Department for Energy Security & Net Zero

Ready for RESP:

Net Zero Planning Masterclass: Buildings



Greater South East Net Zero Hub

MIDLANDS NET ZERO HUB

north east & yorkshire NET ZERO HUB

north west net zero hub

South West NET ZERO HUB

Programme delivered by CATAPULT Energy Systems

Catapult team:
Chris Brierley, Dr Anna Stegman, David Lee and Christabel Ofori-Atta

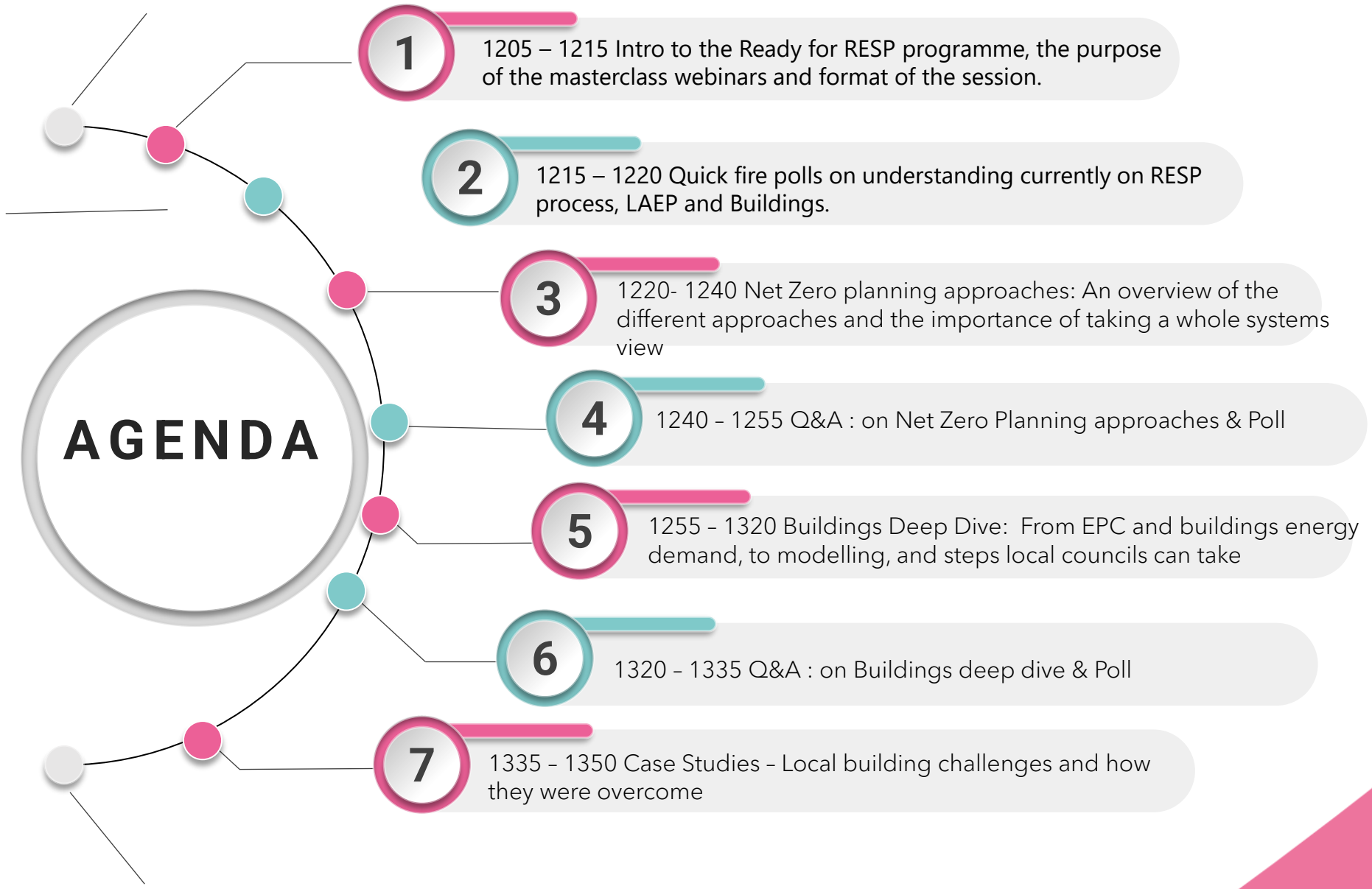
Housekeeping





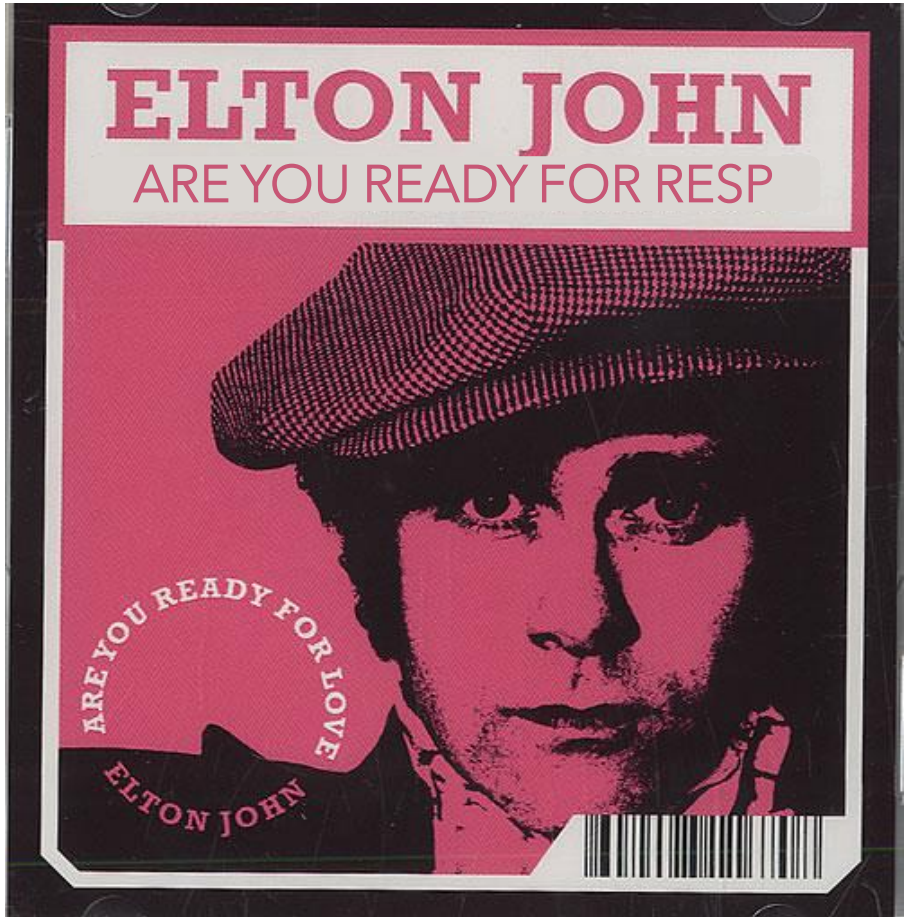


12.00: Welcome & Introductions



13.50: Wrap up

QUICK POLL:



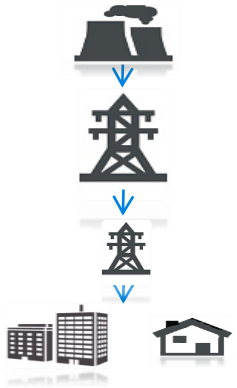
- What are your feelings towards the introduction and process of RESP?

The creation of Regional Energy Strategic Plans mean local needs and priorities will directly influence how energy networks are developed, resulting in a more democratic, low carbon, energy system.

A smarter, more flexible energy system is emerging but it currently lacks co-ordination

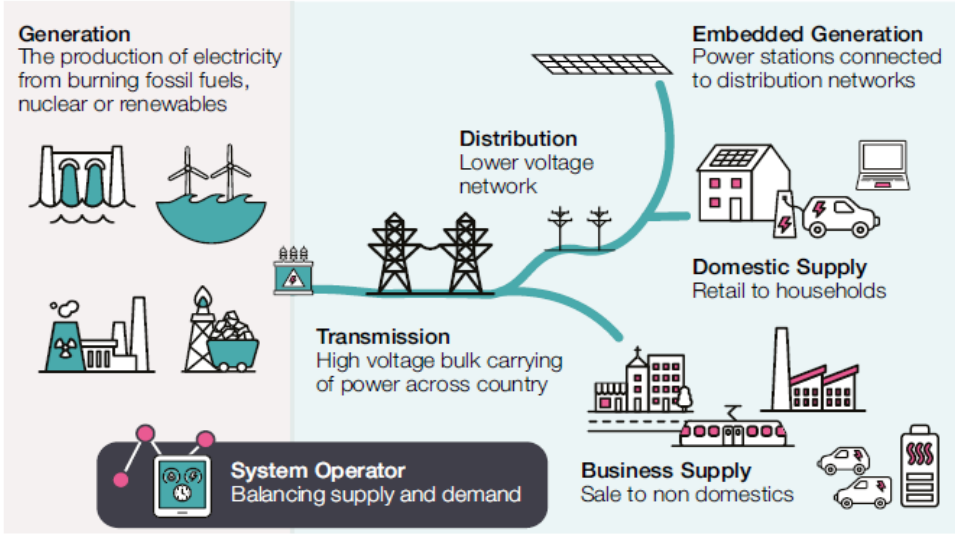
Ready for RESP

Yesterday



- Carbon intensive
- Centralised generation
- Predictable demand curves (seasonal/daily)
- Steady increase in generation/demand
- ‘One-way’ flow of electricity
- Very limited role at ‘distribution’

Emerging System – increased interactions



- Low carbon
- Interconnectors
- More distributed
- Storage

