

A Call for Evidence from the DESNZ Committee

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2. Heating our homes – Investigating the changes needed to deliver energy efficient homes across the UK, how the Government can support innovation and the affordability of the switch to decarbonised heating.

The following questions have been answered within the context of ‘The Net Zero Terrace street’ a project being undertaken by Rossendale Valley Energy and Chipping community energy – community scale decarbonisation heat transition – please see attachments.

The Call for Evidence for Heat our Homes should also be read in conjunction with the Call for Evidence ‘a flexible grid for the future’ and ‘keeping the power on’. Decarbonisation is a whole systems transition and consideration of all aspects of decarbonising the Grid (generation and consumption) must be considered in the round and holistically.

The objective of both projects referenced is to find a collective, community based solution, that is replicable and therefore scalable. The objective is to find a model that can provide affordable, low carbon energy and create healthy warm homes – in the context of the Net Zero Terrace street, this must be at no upfront cost to the householder.

Both projects are based on Smart Local Energy Systems which will be fundamental to a decarbonised, flexible grid and will need to be organised at community level to provide the most effective and efficient decarbonised solution.

The counterfactual is a piecemeal, ad hoc approach, that will take a long time, be costly to many, leave people behind and not provide an efficient solution to effectively utilise the grid or minimise costly reinforcements or the delay that they will take.

In the case of the Net Zero terrace street, Air Source Heat Pumps are not viable due to space and noise constraints, and the counterfactual is electric boilers, cheap to install, but expensive to run and will put considerable load on the grid.

The solution identified is a Smart Local Energy System (SLES) which will comprise ambient loop ground source heat pumps (GSHPs), community EV car clubs, community storage, solar PV and local peer-to-peer Power Purchase Agreements (PPAs) controlled by optimisation software. With the Net Zero Terrace Street, the benefits case of the system can simply be summarised that it would reduce bills and peak network capacity by up to 80% compared to the counterfactual of direct electric heating in individual homes. Other benefits include rapidly accelerating the transition of millions of

homes through mitigating against electricity grid constraints and developing local energy economies that enable the fair distribution of energy and wealth into areas where it is needed.

The Net Zero Terrace street project has been brought forward through Community Renewal Fund grant, it has subsequently benefited from the Net Zero Living: Pathfinder places stage 1 grant and is currently putting in an application for demonstrator funding through Pathfinder 2 and awaiting feedback on applications through Strategic Innovation Funding Alpha and DESNZ Flex Unlocked.

The Chipping community energy project has successfully delivered stage 1 and stage 2 Rural Community Energy Fund grant and is currently partnered with Prospus group undertaking a Green Home Finance Accelerator stage 1 and applying for Stage 2 demonstrator.

We will be happy to present further details of these projects.

1. What policy changes are needed to deliver energy efficient homes across the UK?

The Net Zero terrace and Chipping community energy solutions look to replicate the success that Ambient shared ground loop systems and retrofit projects have had in the Social Housing sector and transpose that solution to a streets of mixed tenure properties. This is more complex, and the key feature of the project design has been that there must be a homogenous, inclusive solution that each and every householder can take up, no matter what tenure or financial circumstance.

The no-upfront cost solution, is dependent on debt sitting on the shared ground loop and bore hole infrastructure and repayment via a standing charge is a key enabler of the solution.

Key policy requirements to help enable this model will be:

1. Set an earlier date for banning the installation of new oil and LPG boilers in rural areas (creating the demand and then provide backing for a collective solution such as Chipping Community Energy – carrot and stick)
2. The EPC C for Private rented must come into place for 2025, as this could become the anchor load for projects like Net Zero Terrace street.
3. Statutory undertaker for heat pipe delivery: Give heat providers equivalent access to roads to electricity providers through statutory Code powers to enable them to install and upgrade pipes
4. There is no policy for rural decarbonisation transition – electrification of heat will put huge load on the rural 'weak' grid and as with Broadband communities will be left behind. We need a rural Giga Watt voucher scheme (like the rural giga bit that helped roll out broadband in rural areas that were left behind)
5. Create a funding pot for smaller and disaggregated heat projects that cannot access the Green Heat Network Fund (Shared ground loop are unable to access GHNF despite conversations with DESNZ)
6. Reinstate Enterprise Investment Scheme style tax relief for community heat projects
7. The enactment of the Future Homes Standard without delay
8. Publication of the equivalent version of RdSAP without the customary 1-2 year lag.
9. Provide transparent information on how the Climate change levy is spent annually on decarbonising heat.
10. Reform building energy efficiency certification. EPC, SAP, based on smart meter data from usage.
11. Support Local Area Energy Planning: however, this should be down to community LAEPs and sub-station LAEPs

12. Heat Zoning should be used to see where shared ambient solution will be most efficient (for the grid and for communities) and work done to look at how this can be planned.

