Laying the foundations for net zero: Putting households at the heart of the energy transition

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The Association for Decentralised Energy

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The Association gratefully acknowledges the contribution of our members to this report. Particular thanks go to:

Householder's report Steering Group members

- Emma Ashcroft, Carbon Trust
- Jenny Boyce, E.ON
- Nigel Donohue, CIGA
- Akshat Gupta, EDF Energy
- Neil Jones, Upside Energy
- Alban Leiper, ARUP
- Pete Mills, Bosch
- Dave Robson, Instagroup

The ADE Strategy Board:

- Ben Watts, ENGIE (Chair)
- Mark Knights, Viridor
- Dominic Parsons, WSP
- Jody Pittaway, SSE
- Marcus Postings, Danfoss
- Bill Rees, Centrica Business Solutions
- Brian Tilley, E.ON
- Harry Trump, Centrax

Additional contributors:

TrustMark, Green Finance Institute

For further information please contact
Lily Frencham
Head of Operations
The Association for Decentralised Energy
Lily.Frencham@theade.co.uk

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Executive summary

Householders are essential actors in the decarbonisation story – so they need to be placed firmly at the heart of discussions around the journey and the destination.

There is growing willingness, and indeed pressure, to take action on climate change. However, the current policy framework and energy system can leave people confused or shut out.

We believe that the best way to reach net zero is by creating a system where customers understand and can access the considerable benefits of the energy transition. This will be a system in which people live in more comfortable homes, can afford to meet their energy needs, make a real difference towards mitigating climate change, and do not personally bear excessive risk or cost.

There needs to be an energy system that engages people, making them a part of a just and positive transition.

Three interrelated areas of intervention can work together to create – or start creating – such a change: better data, better buildings and better financing.

Better data will be essential in allowing householders, service providers and government to understand how we – collectively and individually – use energy and what system requirements are needed to support that.

Better buildings will support the delivery of a net zero system at far lower cost and with far greater co-benefits than without them.

Better financing will facilitate the change by making it more affordable for all householders to take the necessary action.

When enacted, the feedback loops between these interventions reinforce and support each other. Ultimately, they should also lead to improved understanding, improved acceptance and improved participation.

It is a critical time in our history, and a time that demands real action as we strive towards net zero. This report explores the vital role that householders will play in the transition – and what needs to be done, right now, to make it happen.

Summary of recommendations:

Better data

- Mandate truly intelligent home energy data (by 2030, every household in the country should have access to useful data about their home's energy and performance, and smart controls enabling them to manage their energy use and respond to market opportunities)
- Move to actual, detailed data, wherever possible (with some exceptions – modelled data still has a place in whole-systems planning)
- Review half-hourly settlement arrangements in 2025 and every 5 years, to ensure they have kept up with innovation in the sector and remain fit for purpose
- Government and industry should work together to progress the Energy Data Taskforce's Strategy for a Modern Digitalised Energy System

Better buildings

- Create a demand pull for fabric efficiency in households, driven by Minimum Energy Efficiency Standards trajectories for all tenures
- Prioritise improvements for people in vulnerable circumstances, including the fuel poor

Better financing

- Government should work with financial institutions to communicate clear trajectories for building standards, and to identify appropriate financial products that can be offered
- Implement a rising, net zero-compliant price on carbon for households' energy use in 2030, exempting the fuel poor until 2040
- Introduce a low-carbon transition support fund for householders, in place of the soon-to-close Domestic Renewable Heat Incentive (RHI)
- Ensure there is a system of redress so that householders don't bear the risk of poor performance

Introduction

Householders have a crucial role to play in the decarbonisation of our villages, towns and cities. It is unlikely that a net zero trajectory will be met without clear action taken by householders. So, it's time we put them firmly at the heart of discussion around the journey and the destination.

Energy customers make many of the key decisions that lead to changes in carbon emissions, often without even realising that is what they're doing – be that buying a new car, undertaking a home renovation, installing a new gadget or technical solution to make their home a more comfortable (or exciting!) place, or deciding whether to keep the heating 'ticking over' while they are away on holidays. To move to a low carbon – or no carbon – system, we need customers to choose low carbon ways to meet their needs and also to use their energy in a way that supports the integration of renewables while keeping costs reasonable for all.

We need an energy system that allows all customers to participate - a particular challenge, and opportunity, when it comes to enabling householders to engage.

What do we mean when we say 'householder'?

When people talk about 'the household' or 'the householder' in terms of energy decisions, they could mean a variety of things. For instance, a landlord in the private rented sector or in social housing doesn't live in the property but does make many of the larger-scale energy 'decisions' for the household.

In this report, when we talk about the householder, and the household, we are using the very traditional understanding – that is, the person or people living in the house are the householders. They are the people that switch the lights on and off, decide when, where and how much to heat their rooms, and bring their personal behaviours to bear on the property.

(We recognise, however, that tenure is an important element to consider when trying to encourage different parties to act, and that both the motivations and options available to parties can differ significantly depending on tenure.)

Many of the issues faced by householders are analogous to those faced by microbusinesses. However, in recognition of how personal our homes are, we focus solely on households in this report.

We consider the household up to the boundary line – this recognises that an EV is part of a household's energy system while it is at home and charging (or acting as a battery), but is not a part of the household system when it is out on the road.

Where are we now?

In our 2019 report, 'Solving the energy policy puzzle for users', we discussed how the current energy system and policy framework makes it challenging for householders to participate.

Crucially, today's system – a system that was built around core tenets of centralised generation and passive consumers – does not send clear signals to customers about the actions they need to take. It does not help them to identify the right choices for them, or what order they need to take those choices in.

Energy choices are deeply personal – and the most appropriate choices for any householder will be very dependent on their specific situation. Geography, housing type, availability of resources, personal behaviours – these are all elements that will have a significant impact on what choices will best serve a householder's needs.

Many householders find it difficult to understand the choices on offer, which of those would best suit their particular circumstances, and how their choices relate to the wider energy system[1].

Policies that are designed to support householders in the energy transition tend to be output focussed, encouraging or requiring investment in one or more specific technologies, and are not always coordinated – meaning they do not aid the householder in deciding what is the best course of action for them. For instance, the Domestic RHI pays a householder on the basis of how much heat a system will generate and what technology generates that heat, but doesn't tell a person what technology is most suited to their home or what the right size system is.

