

# Heating our homes

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## Summary

Decarbonising how we heat our homes is perhaps the biggest challenge we face in achieving net zero and so we welcome the opportunity to respond to this enquiry. We have focused on three key interdependent challenges at the centre of home heating that we have identified through our work:

- **Customer journey:** There is a lack of trusted, balanced, bespoke advice available to homeowners.
- **Supply chain:** The gas engineer workforce is shrinking, and we need to give the next generation of engineers the confidence to invest in the growth of the 21<sup>st</sup> century heating industry.
- **Strategic planning:** national and local coordination will be required to unlock the best solutions for people and planet.

Across these three themes, we need to *build confidence* in the direction of travel. We need clarity for consumers, trust for the supply chain to invest in growth, and a solid basis for locally delivered place-based projects.

Improving the fabric efficiency of homes and switching to low carbon heating is not just about our climate commitments; these interventions are necessary building blocks for healthy, resilient 21<sup>st</sup> century communities. To level up our housing, we will need a combination of market interventions, strong policy, and national and local government to work together.

## About Regen

Regen is a not-for-profit centre of energy expertise with a mission to support and accelerate the transformation of the UK's energy system to net zero. Regen has worked extensively with the clean heat sector, energy networks and local government on heat decarbonisation projects and local strategies. Some examples of this include:

[“A day in the life of 2035”](#) a study, with National Grid ESO, of how the decarbonised electricity system could operate, through the lens of its most challenging winter and summer days.

[The Local Delivery of Clean Heat](#), a study funded by the European Climate Foundation, that explores the role of local authorities and the importance of a national local partnership.

Work supporting Welsh Government, including development of their [Heat Strategy](#), [Renewable Energy Targets](#), and [Energy Generation and Demand reports](#).

Supporting local projects, including [Bristol City Leap](#) and [heat network](#), Plymouth waterfront project and [heat networks for Plymouth City Council](#), and [Greater Manchester Local Energy Market](#).

[Decarbonisation of Heat](#), a thought leadership paper with Wales and West Utilities looking at the options and challenges to decarbonise heat.

[Rethinking Heat](#), a study on network impacts of a street-by-street approach to ground source heat pumps.

## Responses to questions

### Q1: What policy changes are needed to deliver energy efficient homes across the UK?

In order to grow the nascent retrofit sector, a combination of carrots and sticks is needed to build confidence in the supply chain and households. Two policy gaps, which could have a significant impact with relatively little extra funding, are: **a) clear national pathway on energy efficiency (and wider heat decarbonisation).** and **b) better support through the customer journey, by funding whole-house assessments.**

#### a) A clear national pathway for energy efficiency

The government has not set a clear pathway for decarbonising heat. This uncertainty is now a key barrier :

- **Heightening perceived risk for consumers.** The latest consumer perception interviews conducted found that “given the relatively weak motivation to act, the pragmatic approach interviewees articulated was to ‘wait and see’” (p.15 [All the things I could do](#), NESTA)
- **Compounding lack of trust in the supply chain.** Evidence collected on the Boiler Upgrade scheme, from experts in the clean heat supply chain, show that “would-be heat pump installers... need much greater certainty from government about the future trajectory of the heat pump market to invest their time in training.” (p. 4 [The Boiler Upgrade Scheme and the wider transition to low-carbon heat](#), Letter, Baroness Parminter Chair, Environment and Climate Change Committee.)
- **Delaying electricity infrastructure investment.** “Electricity networks are able to invest in infrastructure build out according to their ‘least cost’ scenario, namely, where are still required to invest under [a hydrogen] pretense, resulting in a lack of investment in the low voltage network needed for the transition to electrified heat.” (p.24 [Building a GB electricity network ready for net zero](#), Regen and MCS).

In our view, the evidence is now clear that hydrogen heating will not and should not play a widespread role in home heating and we need government to set out a clearer national pathway towards *predominantly* electrified heat, largely via heat pumps (both in individual properties and using heat networks). Our national ‘core’ pathway would therefore align with National Grid’s Consumer Transformation and/or the CCC’s Balanced Pathway. This approach has been taken by Welsh Government in their draft [Heat Strategy](#).