Whole systems approach must be adopted and Regional System Planners will be strategically placed to coordinate.

2. What are the key factors contributing to the under-delivery of the UK's government-backed retrofit schemes?

There are a myriad of barriers to the delivery of retrofit and affordable decarbonised heat. Here are some of the 'non-technical' barriers highlighted in the Pathfinder places stage 1 for the Net Zero Terrace Street.

	Non-technical barriers	Type of barrier
1	Space constraints for ASHP	Locational
2	Noise constraints for ASHP	Locational
3	Hard to treat homes	Retrofit- complexity
4	Inaccessible solutions to retrofit	Retrofit - complexity
5	Inability to face disruption for whole house retro fit and nowhere to move whilst work undertaken	Retrofit - complexity
6	Affordability of energy - fuel poverty	Affordability
7	No access to capital	Affordability
8	Below average house values	Affordability
9	Hard to reach people	Social
10	Inability to access Jobs and Skills that the NZ transition may bring	Social
11	No accessible, inclusive solution to decarbonise across a whole systems approach	No Community solution
12	Lack of understanding about what decarbonisation is or the solutions available	Education/ messaging
13	No holistic, collective solution that people can engage with	No Community solution
14	Access to most efficient heat system, therefore the lowest running cost. Electric boiler V GSHP	Education/ messaging
15	Cost, time and resource for grid reinforcements	Education/ messaging
16	Access to the benefits of Flexibility, aggregation through community model brings enhanced benefits	Education/ messaging
17	A replicable, scalable solution that can be taken on by other 3rd sector parties or Local Authorities	No Collective solution
18	Small Local Authorities do not have the resource to develop and deliver complex whole systems transitions	No Resource
19	Confusion on pathway to deliver retrofit	Retrofit - complexity
20	No mobilisation of the Supply chain for retrofit	Supply chain barrier
21	Not enough creation of jobs and Skills for retrofit	Supply chain barrier
22	Roll out of grid reinforcements. Global supply chain	Supply chain barrier
23	planned, phased approach for DNOs to create cost effective solutions. Need Local Area Energy Plans down to community and sub-station level.	No mapped pathway
24	Whole systems architecture with operational and organisational Governance	No Collective solution
25	Gas is cheaper than Electricity and therefore gas heating remains cheaper than electricity - subsidised electricity costs	Systemic barrier
26	Grants don't work - HUGS and Boiler Upgrade Scheme underspent	Education/ messaging
27	Holistic service model	No Collective solution

28	Overcoming the inertia of Business as usual	Education/ messaging
29	Bringing together commercial partners who ordinarily would not collaborate to create whole systems solutions	Systemic barrier

Retro fit to date has been targeted at:

- Social Housing where tenants are obligated to have measures installed
- 'able to pay', 'willing to pay' 'willing to contribute' etc.

This is targeted at those who don't have a say and those that are early adopters and incredibly motivated. There needs to be planning for creation of affordable, low carbon heat and healthy warm homes for those that need it most and those areas that are most likely to be left behind (including rural areas)

A planned, phased street by Street, community level approach will be most cost efficient (for grid and economies of scale), allow the supply chain to mobilise bringing the benefits of jobs and skills to the local economy and ensure no one is left behind.

Whole house 'deep' retrofit is costly and incredibly disruptive, meaning people are likely to need to move out. Shared ground loop (or individual ground source heat pumps) still require home upgrades but will be less disruptive. The added efficiency of a raised coefficient of performance of a GSHP will give better value to householders and with a community collective solution, debt can be leveraged on the bore hole infrastructure rather than on individual homes (another barrier to uptake) Paying through a standing charge will spread the cost.

The price of electricity is a significant barrier to the electrification of heat with most people unable to realise savings when switching to a heat pump. The Community solutions being developed through the NZ Terrace street and Chipping integrate local energy generation, peer to peer local energy markets and the value of flexibility being delivered across the community solution. This is trying to address the affordability issue and with a collective inclusive solution, ensuring that no one is left behind.

3. Which standards and assessment frameworks are needed to deliver a reliable, skilled workforce capable of transitioning UK homes to modern heating solutions?

