



Reaching Rural Properties

OFF-GRID HEATING IN THE TRANSITION TO NET ZERO

By Zayn Qureshi



Executive Summary

Since the UK became the first country in the world to set a legally-binding target to reach net zero emissions by 2050, policy focus has been geared toward how best to achieve and support a sustainable and just transition. Nowhere is this truer than with the decarbonisation of the nation's housing stock. Given that 80 percent of the houses people will be living in in 2050 have already been built, a focus on decarbonising the existing stock naturally forms a major priority. This is recognised by government through their Clean Growth Strategy, the Ten Point Plan for a Green Industrial Revolution and the Heat and Buildings Strategy.

Off-grid energy in the UK

The task of decarbonising the nation's off-grid building stock warrants particular consideration. In the UK, around four million households are off the gas grid, which is approximately 15 percent of all households. In England, the 1.1 million off-grid homes on fossil fuel heat sources breaks down to 78 percent using heating oil, 13 percent using liquified petroleum gas, or LPG, and nine percent using coal. In addition to fossil-based sources, there are also number of low carbon technologies and systems that can heat buildings off the gas grid. These include Air Source Heat Pumps (ASHP), Ground Source Heat Pumps, Solid biomass fuelled heating systems (including wood pellets), and biofuels.

Geography is the principal reason why many domestic and commercial properties will be off the gas grid. A higher percentage of households in rural areas will be off the grid owing to their distance from the wider gas network. In the current political and economic context, those heating their homes and businesses off-grid face a myriad of unique place, property and personal challenges that need to be addressed in order to bring all households along on the journey of heat decarbonisation. On the one hand, there are factors which exacerbate the cost-of-living issue for those living off-grid whilst on the other, challenges around decarbonisation are currently not well reflected in policy.

The costs of living off the gas grid will depend on the fuel source. While low carbon options are cheaper in the long run, they have high up-front costs that many rural households are unable to afford. Many off-grid properties are not uniform in design and idiosyncratic in character. They are often a lot older and tend to be poorly insulated. These issues are exacerbated in the current cost-of-living crisis and the associated rise in energy prices. In a letter sent to the Business Secretary, a number of rural MPs argued that it is indefensible how their constituents are facing significantly steeper energy bills on top of the additional

day-to-day costs without government support.

Certain challenges in decarbonising off-grid properties arise from geographic location, since many are in rural areas, as well as older buildings, which impacts energy efficiency and places in focus the need for effective fabric first retrofitting. Despite the eagerness of many off-grid households to play their part in reaching net zero and decarbonising their heating, installing renewable sources of heating is therefore not always an immediate or straightforward option for them. In an attempt to help address this and support the uptake of renewable heating, the government has rolled out certain incentive schemes. The Boiler Upgrade Scheme came into effect on 01 April 2022. The technologies covered and the funding available include ASHP with £5,000 available for installation and GSHP with £6,000 available for installation. Biomass boilers are also covered with £5,000 available, but only in rural locations and properties off the gas grid. However, biofuels are currently excluded from this support mechanism.

The funding and incentive support currently available, including the Boiler Upgrade Scheme, will contribute to the transition to low carbon heating and the uptake of heat pumps, where appropriate. However, it is also true that it is most beneficial for properties already suitable for heat pump technology – and especially in terms of maximising energy efficiency. For this reason, industry groups have argued that more thought needs to be given to what role future cost reductions in fuels and technologies might play for those whose properties are not currently suitable for heat pump installation.

The policy landscape

Following the publication of the Clean Growth Strategy, government launched the Future Framework for Heat in Buildings call for evidence in March 2018. A key realisation from the call for evidence in 2018 was the need for a consistent, long-term policy framework, backed by regulation where needed, to help industry support the decarbonisation of heat. In October 2021 the government launched the Heat and Buildings Strategy to outline the transition to net zero heating. Of particular relevance for some off-grid households, the strategy sets a 'clear ambition for industry to reduce the cost of installing a heat pump by 50 percent by 2025 and to ensure heat pumps are no more expensive to buy and run than gas boilers by 2030'.

Alongside the Heat and Building Strategy, government also put out a new call for evidence 'Phasing Out the Installation of Fossil Fuel Heating in Homes Off the Gas Grid', including an end to the installation of all fossil fuel heating by 2026 and a 'heat pump first' approach to replacements. For those houses that require major upgrades including external wall insulation ahead of boiler replacement to ASHPs,

government have pledged to consult on alternative low carbon heating solutions consistent with the objectives of net zero.