- Demand-side response
- Electric vehicles/heat
- Smart grids
- A smart system

Integrating Top-Down and Bottom-UP: aligning local ambitions with national Net Zero goals

Ready for RESP

Providing consistent system-level forecasts and network investment needs that shape the strategic direction of the RESP

Bringing together place-based data and local priorities to ensure the RESP reflects real local needs

This year the priority is the **transitional RESP** but then focus on the longer-term **enduring RESP** due to be published in Late 2027



Literature review, stakeholder consultations, and Catapult experience collated

Library of evidence collated

Series of simple language guides
1: Ready for tRESP
2: Ready for RESP
3: Local Government Resourcing plan
4: Local Net Zero Plan Guidance

Hub engagement plan

Game style workshop to bring the interactions of local and regional stakeholder objectives together, demonstrating the value RESP and planning can provide.
Plus follow up in person regional sessions

Change Management training day

Deliver subject specific webinars (buildings, renewable generation, energy networks, transport, industry, hydrogen)

National stakeholder engagement plan

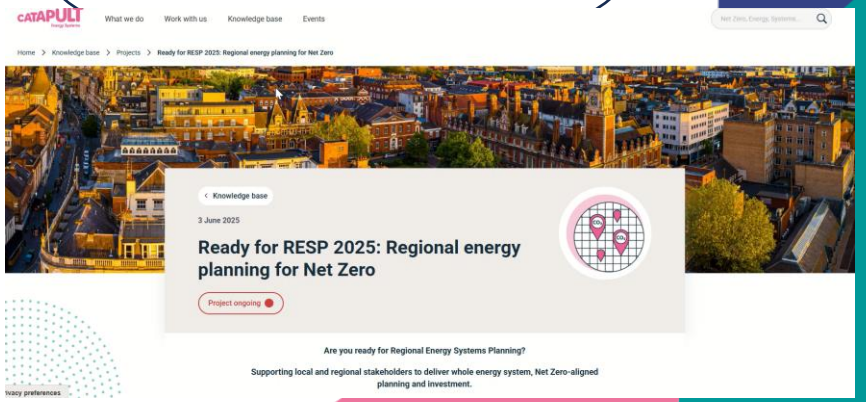
Disseminate guides with 3 interactive online briefing sessions for each region

