Net Zero Terrace Streets

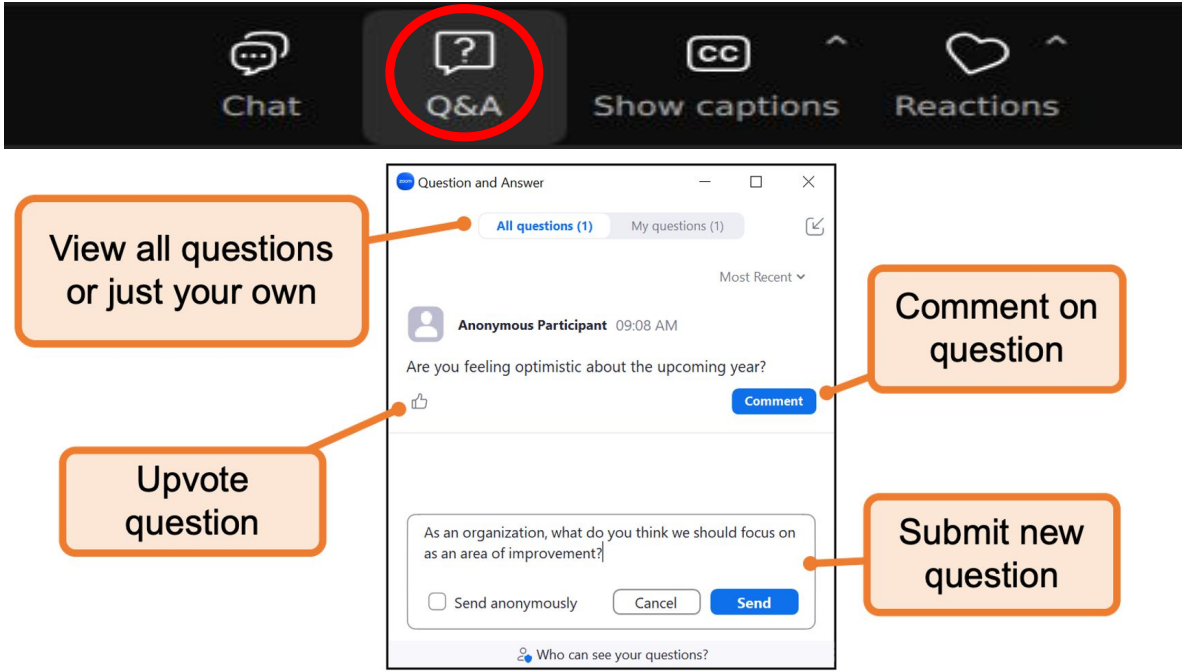
Community Energy AWARDS
2023 WINNER

UtilityWeek AWARDS /2024
FINALISTS

ELECTRICAL INDUSTRY AWARDS 2025
WINNER

RV ENERGY
A community energy organisation for Rossendale

- This webinar is being recorded
- Please ask questions using the Q&A button (not the chat)



RV ENERGY
A community energy organisation for Rossendale

Peter Griffin
Principal Analyst – Heat and Buildings, Regen

Webinar Chair

Kate Gilmartin
Volunteer Director, Rossendale Valley Energy;
Non-Executive Director, GB Energy;
CEO, British Hydro Association

Phil Proctor
Technical Director and Digital Energy Service Leader, Buro Happold

Ainsley Barker
Investment Director, Abundance Investment

Adam Marvel
Development Advisor, Social Investment Business (SIB)

RV ENERGY
A community energy organisation for Rossendale

Agenda

1:00 - 1:05 (5 mins) **Welcome and introductions**
Peter Griffin, Regen

1:05 - 1:15 (10 mins) **NZTS progress update – refined 8-Stage Delivery Methodology**
Kate Gilmartin, RVE

1:15 - 1:25 (10 mins) **Techno-Economic Model – assessing technical feasibility at street scale**
Phil Proctor, Buro Happold

1:25 - 1:40 (15 mins) **Financing NZTS – the financial model and making this investable**
Ainsley Barker, Abundance Investments and Adam Marvel, SIB

1:40 – 1:45 (5 mins) **Reflections and next steps – local delivery and replication potential**
Kate Gilmartin, RVE

1:45 – 2:00 (15 mins) **Audience Q&A and wrap-up**
Peter Griffin, Regen

RV ENERGY
A community energy organisation for Rossendale

NZTS progress update

Kate Gilmartin, RVE

RV ENERGY
A community energy organisation for Rossendale

Why terraces get left behind

Photo taken in Bacup, Rossendale

- 6 million smaller terraces in UK
- Pre 1919 homes
- Installing electric boilers pushes up costs for residents

- Mixed tenure
- Low incomes, high fuel poverty
- Less space for alternative solutions
- Often outside of centralised district heating schemes

RV ENERGY
A community energy organisation for Rossendale

Why street by street?

Individual properties and tenure-based?
Changing and complex eligibility or single-measure incentives
Fit and forget

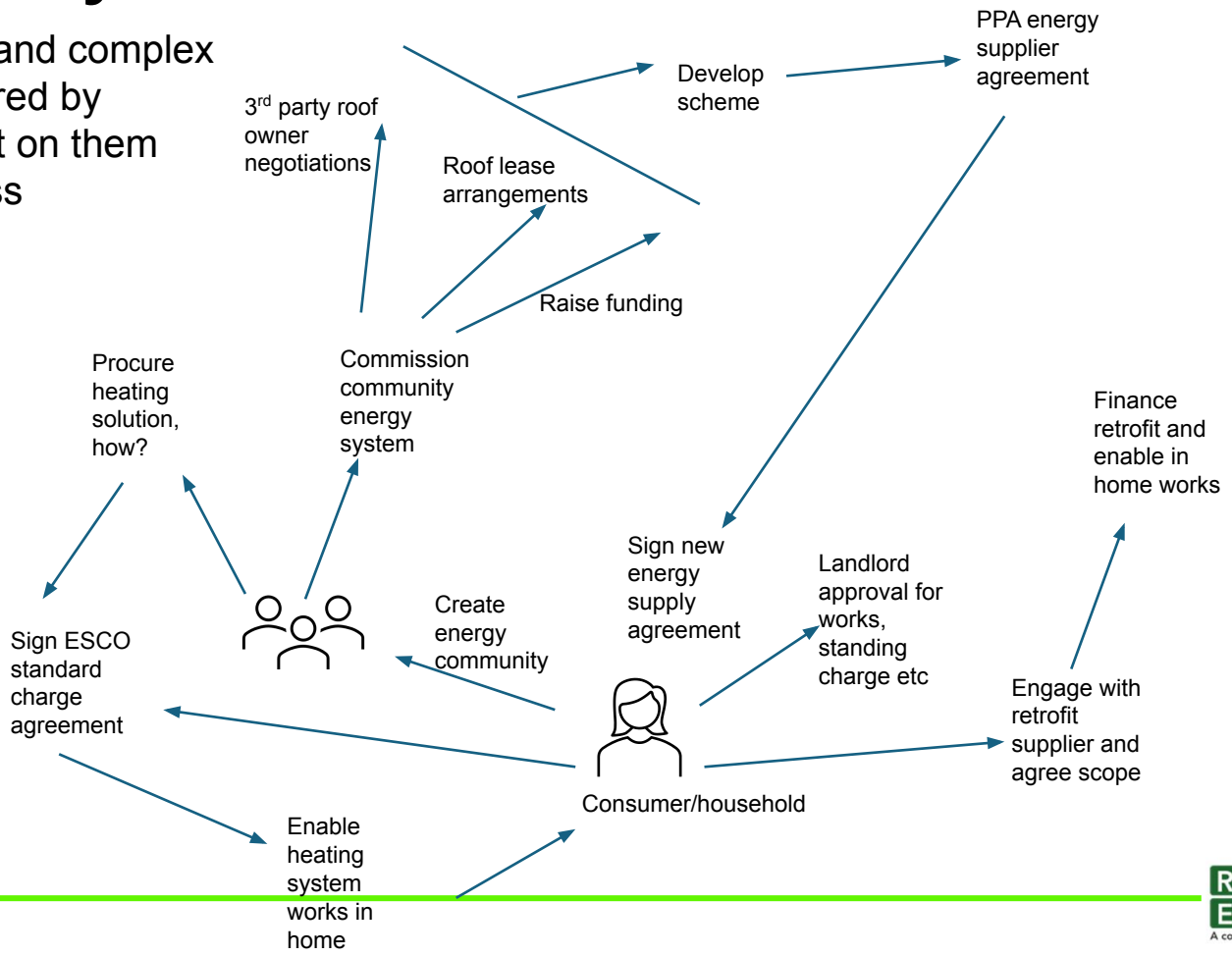
OR

Street by street or neighbourhood?
Community-led fair share with long-term support and care