The results of the consultation on alternative heating solutions are of great importance to many rural off grid households. As it stands, placed against the unique challenges facing those off the grid, including rising fuel prices bills amidst the cost-of-living crisis, the proposed approach risks failing to adequately help households decarbonise. Furthermore, what is missing from the proposed regulations is any indication of how the current electricity network in rural areas could cope with the demand to electrify all heating alongside a transition to electric vehicles and other decarbonisation policies.

Elsewhere, aside from the heating technology itself, government needs to place greater emphasis on 'fabric first' energy efficiency improvements, where repairs, insulation and draft-proofing are prioritised ahead of add-ons and holistic system changes. Especially in supporting the proper insulation of low efficiency off-grid properties. However, the Heat and Buildings Strategy has been largely silent on fabric first improvements, while the package of support currently available has not been effective enough in supporting off-grid households decarbonise. Rather, there appears to be a 'baked in assumption' within the Heat and Building Strategy that the price of heat pumps will drastically reduce by 2030 - an assumption which critics of the policy argue the government is overly reliant on. Furthermore, many older rural houses off the gas grid, are technically unsuitable for the energy efficiency measures which are required in order to heat pumps to work.

Heat, buildings and energy security

The British Energy Security Strategy, launched in the aftermath of the invasion of Ukraine, is aimed at accelerating the generation of homegrown power in order to make the UK more energy independent. In accordance with the proposed 'heat pump first' approach, government will be running a Heat Pump Investment Accelerator Competition in 2022, worth up to £30m, to speed up the manufacturing of heat pumps. A major focus in the strategy has been on what role domestic oil and gas should play in the transition to low-carbon energy. On this, government has acknowledged that as international imports are reduced, there will be a continued need for 'gas to heat our homes and oil to fill up our tanks' as they both remain the glue that holds the British electricity system together and as such are a vital transition fuel.

However, there is no indication of what role biofuels can play. This is despite government committing to a Biomass Strategy by the end of 2022. In light of recent policies aimed at getting more domestic gas supplying the grid, the lack

of concrete support for off-grid homes in the energy security strategy appears all the more concerning. It means that while extra leeway is being given to the 86 percent of the population on the grid, who have a further decade to replace their high carbon boilers, no practical support is being provided to those off the grid who have a much more imminent deadline.

Policy support for off-grid properties

The fact that a regulatory and policy framework is currently in development by government means there is no coherent approach through which to adequately support them through difficulties they face. In general, the support mechanisms available for off-grid homes in the cost-of-living crisis are the same as for those on the grid. However, in the long term, what off-grid homes need is tailored support around fabric first energy efficiency measures including loft insulation, bringing down bills and paving the way for low-carbon heating systems.

Although the government have looked at this, there remain several outstanding issues with its current approach, particularly pertaining to the Homes Upgrade Grant, aimed at upgrading all households to an Energy Performance Certificate (EPC) band C. So far, 51 local authorities have been successful in receiving grant funding for a total of 78 projects. The grant is a step in the right direction in providing targeted support to vulnerable off-grid households, after the policy failings of the Green Homes Grant, yet there are potential problems with the use of the EPC system as a gauge for the energy efficiency of a domestic property that may unfairly target those using off-grid heating.

Off-grid properties face particular challenges in using the EPC methodology to measure energy efficiency. This is because the energy efficiency metric will take into account both the fabric efficiency of the building and also the higher costs of heating oil compared to natural gas. The methodology essentially is based around energy cost square metre of property, rather than true energy efficiency, as such off-grid households with more expensive heating systems – be they renewable or fossil-fuel based – end up with a worse EPC rating.

The need for consistency

On the whole, it is important for government to show consistency in its approach to decarbonising heat in off-grid properties. Policy support for off-grid properties needs to set out long-term certainty to allow those households ready for low carbon heating systems to transition at pace. Additionally, for it to be truly effective, support must be reflective of the circumstances which those living rurally and off the grid face.

When it comes to the proposed regulations, concern has been expressed over rural communities not being adequately communicated to or engaged with - meaning they risk not understanding either what they are or what their implications could be. This may lead to unintended consequences and a panic-driven rush for low carbon heating installation as the proposed deadline nears. To forestall this, therefore, a concerted effort from lead departments and a sustained government communications campaign aimed at rural householders will be necessary.

Alternatives to the current approach

In order to fully understand the challenges to the current approach, it is important to first contextualise the impact of being off the gas grid on energy efficiency, fuel use, and the costs involved. One-in-five homes in rural areas are in the very energy inefficient F and G categories. For such properties, many of the low carbon alternatives come at a significant cost. Either through the upfront installation costs or those associated with the required retrofitting needed before installation.