Policies, markets, and people – even the well-meaning and well-informed – intermix to create a web of confusing messages that leave people feeling unable to act.[2]

1. Bonfield, P. 2016. Each Home Counts: An independent review of consumer advice, protection, standards and enforcement for energy efficiency and renewable energy. (https://www.gov.uk/government/publications/each-home-counts-review-of-consumer-advice-protection-standards-and-enforcement-for-energy-efficiency-and-renewable-energy). Section 9.5 (p.33) highlights the 'difficulty consumers face in finding out about and buying new technologies where there are few companies in the market, where neighbours and friends have little experience of the products, and there is limited information available on the internet from consumers who have that these measures installed'. It also notes that 'homes are complex energy systems, with consumers struggling to understand how different measures relate to each other and which action to take first'

   Ofgem, 2017. Consumer First Panel 2017: Understanding information needs. (https://www.ofgem.gov.uk/publications-and-updates/ofgem-consumer-first-panel-year-9-wave-1-understanding-information-needs). Ofgem work with consumers on their information needs in 2017 found that most consumers had a passive approach to engaging with communications from their energy suppliers, a significant proportion expected communication with suppliers to be challenging and difficult, and most expressed a need to better understand their energy use in order to find solutions that reduced the cost of their bills

   Good Energy, 2019. Consumers urged to freeze out fossil fuels to combat climate breakdown. (https://group.goodenergy.co.uk/reporting-and-news-centre/press-release-news/press-release-details/2019/Consumers-urged-to-freeze-out-fossil-fuels-to-combat-climate-breakdown/default.aspx) Good energy found that more than 40% of people are unclear what action they should take to make a positive difference to climate change

2. The Each Home Counts report (see footnote 1, above) notes how the difficulties in finding information and the lack of understanding of how a home as an energy system works contribute to why householders often do not choose or agree to energy efficiency and renewable energy measures; Citizens Advice, 2015. Knowing who can help: The future for energy consumer advice and redress. (https://www.citizensadvice.org.uk/Global/CitizensAdvice/Energy/Knowingwhocanhelp-final.pdf) Further outlines confusion faced by consumers when trying to address issues with their energy use; OFGEM, 2019. Insights from Ofgem's consumer engagement trials: what works in increasing engagement in energy tariff choices? (https://www.ofgem.gov.uk/ofgem-publications/156422)

A transition that benefits householders

To deliver net zero is no longer just an ambition, it is a legal requirement. We have to realise net zero in every sector – or at least across all sectors – and households are no exception.

Government and service providers need to begin a candid conversation with householders about what this may mean for them, including the scale of change that is likely to be needed and the prospect that all householders should have what they need from the energy system but won't necessarily be able to have everything they want.

But does that mean that householders will lose out? Is the decarbonisation of the country a bitter pill that we all must swallow for a necessary end goal?

Not necessarily. We suggest that the best way to reach net zero is by creating a system where customers understand and can access the considerable benefits from the energy transition. This will be a system in which people live in more comfortable homes, can afford to meet their energy needs, make a real difference towards mitigating climate change, and do not personally bear excessive risk or cost.

We need a system that engages people, making them part of a just and positive transition. It is a system that can give people what they ultimately need from their energy system, whilst enabling them to make a real difference, by giving them a tangible course of action in the face of an issue that can otherwise seem enormous and insurmountable.

This is a system that is possible, and one that is within reach.

Now is the time to grasp the growing public interest in climate change and the desire of householders to take action.

"We need a system that engages people, making them part of a just and positive transition."

How do we get there?

To make this happen, there are a number of elements that will prove important to a successful transition.

- **See, and enable, the householder as a participant in the energy transition –** while acknowledging that there will always be a spectrum of interest and capacity to actively engage (from those that want to be very involved and take active choices, to those that are largely uninterested day-to-day), we cannot reach net zero without involving people[3]. We need an energy system that supports this by enabling householders to participate, and acknowledging them as a part of the system – not just a passive audience on the end of it.
- **Preserve consumer choice (within the limits of decarbonisation) –** if we are to engage householders in the transition and empower them to be part of the solution, the energy system must act with them rather than impose solutions on them. There is a balance to be struck here – preserving choice does not mean that some choices cannot be restricted. Rather that consumers are informed and enabled to act of their own will within the constraint of net zero and the system works to encourage active choices in the right direction.
- **Stop regulating and planning in silos –** when the householder thinks about their home, they think about it as a whole entity, not a collection of separate technologies or decisions. Policy and planning needs to better reflect that a household's energy usage is determined by the interplay of the different elements of a home's energy systems and needs to consider the way householders think. This will become increasingly important as households play a more active role in the energy transition and decisions interact – such as whether efficiency upgrades could optimise opportunities for flexibility, flexibility investments can optimise the opportunities for efficiency upgrades, and both together could work to support the wider energy system to transition.
- **Create a demand pull –** both finance and demand are needed to realise the changes we require. The most effective way to incentivise householders to act is to catalyse a 'want' to act in them. This is done either by offering people services, products or opportunities that are attractive to them, or by making it clear that not acting is no longer an option. It can drive uptake and facilitate change at an extraordinary rate. The crucial role of demand pull has often been overlooked in policymaking – for instance, previous policies intended to encourage uptake of energy efficiency, such as the Green Deal, focused on unlocking finance but failed to deliver the scale of change needed as they did not excite the market and address the corresponding lack of demand. More recently, the introduction of Minimum Energy Efficiency Standards (MEES) for the Private Rented Sector has demonstrated a growing recognition of the need to drive demand for home energy action – obligating action creates a demand pull.
- **Remove the risk of poor performance from householders –** people don't generally tend to consider their existing energy arrangements, other than to think about the cost of their monthly bill or emergency repairs. This lack of thought implies that home energy is imbued with the reliability or inherent trust that allows something to fade into the background. Asking people to change, as we must if we are to reach net zero, is in a sense asking people to take a chance on new arrangements that they do not yet know and trust. We must give them the safety net of

3. For example, the Committee on Climate Change estimates that societal and behavioural changes will be involved in 62% of the total (not only energy-related) emissions reductions required to achieve net zero. (9% will be from changes that are largely societal or behavioural, and 53% will be from measures that combine low carbon technologies with societal / behavioural change.)
Committee on Climate Change, 2019. Net Zero: The UK's contribution to stopping global warming. (https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/#key-findings) p.155

ensuring that the risk of poor performance of equipment or services does not sit with them. Assuring performance, and delivery of promised outcomes, through the use of warranties as in other industries, must sit with service providers and be encouraged by government. Recent studies by the Energy Systems Catapult[4] show that people are much more likely to take up new low-carbon heat technologies when the performance is assured (in that instance, as part of a services contract)[5].

Performance assurance should also be linked to the government's work on measuring buildings' actual performance and the ongoing exploration of methods for measuring the thermal performance[6] of domestic buildings using smart meter and other data - these have been collectively termed Smart Meter Enabled Thermal Efficiency Ratings (SMETER) methods. SMETER methods may have a role to play in lending confidence to householders that their buildings are performing as designed - and indeed could have an impact on future green mortgages and saleability.