**A note on defining ‘energy efficiency’:** we tend to think of fabric efficiency measures that reduce household consumption as energy efficiency. However, heat pumps are an effective national energy efficiency measure. Heat pumps deliver around three units of heat for each unit of electricity used, reducing our primary energy demand. See figure 1.

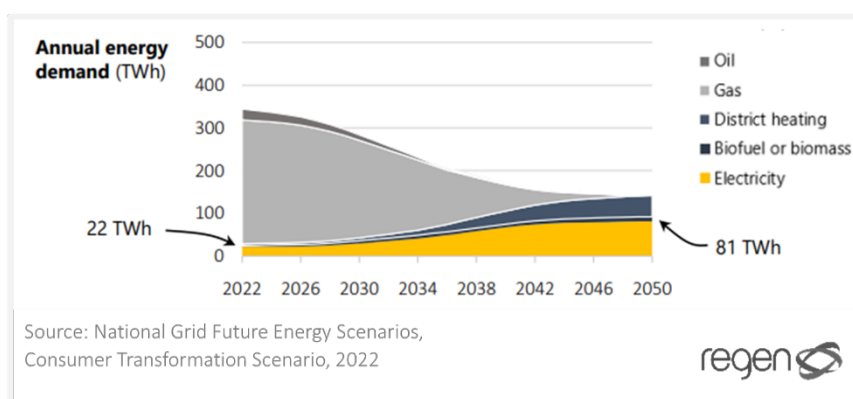


Figure 1: High electrification scenarios show annual energy demand for heat decreasing p.17 [Building a GB electricity network ready for net zero](#), Regen and MCS

## **b) Whole-house plans that provide support throughout the customer journey**

To upgrade the energy efficiency of our housing, it is important a whole-house approach is taken to planning fabric upgrades, clean heating and other low carbon technologies. However, the retrofit sector currently consists mainly of small businesses geared towards measure-by-measure solutions, rather than a whole-house approach. We are missing independent, personalised whole-house assessments and retrofit plans, which can be delivered over several years according to customer preferences.

A recent study examining green finance packages for home heating found that “providing [guidance] support is equally, if not more, important than the details of the finance product itself. Most aspects of this support are within the gift of government to either influence or provide.” (p.5 [All the things I could do](#), NESTA)

Voluntary ‘property passports’ are an emerging tool for comprehensive whole-house assessments and retrofit plans. (See [Identifying opportunities and barriers to Energy Efficiency in the Private Rented Housing sector](#), Citizens Advice Scotland; [Building Renovation Passports: Creating the pathway to zero carbon homes](#), Green Finance Institute; [Energy efficiency in UK property: Where to go from here?](#), Propertymark)

This is also important to ensure that available finance is taken up by as diverse a group as possible. Simply providing financial incentives for clean energy technologies results in a widening of socio-economic disparities, due to a range of challenges in accessing the funding available. This can be further addressed through implementing local and community approaches. ([How income and peer diffusion combine to create an inequality ‘trap’ in the uptake of low-carbon technologies](#), Fraser Stewart)

## Q2: What are the key factors contributing to the under-delivery of the UK's government-backed retrofit schemes?

While short-term financial packages are a step in the right direction, the under-delivery of UK government-backed retrofit schemes can be attributed to the lack of long-term support and local delivery. Both are essential to foster a steady uptake curve, building trust among businesses and awareness among homeowners.

### Longevity and stability

There are traders who wish to transition to heat pump installations and are motivated by the twin opportunities of an emerging market and tackling climate change. Unfortunately, the boom-and-bust of schemes such as the Green Homes Grant has left them out of pocket and even less able to invest in the transition.

Lessons can be learned from Germany's retrofit programme (KfW), which has been consistently running programs specifically to support climate goals since the 1990s and is a well-known brand that people and the supply chain can rely on.

