Net Zero Terrace

SIF 2022 Discovery – Show and Tell

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Agenda

- The problem/project summary
- Headline messages
- Overview of work packages, including:
  - Activities through Discovery
  - Benefits
  - How thinking has evolved
- Next steps
- Q&A

Project Partners

BURO HAPPOLD

RV ENERGY
A community energy organisation for Rossendale

Rossendale BOROUGH COUNCIL

electricity north west
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NORTHERN POWERGRID

Other collaborators

local energy north west hub

CEE Centre for Energy Equality

The problem

Innovation Challenge 1: Supporting a just energy transition
Project Scope 2: Supporting the decarbonisation of heat and mobility for rural, off gas grid, fuel poor and those consumer groups with reduced access to opportunities for decarbonisation

Problem:

- Electrification of heat and transport in urban areas is a complex problem.
- Space and noise constraints prevent millions of terraced homes in the UK from adopting low carbon heating, specifically. This risks leaving them locked into higher energy bills and at increased risk of fuel poverty.

Solution:

Net Zero Terrace will produce a replicable technical and financial model for decarbonisation of terraced housing that can be scaled and is appropriate for those that might otherwise be left behind.

Project summary

Many of the 10 million terraced homes in the UK are not suitable for heat pumps due to space and noise constraints. The counterfactual low carbon heating option is an electric boiler meaning increased costs and demand on the grid. Net-Zero Terrace street provides and affordable, community led offer to decarbonise these hard to treat homes.

1. A technical solution: Clustered, boreholes with shared ground loop and individual household shoebox heat pump, a standardised package of retrofit, smart water cylinder and shared solar PV.

2. A financial solution: Investor backed delivery at no upfront cost to householders, but a longer repayment through a standard charge. Local generation model to subsidise the energy bills of householders participating.

3. Grid: Areas will be engaged within their individual substation and each Low carbon heat project will be delivered within the constraints of the substation. This will be a Smart Local Energy Solution with all technology deployed being smart and able to be agile within the needs of local grid flexibility.

4. Engagement: The engagement methodology is central to the success of the Net Zero Terrace Street. If people do not sign up, then the economics of the model will not be viable or therefore deliverable.

Headline messages

- Net Zero Terrace solution is the **lowest cost option** for delivering low carbon heat (and almost on a par with the current gas / do nothing option).
- It **saves approx. 2tCO2e per house** compared to the counterfactual and **approx. 6 tCO2e compared to gas**.
- It is **technically possible but more work is required** on how all the components work together.
- Integration into the network is **possible under current regulations** and the project proposes to use a platform provided by Urban Chain to administer the PPAs
- Current connection processes also enable integration to the network but **miss opportunities to maximise the benefits** of the SLES by treating each aspect in isolation.
- **Engagement plans have been developed** with a range of tools and channels proposed but need testing to discover the most effective.

Milestone: Publication of the complete Regulatory Review report

Key Findings

- There are no in surmountable barriers, and this project has been devised to work within the existing regulatory regime.

Challenges

- The largest barrier is the supply of community generated electricity to local customers and those identified with third party solar panels on domestic properties.
- There are many requirements for installing a ground source heat pump which need careful consideration as the project develops.
- This is a relatively new approach so the project will also need to keep this approach under review as this area of policy and regulation develops.

WP3 – Final operational interfaces

Milestone: Publication of final report on the DNO operational interfaces

Achievements

- 108 individual terraced houses assessed for the network to accommodate a 2kW (electrical) Ground Source Heat Pump and a shared solar PV array on each associated terraced row
- The counterfactual heating option of an electric boiler in each house was compared to the GSHP
- 3 x existing LV feeders investigated taking into account thermal, voltage drop/rise and fault level considerations
- Options for the shared PV array to provide Flexible Services was investigated using the ENWL in house flexibility map

Key Findings

- Reinforcement required to accommodate the GSHPs and PV. The most cost effective option is to commission a new HV substation with new LV feeders situated in close proximity to the terraced houses. A reinforcement cost was provided using an ENWL in house budget calculator, the cost was apportioned appropriately between DNO/DSO and customer using the latest Access SCR charging review
- The total demand from the development was found to be significantly lower using GSHPs as opposed to the counterfactual option of electric boilers. Approximately 166.69kW v 424.20kW. This resulted in more LV cable reinforcement required for the counterfactual
- Limited options for Flexible Services in the Bacup area however as more LCT's connect to the network, this could potentially change