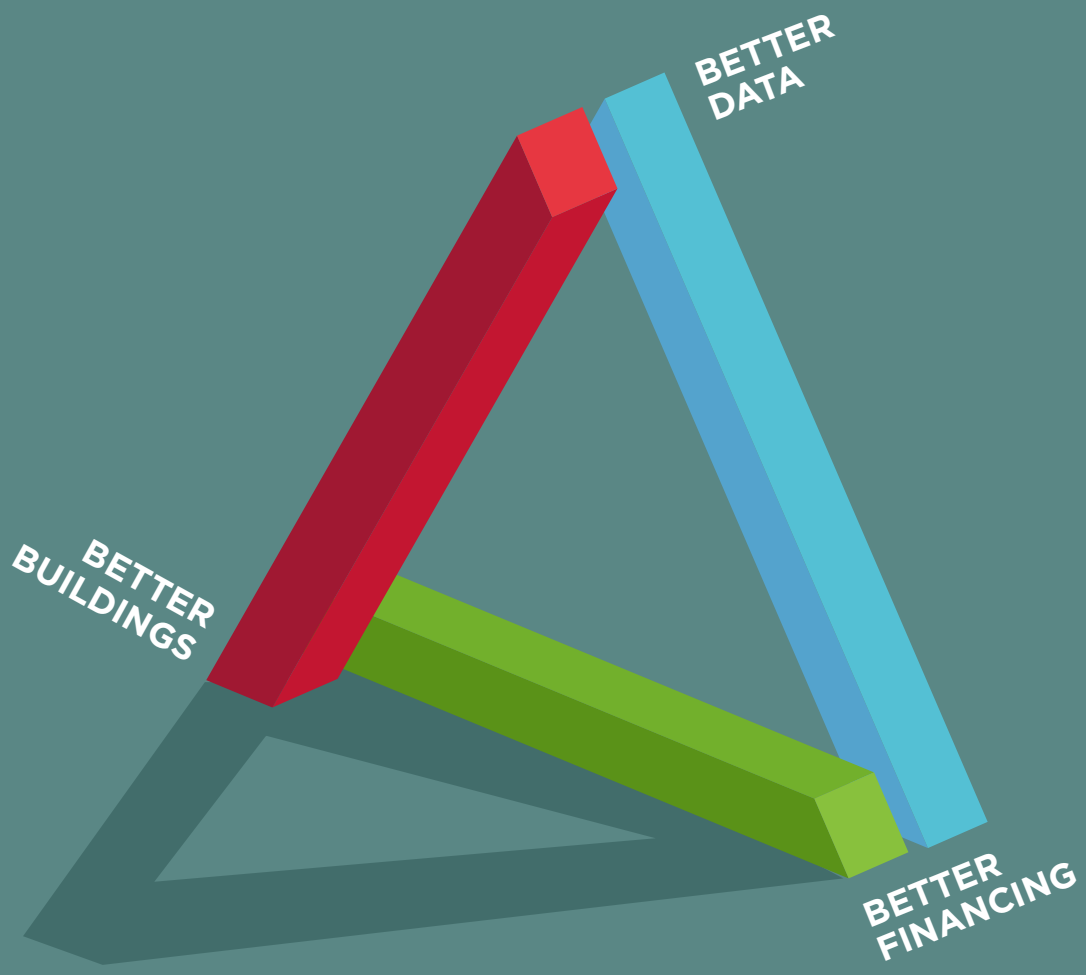
- **Neither state nor market alone, but rather both working together, can achieve the best results –** Government cannot deliver the transition in isolation and nor can businesses. To create the necessary change, government and business must work in tandem to deliver messages and opportunities to householders that encourage their participation, and ultimately facilitate the necessary decarbonisation. Government must create a policy and regulatory environment in which businesses can come forward with attractive offerings to help reach the specified outcomes, as well as regulating to prevent undesirable outcomes. They should also unlock finance to support necessary change, whether by providing incentives to act or by ensuring appropriate private mechanisms are enabled. The market must rise to the challenge of innovating and competing to engage consumers and realise the desired outcomes. Government (including local government), businesses, and households must work together to unlock the necessary changes.

- **Get going; begin acting on no regrets steps right now –** there are some aspects of the pathway to decarbonisation for all energy users – from householders to large industrial users – that are still yet to be established. In some areas, the most sensible action to take right now is for government and businesses to work together to trial different approaches, engage in large-scale demonstration projects, innovate and be prepared to accept some aspects of failure, and learn lessons along the way. However, it is not necessary nor right to sit around and wait for these lessons and resulting decisions before we take any action. There are areas of activity that are well-recognised as 'no regrets' steps that will be either necessary or valuable in any decarbonisation pathway (some of these are explored throughout this report). Such activities should be pursued right now.

4. Energy Systems Catapult, 2019. Smart Systems and Heat programme: Phase 2 Summary of key insights and emerging capabilities. (https://es.catapult.org.uk/news/smart-energy-services-for-low-carbon-heat/)
5. Of course, performance assurance has to take into account the role of the household: a technology or service contract will only deliver the expected benefits if the household uses the systems involved in an agreed way. If the household changes its demands for heat or decides to charge its EV less flexibly, the impact on energy costs and service contracts must remain the responsibility of the householder
6. For example, Government has recognised the importance of measuring actual performance through recently stating that they would consult on introducing mandatory in-use energy performance ratings for non-domestic buildings. See. BEIS, 2019. Non-Domestic Private Rented Sector Minimum Energy Efficiency Standards: Future trajectory to 2030. (https://www.gov.uk/government/consultations/non-domestic-private-rented-sector-minimum-energy-efficiency-standards-future-trajectory-to-2030)

Nice ideas, but how do they come together?

Three interrelated areas of intervention bring these elements together in a compelling way that can create real change. These three elements may not be the only changes that are needed, but they will be common to any effective decarbonisation strategy – and we can get started on them, right now.



Intervention 1: Better data

we need better data about the right things at the right level of detail

It is increasingly obvious, and increasingly well accepted[7], that having good energy data will be essential to enabling the transition and facilitating the future energy system.

> "Having worked on a number of the reviews mentioned in this report, it encouraging to see the same three themes consistently being recommended as part of the consumer solution. Solid, ongoing consumer outcomes are critical for financing the marketplace and it is evident that there are significant merits in being able to use better data to help consumers utilise their living spaces in improved ways, ultimately leading to superior customer experience. A market working in harmony is one which will allow financiers to consider product development innovation. We look forward to tangible solutions being delivered from this solid starting position"
>
> **- Stephen Huller, Green Finance Institute**

> "...data and digitalisation, while not the sole enablers of Energy System transition, are essential to unlock the decarbonisation and decentralisation dividends for the benefit of consumers. As the system becomes more disparate, diverse and decentralised, data sharing will be crucial to coordinate the wide range of actors undertaking new roles across the sector and ensure system stability."[8] **– the Energy Data Taskforce, A strategy for a Modern, Digitalised Energy System**

Pursuing better energy data is a no regrets step

No matter the decarbonisation path, it is clear that better data will be needed. Better data is essential in allowing householders, service providers and government to understand how we – collectively and individually – use energy and what system requirements are needed to support that. It is also essential to support the necessary changes required. Householders, and those that provide services to them, need good data to:

- Understand and improve the energy performance of homes (optimising heat and electricity use, and improving the comfort of householders)
- Understand what decarbonised heat solution[9] is right for them
- Participate in flexibility services (for instance through smart electric vehicle charging, or through flexible use of heating and appliances)

Better data will also be critical in allowing us to measure, monitor, validate and verify progress towards net zero. It will help to assure performance and make all parties more accountable for the role they play in the system – including the benefits they provide.