LA survey and findings to understand regional readiness for Local Net Zero planning

Briefing notes to summarise Guide content for different audiences

Outputs from each activity hosted on Net Zero Go

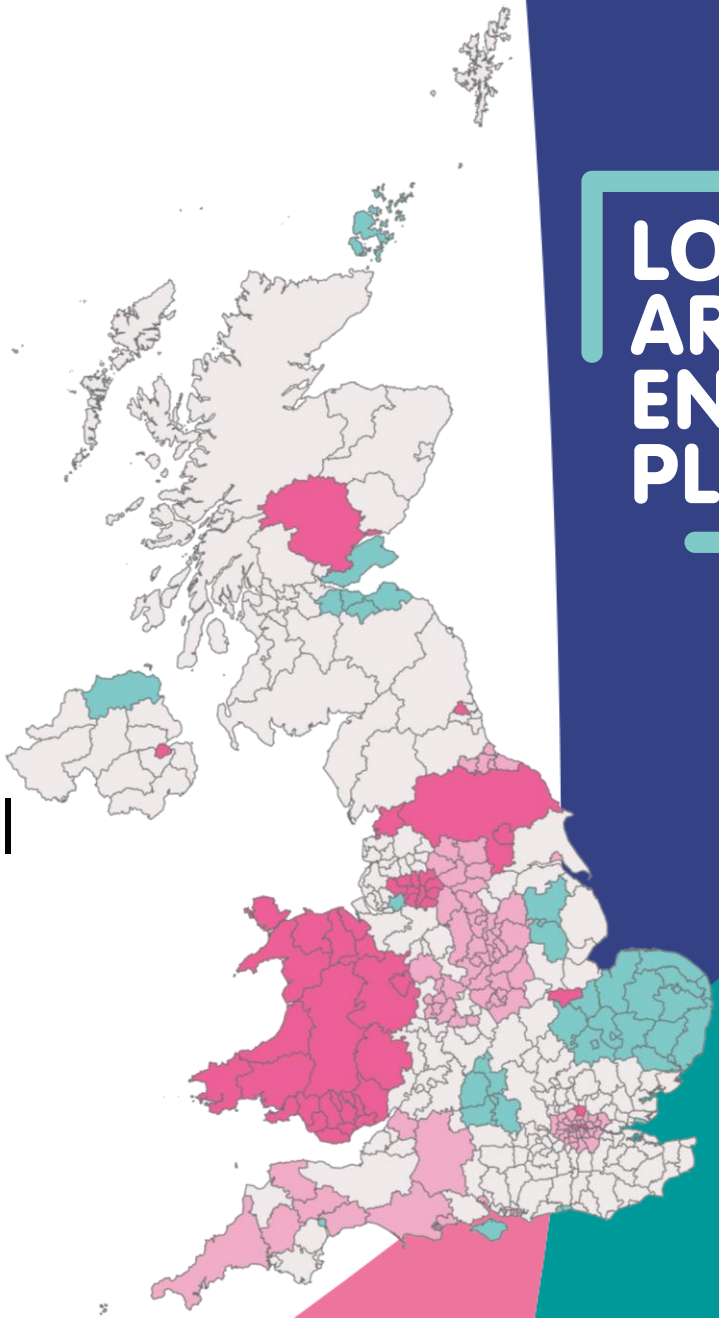




QUICK POLL:

- How would you rate your current knowledge of Local Area Energy Planning? (1 none – 5 expert)

- What is your current perception of Local Area Energy Planning? (1: against it, 3: undecided, 5: everywhere should have one)



LOCAL AREA ENERGY PLAN

QUICK POLL: Buildings



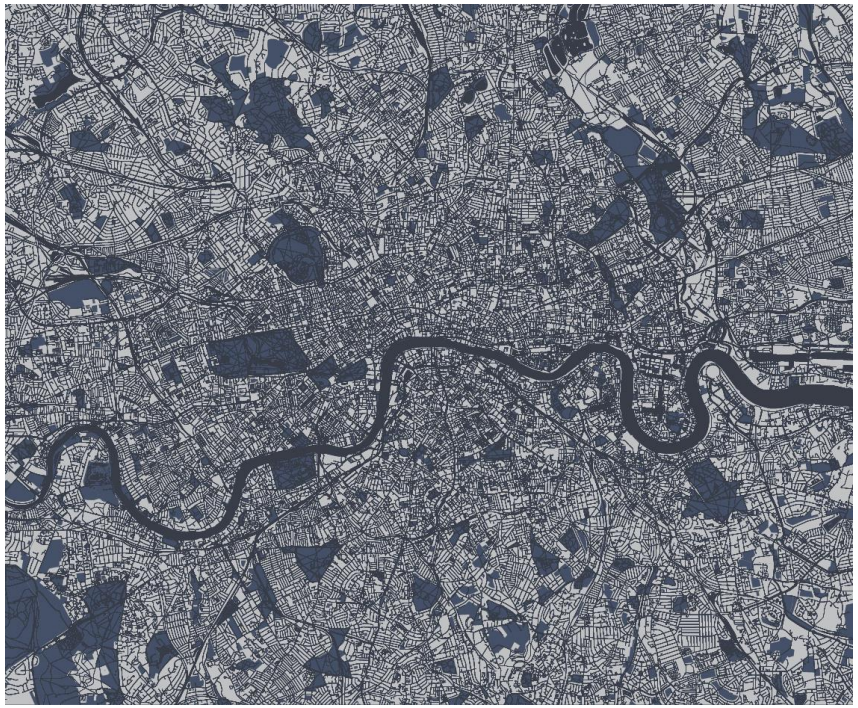
- When supporting local authorities in buildings projects (retrofit, domestic/commercial decarbonisation or new developments) what are some of your main data and planning challenges?


