Existing Towns and Settlements

Photo credit: Eole Wind

Photo credit: George Eierman

Overview

Decarbonising domestic heating is one of the UK's most significant infrastructure and environmental challenges. While the transition from fossil fuel heating to electric heat pumps is underway, deployment rates remain too slow to meet net zero targets.

Energy Superloops are designed to accelerate large-scale retrofit by delivering low-carbon heat as a shared utility. By combining ambient heat networks, data centre waste heat and networked ground source heat pumps, Energy Superloops make low-carbon heating viable for a much larger proportion of the UK's existing housing stock.

Unlike conventional standalone ground source heat pump systems, which often require extensive land or garden space for ground arrays, Energy Superloops distribute shared infrastructure across streets and communities.

This removes one of the major barriers to widespread heat pump adoption in existing towns, suburbs and villages, significantly lowering install cost for the end user.

Our approach reduces emissions, lowers energy bills, improves air quality and future-proofs homes while supporting the UK's transition to net zero.

The Challenge

Decarbonising existing housing stock is more complex than designing low-carbon systems for new developments.

Many homes across the UK:

- Lack sufficient outdoor space for individual ground arrays
- Are difficult or expensive to retrofit individually
- Depend heavily on ageing gas infrastructure
- Face rising energy costs and fuel poverty pressures
- Sit within communities with constrained grid infrastructure

At the same time, the UK Government has committed to rapidly scaling heat pump deployment, targeting hundreds of thousands of installations per year by 2030.


Photo credit: Kensa

Traditional retrofit approaches often face multiple barriers:

- High upfront costs
- Limited installer capacity
- Grid reinforcement requirements
- Space and acoustic concerns associated with ASHPs
- Resident disruption during installation

The challenge is therefore not simply technological; it is one of scale, affordability and deliverability. There is also increasing pressure on Local Authorities, housing providers and communities to reduce emissions while maintaining affordability and public acceptance.

The Solution

Energy Superloops provide a community-scale approach to low-carbon retrofit.

Rather than relying on every property to install its own individual heat collection system, Energy Superloops create a shared ambient heat network beneath streets and public spaces. This network distributes low-grade heat across entire neighbourhoods, allowing homes to connect via individual ground source heat pumps.

Each Superloop features:

- A data centre generating recoverable waste heat
- A shared ambient loop network
- Borehole arrays providing renewable heat exchange and thermal storage
- Individual GSHPs installed within each property
- A new or existing renewable energy asset to power the system

By bringing heat to homes as a utility, rather than generating it independently at each property, Superloops don't just unlock a scalable pathway to low-carbon heat for homes previously considered unsuitable for conventional GSHP systems. They also create heating systems that are more efficient than most other renewable heating systems on the market.

How It Works

The system operates as a closed regenerative loop:

Power generation

Local renewable energy and the national grid powers Superloop's data centre

1

Data centre

Computing operations generate recoverable waste heat 24/7

2

Heat recovery

Waste heat is used to warm water circulated through Superloop's pipes

3

Home heating

Pre-warmed water moves through your new ground source heat pump, boosting efficiency and cutting bills and emissions

4

Closed loop

Cooled water returns to our data centre to be reheated - cycle repeats endlessly

5

Energy Superloop

Because each Superloop operates at a low ambient temperature, heat losses across the network are significantly lower than traditional high-temperature district heating systems.

The modular nature of the infrastructure also allows for phased rollout, supporting long-term expansion without major disruption.

The Network

Construction begins with the installation of a shared borehole array within the community. Boreholes are typically drilled to depths of between 150–200 metres and connected via a continuous loop of buried pipework.

Each borehole is backfilled with thermally conductive grout, ensuring efficient transfer of heat between the surrounding ground and the circulating fluid inside the network.

These boreholes serve multiple purposes:

- Renewable heat exchange
- Seasonal thermal balancing
- Long-term thermal storage
- System resilience during maintenance periods