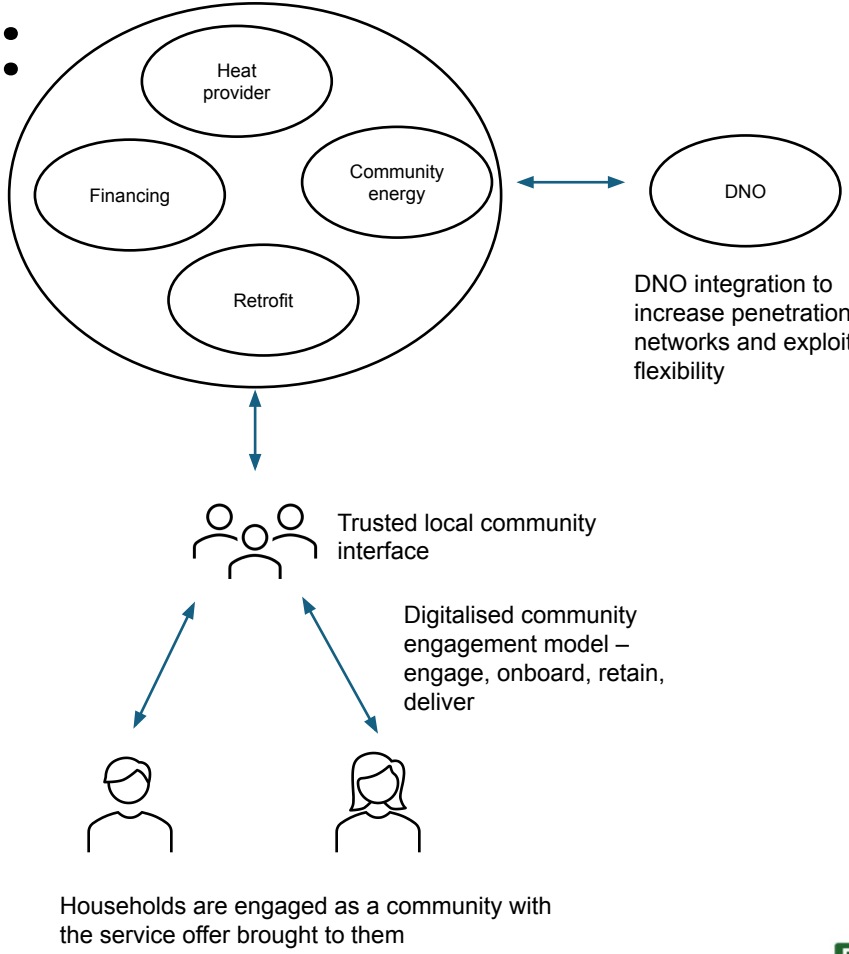
RV ENERGY
A community energy organisation for Rossendale

Complexity for Individual

Multiple different and complex interactions required by individuals, reliant on them driving the process



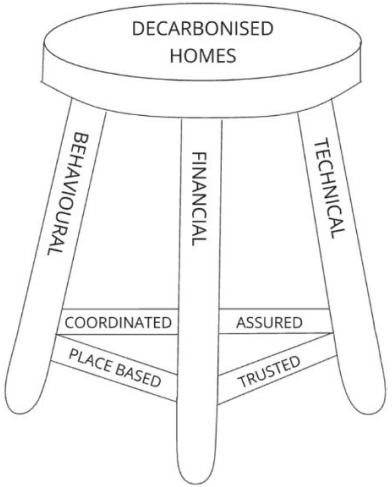
Community based:

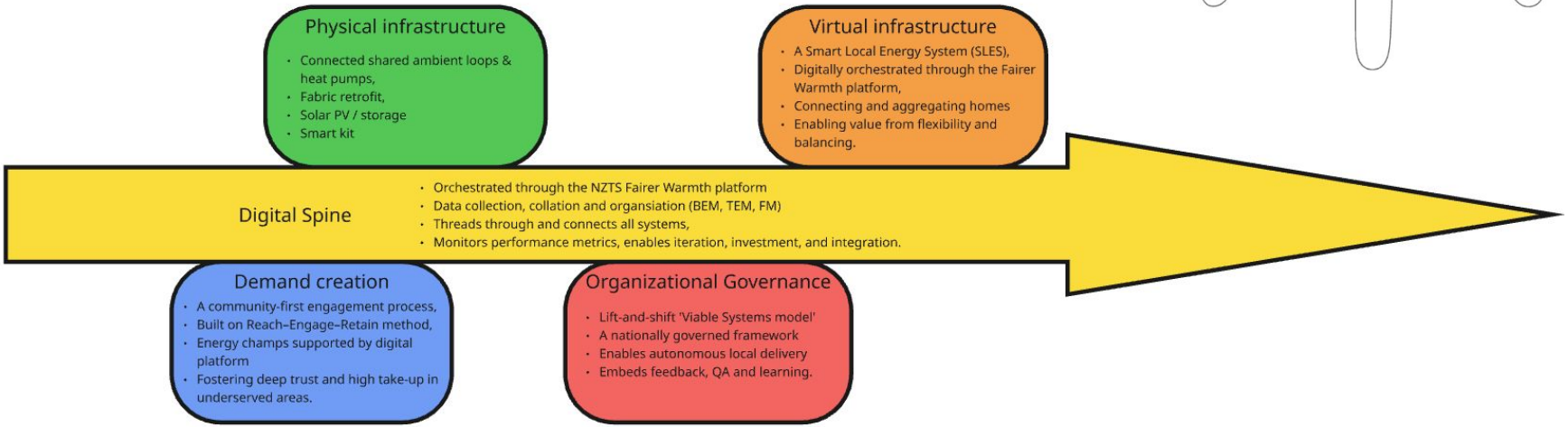


A single delivery vehicle (the wrapper) with either consortium or SPV structure to deliver the service offering – selection of the model will likely be determined from the local authority capability

NZTS: Route to deployment

- The solution is to develop and deploy 5 systems in tandem
- We use an 8 stage methodology as an end to end process that enables dep
- And a supporting tool kit that underpins all the activities
- Everything we develop corresponds to our sturdy stool….





RV ENERGY
A community energy organisation for Rossendale

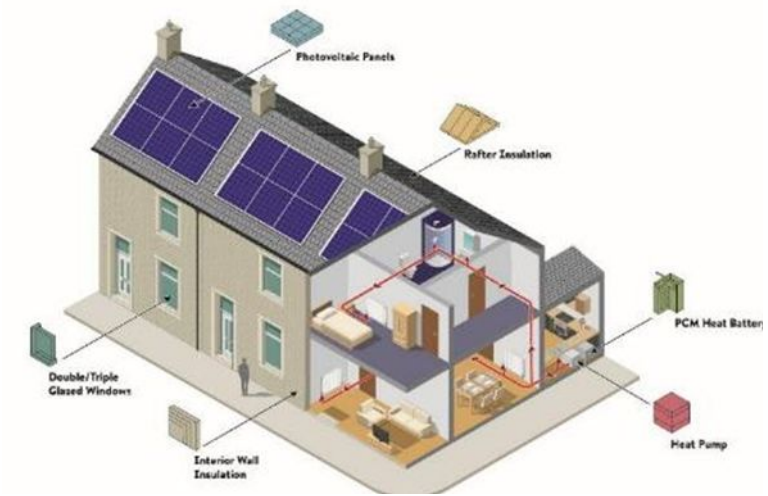
The technical solution

What's the technical solution for delivering a whole system approach that delivers affordable energy and healthy warm homes?

The Physical infrastructure

Optimal fabric upgrades - Depending on what's needed a mix of:

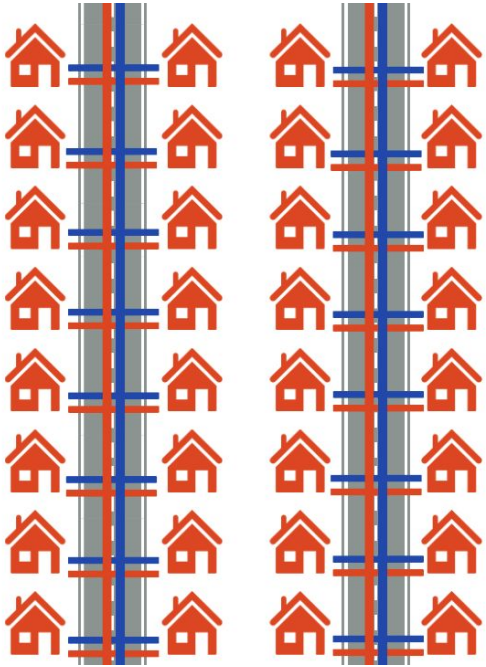
- Loft Insulation
- Internal Wall Insulation
- Less often: External Wall Insulation
- Air tightness measures
- Solar Panels (+ sometimes battery storage)
- New Windows and Doors
- Mechanical Ventilation with Heat Recovery
- **Necessary repairs**



RV ENERGY
A community energy organisation for Rossendale

Ambient Loop Ground Source Heat Pumps

Buried in-street pipework with bore holes to take low grade heat from the ground and take that warm water (12degsC) to an in-home heat pump, where it will be upgraded by the heat pump to 45degC flow temp for the central heating system.