CATAPULT
Energy Systems

Net Zero planning approaches

David Lee

Practice Manager - Local Energy Systems Modelling



Programme delivered by

CATAPULT Energy Systems

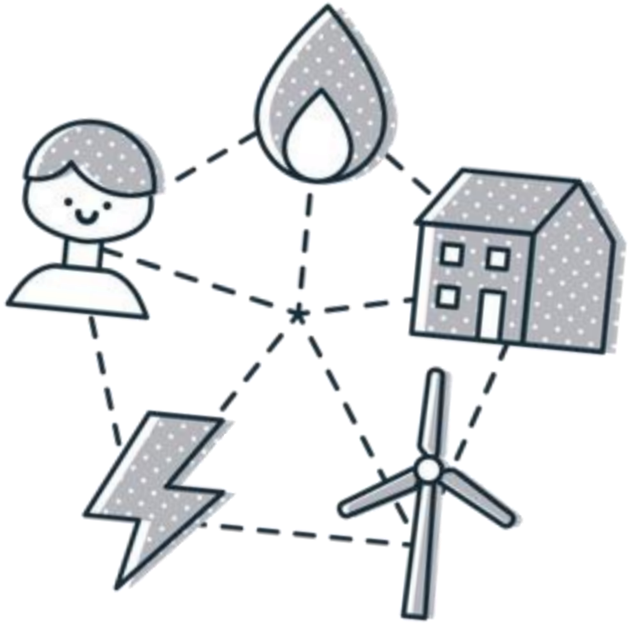
Whole Systems Planning lens to assess costs, risks and opportunities

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

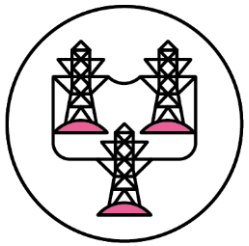
Physical system + Digital system + Market system + Policy

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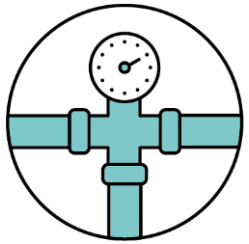
What does a LAEP include?



Decarbonisation of buildings including fabric upgrades, heating systems and infrastructure in different local areas



Impact on electricity networks



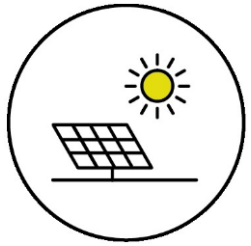
The future of the gas network (including the potential of hydrogen)



Electric Vehicles & Infrastructure



Impact of decarbonisation on consumers



Local Generation

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Why local data matters now more than ever...

A co-ordinated plan

Data rich with local information including scenario modelling through a whole systems lens leading to the most efficient and effective local plan to deliver Net Zero.

A siloed approach

If projects are done in isolation and not understanding the future energy system needs, decisions based on limited data and knowledge can lead to stranded assets and wrong investment decisions and this method will not get you to Net Zero.

Local Uniqueness

A good plan needs to truly reflect a local areas and its priorities and growth plans. Stakeholder engagement is key combined with granular building level modelling it provides robustness and confidence to act.

Modelling only

Substation scale modelling as opposed to building level results in having to make lots of assumptions and risk top-down decision making with oversized outputs and its made even worse with no local engagement / knowledge included.

What, where, when & how

A good LAEP will help local areas understand what LCT they can deploy, where and in what time frame and how to do it in a coordinated way to get to Net Zero

High level aggregation

Producing outputs that are aggregated at too large scale lacks the detail to be able to spot local opportunities and properly define and action projects for change. This approach will need further work and cost to understand and determine projects.

Data led decision making

With evidence and data and a plan an area can priotirise as well as delivering. It creates certainty and highlights the low regret options. By creating certainty it derisks decisions.

Project by project approach

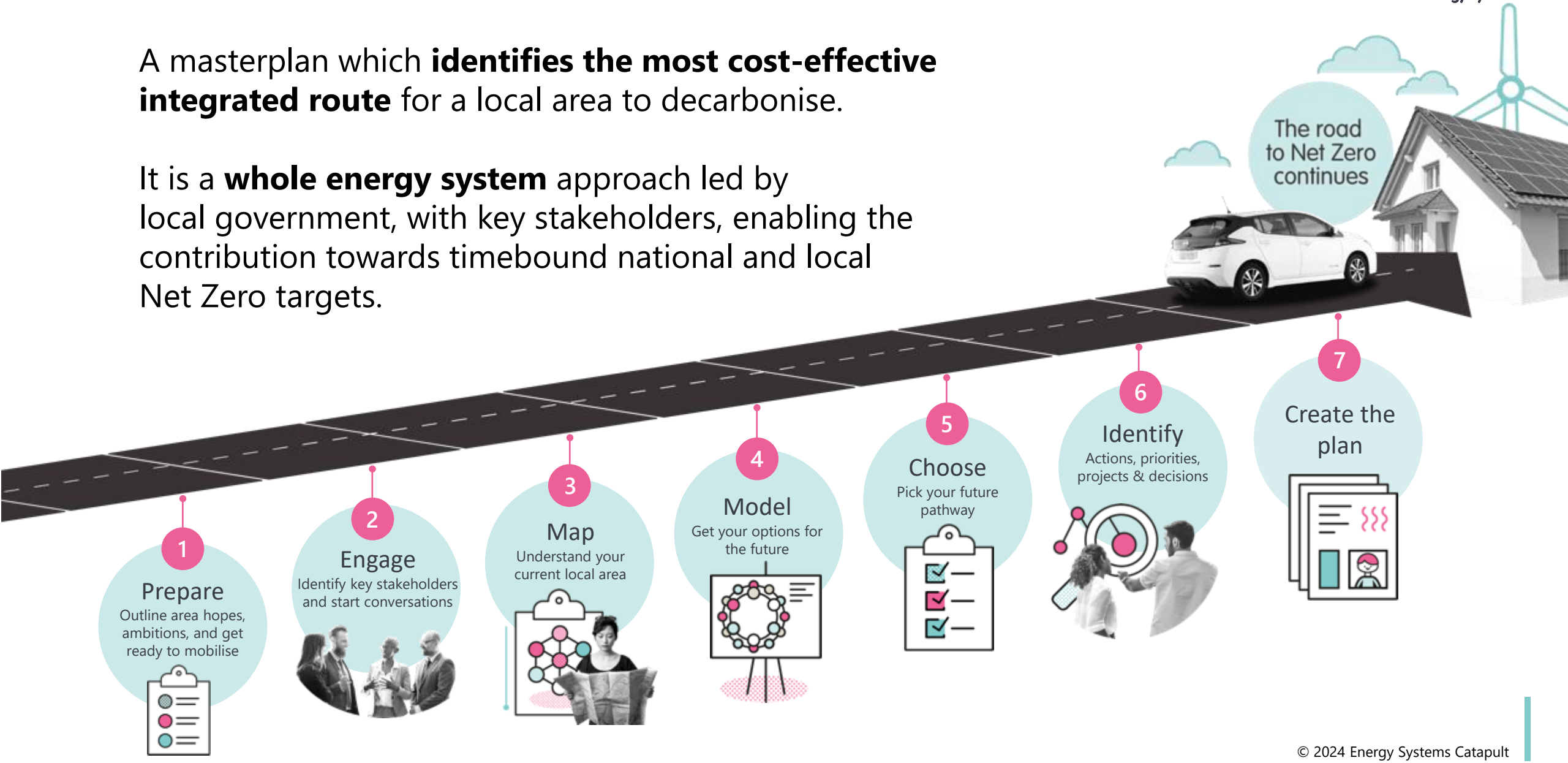
This piecemeal approach will not get you to Net Zero as its uncoordinated but crucially you won't know what the true options are, and it does not provide certainty for investors as its not based on evidence.