Beyond an all-or-nothing approach

Data from Liquid Gas UK¹ has shown that the capital costs for installing an Air Source Heat Pump in a detached off-grid family home in England, including the need for retrofitting, are around £30,000. This figure helps illustrate the extent of the financial barriers facing rural off-grid properties in switching to low carbon fuel alternatives. And unfortunately, proposed government regulation will increase the burden on off-grid households further. This is counterproductive to accelerating the transition to low-carbon alternatives, as all it does is add increasing financial pressure on already cash-strapped households.

While an eventual transition to heat pumps is the desired outcome, the current all-or-nothing approach of the government, through the 2026 end date for the installation of fossil fuel heating as well as the 'heat pump first' approach, places an unfair and disproportionate burden on off-grid properties. A leading problem with the approach being proposed is that the incentive schemes attached to it do not give a variety of cost-effective choices to consumers as to what heating technology they can choose. At the same time, in their fuel poverty strategy² government have signalled their intent to remove support for new LPG and oil heating systems from 2022. Although they have not clarified how this will happen.

1 Liquid Gas UK – Decarbonising a detached family home in rural England

2 BEIS (2021) – Sustainable Warmth: Protecting Vulnerable Households in England

Nevertheless, this gives little scope to working with these systems to understand how biofuels can play a role.

The government, in its latest call for evidence, has recognised the potential benefits of net zero consistent biofuels and signalled their awareness of the LPG industry's commitment to transitioning to 100 percent renewable gas by 2040. In the Heat and Buildings Strategy, government has acknowledged the potential of bioLPG as part of a hybrid heating system along with an air source heat pump. A mixed technology approach, where low carbon technologies along with feasible 'drop in' fuels such as bioLPG, play equal parts in reaching the net zero goals in a cost-effective and popular manner should be adopted. Overall, this would allow more choice for off-grid consumers, which would increase the likelihood of meeting net zero transition targets.

Towards greater flexibility

Many rural tenants are older and face different living circumstances to their urban counterparts. Therefore, a mixed technology and flexible approach has the added benefit of adapting to the needs of households, whilst also embedding an understanding of the need to decarbonise heating and its wider significance. Such an attitude to heating decarbonisation will lead to increased consumer buy in, as efforts will be made alongside households rather than imposing from above a certain pre-determined solution that may not suit everyone's circumstances.

Off-grid households and businesses need to be offered a range of choices in their decarbonisation journey. Through creating a range of choices, a market incentive is provided for suppliers to start producing more low carbon fuels and to bring them to market. Additionally, it instils a sense of individual agency for meeting the varied needs of unique properties, as opposed to imposing limited 'one size fits all' solutions in what might be felt as a high-handed, top-down manner.

Role of government going forward

In order to effectively support off-grid households, government needs to adapt their proposed framework to reflect the reality of transition for many. At the same time, it is imperative that households are made aware of the support and different options available to them on their decarbonisation journey. Here, the local state has a strong role in leading locally tailored engagement campaigns that raise awareness and help empower off-grid consumers.

Central government

The roll out of government support schemes has faced increasing criticism.

Leading reasons for this are unachievable deadlines set by BEIS and insufficient financial support. For example, the amount of funding available for the Boiler Upgrade Scheme will only fund 30,000 installations of heat pumps a year, which is approximately the size of the current market. The problem is that contrary to government aims and ambition, this will do little to encourage new installer businesses to enter the market, which will create problems further down the line in 2026 when there will need for a far larger numbers of installers than are being trained currently.

While the development of a regulatory framework and the associated incentive measures to support off-grid households and businesses is an encouraging step from government, flexibility, and adaptability to the local circumstances of off-grid consumers is critical, government must give due consideration to each varying factor of the decarbonisation of off-grid properties. Specifically, in defining what role each different low carbon alternative can take. Setting this out from the beginning will be vital to creating a truly responsive and flexible framework.

Local government

Local government can play a leading facilitatory role in engaging with off-grid communities and to raise consumer awareness and buy-in. Polling has consistently shown that local government is more trusted than national government. Research shows that over the pandemic trust in local government³ remained higher than at national level. They are perfectly placed to lead locally-tailored engagement campaigns that speak to the unique circumstances of the housing stock in their locality. Awareness-raising in this manner is extremely important if government wants to reach goals set out in their proposed regulations on off-grid buildings and wider net zero objectives. Particularly when considering how, according to statistics from the BEIS Committee report, 77 percent of people polled in December 2020 showed little awareness or willingness to install an air source heat pump.