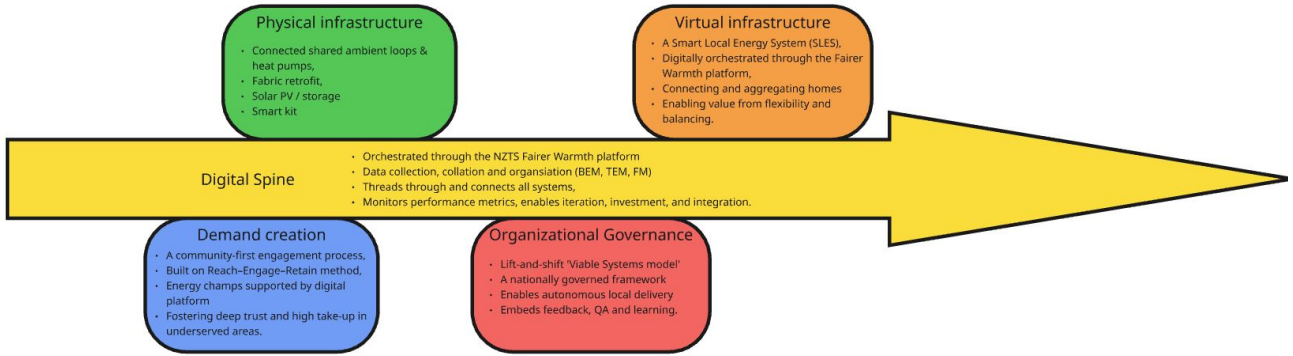


RV ENERGY
A community energy organisation for Rossendale

Getting Buy in – demand creation

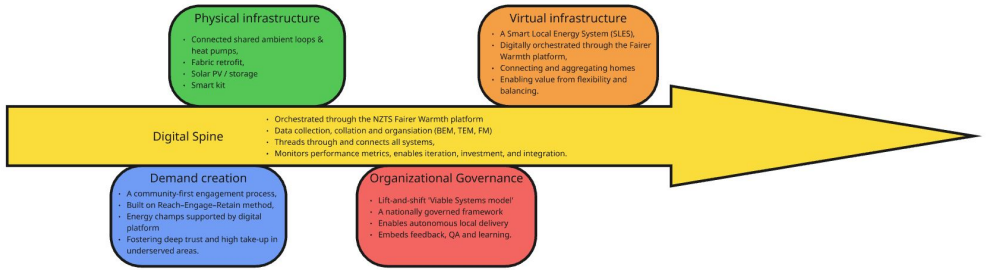
Behavioral - getting buy in – placed based solution, community engagement, community rooted governance/ ownership, local trust, local jobs, skills, quality assurance, well coordinated with legacy support, visible benefits.

- Local energy champions engage with and sign people up
- Ongoing support, monitoring, maintenance and expansion
- Partnership or collaborative procurement with supply chain



Virtual infrastructure & digital spine

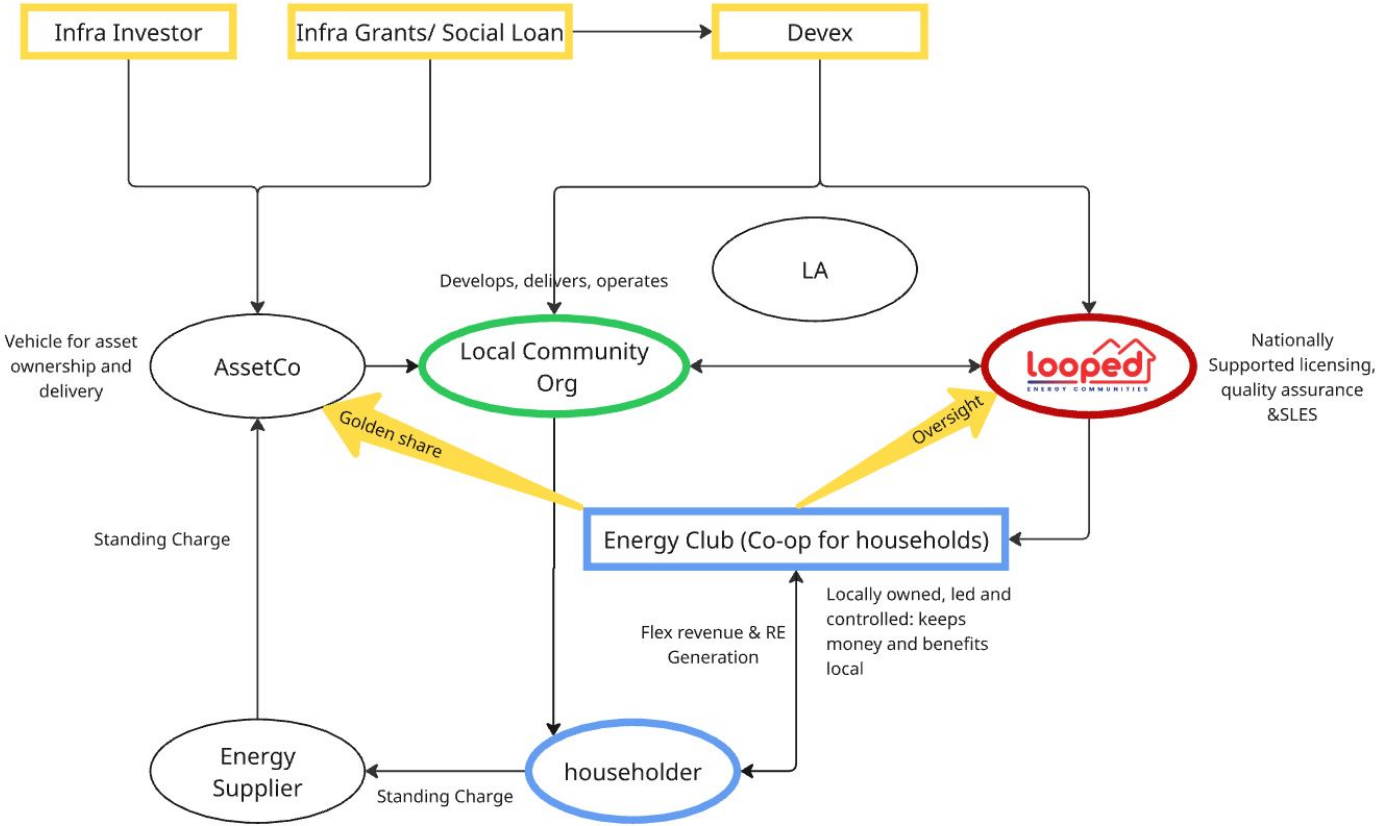
- Working in partnership with the electricity distribution grid operator (DNO)
- Developing a system between the Home Energy Management System (HEMS) and the Grid to create a Community Energy Management System
- Will help facilitate local balancing and aggregation of flexibility across a cluster of homes.



People → Property → BEM → Retrofit design & costs → TEM → Financial model → HEMs → CEMs → SLES/Fairer Share/Flex → Digital twin