Challenges

- Large areas of the network prone to reinforcement when deploying large clusters of Ground Source Heat Pumps and shared Solar PV arrays
- Limited options for flexible connections on the LV network
- No requirements for flexible services in parts of the network
- Lack of LV network data and visibility makes it difficult to predict which areas of the network have available spare headroom without doing a full connection study

WP4 – Community energy strategy

Milestone: Publication of a strategy for community engagement

Achievements

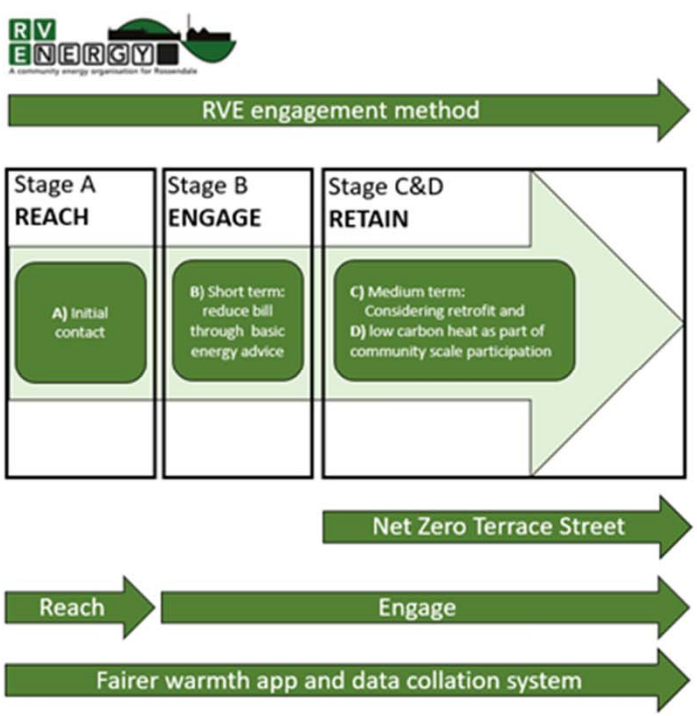
- Robust Framework for delivery, using reach, engage and retain methodology.
- Branded collateral based on animation.

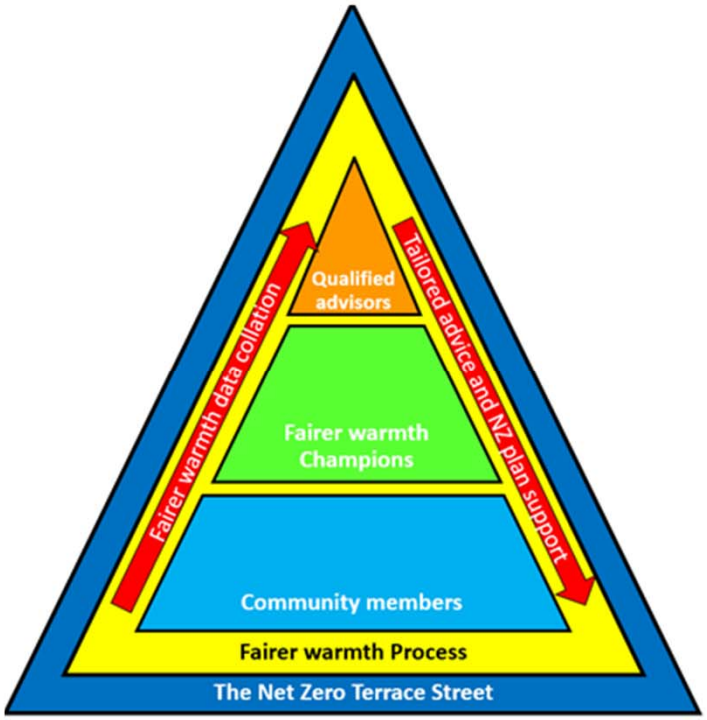
Key Findings

- Ability for the Fairer warmth app to triage on house type, grant funding applicability and engagement preferences.
- Avoidance of engagement or survey fatigue.
- Retention of interest through the app being a 2 way dynamic interface.

Challenges

- Setting up a methodology for a rigorous evaluation and impact assessment process.
- Creating a sufficiently robust support framework for Fairer Warmth Champions, to ensure retention.