Without this understanding, off-grid households may feel penalised for being targeted first, which will risk eroding support for the heat decarbonisation agenda before it has had a change to effectively start in the first place. A sense of unfairness could be embedded in off-grid households given that on-grid households will not have to replace their existing gas boiler until 2035, while they only have four years within which their boilers can be replaced.

3 LSE Covid-19 blog (2021) – Trust in local government is still high, and policy makers should take advantage of it

Recommendations

The table below displays key facets of the current approach to decarbonisation of off-grid homes, alongside policy recommendations based on the research for this report that might make net zero more achievable for the four million homes currently using off-grid heating.

Government policy	Localis recommendation
<p>An end to the installation of fossil fuel heating in homes off the gas grid from 2026.</p> <ul style="list-style-type: none"> Part of this policy will rely on working with industry to reduce upfront cost of heat pump installation by 50 percent by 2025 and achieve cost parity between them and gas boilers by 2030. Government support to enable an end to installation of fossil fuel heating includes £450m Boiler Upgrade Scheme and £2.5bn Heat Upgrade Grant Government believes these steps will enable them to end the installation of fossil fuel heating in off-grid homes from 2026. They believe this is enough time to allow their funding support and the market mechanism time to improve heat pump market condition 	<p>Bring the 2026 ban on fossil fuel boilers for off-grid homes into line with the 2035 deadline for on-grid homes.</p> <ul style="list-style-type: none"> Set out evidence for how government will work with industry to reduce costs of installation and what steps are being taken already. Increase the amount available within the Boiler Upgrade Scheme to match the entire cost of a heat pump. Broaden the Boiler Upgrade Scheme to include liquid biofuels. Four years is not enough time to improve the current heat pump market condition. Government needs to improve the incentive schemes available to households as well as embark on a communication campaign to engage with off-grid households over the proposed regulations. This will help increase uptake and help grow the market.

Government policy	Localis recommendation
<p data-bbox="353 314 746 413">A 'heat pump first' approach to replacement heating systems from 2026.</p> <ul data-bbox="353 444 773 1177" style="list-style-type: none"> <li data-bbox="353 444 773 644">• This entails setting a high standard governing the choice of replacement heating system, with air source heat pumps being the lead replacement technology in most cases. <li data-bbox="353 661 773 890">• Ahead of the regulation coming into force, government will issue guidance on how households and installers should determine whether it is reasonably practicable to install a heat pump in their home. <li data-bbox="353 907 773 1177">• Government also proposes to extend this 'heat pump first' approach to replacement heating systems in off-grid fossil fuel heated homes that can be made suitable through minor energy efficiency upgrades that can be done quickly including insulation. 	<p data-bbox="810 314 1218 447">Government should not be proscriptive over technology at this stage in the decarbonisation process.</p> <ul data-bbox="810 479 1230 1246" style="list-style-type: none"> <li data-bbox="810 479 1230 713">• With an eventual transition to heat pumps in mind, at this stage government must encourage a variety of low carbon heating technologies that accord with the place circumstances of each rural off-grid community. <li data-bbox="810 730 1230 930">• Government must work with industry to immediately set out guidance on the different low carbon options available for households that are not ready for heat pump installation. <li data-bbox="810 947 1230 1246">• With focus currently on costly major transformations to homes and their heating systems, more achievable improvements to efficiency risk being overlooked. The government should provide funding for 'fabric first' improvements to rural homes via local councils.

Government policy	Localis recommendation
<p data-bbox="128 314 518 479">Requiring high performing replacement heating systems where heat pumps cannot reasonably practicably be installed</p> <ul data-bbox="128 513 546 1211" style="list-style-type: none"> <li data-bbox="128 513 546 748">• Government intends to consult on the criteria governing the choice of replacement heating systems available to households not ready for heat pumps ahead of the 2026 implementation of the heat pump first approach. <li data-bbox="128 765 546 1034">• Government have proposed that any alternate choice of technology for households not ready for heat pumps must reflect the high standards of performance of high temperature heat pumps and solid biomass systems. <li data-bbox="128 1052 546 1211">• It is believed that this proposal will create space for industry to innovate and bring forward new low carbon heating solutions that are not currently available. 	<p data-bbox="584 314 996 548">Embed a mixed technology approach in the regulatory framework and work with industry stakeholders to determine what role biofuels will play in the decarbonisation of off grid homes.</p> <ul data-bbox="584 583 996 1567" style="list-style-type: none"> <li data-bbox="584 583 996 887">• Government needs to work with industry stakeholders operating in alternative low carbon heating sectors to set out the role and capacity of each replacement heating system. This communication needs to be underpinned by clarity and consistency. <li data-bbox="584 904 996 1104">• Work with same industry stakeholders to clarify what ‘high standards of performance’ means and how alternative low carbon heating technologies can achieve this. <li data-bbox="584 1121 996 1355">• Providing certainty over the role that biofuels will play in the decarbonisation of off-grid homes will allow the sector to make the appropriate investment decisions to build required infrastructure and stimulate the market. <li data-bbox="584 1373 996 1567">• Government must ensure that the mixed technology approach in the regulatory framework is localised and flexible depending on the place circumstances of off-grid homes.