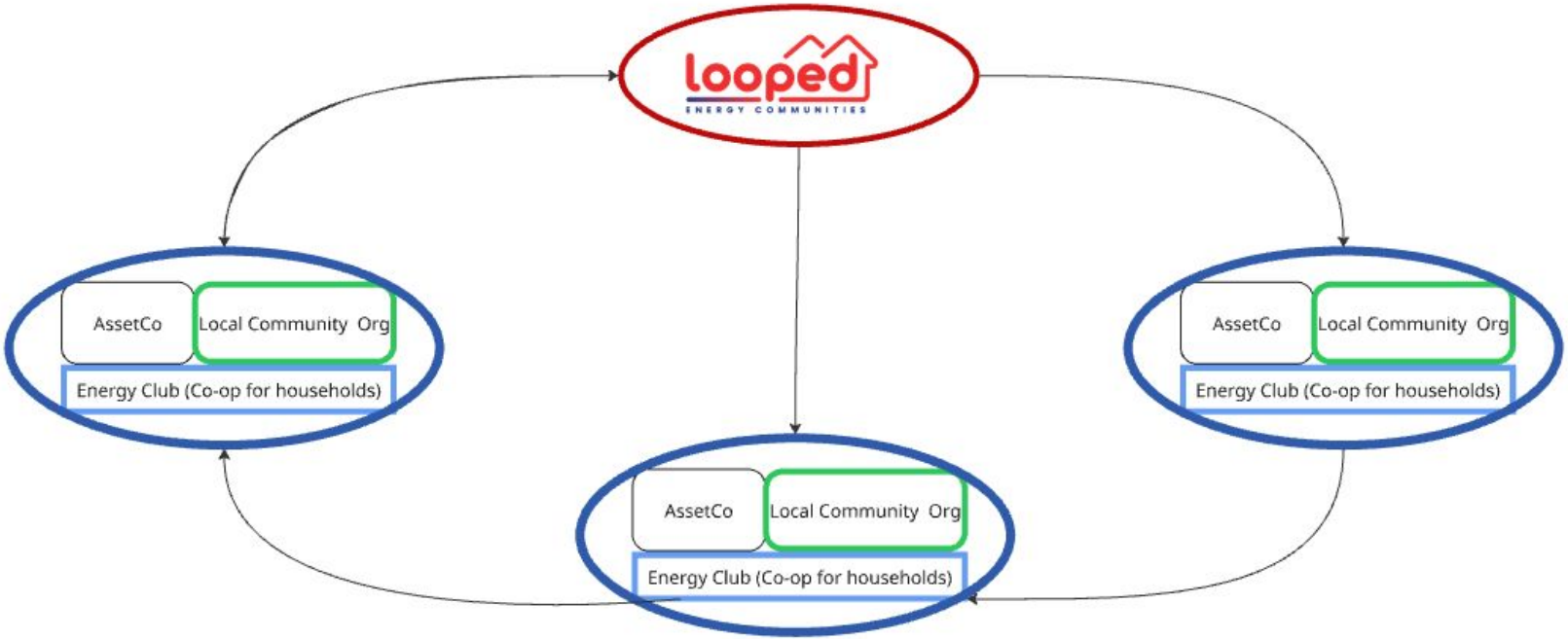
RV ENERGY
A community energy organisation for Rossendale

Local Governance - Nationally supported



RV ENERGY
A community energy organisation for Rossendale

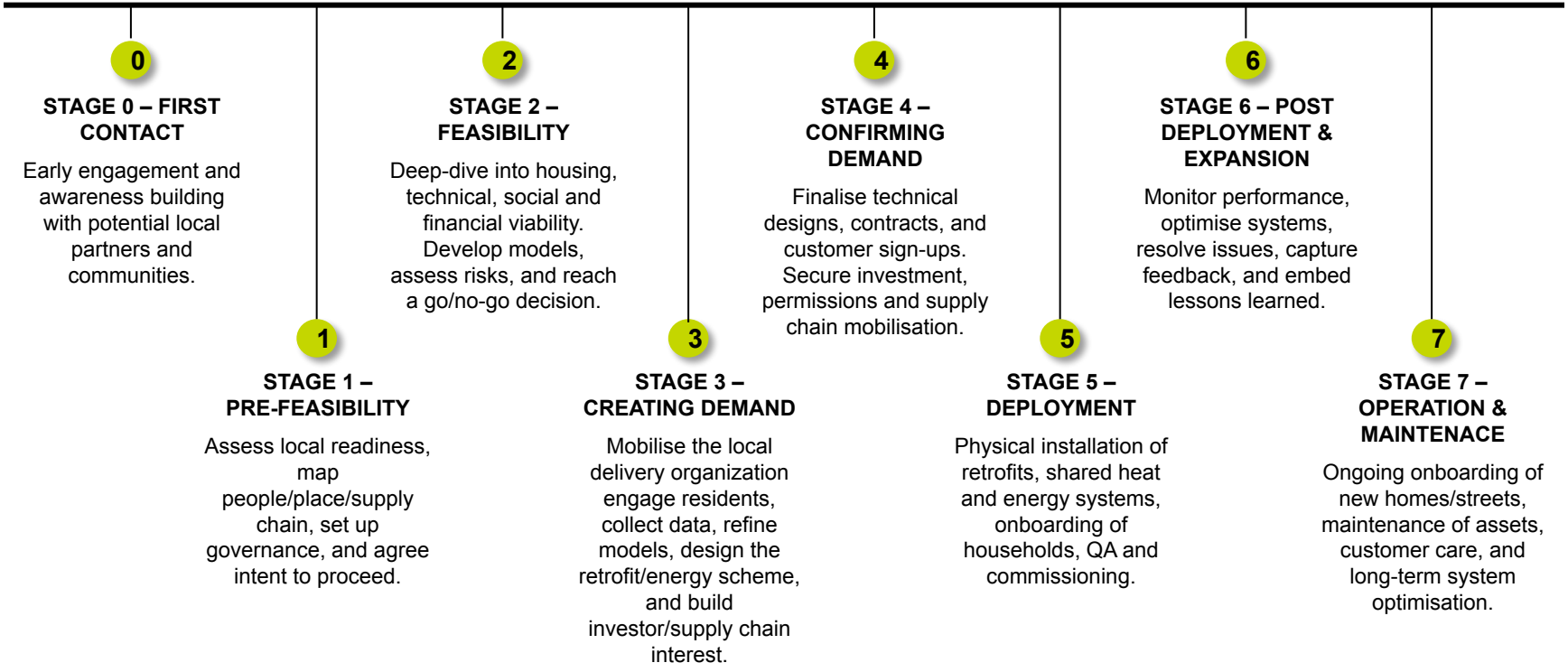
Local Governance - Nationally supported



RV ENERGY
A community energy organisation for Rossendale

8 Stage Methodology to deploy….

Eight stages of development to deliver the 5 systems: ensure buy-in, governance, investment and quality while controlling spend and delivering community and customer confidence and supply chain involvement



Testing deployment of technical solution

Delivering 3 properties

Design specifics – Aim: Heat load <5.8 kW

- Property 1: Mid terrace (conservation area)
- Property 2: Mid terrace with extension (conservation are
- Property 3: Back-to-back end terrace

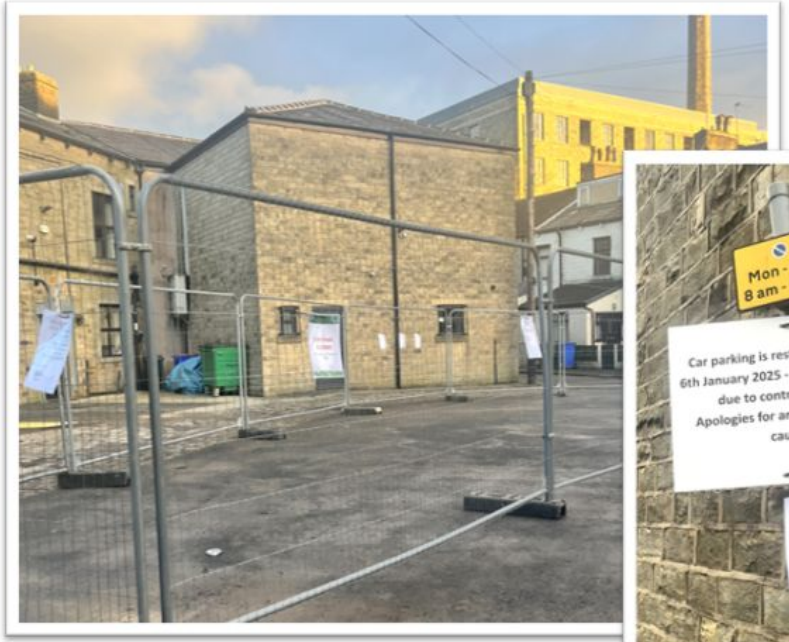
PHPP Heat Load	Current	Baseline	Full design
Property 1	15 kW	4.7 kW	3.8 kW
Property 2	17.5 kW	5.7 kW	4.6 kW
Property 3	11.9 kW	8 kW	4.4 kW

Baseline measures:

- RIR Insulation
- Basement floor soffit
- Retain windows and doors with new seals and hinges where required
- Airtightness: 3 ach
- MVHR 90% efficient
- PV & battery