The market is the biggest barrier to the creation of a reliable, skilled workforce that can enable the NZ Transition. The market has not been created yet (stop-start policies), as there is not sufficient demand to bring forward the creation of a stable market and the jobs that will come alongside that. Government must focus on creation of demand that will then allow the supply chain to mobilise. The creation of this demand cannot be done piecemeal and ad hoc as it has been done to date, but must be coordinated, planned and phased through community solutions. NZ terrace street & Chipping, working with the DNO, sub-station by sub-station is an example of how this planned and phased approach can be undertaken.

4. How might the Government support innovation in delivering local solutions?

There has been much focus on delivery for Social Housing and the 'able/ willing to pay/ contribute' but there has not been focus on collective community solutions across mixed tenures properties, Private rented or those without capital, interest or motivation to make the changes.

There are innovation competitions, but these are often for small amounts of funding, leading to larger funding pots, but there is not enough to bring through enough projects that can enable real demonstrators and pilots to be developed.

Government needs to move away from multiple competitions which only back a few 'winners' and think strategically about where the need is and focus attention on how this can be brought forward, ie areas of deprivation and rural areas which are likely to get left behind and face the most issues with rural 'weak' grid constraints and length of time to resolve these issues.

Smart Local Energy Solutions (SLES) will need to be a key part of the NZ delivery as we face the huge barrier of Grid constraints and the time it will take to undertake the reinforcements necessary to cope with the 2.5 times increase in demand that will come from electrification of heat, transport and industry. SLES will enable communities to create place based, whole systems solutions despite the constraints of the grid and will therefore not face the delays that an unplanned, unphased transition will face.

5. What role should customer choice play in the future planning of energy networks for home heating?

Choices are limited, as with gas heating, the choice will largely be determined by affordability.

- Electric boilers are more expensive to run than heat pumps (but cheaper to install- therefore private rented landlords are likely to put in something cheap for them) Many flat conversions are using electric radiators as this is cheaper than putting in a wet system and gas and can be flagged as 'green' but commits the householder to very high bills)
- Many homes built in the 1960s had Electric heating (as Nuclear was going to be so cheap) however, due to cost, most people went on to retro fit wet systems and gas, as this was substantially cheaper.

Providing community SLES is going to be the most economic. People will have a choice to opt in, but it is thought that if it is the:

- Cheapest solution
- Offers a 'hand holding' support through trusted community members
- Is organised collectively, so getting 3 quotes from builders, making decisions about complex retrofit isn't left to individuals and becomes a barrier.

People are likely to feel safe in their decision to move with the crowd.

6. Does the current state of consumer protections for low-carbon home technologies represent a barrier to uptake of these products?

There are many barriers to low carbon technology uptake. The DNOs and the complexity around getting an ASHP fitted is something that needs to be reviewed.

7. How will the public be able to afford the switch to decarbonised heating?

Cost is the biggest barrier to switching to decarbonised heat. (although there are many other barriers see Q2). This is way the main starting point with the NZ terrace street is how we can create

a model that has no upfront cost to the householder. As we are delivering new infrastructure, this can be leveraged with debt and repaid over the long term – just as the National Grid (electricity and Gas) have been over the years through our daily standing charge on our gas and electricity bills.

The 'no-upfront cost' within the Chipping project is more complex as the needs of retro-fit will differ and is harder to incorporate into a standardised model. With NZ terrace street, the decarbonised heat and retrofit is at no-upfront cost, whereas only the heat can be offered in this way at Chipping, with access to loans being considered for the retro-fit.

8. How will decarbonisation plans be drawn up in each area?

Vertically integrated planning

The ESOs Future Energy Scenarios (FES) takes a **whole systems approach**, and this approach needs to be cascaded down with more detail to the Distribution FES and a concerted effort to bring forward further granularity of detail through Local Area Energy Plans, Community based Local Area Energy Plans and then down to Sub-station level Local Area Energy Plans. This strategic, vertically integrated planning approach must be developed if best value for the consumer is to be realised through an efficient process of reinforcements. The proposal by Ofgem to introduce 'Regional Systems planners' could facilitate this approach and use a deep understanding of the distribution network to understand and create local, place based solutions.

Some of the Rural grid is 'weak' and will not have the capacity to meet electrification requirements. The cost of reinforcing the entire rural grid would be cost prohibitive, take too long, not be a priority and there isn't likely to be sufficient workforce to deliver. The solution will be to create local, place based solutions where new demand is met by new generation in Smart Local Energy Systems (SLES). Local balancing, local flexibility, digitalisation, Active Network Management will all need to be deployed to ensure the best and most cost efficient solutions are developed. This cannot happen organically, or piece meal, but will need holistic, whole systems planning which will require adequate skill and resource.