7. Energy Systems Catapult, 2019. A strategy for a Modern Digitalised Energy System: Energy Data Taskforce Report. (https://es.catapult.org.uk/news/energy-data-taskforce-report/); Webborn E and Oreszczyn T, 2019. Champion the energy data revolution, Nature Energy (4) 624 – 626. (https://www.nature.com/articles/s41560-019-0432-0); Ofgem has begun a 'midata in energy' project (https://www.ofgem.gov.uk/gas/retail-market/market-review-and-reform/midata-energy-project), which aims to put domestic energy customers in control of their data, allowing them to quickly and easily share it with trusted third parties. Although the initial aim is to facilitate switching, there is a recognition that the data could also be useful for design and delivery of innovative new products and services for consumers; International Energy Agency, 2017. Digitilization and Energy. (https://www.iea.org/reports/digitalisation-and-energy); Bonfield, P. 2016. Each Home Counts: An independent review of consumer advice, protection, standards and enforcement for energy efficiency and renewable energy. (https://www.gov.uk/government/publications/each-home-counts-review-of-consumer-advice-protection-standards-and-enforcement-for-energy-efficiency-and-renewable-energy).Opening up accessibility to data and information in a more useful way, while at the same time protecting consumer privacy, was a key objective of the Review
8. Energy Systems Catapult, 2019. A strategy for a Modern Digitalised Energy System: Energy Data Taskforce Report. (https://es.catapult.org.uk/news/energy-data-taskforce-report/). p.5
9. When we refer to 'heat solutions' we mean provision of heat for space and water heating in the home

What is good data?

Good data is data which is accurate and useful, and should achieve two key outcomes:

- **It should give householders a clearer understanding of their actual energy use, enabling consumer choice; and,**
- **It should allow system providers to optimise the system in a way which provides clear benefits for consumers.**

In terms of what is needed for the future energy system, good data likely means accurate and actual (rather than modelled) data. This data may need to be presented or accessed in different ways, depending on the audience and intended use.[10]

Good data from the perspective of a householder who is wanting to engage with their energy use is accurate, understandable, usable and useful. In fact, it may not even be data at all – it may be information and advice; it may be insight distilled from data that can increase householders' understanding. This could include, for instance:

- Simple graphics to demonstrate patterns of use
- Commentary on bills, offering context to usage or spend
- Emoticons/graphics to indicate positive or negative outcomes or behaviours[11]
- Benchmarks or comparators:
  - Against other technologies
  - Against other houses of a 'like' fabric, or within the same street; or
  - Against the same house at a comparable time the previous year
- Action plans, illustrating what steps to take and when to take them

Good data from the perspective of an energy services provider is accurate, disaggregated and detailed. It is likely that, to achieve the changes discussed above, detailed data will be needed on:

- temperature (heating patterns)
- ventilation
- humidity
- thermal inertia within the home; and
- other information that may assist service providers develop services tailored to the particular householder, such as occupancy data and information about particular patterns of use

In general, we must be targeted in what data we collect and how, with a view to ensuring the information helps householders (and those that act in their interests) to make the right choices. Crucial to all sides is that data must be useful and at the right level of detail to inform decisions for the particular user. A swimming pool of information that doesn't flow in any direction and thus doesn't indicate a clear course of action will not be helpful to the average householder. Having different levels and presentations of data so that people can engage with it in different ways is desirable.

10. Questions are therefore raised over the suitability of Energy Performance Certificates (EPCs), currently the primary indicator of energy performance in buildings, as an ongoing benchmark against which regulations are set. In their current form, EPCs do little more than describe how a building should act in theory. Considerable disruption would occur were they to be removed, but there is clear scope for them to go further and include real data about energy consumption so that they better reflect actual energy use and can be used to address performance gaps. The SMETER project is one such way this avenue is currently being explored

11. For example, a trial in the US found that the use of descriptive norms through smiley faces on energy bills resulted in reduced energy consumption. The Conversation, 2011. It takes energy to smile...the psychology behind smaller power bills. (http://theconversation.com/it-takes-energy-to-smile-the-psychology-behind-smaller-power-bills-4094)

While whole house information can be useful in guiding investment choices, room by room data could be most useful in informing optimisation advice and tailored service offerings for householders. This hypothesis is borne out in the quantity and quality of measuring equipment that is typically deployed alongside more complex flexibility offerings or trials[12] seeking to better understand consumer behaviours in relation to energy.

Further, good data is also data that is freely given in common understanding about its use and purpose, with a clear benefit for the consumer as well as industry[13]. In essence, data is currency; it's a 21st century method of paying for services, and the service that householders are exchanging their data for in this scenario is a cheaper, more reliable, lower carbon energy system.

12. For example, Energy Systems Catapult's Living Labs use a range of sensors and controls to better understand how energy is used and users' preferences. See. Energy Systems Catapult, 2019. Asset Guide: Living Lab. (https://es.catapult.org.uk/news/asset-guide-living-lab/?download=true)
13. Benefits to the consumer include opportunities to participate in flexibility markets or to reduce bills through better energy efficiency. They can also include ways in which the information can be used 'for the public good'. The Smart Meter Data Public Interest Advisory Group (PIAG) has examined this aspect of data use in some detail. PIAG, 2019. Smart Meter Energy Data: Public Interest Advisory Group: Final Report – Phase 1. (https://www.smartenergydatapiag.org.uk/)

How do we make it happen?

Recommendation:

Mandate truly intelligent home energy data.[14] As discussed above, data is critical to engaging energy consumers and optimising the transition to our future energy system. Through the smart meter roll-out, it is at least now mandatory for all homes to be offered real-time monitoring of data. However, work also needs to be done alongside this to improve the benefits that smart energy data offers to householders and to improve householders' understanding of the potential benefits such data can offer, so that they are happy to have them.

The smart meter roll-out has so far been plagued by significant issues, including failings in stakeholder engagement and in technology. This has sadly also caused trust to further dissolve within the sector.

It is critical that we move past this first phase and move forward in the spirit of bettering people's relationship with both energy data and energy service providers[15]. If we know that data will be a necessary element in addressing the decarbonisation challenge (and we do!) then we must ramp up efforts to ensure all homes have a way to collect, measure and share data. This needs to include not simply a household's consumption of gas and electricity as is now happening, but also monitoring of the home's overall performance, including energy efficiency measures. Having actual, detailed data on the impact of such measures would, in turn, allow the industry to offer warranties guaranteeing such performance. **By 2030, every household in the country should have access to useful data about their home's energy and performance, and smart controls enabling them to be flexible.**

Food for thought:

Consideration should be given as to how to accelerate smart meter deployment. For example, whether:

- demand could be created through increasing both opportunities for, and understanding of, householders' ability to make money through avenues that are dependent on having smart meters fitted – for instance, through engaging in domestic demand side response
- willingness to accept smart meters may be increased if householders understand that the data is needed – by government and others – to ensure that the most efficient, optimal low-carbon system can be designed and delivered, and to help monitor the fairness of the policies being implemented to drive the transition[16]
- there are lessons to learn from other countries that have successfully rolled out such technologies, such as Italy (with ~100% penetration of smart meters)[17] and Estonia (with ~98% penetration of smart meters)[18] – while acknowledging that national context can play a significant role in what deployment mechanisms may be effective

14. A note: when we say intelligent data or talk about smart data or smart meters, we don't necessarily mean SMETS1 or SMETS2 smart meters. We simply mean that every household should have something - a technology or piece of kit - that is monitoring their energy in real-time and that should be interoperable with the rest of the system
15. The PIAG findings (see note 12) suggest that consumers are happy with sharing their data via smart metering when they understand that it will be used to improve the overall energy system and when they know that the data processing will be carried out by a trusted organization such as the Office for National Statistics
16. PIAG, 2019. Smart Meter Energy Data: Public Interest Advisory Group: Final Report – Phase 1. (https://www.smartenergydatapiag.org.uk/)
17. EXL Utilities Academy, 2016. Smart Metering: What the UK can learn from other countries. (https://www.exlservice.com/smart-metering-what-the-uk-can-learn-from-other-countries)
18. Tractebel Engie, 2019. European Smart Metering Benchmark. (https://www.vert.lt/SiteAssets/teises-aktai/EU28%20Smart%20Metering%20Benchmark%20Revised%20Final%20Report.pdf)

Recommendation:

Move to actual, detailed data, wherever possible (with some exceptions). While there are some circumstances in which modelled data will continue to be useful[19], the vast majority of the system will need to be using accurate, actual data to ensure the system works best and serves all. This will be particularly important to develop the market for domestic demand side response, in which accurate and real time data are required to demonstrate that system benefits are being realised and can be rewarded; and in closing the energy performance gap in buildings by being able to evidence how they are actually performing in terms of their heat use, for example.