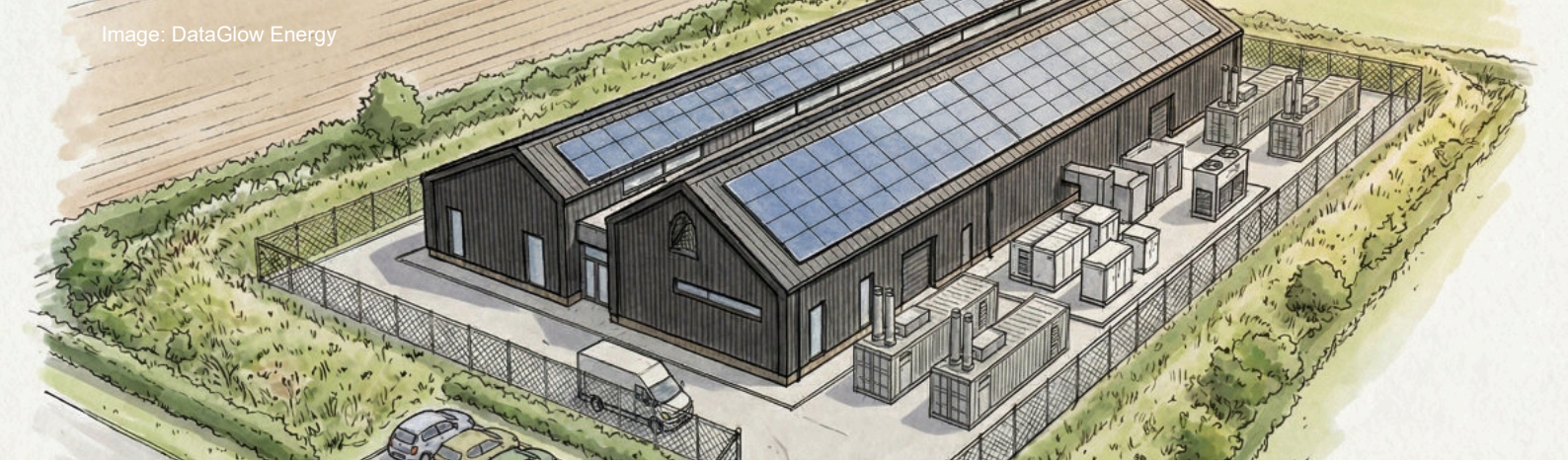
The borehole array is connected to a wider ambient heat network installed beneath roads, pavements and shared spaces. Flow and return pipework distributes low-temperature heat throughout the network.

Waste heat from the collocated data centre is continuously fed into this network. Rather than being expelled into the atmosphere through noisy cooling systems, this low-grade heat becomes a valuable resource for nearby homes, commercial buildings, and community spaces.

Individual ground source heat pumps are installed within each property and connected to the Superlooop network. These units extract the low-temperature heat from the network and upgrade it to provide heating and hot water. Every home recieves the same inlet temperature.

Our Kensa ground source heat pumps connected to Superloop are up to 5x more efficient than a gas boiler, driving down energy costs. Each property's heat pump is connected directly to the home's electricity supply, meaning:

- No complex communal heat billing system
- No separate heat metering requirements for domestic properties
- Residents can access competitive tariffs and smart electricity pricing from any supplier.



Delivery

Data Glow Energy's Superloop concept is backed by major green infrastructure investment from Octopus Energy Generation, enabling long-term funding models that reduce barriers to deployment.

Delivery typically includes:

- Feasibility studies
- Community engagement
- Planning support
- Network design
- Data centre design and construction
- Borehole installation
- Kensa heat pump installation
- Long-term operation and maintenance

The model also aligns closely with emerging government funding support for low-carbon retrofit.

Our joined-up approach enables communities, councils and housing providers to pursue retrofit at neighbourhood scale rather than relying solely on piecemeal property-by-property upgrades.

Infrastructure & Resilience

Energy Superloops are designed for long-term durability and operational resilience.

Key resilience features include:

- Boreholes that store heat, balance network temperature and help guarantee heat to households.
- Reduced reliance on individual heating assets
- Distributed infrastructure with no single point of major failure
- Underground infrastructure with a lifespan of up to 100 years
- Ability to expand networks over time as communities grow

Planning & Policy Alignment

Energy Superloops align strongly with current UK retrofit and decarbonisation policy.

Key policy drivers include:

- The UK Government's Warm Homes Plan
- National net zero targets
- Heat pump deployment targets
- Local Authority climate action plans
- Air quality improvement strategies