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Local Area Energy Plan (LAEP)

A masterplan which **identifies the most cost-effective integrated route** for a local area to decarbonise.

It is a **whole energy system** approach led by local government, with key stakeholders, enabling the contribution towards timebound national and local Net Zero targets.



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How we ensure LAEPs have impact

- Since the first pilots, the LAEP approach has been in a cycle of continuous improvement, learning from experience. Our focus is in ensuring LAEPs are high quality and can drive real impact.

- 1. Developing **consistency** in approach but without blocking innovation in approaches or failing to meet local needs. E.g. Planned programme in Wales with some consistent approaches across three suppliers.

- 2. Ensuring a **delivery focus** - making sure a LAEP identifies low regret, near term actions to take forward, providing information helpful to making this happen.

- 3. **Embedding** the LAEP into local processes when appropriate
- Many have been adopted
- Some are used as evidence bases for other plans.
- Increasingly embedded into network planning e.g. UKPN & NGED DFES

How we ensure LAEPs have impact

- 4. Getting the **balance** right between level of detail and effort compared to the outcomes, focusing effort on the items that have the biggest impact.

- 5. **Recognising** that much of what a LAEP recommends is hard for a local authority to influence – although it does contribute to their carbon target. Ensuring the LAEP can help activate other stakeholders who can make change happen.

- 6. Ensuring that **up to date** inputs are used, identifying what might change over time and which may have a significant impact on the plan. Focusing on low regret actions to take forward, which make sense under a wide range of conditions.

Ready for RESP

Any Questions?



Buildings Deep Dive

Christabel Ofori-Atta

Senior Modelling Analyst



Programme delivered by

CATAPULT Energy Systems

Why Buildings Matter in Net Zero Planning



UK Emissions from Buildings

30-40% of UK emissions come from buildings (heating, lighting, appliances).

Influence of Local Authorities

Overlap between Local Authority influence and building stock.

Energy Levers

Apply levers: energy efficiency, electrification, local generation.

The Role of Buildings Modelling

Understand the area's built-environment and explore a range of technologies and scenarios that will help us **identify the most cost-effective and preferred pathway** and plan of proposed actions to achieving an area's net zero goal.

- All categories of domestic, non-domestic, commercial and industrial buildings.
- Considers the interactions between different heating systems, building fabric, weather, local generation technologies and consumer requirements.
- Current and future integrated options.
- Modelling approaches: Include techno-economic optimisation, simulation and system mapping models.



What Is More Readily Available



National Datasets

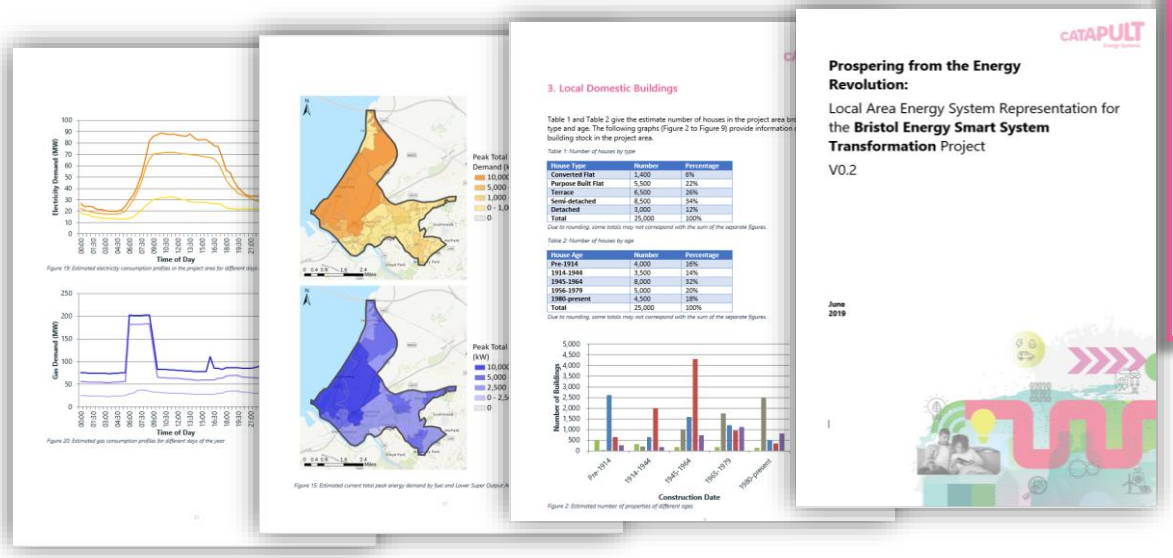
- Energy Performance Certificates
- OS Mapping Data for spatial accuracy
- Housing Surveys
- BEIS/NED/NEED historical area demand data
- Fuel Poverty data
- Valuation Office Agency data (non-domestic stock)

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What We Need In Addition

Local Datasets

- Local plans
- Planning constraints
- New housing area allocations
- Social housing stock data
- Local authority assets registers
- DNO data - Distributed Future Energy Scenarios
- Demand data for significant sites



RESP Gaps & Opportunities

- Consistency of approach between different local areas.
- Enhancing local data collection and sharing to fill gaps e.g., EPC, stock condition survey, etc.
- Document future local developments e.g., planned housing.
- Reinforce priorities and collaboration.
- Better inputs = Better outputs.