Local generation must be part of this planning. Currently there are no incentive mechanisms to bring forward smaller scale renewable energy generation (Contracts for Difference is the only mechanism and is for >5MW). This is a huge oversight, as local generation will be the key to provide SLES and affordable low carbon energy to communities. We need new local generation to enable flexibility, community storage and local balancing.

9. Do the current EPC frameworks help consumers make informed decisions on transition?

The EPC is a blunt instrument, but it is a starting point. The Chipping Community Energy Working group and the Net Zero Terrace street work will both require much more detailed surveys for the houses to understand heat loss and therefore the heat load required to maintain a warm, comfortable home. With the NZ Terrace street project we are utilising the 'Fairer Warmth' app/ CRM system and will be training Fairer warmth champions to help enable the collation of more detailed data that will feed into the energy model for the heat network design. The key is that the cost and

time required for a detailed energy audit of each home will be cost and time prohibitive. The aim is to use the Fairer warmth platform/ app to make this process more efficient.

Currently there are requirements for PAS2035 qualified people to undertake energy audits for whole house retrofit, this is expensive and time consuming and may not be required for less invasive energy efficiency measures done as a more standardised package across the NZ terrace street (in the same way the RSLs approached this).

10. Do standards need to differ for different types of housing?

Chipping has a myriad of different architypes, some of which will be very difficult to undertake retrofit. This means a solution where people can access shared ground loop at no upfront cost will be an effective way to decarbonise heat and get people to move away from oil.

11. What is the role of different levels of government in developing, funding and implementing schemes?

The most successful areas for decarbonising heat, undertaking retrofit and creating healthy warm homes has been in the Registered Social Landlord sector, through grants such as the Social housing Decarbonisation Scheme. This success has been down to localised strategic planning, access to finance, the ability that planning gives to mobilise the workforce, tenants being brought on-board with the changes being made.

Localised schemes gather momentum and create a 'social contagion' whereby the changes are normalised, and people are happier to move with the crowd. There will always be early adopters and laggards, but uptake will be much slower if Government continues to try and nudge individuals in a piece meal way, rather than focus on communities.

As with Question 8, the key is Local Area Energy Planning and the Regional System Planners and other stakeholders working together in a coordinated way.

Examples such as Net Zero Terrace Street and Chipping offer examples of what change can look like, how models of finance/ Organisational Governance and Operational governance can enable delivery, what the impacts on the grid will be, what the supply chain and work force will need to deliver.

Decarbonisation/ LAEP multi-stakeholder taskforces could be enabled through the Net Zero Hubs to ensure learning is shared and delivery mechanisms are understood across different areas.

The Net Zero Terrace Street

Net Zero Terrace Street will create net zero communities that otherwise would be left stranded. It is applicable to millions of homes in the UK. It is unique in being community centred, with no upfront costs to consumers and a Fairer Warmth approach. Local authorities of all sizes can participate with delivery models tailored especially to deliver in areas of resource and capacity constraints.

“Putting power into the hands of local people to move to a greener, inclusive, and more affordable energy system.”

Our aims under this project:

- Develop an approach to decarbonising nearly 10 million terrace homes
- Help everybody in the community to significantly reduce their home energy use and create lower energy prices.
- A plan to collectively transition terraced communities from fossil fuels to renewable energy for all.
- A planned approach which accelerates deployment through collaborative planning with key stakeholders including local authorities, the DNO, local community energy groups, energy suppliers and financiers.



The non-technical solution:

a ‘one stop shop’ where a commercial standardised, replicable, scalable model can be developed, then utilised across multiple areas irrespective of geography, demographic or local authority size.

At its centre is a consumer focussed service model that creates ‘energy communities’.



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The Net Zero Terrace Street

The technical solution:

- A community heat service delivered through clusters of shared bore holes and ambient heat loops to provide more efficient community heating with less impact on the grid.
- Tailored energy efficiency package and renewable energy
- ‘Fairer Warmth’ digitalised consumer journey to reach, engage and retain interest within the community.



Why is this project important?

- ‘Unlocks’ potentially millions of otherwise stranded homes mitigating noise, space and affordability barriers.
- Homogenous, inclusive solution with no upfront cost for householders
- Delivers Affordable, low carbon energy and healthy warm homes, improving lives, **reducing bills by over 80%**.
- Speedy delivery, replicable & scalable for all sizes of local authority using local supply chain (job and skills growth)

More about the barriers:

The main driver for the solution is to find an approach that can be used to decarbonise terraced streets, where issues around space constraints and fuel poverty prohibit the deployment of off the shelf low carbon solutions such as air source heat pumps. Choices for consumers are heavily restricted, effectively limiting consumers to the use of electric boilers which will prove both prohibitively expensive to operate, as well as putting huge strains on the electricity system.