RV ENERGY
A community energy organisation for Rossendale

Getting the site ready



RV ENERGY
A community energy organisation for Rossendale

Re-roofing and solar

RV ENERGY
A community energy organisation for Rossendale

Boreholes

RV ENERGY
A community energy organisation for Rossendale

Trenching

RV ENERGY
A community energy organisation for Rossendale

Heat Pump

RV ENERGY
A community energy organisation for Rossendale

Fabric Retrofit

RV ENERGY
A community energy organisation for Rossendale

Monitoring the difference

RV ENERGY
A community energy organisation for Rossendale

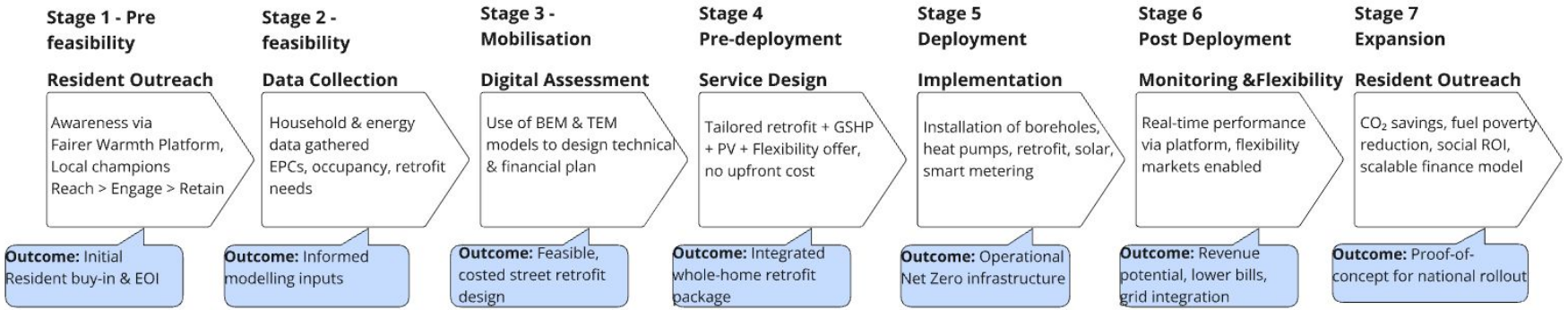
Techno-Economic Model – assessing technical feasibility at street scale

Phil Proctor, Buro Happold

RV ENERGY
A community energy organisation for Rossendale

Applying to to 7 Stages of the delivery model

- Each stage has a cost associated with it, whether and when this is directly allocated or not is determined by the financial model and risk appetite of partners
- Early stages are at risk and not recovered directly because there is no mechanism for direct recovery
- Later stages moving into stage 3 onwards will require a step up in cost to commit to procurement. This is driven by acquisition levels and governance sign off including TEM outputs
- Revenues come in during the deployment stage (Stage 5) and these are factored into the TEM over 40 years
- The financial model considers the cycling of this for multiple clusters and informs the TEM. Ie we should not be looking at individual cluster costs as such but how multiple clusters as a portfolio operate together and revenue from one set of clusters could be used to support further expansion. Inevitably early phases will be more expensive and will often require subsidy to work

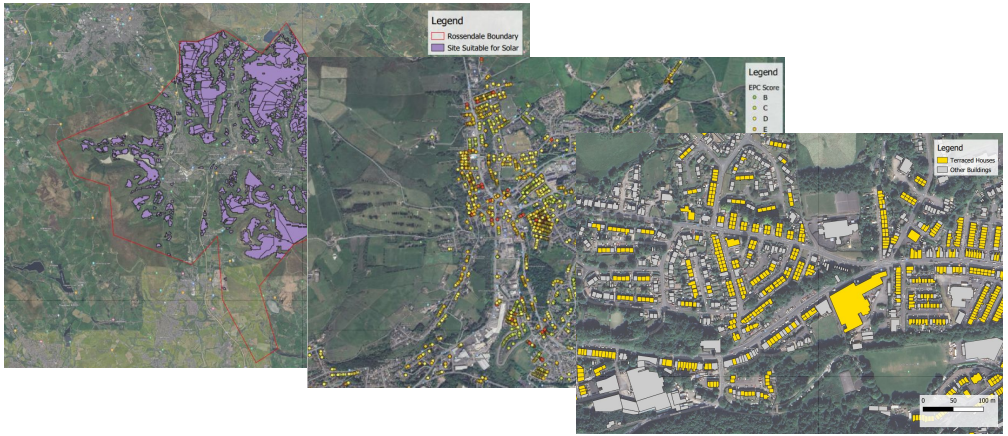


RV ENERGY
A community energy organisation for Rossendale

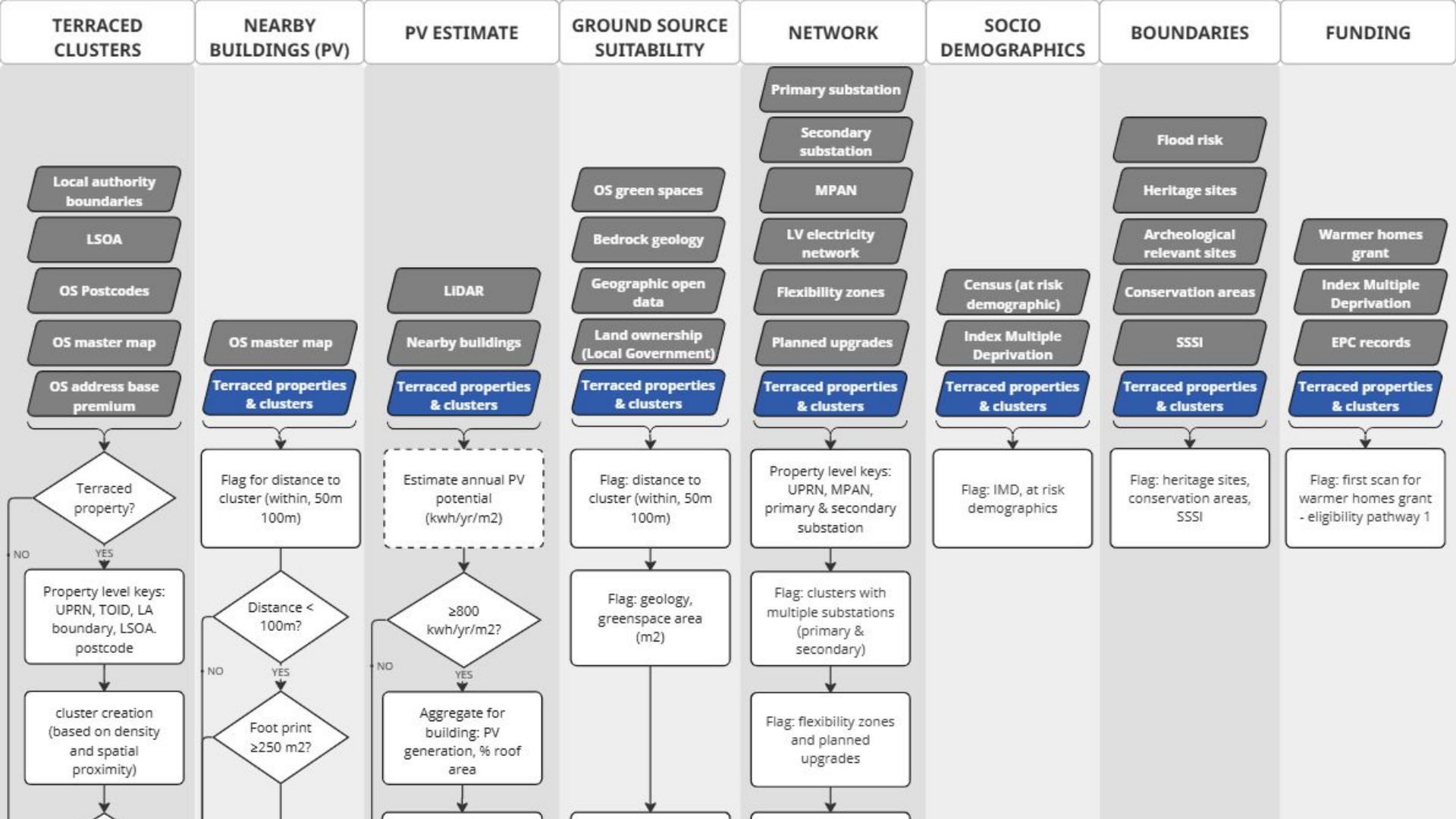
Planning Flow

- The planning flow is critical to TEM appraisal as part of the feasibility and deployment process
- The flow will;
  - Identify terraced homes
  - Determine the archetypes
  - Determine substation capacity
  - Determine building physics requirement
  - Input into the design criteria
  - Overlay community demographics
- Determines;
  - Initial cluster locations
  - Size of cluster
  - State of housing and level of retrofit
  - Lengths of pipework
  - Connection strategy
  - Orientation and amount of solar PV – level of generation
  - Opportunities for community energy
  - Network constraints and likelihood for flexibility payments
  - Borehole locations
  - Street works requirements
  - Affordability criteria of residents
- Informed by;
  - Benchmarks
  - Community data (via Fairer Warmth)
  - Supply chain
  - Procured and open data sets