Future policy support must repair trust with the retrofit supply chain and provide long-term assurance of support. (See report by [Energy Efficiency Infrastructure Group](#).)

This includes not only installers, but also the emerging role of the 'retrofit assessor'<sup>1</sup>. Analysis of the KfW scheme also suggests the provision of qualified expert advice was critical to the success. ([UCL Energy Institute](#), Mark Schroder et al.)

[BEIS analysis of the Green Homes Grant](#) shows that after a slow start for the first five months, applications did rise steadily. As seen in figure 2, it reached a peak of 44,000 applications a month, before it closed early with four days' notice.

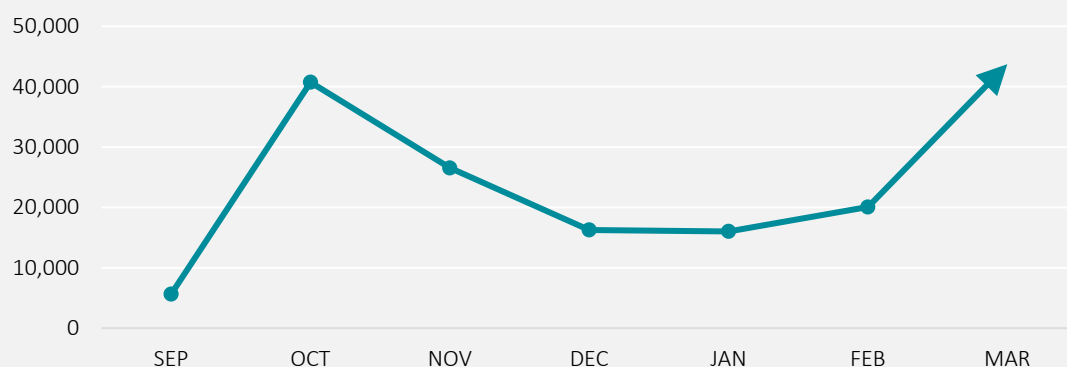
The short-term nature is also likely to have attracted the fraudulent, gaming activities and inflated prices experienced as part of the scheme.

**Figure 2: The Green Homes Grant saw uptake increasing after five months of implementation**

The scheme launched in Sept 2020 and new applications closed in March 2021

Source: Green Homes Grant Voucher Scheme Data.

#### Number of applications



<sup>1</sup> Note that this role goes by many names and we would recommend considering options which are both easily comprehensible to the public and enticing to those exploring career options.