In addition to this:

- The electricity infrastructure in rural areas is in many places not prepared for a widespread switch to electricity as a primary heating source. Therefore, it is important that government **build a programme of electricity infrastructure upgrade in rural areas into the roadmap to net zero**.
- The current Energy Performance Certificate (EPC) methodology is not well-suited to application in off-grid homes. The government should **review the EPC methodology** with the aim of redressing the unequal impact on off-grid homes.

At a local level:

- **Regional Heat Decarbonisation Hubs should be developed** that bring together local state stakeholders including energy providers, neighbouring local authorities and installers. These should be collaborative efforts aimed at engaging with off-grid communities and raising awareness of the need for and importance of heat decarbonisation.
- They should act to illuminate a path to achieving sustainable rural heating through providing consumers knowledge over a variety of low carbon choices best suited to the local housing stock context.
- These hubs should communicate clearly what the regulatory framework is, and what it means for the local housing stock as well as off grid households.
- They should provide all relevant information on key aspects of the decarbonisation process including signposting details of the government's fiscal support scheme, most suitable low carbon heating for the local building stock, support regarding the planning process where relevant, and information on local SMEs and installers available to do the required work.
- These regional hubs should also have a model home to showcase and demonstrate to households what a fully decarbonised off grid property could look like.
- These hubs should also facilitate best practice sharing between and amongst households wanting to decarbonise.

Introduction

A great change to how we go about the fundamental aspects of day-to-day life is in train. Commercial and domestic heating is in the frontline of this epochal shift in the everyday which will have profound implications for millions of households. To take the decarbonisation drive, national attention is rooted on energy policy and prices. Like many national top-down agendas, the policy corridor for this remains stubbornly urban.

However, in trialling the transition to clean heat methods, the pioneering areas are those which lie off the mains gas grid - and in consequence rely on alternative sources, frequently expensive to heat their homes. This is no small concern. In England there are 1.1 million homes off the gas grid that rely on fossil fuel heating, a figure which stretches to four million households – 15 percent of the total, across the UK.

Localis was commissioned by Liquid Gas UK to undertake a rigorous place-based analysis to investigate energy provision and decarbonisation in hard-to-reach and off-grid properties in rural areas.

The intention in our report has been to devise a suite of localist policy recommendations that take in the entire ambit of the challenge of meeting Net Zero energy efficiency targets in hard-to reach, off-grid rural areas and properties in ways that align with:

- the decarbonisation promise of ‘clean growth’ and;
- the beneficial social impact of ‘good growth’ for local economic health and overall place prosperity and wellbeing.

In making the case for place, Localis has sought to first identify the scale of the issue and define which technologies are most appropriate for different areas and properties in the short, medium and long term.

In exploring the policy landscape, Localis has also sought to identify those policy levers at national, local and industry level that could facilitate the work being undertaken in the most cost-effective manner.

For example, how can local government’s strategic planning and placemaking role be set in motion to create a plan for heating and energy rural areas based on local knowledge of area, property types and in line with future spatial strategies?

The history of policy is littered with experimental guinea pigs that turned out to have vicious consequences on their originators. While the transition to clean heat in off-grid gas areas does not seem on the surface to mimic in any way the

disastrous adoption of the poll tax – to name the most contentious ‘guinea pig’ policy in recent domestic history - its success will depend on the deft handling of individual and social sensitivities as well as local economic nuances.

Success will also depend on strongly co-ordinated messaging and communication allied with persuasive bottom-up community engagement strategies. In as vital a domestic policy area as this, a policy which literally affects the hearths of countless homes, there is limited scope to backtrack and reheat policy. It serves all our interests to work together and get this right first time.



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