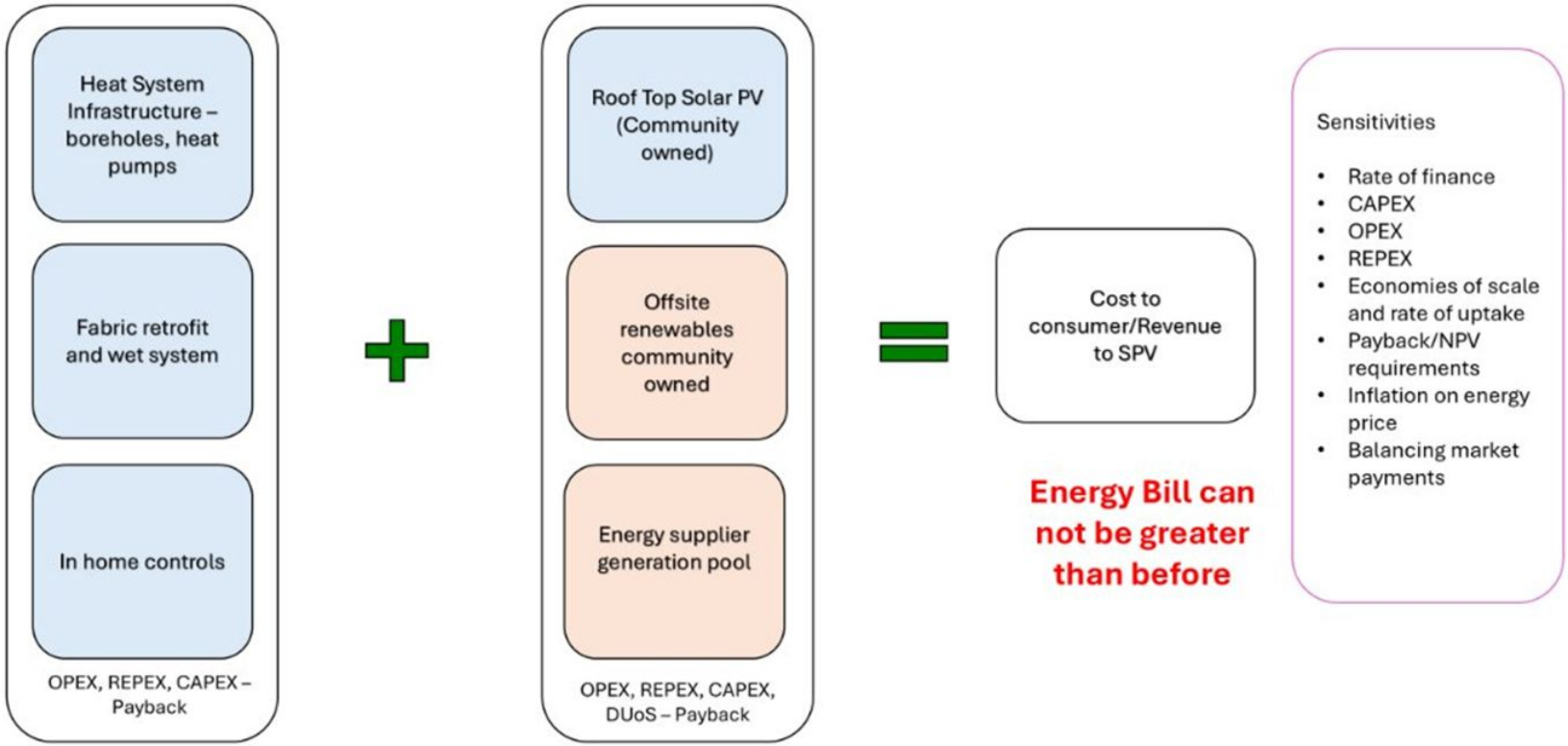
	REGIONAL SCREENING	SPATIAL PLANNING	RETROFIT	BEM	TEM
STAGE	Screening 1: GB/Regional model	Screening 2: Local model	Screening 3: Theoretical model	Screening 3: Theoretical model	Screening 3: Theoretical model
INPUT	Ordnance Survey data Index of Multiple Deprivation data	Ordnance Survey data DNO data Building stock data Collected data via Fairer warmth Open data	Building stock data Collected data via Fairer warmth	Retrofit heat demand reduction Building stock data Collected data via Fairer warmth Renewable electricity generation	Annual electricity demand Annual electricity generation Batches Grant funding Costs: LEC, LDV, retrofit, ambient loop infrastructure
OUTPUT	Terraced clusters	Suitable clusters Batches Renewable electricity generation	Retrofit heat demand reduction	Annual heat demand Annual electricity demand	Standing charge Internal Rate of Return Cashflows



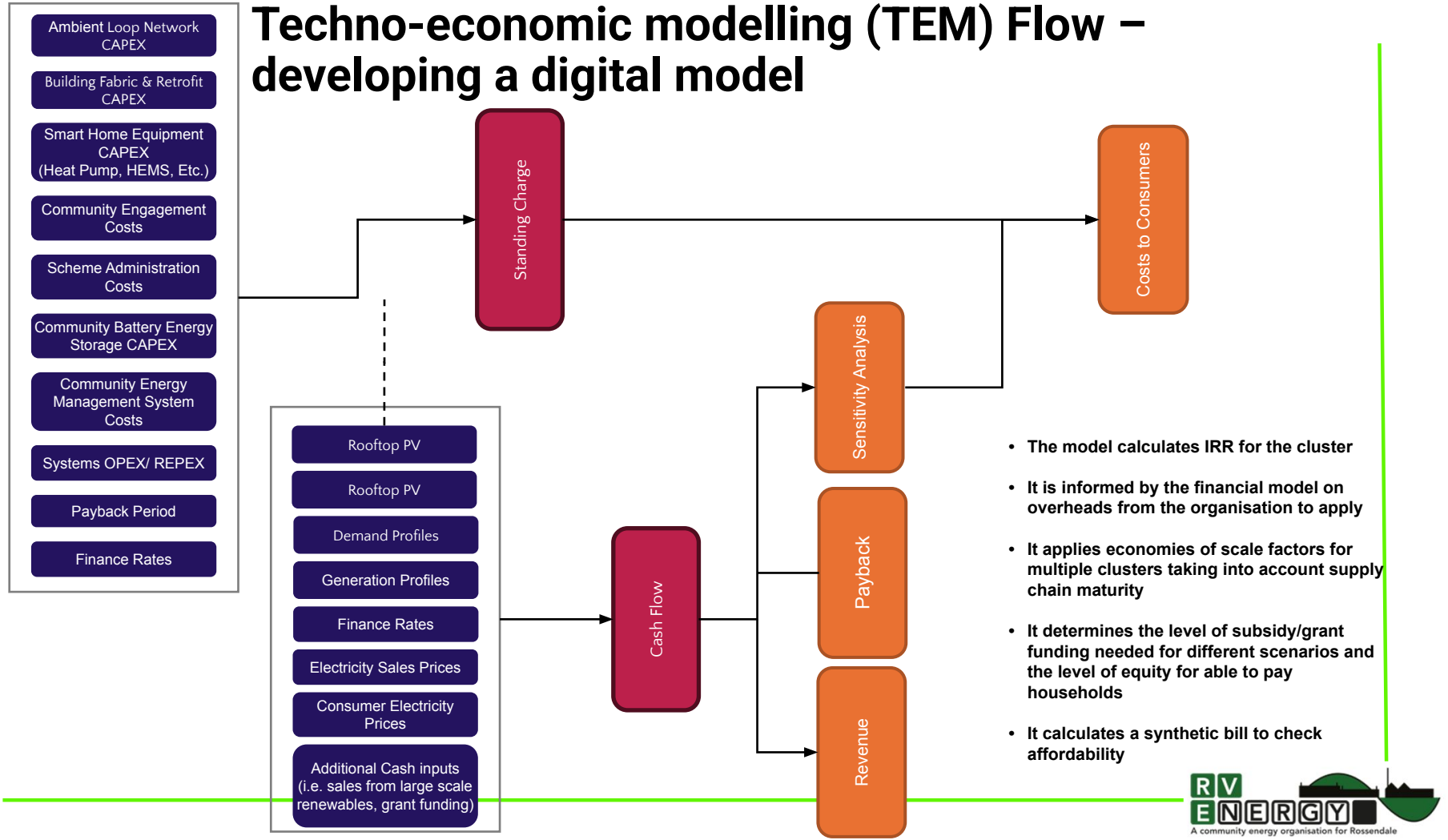
RV ENERGY
A community energy organisation for Rossendale


TERRACED CLUSTERS
NEARBY BUILDINGS (PV)
PV ESTIMATE
GROUND SOURCE SUITABILITY
NETWORK
SOCIO DEMOGRAPHICS
BOUNDARIES
FUNDING
Local authority boundaries
LSOA
OS Postcodes
OS master map
OS address base premium
Terraced property?
NO
YES
Property level keys: UPRN, TOID, LA boundary, LSOA. postcode
cluster creation (based on density and spatial proximity)
OS master map
Terraced properties & clusters
Flag for distance to cluster (within, 50m 100m)
Distance < 100m?
NO
YES
Foot print ≥250 m2?
LIDAR
Nearby buildings
Terraced properties & clusters
Estimate annual PV potential (kwh/yr/m2)
≥800 kwh/yr/m2?
NO
YES
Aggregate for building: PV generation, % roof area
OS green spaces
Bedrock geology
Geographic open data
Land ownership (Local Government)
Terraced properties & clusters
Flag: distance to cluster (within, 50m 100m)
Flag: geology, greenspace area (m2)
Primary substation
Secondary substation
MPAN
LV electricity network
Flexibility zones
Planned upgrades
Terraced properties & clusters
Property level keys: UPRN, MPAN, primary & secondary substation
Flag: clusters with multiple substations (primary & secondary)
Flag: flexibility zones and planned upgrades
Census (at risk demographic)
Index Multiple Deprivation
Terraced properties & clusters
Flag: IMD, at risk demographics
Flood risk
Heritage sites
Archeological relevant sites
Conservation areas
SSSI
Terraced properties & clusters
Flag: heritage sites, conservation areas, SSSI
Warmer homes grant
Index Multiple Deprivation
EPC records
Terraced properties & clusters
Flag: first scan for warmer homes grant - eligibility pathway 1