Recommendation:

Review half-hourly settlement arrangements in 2025 and every 5 years, to ensure they have kept up with innovation in the sector and remain fit for purpose.[20] Ofgem's recent decision to make all households' electricity settled on a half hourly basis, on an opt-out basis only, is certainly a step in the right direction. Allowing this extra level of detail will help to facilitate more nuanced understanding of people's energy use and more tailored service offerings. While half-hourly is the right level of detail for the current context, we know that energy data use is a fast-changing landscape and thus recommend reviewing these arrangements again in five yearly cycles, to ensure it remains fit for purpose[21].

Recommendation:

Government and industry should work together to progress the Energy Data Taskforce's Strategy for a Modern Digitalised Energy System[22]. The Taskforce's work represents the experts' opinions for what is necessary to have an approach to data that is 'fit for the future' [energy system]. The recommendations have been widely commended, by government, industry and the regulators[23] and it's thus important they are implemented.

This should also include agreeing the privacy considerations involved in collecting and sharing this data. Government and industry should work together to map and troubleshoot areas of concern regarding energy data use and agree on 'the rules of the game', establishing clear principles[24]. This should include the central principle that users own their own data, and can share it as they choose, and should also incorporate key principles of consumer protection and 'appropriate use' policies for when permission has been granted.

This should be backed up by guidance for all users which is clear, understandable and accessible to all.

19. There are some circumstances in which modelled data will still have an important role to play. This is mostly when considering decisions from a systems' perspective
20. It is worth noting that while half hourly settlement arrangements are a key enabler for whole house optimisation, there are several other barriers to flexibility in the domestic setting. We've chosen to focus on just a few in this report, other upcoming ADE papers and reports – including one focussed on Domestic DSR – will set out a more comprehensive view of barriers and necessary actions to address
21. It is also important to note the challenge of ensuring that, as households are exposed to the potential benefits and costs of half hourly settlement, the benefits are not concentrated for the few at the expense of customers who are unable to respond. Use of half hourly data to introduce dynamic pricing, for example, needs to be accompanied by alternatives for those who need them
22. Energy Systems Catapult, 2019. A strategy for a Modern Digitalised Energy System: Energy Data Taskforce Report. (https://es.catapult.org.uk/news/energy-data-taskforce-report/)
23. Ofgem, 2019. Using energy system data to benefit consumers: our response to the Energy Data Taskforce recommendations. (https://www.ofgem.gov.uk/publications-and-updates/using-energy-system-data-benefit-consumers-our-response-energy-data-taskforce-recommendations); Energy Systems Catapult, 2019. Energy Data Taskforce makes five key recommendations. (https://es.catapult.org.uk/news/energy-data-taskforce-makes-five-key-recommendations/)
24. Principles concerning the collection and use of data for public interest purposes already exist for other types of data used, for example, by the ONS. These could form the basis for developing broader principles. PIAG, 2019. Smart Meter Energy Data: Public Interest Advisory Group: Final Report – Phase 1. (https://www.smartenergydatapiag.org.uk/)

Intervention 2: Better buildings

building fabric efficiency improvements

It is clear that any path to net zero requires a drastically better building stock than we currently have[25]. We need better buildings because with we can deliver a net zero system at far lower cost, and with far great co-benefits, than without them.[26]

While it is important to ensure that the new homes built from now on are of a much higher quality and are future-proofed, it will not solve this issue. Eighty percent of the buildings that we will be living in come 2050 have already been built[27] – so action will be needed to improve the quality of existing buildings.

Improving the fabric efficiency of homes necessarily must happen (and acting on it today is low, or no, regrets).

In and of itself, improving the fabric efficiency of homes creates tangible benefits for the householder and the environment. It creates homes that are not only higher quality but also more comfortable. Beyond improving energy use, co-benefits to improving efficiency of buildings include improvements to health[28], lower maintenance efforts and bills[29], fewer voids and rent arrears for landlords[30], and increased asset value[31].

On top of this, improving the fabric efficiency of homes creates an immediate carbon reduction.

This direct and immediate reduction continues to deliver benefits over time through the wider impact efficiency measures can have on the energy system. For example, the infrastructure and resource costs of expanding and reinforcing gas or electricity distribution networks to cope with added demand are significant. Energy efficiency measures can help manage grid constraints and must therefore be recognised. Reducing overall energy use also reduces the amount of new energy generation investment needed to get to a net zero emission system.

Investing in improving the fabric efficiency of homes clearly supports the wider system transition also. As well as the above, it helps:

- **Heat decarbonisation broadly.** Under every pathway to heat decarbonisation significant fabric efficiency is required
- **Preserve optionality and choice for heat decarbonisation.** Significant energy efficiency improvements broaden the range of options a household could use to efficiently decarbonise their heating[32] - for instance, through using heat pumps, heat networks or hybrid/green-gas boilers operating at lower flow temperatures
- **To enable further flexibility.** In many circumstances, fabric efficiency improvements can allow for more flexibility in the way the home is operated (by the householder or a business acting for them) by increasing thermal inertia – for instance, by enabling pre-heating options[33] that allow heat pumps and heat networks to operate more flexibly and respond to wider system needs

25. Although we refer here to the building fabric only, it is likely that many smart heating controls systems are also 'no regrets' investments, provided that they can be used with low carbon heating systems when these are installed. Policy should therefore also encourage / mandate investment in such controls
26. Energy Efficiency Infrastructure Group, 2019. Making energy efficiency a public and private infrastructure investment priority. (https://www.theeeig.co.uk/media/1063/eeig_net-zero_1019.pdf)
27. Committee on Climate Change, 2019. UK Housing: Fit for the future? (https://www.theccc.org.uk/publication/uk-housing-fit-for-the-future/) p.124
28. IEA, 2019. Health and Wellbeing. (https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/health-and-wellbeing#abstract); BRE, 2015. The Cost of Poor Housing to Health, and Liverpool's innovative approach (https://renovate-europe.eu/wp-content/uploads/2015/10/REDay-2015-Ian-Watson-v2.pdf); BPIE, 2016. Energy Poverty Handbook. (http://bpie.eu/wp-content/uploads/2016/11/energypovertyhandbook-online.pdf); Using ONS Statistics, NEA assert that 23,200 extra people died in winter 2018-19 compared to the rest of the year, with 30% estimated to be because of cold homes; BRE, 2013. Homes and ageing in England. (https://www.bre.co.uk/healthbriefings)
29. IEA, 2019. Household Savings. (https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/household-savings#abstract); IEA, 2019. Public Budgets. (https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/public-budgets#abstract)
30. Sustainable Homes, 2016. Touching the Voids. (https://www.rockwool.co.uk/learning/advice/touching-the-voids/)
31. IEA, 2019. Asset Values. (https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/asset-values#abstract)
32. Committee on Climate Change, 2019. UK Housing: Fit for the Future?. (https://www.theccc.org.uk/publication/uk-housing-fit-for-the-future/)
33. See for example, Renewable heating supply in Passive Houses on the smart grid, Prof. Richard Hofer, Hochschule Biberach, Germany (2017) as detailed in Low Carbon Heat: Heat pumps in London. Greater London Authority, 2018. Low Carbon Heat: Heat Pumps in London. (https://www.london.gov.uk/sites/default/files/low_carbon_heat_-_heat_pumps_in_london_.pdf)

