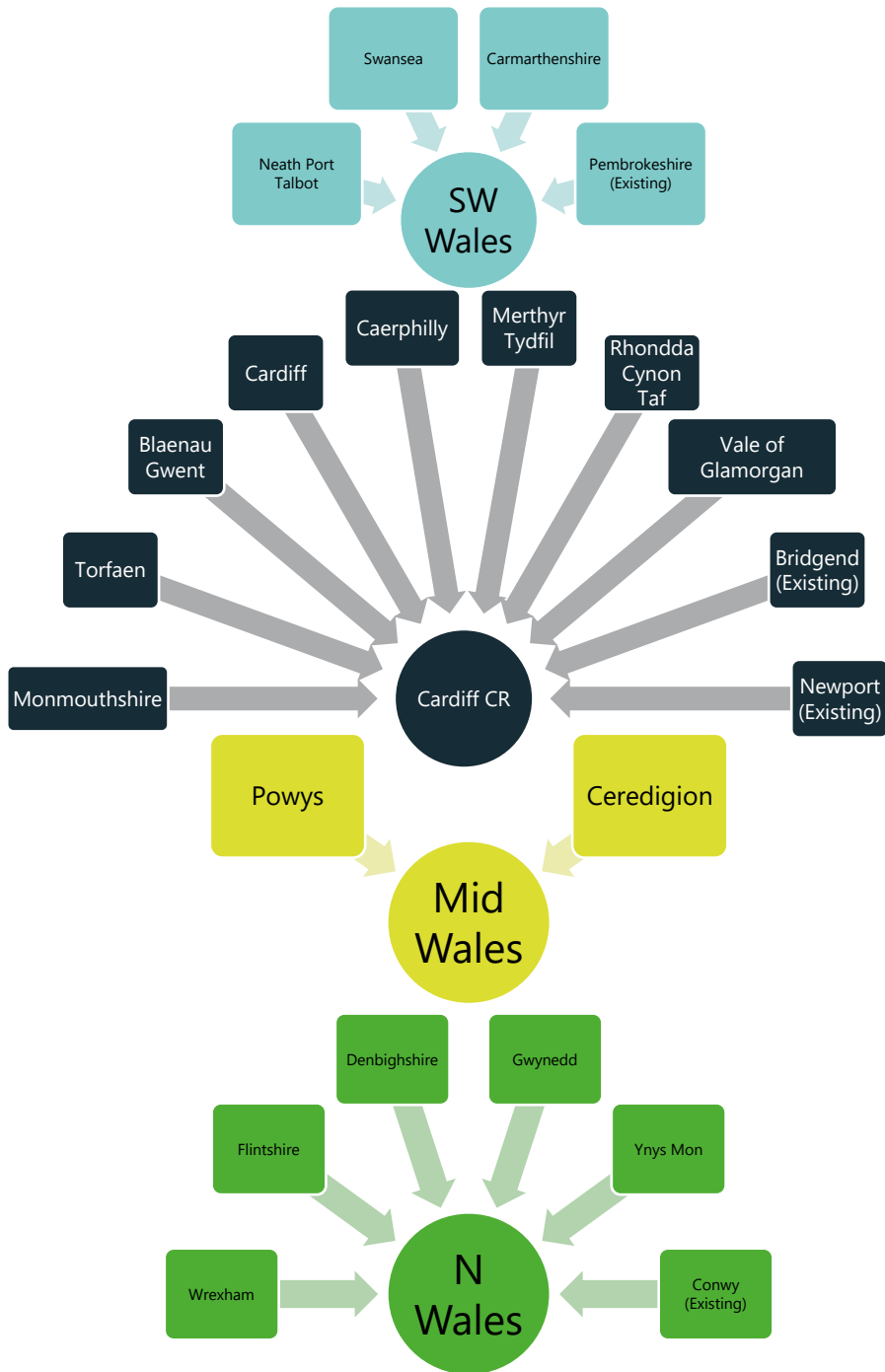
Domestic Archetypes in Cardigan

Age



Type

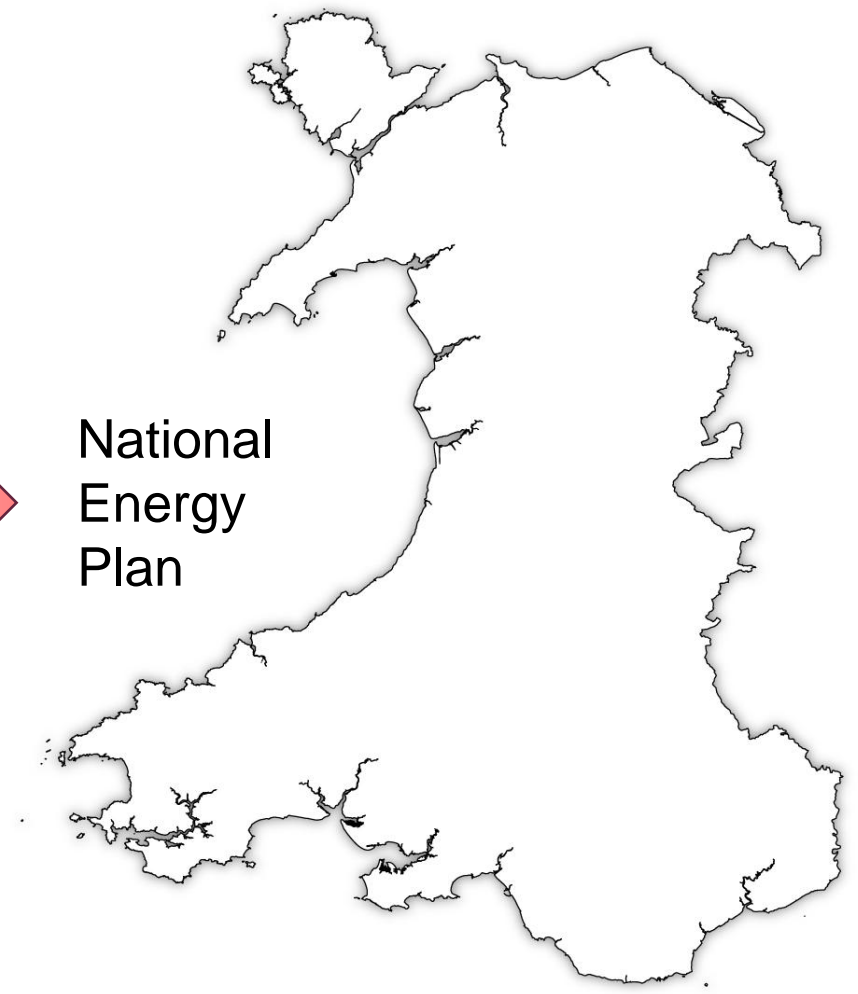




Local & Regional Energy Plans