Affordability to the householder



Techno-economic modelling (TEM) Flow – developing a digital model



- **The model calculates IRR for the cluster**
- **It is informed by the financial model on overheads from the organisation to apply**
- **It applies economies of scale factors for multiple clusters taking into account supply chain maturity**
- **It determines the level of subsidy/grant funding needed for different scenarios and the level of equity for able to pay households**
- **It calculates a synthetic bill to check affordability**

RV ENERGY
A community energy organisation for Rossendale

Financing NZTS – the financial model and making this investable

Ainsley Barker, Abundance Investment
Adam Marvel, SIB

RV ENERGY
A community energy organisation for Rossendale

The financial model – what and why

- Links the techno-economic model, the governance / corporate framework, and investor requirements into one coherent flow
- Template / foundational model that can be adapted to the specifics of an area
- Allocates revenues and costs across the various entities within the group structure
- Overlays financing assumptions at entity level; adds in tax / reserves etc; builds in sensitivity and other (IRR / DSCR etc) analysis required by investors

RV ENERGY
A community energy organisation for Rossendale

The financial model – what and why

- Aim is that once the TEM confirms initial feasibility, the financial model then provides the detail to show how in practice a scheme is put together from a financial perspective and answers the critical questions:
  - Is the standing charge affordable?
  - What are the operational cashflows generated to service the development and infrastructure debt and what are the debt capacity levels?
  - What is the grant requirement (reducing over time with economies of scale and efficiencies)

RV ENERGY
A community energy organisation for Rossendale

Methodology – Key Messages

- Built on first-principles data from the techno-economic model (not generic assumptions)
- Structured to test scenarios dynamically, not to present a fixed answer.
- We are testing the model using:
  - Economies of scale trajectories (200 → 1,000 → 3,000 homes)
  - Capex reduction learning curves
  - Opex and repex options
  - Regional archetype differences
- About building a decision tool that demonstrates methodology, transparency, and robustness and is adaptable for each region

RV ENERGY
A community energy organisation for Rossendale

Role of Looped, LDVs, AssetCo, Energy Club (financial perspective)

- Looped - national aggregator, governance and oversight, builds investor assurance, digital platform – funded mainly via license and service fees
- AssetCo - ring-fenced SPV holding the infrastructure, receiving predictable standing charge revenues, structured as a infra-style investment vehicle.
- LDVs - local trusted delivery body that receives delivery/management fees from AssetCo; costs reduce significantly with scale
- Energy Club - entity to optimise upsides from solar generation / flexibility to households without affecting bankability.

RV ENERGY
A community energy organisation for Rossendale

Key Insights

- The model confirms what is already recognised nationally: these systems cannot be delivered without significant upfront public subsidy, especially in fuel-poor or high-cost archetypes.
- The model is showing learning curve cost reductions and significant benefits when moving from single pilots to aggregated clusters at scale.
- Even in the scaled scenarios, a standing-charge-only model is not affordable without grant intervention – which is entirely aligned with existing Warm Homes Plan policy direction.
- The value of NZTS lies in having the most advanced, granular understanding in the UK of what level of support is needed and where.

RV ENERGY
A community energy organisation for Rossendale

Next steps

- Complete scenario and sensitivity testing using learnings from latest cost reviews
- Produce grant optimisation profiles per archetype
- Engaging with investors using the model outputs to work through key questions / investment risks
- Using the model to inform our policy asks and strengthen the case for embedding NZTS in the Warm Homes Plan
- Deploy the financial model in real-world use, starting with the three 200-home projects now commencing
- Start moving from the individual LDV cluster investment case to the portfolio / refinance investment case as a new investable asset class is created

RV ENERGY
A community energy organisation for Rossendale

Investment Landscape

- Development finance clear challenge on per property basis
- Combination with retrofit is assumed to include grant support, structural clarity is key
- Pilot demonstrations are heartening, there is interest but known risks are substantial
- Long term capital exists in the market - focus should be on filling gaps through construction

RV ENERGY
A community energy organisation for Rossendale

Reflections and next steps – local delivery and replication potential

Kate Gilmartin, RVE

RV ENERGY
A community energy organisation for Rossendale

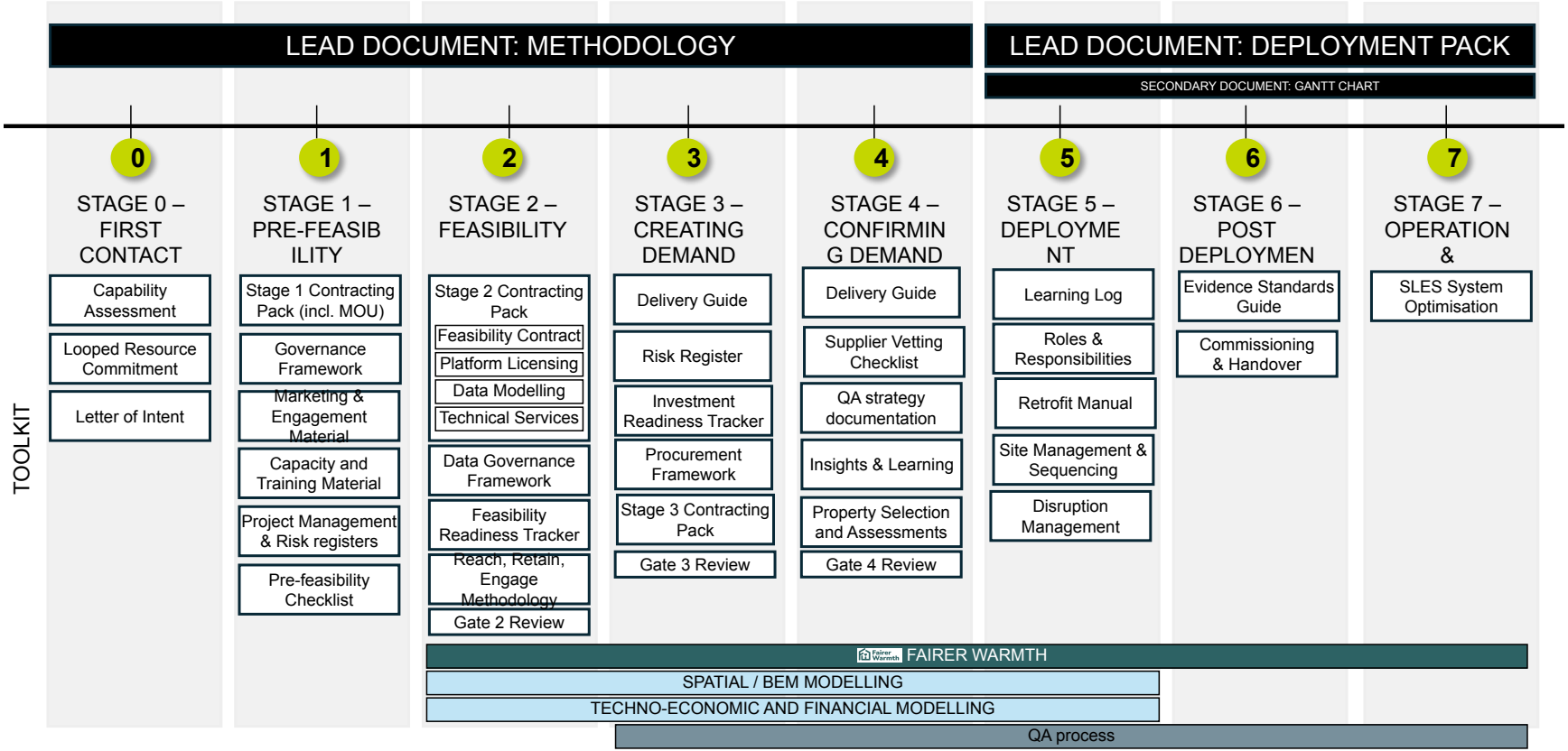
Where are we up to?