How do we make it happen?

Recommendation:

Create a demand pull for fabric efficiency measures in households. As discussed earlier in this report, there must be a combination of finance and demand to succeed in deploying significant efficiency improvements. This demand could be created through introducing and enforcing regulation with a trajectory of escalating minimum building performance standards for all tenures. This obligation, with the addition of investment support, would create a demand pull.

Food for thought:

While the benefits of fabric efficiency are increasingly well recognised, as is the need for them within the context of net zero particularly, consideration must be given as to how to best support those that cannot afford to invest in the relevant measures. Financial support is likely appropriate in these circumstances.

Food for thought:

It is worth considering the role of network system operators as drivers of investment in energy efficiency[34]. Early trials[35] outline the potential role energy efficiency can play in avoiding network reinforcement costs and there is an opportunity through price control mechanisms, such as RIIO, to further support efficiency and flexibility solutions. The need for innovative solutions will only grow as heating and transport electrification intensifies. Further trials to highlight the full potential of domestic demand management should therefore be pursued. These trials can outline not only what the network benefits are but also what the benefits to households can be. Sharing of the lessons learned from these trials will be important to increase transparency and trust in the offerings, improve understanding and thus services and to encourage the market to grow.

Food for thought:

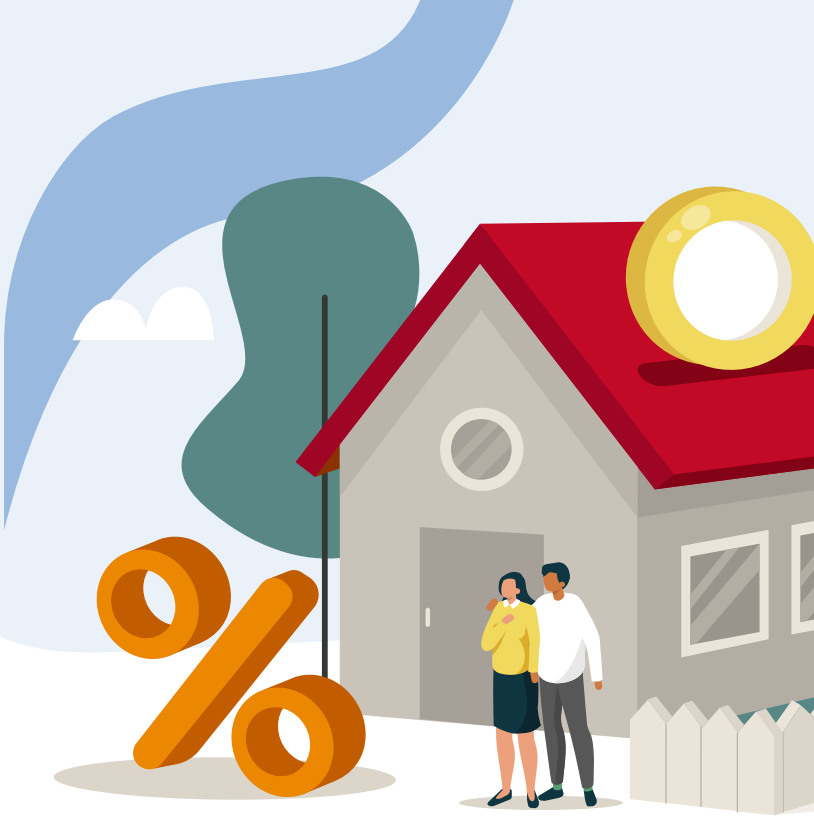
To aid householders in their decision-making regarding improving the overall energy efficiency of their home, there could be a role for 'generic tailored' advice – that is, advice that will be generally true for specific circumstances. Consideration would need to be given on the appropriate balance of generic to tailored advice in light of the challenging timescales for implementation.[36]

It would be beneficial to explore how this kind of initiative could work – whether through fact-sheets on archetypal houses and the likely 'best' order of choices, an overall hierarchy of measures with commentary for context, or even home improvement 'passports' which specify the improvement journey for a particular property. Such approaches have been implemented in other countries[37], however the long-term timescales for the programmes mean that it's difficult to ascertain their relative success yet.

34. Consideration of network system operators as drivers for investment in efficiency measures should be extended to considering all available grant funding - whether that is a tax payer scheme, Energy Company Obligation (ECO) funding, capital from carbon offsetting funds - to maximise whole house approaches. Too often in the past we have seen funding, like policy, dealt with in silos which ultimately undermine a holistic approach to such decisions. We are now seeing best practice examples where funding opportunities are joined up – for instance in Wales where Nest or Arbed funding can be combined with ECO funding to achieve better outcomes, and in Scotland where HEEPS funding can be combined with ECO funding for a more holistic approach
35. For example, Solent Achieving Value from Energy Efficiency, 2019. (https://save-project.co.uk)
36. Homeowners will not be able to take action without understanding not only how efficient their house is at the moment, but also what choices they can make to improve it. EPCs and similar mechanisms are limited in understanding the actual performance of buildings, and advice can be too generic to inform confident decision making. There needs to be intelligent tools that provide usable data to inform consumer choices
37. See for example: BPIE, 2016. Building Renovation Passports: Customised roadmaps to deep renovation and better homes. (http://bpie.eu/wp-content/uploads/2017/01/Building-Passport-Report_2nd-edition.pdf)

When setting a trajectory for building performance standards, there are strong arguments for and against interim or 'milestone' targets. Some argue that simply being clear on the endpoint and letting people navigate the middle is the best way. However, if 'nothing galvanises like a deadline' and people do rush to act all at the last minute then (a) there will be significant carbon emitted in the interim, and (b) there is highly unlikely to be the skills and resources available in the supply chain to deliver the work all at once. Given the scale of the change needed, there is significant risk to achieving the required transformation if all, or most, householders do not act until the last minute. Thus, some interim targets – perhaps based on natural trigger points such as home renovation, re-mortgage or moving – are sensible. Government should seek to introduce standards activated at point of sale[39] and introduce improvement obligations at points of major renovation[40].

Being very clear and communicating to the public, to businesses, and to financial institutions (as issuers of mortgages and loans) on the final required standard will prove essential regardless.