## Local delivery supporting first movers and the fuel poor

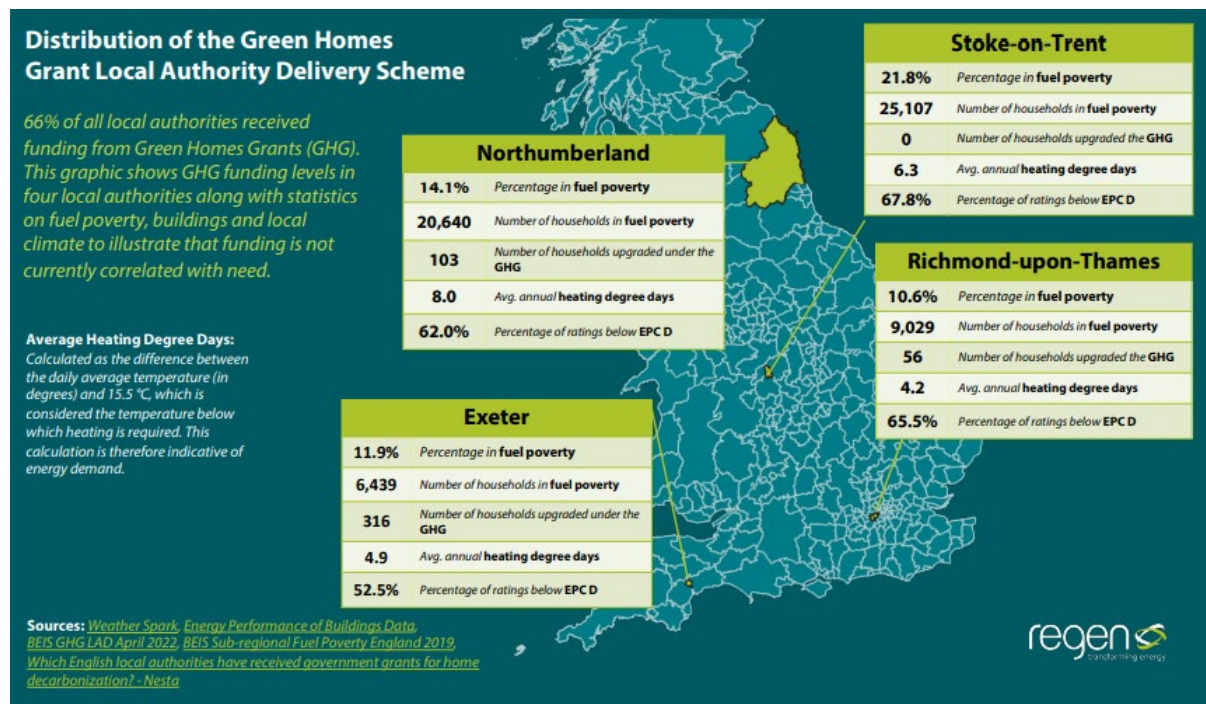
In contrast to the Green Homes Grant vouchers, the local delivery arm of the programme was successful in delivering its intended outcomes and has shown that local authorities are well placed to help the delivery of local green home retrofit schemes.

Regen’s [Local delivery of clean heat](#) study found that, to maximise impact and build the market, local authorities should focus on two target groups: those willing and able to invest in new technology and the vulnerable and fuel poor.

The current approach of competitive and short-term funding pots is not effective at targeting areas of greatest need. [Regen’s research](#) comparing the numbers of homes retrofitted through the GHG LAD scheme across England with the level of fuel poverty in that area that demonstrates there was no correlation between level of funding and level of need in this scheme. The current funding model is driving funding towards already well-resourced local authorities. Furthermore, they then have to spend it within a short period of time, hampering efforts to ensure the cash is spent strategically.

Figure 3: Examples of distribution of energy efficiency funding to local authorities

Source: [The local delivery of clean heat, Regen](#)



## Q5: What role should customer choice play in the future planning of energy networks for home heating?

Understanding how we think, feel, and ultimately make choices is critical in shaping effective heat and energy efficiency policy. There is a need to empower households to take informed action, but the concept of unfettered ‘customer choice’ is misleading.

**National infrastructure decisions need provide a framework for individuals to make decisions in their home and the public should be actively engaged in the planning of heat infrastructure in their locality. Failure to plan for future of home heating will result in poor customer experiences and increasing costs.**

### The need for empowerment to take informed action rather than ‘choices’

Retrofit can be a confusing and risky endeavor ([Why home heat decarbonisation is about people](#), Regen Blog: Mark Howard) and it is well documented that a proliferation of choices adds to decision-related distress rather than action. Policy design, with people at its heart, should acknowledge that we all have common cognitive biases and that there are neurological limitations on our ability to process choices.

User-centric studies show that rather than ‘choices’, we should be aiming for the *empowerment to take informed community and individual action*. ([NESTA 2023](#), [Arup and Imperial College London 2022](#), [Citizen’s Advice 2020](#)) This requires:

- 1. Widespread awareness amongst the public.** This requires cracking down on heat pump misinformation and hydrogen greenwashing. The [Competition and Markets Authority](#) has raised this greenwashing concern.
- 2. Clarity on the overarching direction of travel from government leadership.** The evidence shows that interested homeowners assume government will do the heavy lifting, ensuring that the right solutions are made available and guarantees are in place. (p.15 [All the things I could do](#), NESTA).
- 3. Place-based heat projects, with well designed community participation.** Many heat solutions benefit from economies of scale, making community decision making key for viability. (See [Rethinking heat](#), Regen.) With community involvement from the outset, projects better serve local needs and have higher acceptability, even for unfamiliar technologies. ([Moving From ‘Doing to’ to ‘Doing With’ – the Case of Minewater Geothermal](#), Journal: Earth Science, Systems, and Society)