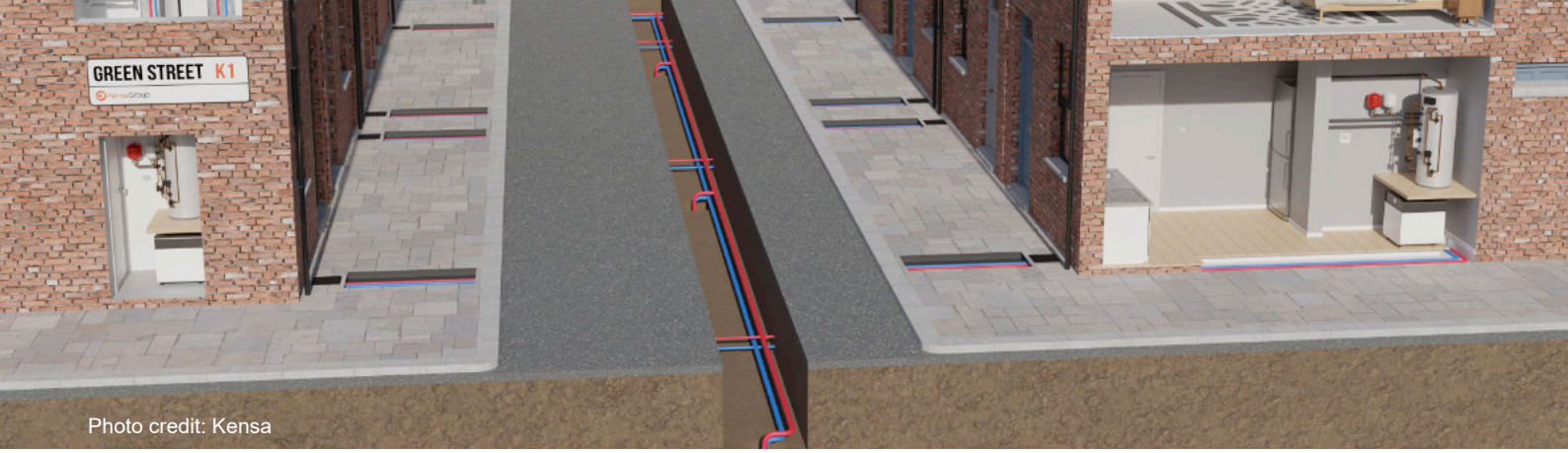


Photo credit: Kensa

The Warm Homes Plan announced £15bn of support for low-carbon heating and energy efficiency measures, including:

- Heat pump grants
- Low-interest retrofit finance
- Green mortgage support
- Funding for low-income households

Energy Superloops support evolving EPC methodologies and future regulatory requirements around:

- Carbon reduction
- Energy affordability
- Smart readiness
- Building performance

The approach aligns with wider planning and infrastructure objectives concerning:

- Decarbonisation
- Public health
- Fuel poverty reduction
- Infrastructure resilience

Benefits for Communities & Homeowners

Energy Superloops deliver multiple long-term benefits for residents and communities:

- Lower energy bills compared to gas heating
- Significantly improved heating efficiency
- Reduced exposure to fossil fuel price volatility
- No external ASHP units or associated noise
- Access to ultra-fast fibre broadband infrastructure
- Lower maintenance requirements than gas boilers
- Ability to choose electricity supplier and tariff

Additional Capabilities

Energy Superloops can support broader community infrastructure goals, including:

- Fibre broadband deployment
- Future smart energy integration
- Potential integration with local renewable generation
- Expansion to community buildings and public assets

The network can also support mixed-use developments, connecting:

- Homes
- Schools
- Leisure centres
- Community buildings
- Commercial properties

Why It Matters

Heating remains one of the UK's largest sources of carbon emissions. Energy Superloops provide a realistic pathway to:

- Deliver low-carbon heat at scale
- Reduce fuel poverty
- Improve public health
- Future-proof housing stock
- Unlock the value of waste heat from data centres that create local jobs

The approach demonstrates how energy, digital infrastructure and heat decarbonisation can be integrated into a single long-term infrastructure solution.

Rather than treating retrofit as an isolated building-by-building challenge, Energy Superloops create shared infrastructure capable of transforming entire communities.

Case Studies and Precedents

We have our first Superloop project underway in Melbourn, South Cambridgeshire. Hundreds of residents are interested in making the switch to affordable low-carbon heating.

Photo credit: DataGlow Energy

Kensa, a award winning UK based Ground Source Heat Pump manufacturer, is a Superloop project partner. They are experts in large scale networked heat pump projects (new build and retrofit) and have installed GSHPs cross a huge range of home periods and styles:

Chestnut Mews & Aspen Mews

Throughout 2015 Kensa worked to install ground source heat pumps in nearly 200 rural off-grid properties across East Staffordshire. At the end of a highly successful project, which featured Kensa ground source heat pumps being installed in 133 bungalows, tenants achieved savings of between £350 and £750 on their heating bills.

Sutton Dwellings, London

With the help of Kensa and networked heat pumps, Clarion Housing Group has refurbished four blocks of socially rented flats, each over 100 years old, in their Sutton Dwellings estate in Chelsea – an area containing some of the UK's most expensive real estate – whilst honouring its heritage at the same time.

Walton Hall, Warrington

Warrington Borough Council worked with Kensa to replace old gas boilers at Walton Hall. A perfect 'myth-buster' example: ground source heat pumps fitted into a 19th century, Grade II listed hall with no visual impact or insulation upgrades, saving on energy costs and cutting emissions.

Llanishen House

Overlooking the Usk Valley in picturesque Monmouthshire, this spawling home was formerly the site of an old inn, parts of which date back some 600 years. Twin Kensa heat pumps now keep both the modern extension and ancient rooms cosy, whatever the weather.

Existing networked ground source heat pump projects from Superloop partner Kensa demonstrate the viability of community-scale retrofit and networked ground source heat pumps, and with the addition of waste heat from a data centre, networked heat pumps can provide even greater efficiency.

Next Steps

Successful Energy Superloop projects begin with early collaboration. Initial stages typically include:

- Feasibility assessment
- Community and stakeholder engagement
- Heat demand mapping
- Planning and infrastructure review
- Funding and delivery modelling

Communities, councils, developers and housing providers interested in large-scale low-carbon retrofit are encouraged to engage early to explore suitability and delivery options.

Contact us to via info@dataglow.energy to discuss whether your community could support an Energy Superloop.