One to watch: TrustMark's Property Hub:

Set to launch in 2020, TrustMark has been developing a 'Property Hub' which seeks to help address some of the concerns explored above. The Hub intends to act as a building passport, and will be the householder-facing view of the Data Warehouse that TrustMark is building. The objective is for the Hub to be a secure repository to find information about a property, including details of any work undertaken (and by whom, and when) and routes to advice on further home improvements and potential funding routes.[38]

Recommendations for establishing trajectories

Careful consideration needs to be given to the appropriate trajectories for all tenures.

- all tenures' trajectories must be consistent with net zero by 2050
- social housing is further along in its journey and can therefore demonstrate leadership and move faster towards net zero, paving the way for others
- a Private Rented Sector trajectory is already in place, but it should be re-evaluated against net zero and implemented ambitiously through key trigger points including a change in tenancy
- owner occupied tenure likely needs a longer lead in time, with fewer trigger points than other tenures. Financial mechanisms should be used to encourage early and comprehensive action
- interim targets, if utilised, should be future-proofed to ensure retrofit doesn't lead people down technological cul de sacs that prevent reaching ultimate milestones (at an a non-prohibitive cost)

38. Such a tool aligns with the recommendations of the Bonfield review (recommendation 6) – it is worth noting that recommendation 7 of the same review notes the importance of having the appropriate tools and communication avenues to allow ordinary householders to engage with the information. Bonfield, P. 2016. Each Home Counts: An independent review of consumer advice, protection, standards and enforcement for energy efficiency and renewable energy. (https://www.gov.uk/government/publications/each-home-counts-review-of-consumer-advice-protection-standards-and-enforcement-for-energy-efficiency-and-renewable-energy)
39. This has already been introduced in the Private Rented Sector
40. This concept, popularly known as 'consequential improvements', has been considered before and was met with some resistance. However, renovation is a natural point to consider and act upon further improvements and is thus an important trigger point for efficiency – this aligns with the discussion and recommendations of a House of Commons Science and Technology Committee report. House of Commons Science and Technology Committee, 2019. Clean Growth: Technologies for meeting the UK's emissions reduction targets. (https://publications.parliament.uk/pa/cm201719/cmselect/cmsctech/1454/1454.pdf)

Food for thought:

Setting and communicating these clear trajectories will also have an important role to play in giving industry a clear pipeline of work. This is critical to giving industry the confidence it needs to invest in the necessary training to help bridge the skills gap which could otherwise undermine the energy transition.

Food for thought:

Action by the finance sector (see 'intervention 3', overleaf) may be insufficient to avoid a concentration of action around deadlines – whether a single end-point or interim targets. Government may therefore need to put in place fiscal 'nudges' (for example, zero rate VAT on energy efficiency retrofits or differential stamp duty linked to energy performance) to reward those who act now and thus smooth the demand for energy efficiency measures.

Recommendation:

Prioritise improvements for people in vulnerable circumstances, including the fuel poor.

This approach is sensible for a number of reasons.

On an ethical level, it works to protect those who are most vulnerable from the uncertainties of the future, in which the composition of the energy system is not yet known. Increasing fabric efficiency reduces a vulnerable householder's dependency on energy supply, and can cushion them against possible future price shocks (from more expensive low-carbon heat solutions, for example) or other risks.

Additionally, those in vulnerable circumstances may derive more benefit than the general population from the health impacts of warm and comfortable homes, which translates into improved health and wellbeing outcomes, and a lower cost to the National Health Services and to social services.[41]

Food for thought:

It is worth considering what other sectors or tenures can do to take the lead in the transition. The social housing sector, for instance, has already shown leadership in terms of the levels of energy efficiency generally found across their housing stock[42]. They should continue this role, leveraging the potential for lowered transaction costs for deep retrofit, as further efficiency improvements could be delivered through a single provider of social housing. Such a provider may:

- Be better able to arrange for temporary relocation/accommodation of residents while renovation is undertaken, in contrast to a large group of individual householders attempting the same retrofit approaches
- Own multiple properties in a concentrated area and thus be able to achieve economies of scale in construction, which can help offset potential first-mover cost disadvantage
- Be able to coordinate a schedule of retrofit to coincide with cyclical maintenance activities

The role of the public sector in 'taking the lead' in the energy transition will be the focus of a follow up report by the Association, which will explore this in further detail.

41. For instance, Warm Homes Oldham offers comprehensive advice and support to local residents in fuel poverty. A review of the scheme found that investment in energy efficiency led to significant improvements in general health and wellbeing, life satisfaction, and the condition of homes. Headline findings were that 75% of participants moved out of fuel poverty, 80% of reported a positive impact on their general health and wellbeing. It was estimated the scheme resulted in a £45,000 annual saving for the NHS due to reduced GP and hospital visits, counselling and medication. The study also estimated a £215,000 increase in Gross Domestic Product (GDP) due to higher employment rates and reductions in sickness absence, and a £137,000 reduction in benefit claims

    The ADE & ACE, 2018. Energising Greater Manchester. (https://www.theade.co.uk/assets/docs/resources/Energising_Greater_Manchester_050718v2.pdf)

42. With over half of the social housing stock in the UK currently reaching EPC Band C, the sector is already outperforming other tenures

    Sustainable Homes, 2018. Housing 2050: How UK social housing can meet the challenge of climate change. P.8. (https://omghcontent.affino.com/AcuCustom/Sitename/DAM/114/Housing_2050.pdf)

Intervention 3: Better financing

- make it (financially) do-able

While many householders may indeed want to 'do the right thing' in terms of climate change, we also know that people's decisions around energy, or that impact on energy use, are driven by a variety of factors – including cost, comfort and ethics (and a combination of these)[43]. Additionally, energy decisions and costs are not the only decisions and costs a householder bears on a day to day basis – and in fact, they aren't even the primary ones.[44]

We cannot expect to deploy the scale of change necessary to reach net zero if we do not accept that acting must be affordable to householders. The economics must stack up.

Make the invisible valuable: price decarbonisation into asset value

An element of this is ensuring that assets – primarily property – reflect their true, decarbonised value in the context of a net zero target.

Introduction and implementation of clear minimum standards, as discussed earlier in this report, should create a property value or sale risk if households are not compliant within the required timescales. This would be included in mortgage assessment and, ultimately, would likely be priced into mortgages – much like a home being in a poor state would be now, as the bank assesses they could not easily re-sell it 'as is'. Ultimately, mortgages and associated loan products will need to reflect the legal requirement for a house to be of a certain standard.

This could take shape in a number of ways. For instance:

- Interest rates or timescales offered on mortgages could be higher/lower and longer/shorter to reflect the likely work needed within the time to reach the next performance standards
- More favourable terms could be offered on mortgages, conditional on improvements being made to reach performance standards, as well as more favourable unsecured personal finance offers. This could make a significant difference in making the cost of implementing energy efficiency improvements acceptable to householders

Food for thought:

It may be that some financial institutions are able to offer financial products in which such a 'favourable' mortgage supports the implementation of the work, by utilising the finances that are not needed to be locked up in the mortgage as a result of the better conditions (the differential finance only) to actually cover the cost of the energy performance upgrade.

Food for thought:

It may be that financial institutions and energy service providers work together, collaborating on service offerings, to bring forward a stronger proposition.