### How does this impact planning energy networks?

Regen has extensive experience working with local networks, devolved governments, local authorities, and community energy groups on local and regional energy system and heat planning. What is clear is that it is very difficult for local places to plan how they will decarbonise housing and to ensure this is aligned with infrastructure providers plans for our electricity, gas or heat networks, without a clear national direction.

In particular, the lack of clarity around hydrogen for home heating is damaging our ability to adequately prepare for net zero electricity infrastructure. Our recent [paper](#) (p.24) highlighted that “until government makes a clear decision on hydrogen heating, it is difficult for networks to plan and invest for the electrification of heating through heat pumps. Electricity networks are able to invest in infrastructure build out according to their ‘least cost’ scenario, namely, where are still required to invest under this pretense, resulting in a lack of investment in the low voltage network needed for the transition to electrified heat.”

The government’s plans to introduce heat network zoning are a positive step. Regen’s [local delivery of clean heat paper](#) (p.16) found that heat network zoning could not only “[aid] good decisions in terms of economics and investment but also [send] a powerful local message... The social impact of being in a ‘zone’ gives clarity to people on the direction they should ultimately be taking in buildings, but also a sense that

they are working towards a collective and community goal – and that something is ‘expected’, be it clean air, less traffic or decarbonising heat.”

The proposed introduction of a Regional System Planner is an opportunity to clarify local decarbonisation plans and how they impact decision making. In our response to the [consultation](#) (p.4) we highlighted the need for “creating a virtuous circle between ‘top down’ strategic planning as to how national net zero targets and plans will be delivered at a local level and ‘bottom up’ understanding of local ambitions for a place and local plans and investor appetite to bring forward and deliver the projects required.” Our research with local authorities on the Regional System Planner also demonstrated the value of a clear national plan (see [here](#)).

### Q9: Do the current EPC frameworks help consumers make informed decisions on transition?

The current EPC framework has limitations – it is not an entirely reliable indicator of improved energy efficiency nor net zero readiness. Voluntary ‘property passports’ are emerging as a tool for comprehensive whole-house assessments and retrofit plans. (See [Identifying opportunities and barriers to Energy Efficiency in the Private Rented Housing sector](#), Citizens Advice Scotland; [Building Renovation Passports: Creating the pathway to zero carbon homes](#), Green Finance Institute; [Energy efficiency in UK property: Where to go from here?](#), Propertymark.)

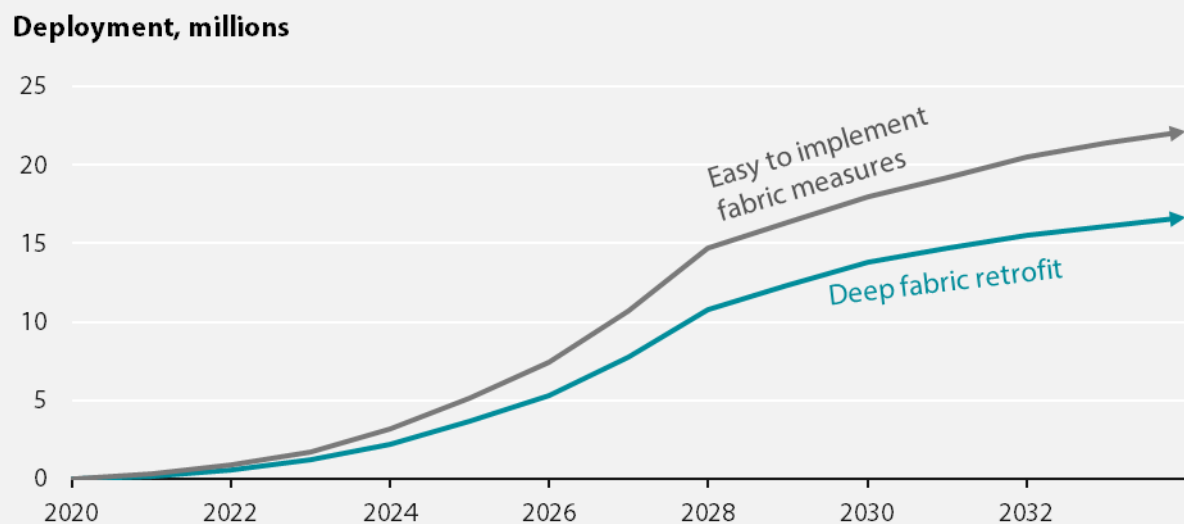
We support the need for EPC reform, in line with the CCC’s recommendations. ([Annex: Reform of domestic EPC rating metrics to support delivery of Net Zero](#)). However, this cannot come with a delay in much-needed action on retrofit policy. As shown in figure 4 below, significant uptake of fabric improvements are required by 2028, if we are to stay in line with the CCC’s Balanced Pathway.