Low effort High impact

High effort Low impact

What we model and analyse



Buildings & Demand

- Domestic Fabric Retrofit
- Domestic EPC data - Actual & Inferred
- Domestic Floor Area and Modelled Space Heat and Hot Water Demand
- Non-Domestic Floor Area, Usage & Modelled Energy Demand (Heat vs Other)

Building Level Technologies

- Potential for Air and Ground Source Heat Pumps (Domestic & Non-Domestic)
- Solar PV Potential (Domestic & Non-Domestic)
- Battery Storage Potential
- Existing Solar PV

NET ZERO DATA

Low carbon technologies included

DOMESTIC

COMMERCIAL

INDUSTRIAL

- Air Source Heat Pump
- Ground Source Heat Pump
- Hydrogen Boiler
- District Heating
- Biomass Boiler
- Electric Resistive
- Thermal Storage









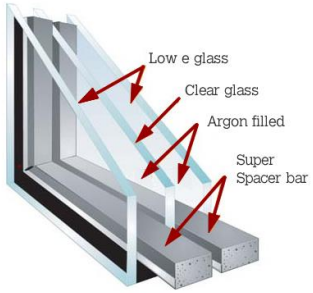
Building retrofit

- Cavity Wall Insulation
- Loft Insulation
- Double / Triple Glazing
- Solid Wall Insulation









Local generation

- Rooftop Solar
- Batteries
- EV Charge Points







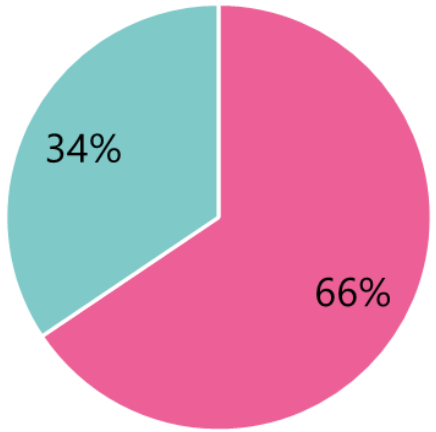
Domestic vs Non-Domestic

Non-Domestic:

- Use-based patterns (e.g., schools, offices, retail, etc.) that can vary generally and over time.
- Often under-documented. VOA data provides a baseline, but public asset registers and engagement with estates teams are key to refining assumptions.
- Considers range of options to meet heat demand vs other and whether it could be met electrically or via other sources.



Typical Demand Split Example



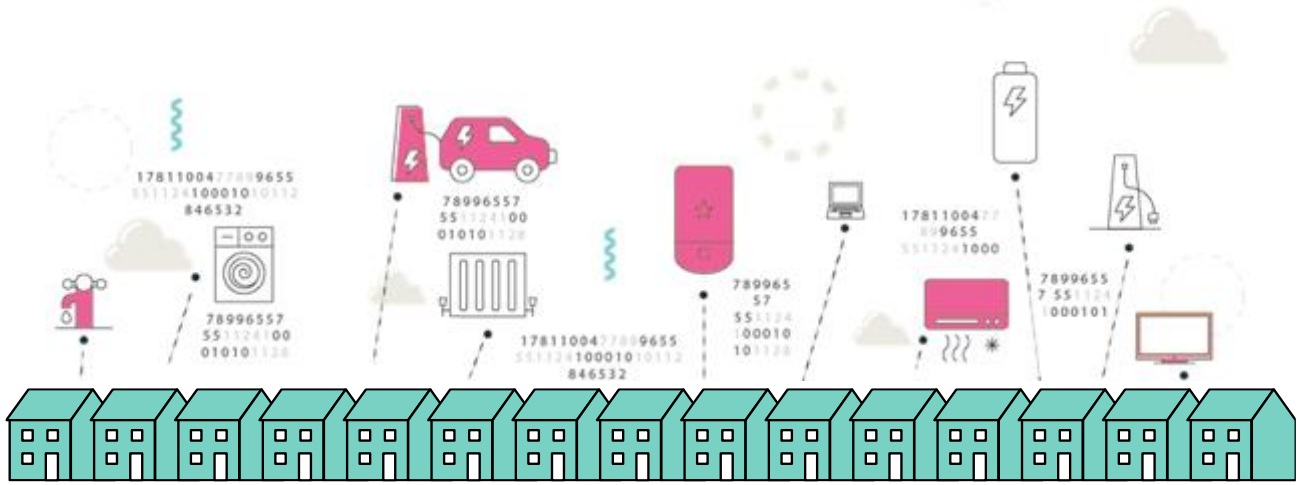
Domestic:

- High variability across housing types, tenure, and occupancy patterns.
- Rely heavily on EPCs, supplemented by ONS housing surveys and council housing stock data where available.
- Considers demand changing options such as fabric improvement, multiple heating systems, occupant behaviour changes, etc.

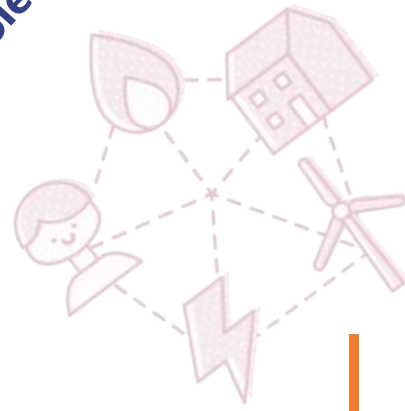
What are the outcomes

- Annual and peak energy demand
- Spatial understanding
- Costed decarbonisation options
- Retrofit opportunity mapping
- LA carbon budget contribution

Data → Models → Priorities → Decisions → Action



We take a whole system view



Ready for RESP

Any Questions?