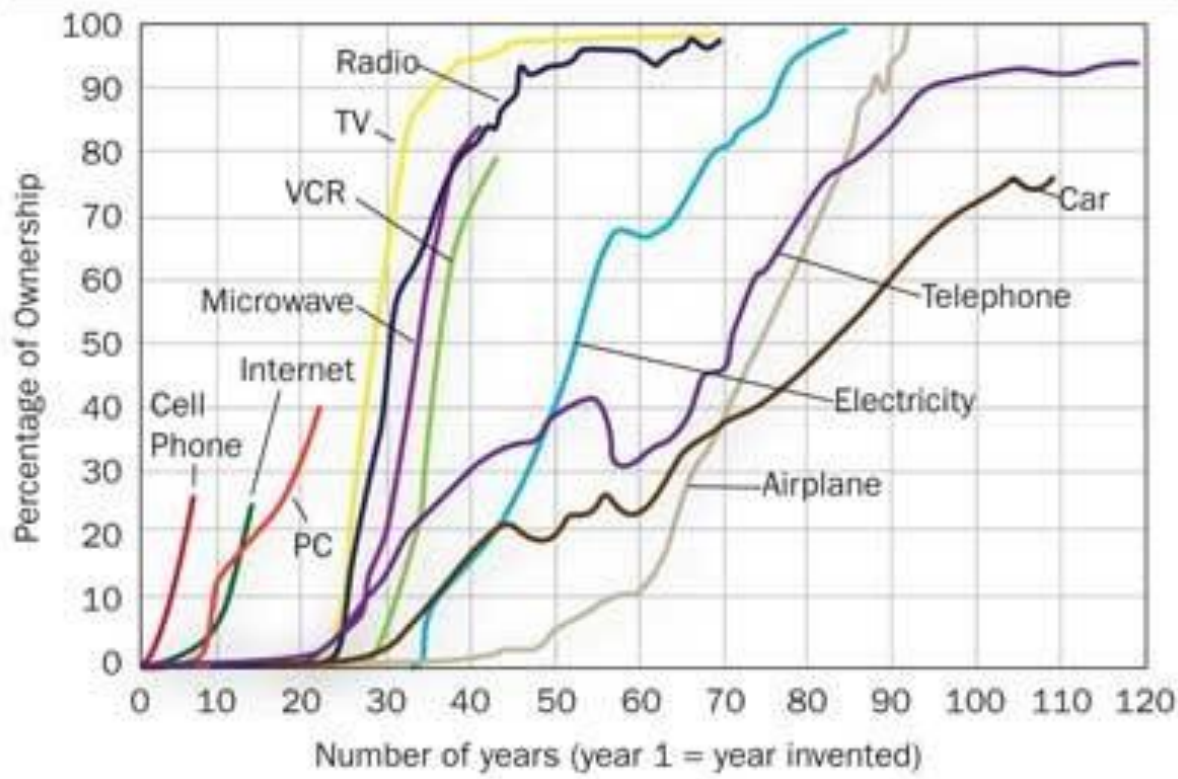


National Energy Plan



Meeting the challenge in time – it can be done

Technology Adoption



Thank you

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