The mortgage and re-mortgage process then become natural trigger points for improvement, as they are a time of asset value assessment. This also works to ensure that not all householders are acting at once, which can put stress on the supply chain.

43. Energy Systems Catapult, 2019. Smart Systems and Heat programme: Phase 2 Summary of key insights and emerging capabilities. (https://es.catapult.org.uk/news/smart-energy-services-for-low-carbon-heat/)
44. See. Energy Systems Catapult, 2019. Hot showers, warm drinks and heating – let's talk about energy how consumers do. (https://es.catapult.org.uk/news/hot-showers-warm-drinks-and-heating-lets-talk-about-energy-how-consumers-do/)

Supporting people to act on their demand pull

While ensuring that home valuation reflects the value of decarbonisation is both necessary and ultimately helpful, it is highly likely that some householders will still need further financial support or incentives to act.

There are generally two ways to address such a quandary: make the newer (decarbonised) choices more affordable, or make the incumbent (higher carbon) choices more expensive. Neither is without challenge, and careful consideration must be given to how a new regulatory intervention could create a financial burden on those least able to take action.

How do we make it happen?

Recommendation:

Government should work with financial institutions to communicate clear trajectories for building standards, and to identify appropriate financial products that can be offered. It is the core business of financial institutions to price risk and incorporate that into their product offerings. While this was purported to be addressed by the publication of the Green Finance Strategy, the strategy itself lacked the specificity and "teeth" to be very useful.

If both government and banks are clear on the need for high performance buildings, this will be reflected in financial services' offers to the market.

Two to watch:

Green Finance Institute:

Established in 2019, the Green Finance Institute is an independent, commercially focused organisation, supported by HM Treasury, the Department for Business, Energy and Industrial Strategy and the City of London Corporation[45]. The Institute intends to mobilise capital by enabling private/public collaboration in green finance with an aim to accelerate the domestic and global transition to a zero-carbon and climate-resilient economy.

Scottish National Investment Bank:

Announced in 2017, the Scottish National Investment Bank's primary mission will be to support Scotland's transition to a net zero carbon economy. Scottish Government have committed £2 billion of capital to the Bank to invest over 10 years[46].

Recommendation:

Implement a rising, net zero-compliant price on carbon for households' energy use in 2030, exempting the fuel poor until 2040.[47] There are numerous models or ways that this could be implemented in order to encourage the necessary behaviour change.

It is clear that in order to reach net zero, it will be necessary for carbon to have a cost.

The current structure of taxes and levies makes it difficult for the economics of lower-carbon options to stack up. In a future in which high-carbon choices are not accepted, we should move away from using them as the price benchmark by making them less cheap.

Householders should be supported in acting to move away from higher-carbon choices, and the most vulnerable should be protected. Those that choose not to move must bear the cost of the carbon they produce. Setting a clear trajectory for the price of carbon with a long horizon to implementation will help people to understand the endpoint, and to make their own plans to decarbonise in whichever way they choose in the interim period.

Careful consideration should be given as to how to ensure those in vulnerable circumstances, including the fuel poor, are protected and enabled to make improvements over a sensible timeline.

It would be worth considering how any funds gathered are used or re-distributed. Analysis shows that people are more likely to be accepting of carbon taxation measures when revenues are ringfenced to fund climate change mitigation activities,[48] and it could be that using revenues raised to support a just transition would achieve this across multiple fronts.

45. See. (https://www.greenfinanceinstitute.co.uk/about-us/)
46. See. Scottish Government, 2019. A National Investment Bank for Scotland: factsheet. (https://www.gov.scot/publications/scottish-national-investment-bank-factsheet/)
47. We are focussing on a price for households as householders are the focus of this report. The potential role for a net zero-compliant price on carbon for other users will be explored in subsequent reports
48. Carattini, S., Carvalho, M. and Fankhauser,S., 2019. How to make carbon taxes more acceptable. (http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2017/12/How-to-make-carbon-taxes-more-acceptable.pdf)

Recommendation:

Introduce a low-carbon heat transition support fund for householders, in place of the soon-to-close Domestic RHI. As discussed above, householders should be supported to move away from higher-carbon choices. There should be government funding available to householders who choose to reduce their heat-related carbon emissions[49]. Scheme design will, as ever, be critical to the success of such a programme. Access to funding should be predicated on having realised a specific building performance standard, and on householders or a designated authority having undergone a process to identify that the particular solution is suitable for their circumstances. This could interact with ideas around heat zoning, which allows for generalised advice to householders on what solutions and actions are most suited within their locality, based on sophisticated energy masterplanning at a local level.

Recommendation:

Ensure there is a system for redress so that householders do not bear the risk of poor performance. As discussed at the start of this report, we must give householders the safety net of ensuring that the risk of poor performance of kit or services does not sit with them. Assuring performance, and delivery of promised outcomes, must sit with service providers and be encouraged by government. Without good, actual building data, assured performance and high-quality installations, the anticipated benefits associated with different measures will not be realised and the development of vital markets to reach net zero will be harmed.

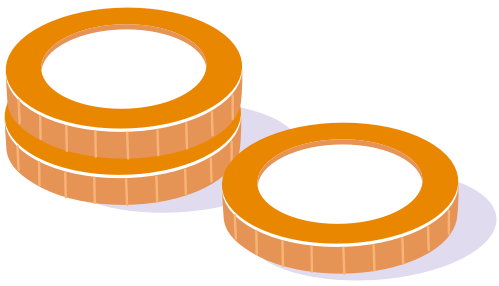
- The New Homes Ombudsman should consider energy performance in its scope and provide an avenue for house buyers to seek redress to close performance gaps in new build homes
- In the retrofit market, the use of a quality assurance scheme with appropriate guarantees for installation should be tied to funding to ensure that consumers are protected when making investments that are valuable to achieving net zero.

Food for thought:

It will be interesting to examine whether service offerings come forward which see a direct commercial relationship between financiers and those delivering efficiency improvement measures and services.

Food for thought:

Redress alone is unlikely to be sufficient to build confidence amongst consumers. There also needs to be an expectation that work will be done right in the first place. Ongoing work to ensure quality[50] in retrofit must continue, as must efforts to ensure an appropriately skilled workforce.



49. We expect this will primarily be needed for more expensive low carbon heating systems, but could equally apply to more expensive fabric efficiency measures
50. See. TrustMark. (https://www.trustmark.org.uk/)

How does it all come together?

To reach net zero, there is an incredible amount of work to do. The public is demanding action on climate change. Now is the time to make things happen. This is our vision for a transition that benefits all. **So, let's get going.**

Better data makes realisation of performance improvements easier to establish. Installers of fabric efficiency measures rather than consumers can bear the risk of their performance.

BETTER DATA

Better data allows greater understanding of the fabric efficiency requirements needed and their potential impact

Better data facilitates activity and service offerings that can result in savings or benefits realised, making the transition more affordable.

BETTER BUILDINGS

Better data critical to householders' access to certain markets, such as flexibility markets, where they can derive value

BETTER FINANCING

Installers and providers bearing the risk of performance allows finance providers to require more and be more certain of conditions within lending agreements

Improved understanding

Improved participation

Improved acceptance

The Association for Decentralised Energy