Case Studies: Local building data challenges and how we overcame them

David Lee

Practice Manager - Local Energy Systems Modelling

Programme delivered by CATAPULT Energy Systems

Case Studies: **Agricultural buildings in Wales**



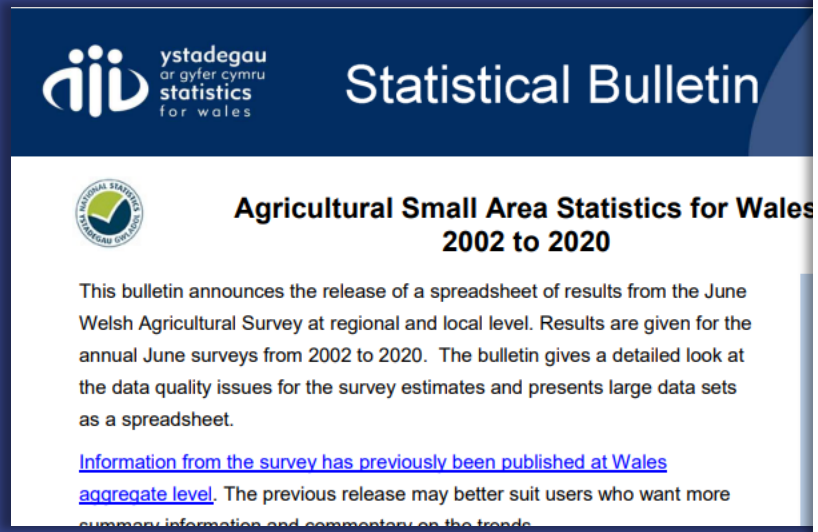


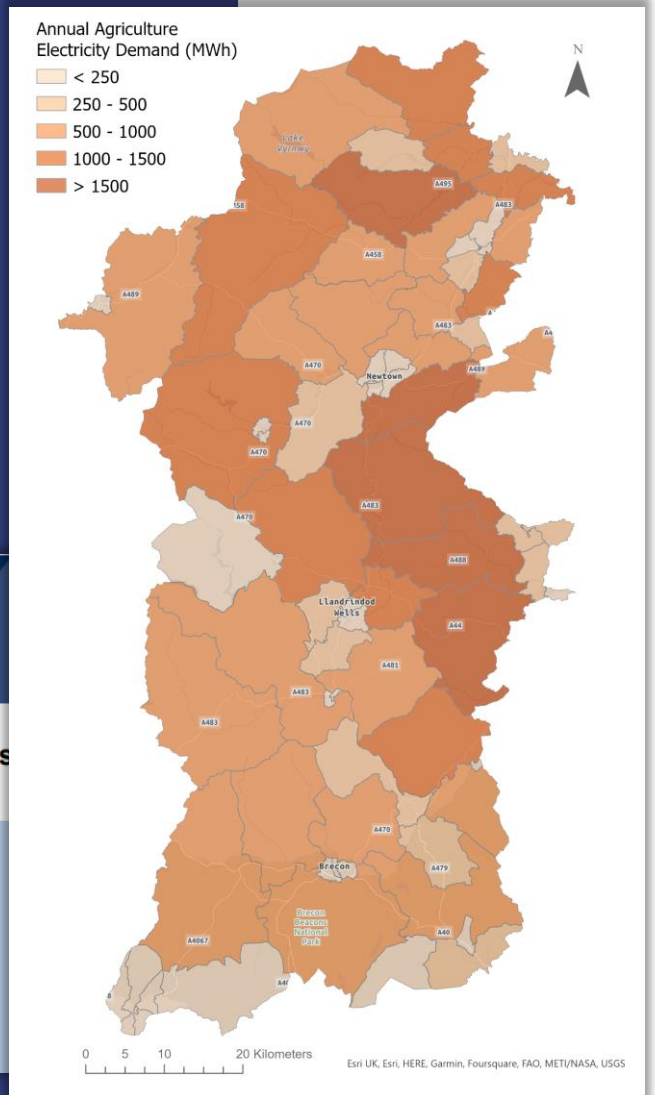
Challenge:

- In rural Mid-Wales some areas were dominated by agricultural buildings.
- From map data it is easy to identify many buildings such as barns, but difficult to understand which of them use energy.
- The large size of the buildings means a per floor area benchmark approach can easily overstate demands.

Case Studies:

Agricultural buildings in Wales





Approach taken:

- Small area agricultural statistics were used to understand the makeup and size (expressed as heads of livestock or ha of crops) of farms inside each area.
- This was then combined with published agricultural research data on typical energy use for units of different livestock or crop to get an overall energy demand.
- Within each of the small areas we spread this demand out equally among agricultural buildings