Existing regulation in the rental market has been inadequate in creating a resilient housing stock. Compounded by the lack of affordable housing, most renters are not able to make the decision to live in a more energy efficient home.

We therefore welcome the update to the Minimum Energy Efficiency Standard (MEES) to an EPC C for all private rentals by 2028, via a fabric first approach, and with a cap of £10,000 per property. As detailed in the [consultation](#), these requirements carefully balance uptake, deliverability, and our climate and fuel poverty commitments.

Doubling down on this commitment would help provide some assurance to the retrofit supply chain on the direction of travel.

Figure 4: Uptake of fabric efficiency improvements required for net zero  
CCC’s Balanced Pathway, Sixth Carbon Budget, UK



#### Notes:

Easy to implement fabric measures are relatively low cost and low disruption, e.g., draught-proofing  
Deep fabric retrofit includes, cavity wall, solid wall, roof, and floor insulation as individual measures



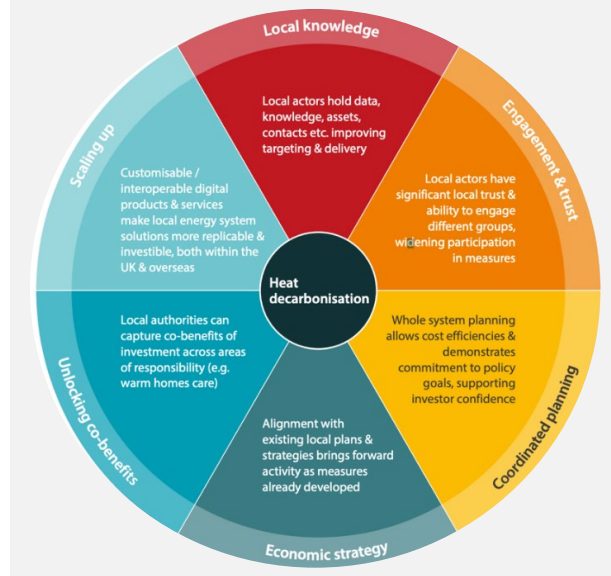
#### Q4: How might the Government support innovation in delivering local solutions?

The EnergyRev programme brought together more than 60 researchers from 22 Universities to help innovate smart local energy systems from an interdisciplinary and whole-systems viewpoint. Their [working paper](#) looking at heat decarbonisation derives the framework in figure 5. The key tenants are local knowledge, engagement and trust, coordinated planning, economic strategy, unlocking co-benefits, and scaling up.

The subsequent Prospering from the Energy Revolution programme is the largest body of evidence on local net zero delivery in the UK.

Regen's [analysis of the programme](#) found that "two key things would help to unlock the wider benefits that smart local energy systems have to offer, on an even bigger scale: more dynamic and sustainable innovation support, and a clearer pathway to policy and regulatory change."