WP5 – Spatial plan

Milestone: Publication of the spatial plan for the Net Zero Terrace solution on a GIS map

Achievements

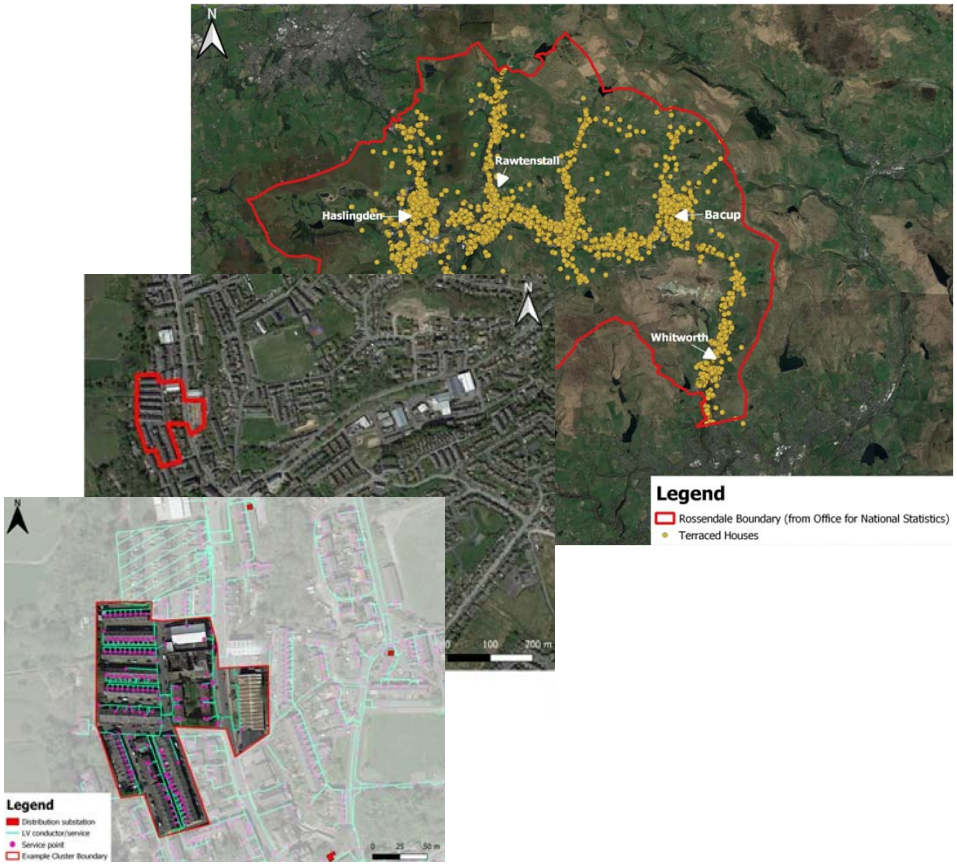
Spatial mapping approach developed, setting wider boundary to map properties then to identify site clusters before then detailed mapping to include appraising solar PV installation, ENWL (DNO) data and heat density for heat cluster mapping.

Key Findings

- Rossendale wide there is potential to deploy over 300km of heat network in ambient loop clusters assisting over 14,000 households
- Spatial plan showing network, local connection point and solar PV potential all viable
- ENWL network study based on map showing minimal reinforcement requirements for cluster due to voltage rise issues.

Challenges

- Scaling mapping using ENWL network data and better automating network impact studies at scale is an opportunity
- Streetworks mapping will be crucial for next stages



WP6 – Design review

Milestone 1: Meeting held to review initial architecture and agree amendments required
Milestone 2: Functional specification produced for solution and requirements for Alpha phase