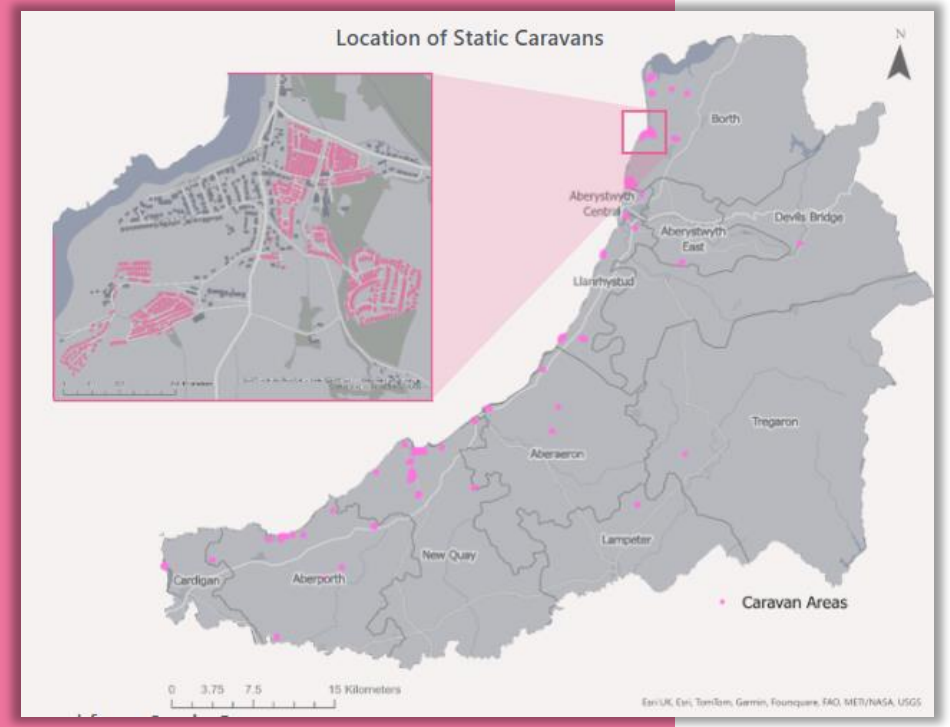
Case Studies: **Agricultural buildings in Wales**



Learning:

- If a sector is locally significant, then specific datasets can aid understanding
  Important to take a whole systems perspective – e.g. if Hydrogen was the answer for decarbonising field operations, would this make it more appealing for local heat?
  Network monitoring or load data could help better understand demands, but relatively sparse in rural areas.

Case Studies: **Caravan Parks in Lancashire**



Challenge:

- Some areas of coastal Lancashire had large caravan parks.
- It is hard to understand from the data whether these are residential or holiday parks
- Understand they are supplied by bottled LNG
- Can sometimes look like buildings on the map data

Case Studies: **Caravan Parks in Lancashire**



Approach taken:

- Priority was to ensure we didn't model them badly
- Make sure we don't treat them as standard homes with typical building fabric
- Hard to accurately capture in analysis.
- Decarbonisation option might be changing the source of the gas, rather than anything in the building.

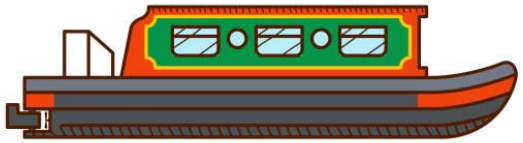
Case Studies: **Caravan Parks in Lancashire**

Other types of home that can bring similar challenges:

- Holiday homes – winter demand?
- Canal Boats
- Student halls, sheltered accommodation – inconsistent classifications
- Army barracks

Learning:

- Can be tricky to incorporate buildings like this
- Understanding winter occupancy is important if considering network impacts
- Easier to handle if identified earlier in the process – rather than when you get to QA!
- Need to balance effort against impact.



Case Studies:
New builds in Leicester and Leicestershire



Challenge:

- Data on planned new build areas can be very variable by local authority
- Sourcing and handling this data can require significant resource
- Although new builds are important, the majority of carbon emissions come from existing stock.
- Leicester and Leicestershire LAEP process covered 8 local authorities, sourcing and processing new build plans from each would be a challenge

Case Studies:
New builds in Leicester and Leicestershire



Approach taken:

- Identified that a process to combine the different new build data had happened a couple of years previously
- This was in order to support transport planning.
- Confirmed this dataset was available
- Although this data was a couple of years old, it was agreed that this downside was worth the effort and resource saving.
- Some value in using same data for transport and energy planning.

Case Studies:
New builds in Leicester and Leicestershire



Learning:

- Thinking outside the box for data sources
- Judgements to be made on impact vs effort
- Value of aligning with other planning approaches

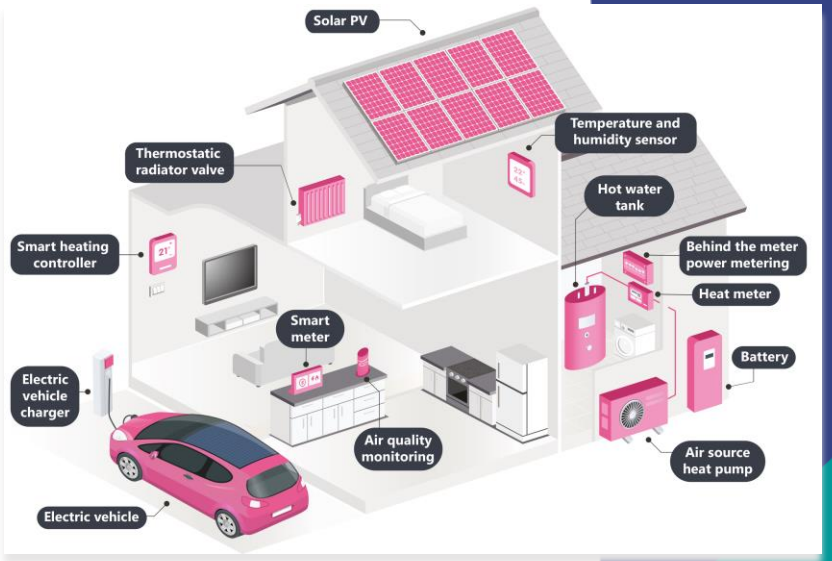
Ready for RESP

QUICK POLL:

- What is your current perception of Local Area Energy Planning? (1 against it, 3: undecided, 5: everywhere should have one)

- How well did this session meet your expectations? (1 not at all, 5 completely)

- What else could we add in future sessions to improve?



Coming up next

- June: Renewable generation & storage
- 9th July: Transport
- 19th September: Heat networks
- 25th September: Flexibility and smart local energy systems
- 2nd October: Industrial clusters & hydrogen

Department for Energy Security & Net Zero

Greater South East Net Zero Hub

MIDLANDS NET ZERO HUB

north east & yorkshire NET ZERO HUB

north west net zero hub

South West NET ZERO HUB

Ready for RESP

Thank you

Any questions/comments please email us:
Anna.Stegman@es.catapult.org.uk or
Chris.Brierley@es.catapult.org.uk

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