Procuring such a solution would normally be complex, requiring multiple parties to work together under complex commercial arrangements. It would therefore not be possible for most communities to engage or local authorities to resource the solution.

The project in a nut shell:

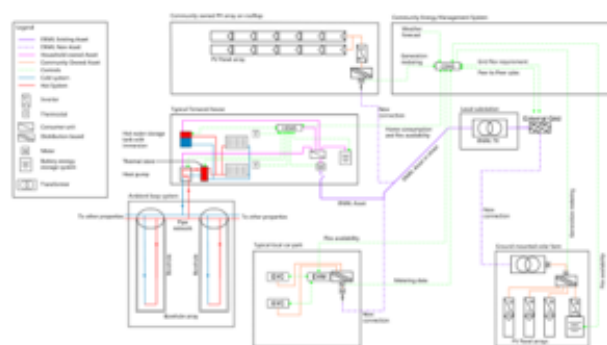
- Further develop the service model to identify all transactions and interactions with stakeholders.
- Develop the digital consumer journey (Fairer Warmth).
- Develop the operational and organisational governance under which the service model is delivered (tailored for 2 operating models, a consortium and an SPV)
- Refine the procurement approach testing it with actual system providers
- Develop legal, commercial and financial templates and models needed to enable delivery.
- Disseminate the outputs including a tool kit that can be used by all
- Develop a planning approach to identify and engage with communities
- Use 2 different geographies; Lancashire and Bridgend South Wales to ensure replicability
- Build a demonstrator that showcases the solution to real community members

A bit about The Smart Local Energy System:

A Smart Local Energy System (SLES) which will comprise ambient loop ground source heat pumps (GSHPs), community EV car clubs, community provided storage and solar PV and local peer-to-peer Power Purchase Agreements (PPAs) controlled by optimisation software. The benefits case of the system can simply be summarised that it would reduce bills and peak network capacity by up to 80% compared to the counterfactual of direct electric heating in individual homes. It will optimise bills, deliver flexibility to electricity networks (reducing reinforcement costs to customers) and utilise local community energy when available.



Service Model will continue to be developed building on Phase 1



System architecture developed under Strategic Innovation Funding will form the technical base to which the solution will be tested



The Story So Far



Chipping Community Energy have been working to develop a community scale, low carbon energy solutions that can allow residents to move away from fossil fuel heating.

Work to date has included surveying of the heat demand for the village, collation of energy data, engagement, and technical studies to consider the following technologies:

- High Temperature Ground Source heat pumps (GSHP)
- Ambient temperature loop system vs High Temperature loop
- Air Source Heat Pump network (ASHP)
- Biomass Boiler network

A second stage of work is currently underway to apply a solution that has been delivered across many social housing portfolios, but not been replicated across private or mixed tenure residential areas.

The system is called a [ground \(ambient\) temperature loop](#) and captures ground source heat from 200m deep bore holes with pipes filled with a water based fluid in localised shared clustered networks. The shared ambient loop will be connected to ground source heat pumps in the individual dwellings, and where appropriate supported by solar generation. The ability to develop these small shared ambient loops offers a more cost effective and efficient heat solution for villages like Chipping, helping to make energy more affordable. The clustering of these solutions is central to their viability, given the dispersed nature of rural communities, the high number of properties outside of villages, and the challenges associated with converting whole communities in a single phase.

The project has the following primary aims:

- To build on the understanding of potential low carbon solutions and their benefits to the community;
- To engage the community in the project development process to ensure the community is instrumental in shaping the project as it develops;
- To raise the profile of the project to key stakeholders;
- To improve understanding of the energy needs of the varied housing stock in Chipping;
- To develop a user interest heat map for the village;
- To undertake technical surveys and investigations;
- To develop a conceptual energy system design;
- To assess the effectiveness of using lower temperature heating systems to heat homes;
- To forecast the energy costs for the different house types within the village;
- To develop a techno-economic model for the proposed energy system;
- To better understand any constraints for the system;
- To develop a roadmap for delivery, including permits, consenting, commercial arrangements, land agreements and consumer contracting.
- To connect a trial borehole drilled earlier this year as part of a pilot project.

The key objective is to find an affordable, inclusive, low carbon heating solution for residents, so no one in the community gets left behind in the Net Zero transition.

See more here: [Chipping Community Energy](#)

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