Achievements

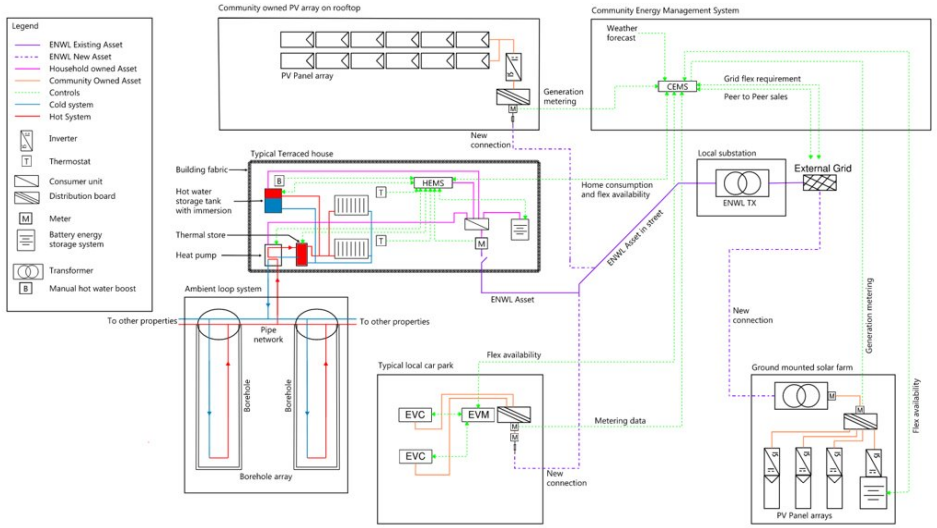
- System high level architecture has been developed which includes identifying the subsystems and interactions required to deliver the system benefits

Key Findings

- All subsystems appear available on the market to be integrated together.
- There are opportunities to integrate with external data providers to add value e.g. "Fairer Warmth App" for consumer journey engagement and management
- Localised energy market structures will be enabled and the system is flexible across different commercial models

Challenges

- A process of integration is required between the subsystems to deliver the solution in such a way to avoid exclusivity
- DERMs interface with ENWL will be key to deliver new flexibility mechanisms in areas of constraint



WP7 – Soft market testing

Milestone: Publication of a report produced on the outcomes from the market testing to feed into the design process

Achievements

- Subsystem providers have been identified through WP6 which then have been mapped against potential providers
- Over 20 organisations have been initially approached to gauge potential interest and capability
- NDAs signed with Kensa Utilities and Urban Chain to go into more detail as part of Alpha preparation
- Salford University approached and agreed to provide testing capability to de risk Beta stage development

Key Findings

- Strong interest from providers to be included
- Local supply chain can deliver solar PV and sensors

Challenges

- Establishing secure test environment to test interfacing and compatibility is required before implementation
- Consideration to be given to contracting mechanism and specifications and coordinating multiple parties in future stages

Kensa Utilities
A KENSA GROUP COMPANY

UrbanChain

University of Salford MANCHESTER

WP8 – Local authority engagement plan

Milestone: Publication of the local authority model for engagement and future deployment produced

Achievements

- Production of Engagement Plan

Key Findings

- Elected Members, Senior Management and Community Groups seem keen to explore potential of savings both financial and carbon
- Community engagement is a two way process requiring input from all sides

Challenges

- Monitoring progress towards residents signing up to qualifying funding
- Ensuring complete buy in from communities rather than just consultation
- Building relationships with residents

WP9 – Applicability review

Milestone: Publication of report on findings from review, which will be used as an input to WP3

Achievements

•The proposal will be fully replicable across DNO licence areas subject to resolving outstanding technical challenges. The proposal to use a shared heat source, individual GSHPs and solar arrays provides an excellent solution to decarbonise terrace properties.

Key Findings

•Electricity North West Limited and Northern Powergrid distribution systems are comparable and developed using similar design tools. Cables, Transformers and other items of electrical infrastructure are also very similar. This allows replicability in the proposal.

•There are some differences in policy mainly concerning the estimated demands and customer profiles used for initial technical assessments. Future phases of the project could be used to develop and refine existing policy.

Challenges

•One of the options for the PV array considers private wire supplies. This is currently not permitted in under Northern Powergrid policy as it would be considered a secondary supply. This proposal will need to be reviewed technically and a solution found that is acceptable to all Distribution Network Operators.

Next steps

Considerations for Alpha

- The aim of the SIF Alpha phase will be to further develop our understanding the key technical components of the proposed net zero terrace street smart local energy system. These are :
- Community engagement – testing to discover the most efficient engagement and retention methods. Eg Fairer Warmth App Vs standard engagement methods
- System design and integration – refinement of the solution with the supply chain providers, integration into the Peer-to-Peer trading platform and sub-system testing
- DNO / DSO integration – how to maximise the flexibility of the system to the network and the value to customers.
- Learning and scalability – from other Innovation projects and across other DNO networks.

Additional partners: Centre for Energy Equality, Urban Chain, Kensa, University of Salford

QUESTIONS & ANSWERS

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