Figure 5: Smart local energy system approach applied to heat decarbonisation  
[Working Paper 3: Decarbonisation of heat, EnergyRev](#)



#### Q8: How will decarbonisation plans be drawn up in each area?

'Decarbonisation plans' describe a plethora of approaches, documents and strategies being explored by most infrastructure stakeholders, including local authorities. Planning for low carbon development and infrastructure projects is complicated by the fact that many of these stakeholders will have mismatched targets for achieving net zero, which translates into competing priorities for investment and resources.

Regen has worked with Innovate UK on research into local decarbonisation planning over the past six months and our report will be published shortly. We found there is value in local authorities leading a 'joined-up' local decarbonisation plan, working with Distribution Network Operators (DNOs), Gas Distribution Network Operators (GDNOs) and other key stakeholders. In particular, a consistent local decarbonisation plan would:

- Provide a framework for efficient local delivery of national net zero plans, including heat network zoning, EV charger provision and energy efficiency funding.
- Provide a consistent basis for engagement between local authorities and network planning, including Ofgem's proposed Regional System Plan.
- Ensure net zero is reflected in all local decision making by providing direct input into local policies, including spatial and transport plans.
- Provide a consistent framework for local authority-led strategic investment in net zero projects.

There are already several approaches being taken by local authorities to produce decarbonisation plans such as the Local Area Energy Planning (LAEP) approach which is championed by the Energy Systems Catapult (ESC). This is a consultant-led process which takes inputs from a wide range of stakeholders and models a route to achieving the local NZ targets. There are a number of innovation projects which are exploring how this process might work better and be more cost effective for local authorities.

## Q11: What is the role of different levels of government in developing, funding and implementing schemes?

The excellent examples of leadership by local authorities on heat decarbonisation remain the exception. There is a need for a better national/local partnership on net zero. This is acknowledged in the Net Zero Strategy.

Regen stakeholder workshops identified key roles and principles, that government needs to undertake to support local authorities and other actors in retrofit and heat decarbonisation. See figure below.

**Figure 6: National government roles in home heat decarbonisation**

Source: [The local delivery of clean heat, Regen](#)

National government roles	Existing examples
 <p><b>Setting a clear goal</b> National government setting clear targets and ambitions. Moving the market requires clear signals.</p>	Dates for gas boiler phase out and lowest energy efficiency standards for properties (MEES).
 <p><b>Supporting the leaders</b> Provide powers through devolution to facilitate leaders to go further and support strategic decision making at the local level.</p>	Devolution Deals, devolving some energy spending and Levelling Up
 <p><b>Bringing up the rear</b> Setting minimum requirements for all local authorities with clear actions on decarbonisation of heat.</p>	Heat Network Zoning MEES powers and requirements.
 <p><b>Ensuring efficient local delivery</b> Provide resources, data and methodologies at a national level to ensure consistent cost-effective local action.</p>	Catapult: Net Zero Go <u>Local Area Energy Planning methodology</u>
 <p><b>Provide sufficient funding and resources</b> Provide long term funding and resources to support consistent focus and action at a local level.</p>	Net Zero Energy Hubs LADs, HUGS, SHDS

Articulating the role for local government is more intricate – it comprises of regional bodies, districts, and local authorities, each with distinct capacities and priorities. Any effective framework for local heat delivery should be both clear and adaptable to these contexts.

Regen research concluded that local government can be summarised into two main functions in heat decarbonisation:

- 1. Providing a stronger local voice for energy and heat infrastructure development:** Local authorities play a pivotal role in crafting crucial energy network infrastructure and facilitating investments in shared heat systems.
- 2. Priming local markets for retrofit and decarbonisation:** Empowering and funding local authorities to strategically employ public procurement, cultivate local supply chains, and provide comprehensive whole-house assessments for early adopters who can afford it.

To support this, government has a role in furnishing adaptable methods, data, and policy frameworks that aid local authorities in effectively fulfilling these roles.