1. Body of work that can be shared and replicated for other communities to deliver NZTS

2. Testing deployment of 5 systems:
    1. Physical infrastructure – 3 homes -> 200 homes
    2. Creating demand – working with Community anchor orgs
    3. Virtual infrastructure – smart system – Strategic Innovation fund
    4. Organisational structures – test with communities and investors (LAs/NWF/GFI)
    5. Digital spine – continue to build and refine – work towards digital twin

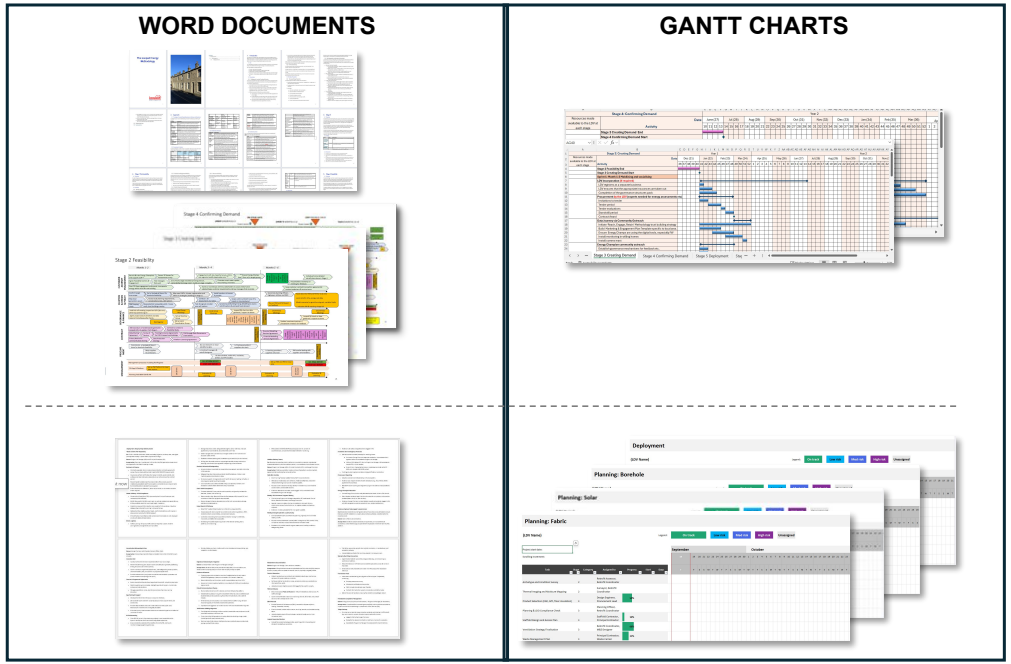
RV ENERGY
A community energy organisation for Rossendale

The 8 Stage Methodology and the supporting toolkit



Tools being developed for local delivery orgs

- Looped has refined the methodology and built out the associated tooling that will be used to support local development organisations.
- Additionally, Looped will develop a specific set of tools to accompany the deployment.
- Together these facilitate the spectrum of tooling for a NZTS project.
- Looped is ready to test these in pilot clusters.

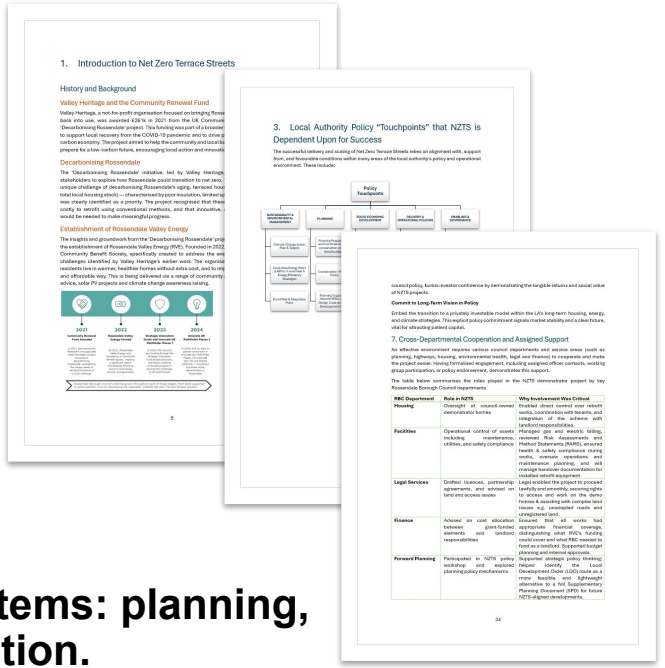


RV ENERGY
A community energy organisation for Rossendale

Local Authority Handbook

NZTS aligns with and has co-benefits for:

- Climate Action Plans & Local Area Energy Plans
- Public Health Strategies (cold homes, mould)
- Fuel Poverty & Equity Agendas
- Housing Regulation (MEES, HHSRS)
- Economic Growth & Regeneration



The project helped test what can work in LA systems: planning, finance, highways, cross-departmental coordination.

RV ENERGY
A community energy organisation for Rossendale

What support does Looped provide?

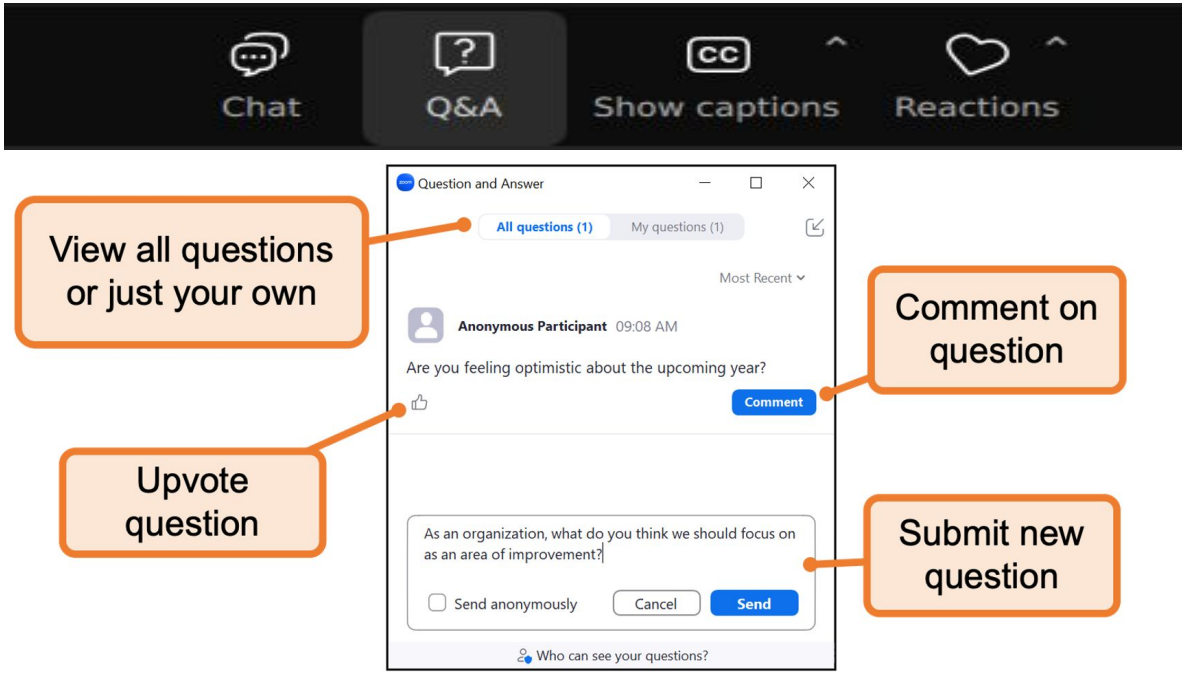
- Start up support
- Local Development Manager
- Licencing of tools, Fairer Warmth Platform NZTS journey and NZTS standards and methodology
- Peer learning and capacity building
- Quality Assurance
- Links to funders and investors
- Tried and tested methods and ongoing innovation
- Profile and policy advocacy across national & local government, retrofit, energy and community energy sectors

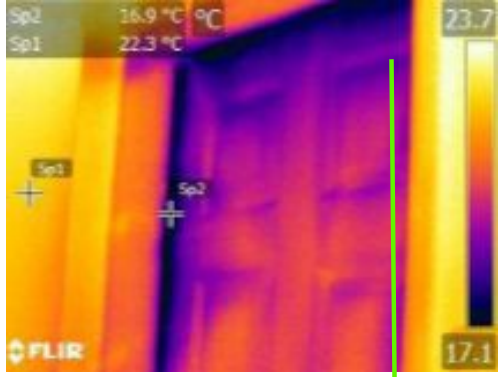
Where Next?

- Network Innovation Allowance (NIA) testing for smart system
- Developing Ofgem Strategic Innovation Fund Beta funding bid
- Conducting study in Leeds
- Funding for x 3 pilots to do feasibility in and cluster development in:
    - Rochdale/Middleton
    - Rossendale
    - Bridgend

RV ENERGY
A community energy organisation for Rossendale

Questions?





RV ENERGY
A community energy organisation for Rossendale