

Submission to BEIS Committee Inquiry into Heat Pumps

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Submission to BEIS Committee Inquiry into Heat Pumps	1
About Energy Saving Trust	3
Call for evidence: Heat Pumps	4
Summary of our response	5
1. Lessons from past policies	7
Lesson 1: Regulation and standards	7
Lesson 2: Heat pumps need to save consumers money	10
Lesson 3: Quality standards to build consumer trust	11
Lesson 4: A clear and simple customer journey	11
2. Priorities to 2024	13
Heat and Buildings Strategy	13
Developing the transformative delivery programme from 2025	14
3. Tackling low awareness	16
4. How can costs be reduced?	17
5. Electricity bill levies	18
5.1 Overview of current levy package	18
4.1 Distributional impacts	18
4.1.1 Current levies disincentivise heat pumps	19
5 Financing a 'fair transition'	20
5.1 Overview of the options and the distributive implications	Error! Bookmark not defined.
6 A revolving loan-fund approach	21
Conclusion	23

About Energy Saving Trust

Energy Saving Trust is an independent organisation dedicated to promoting energy efficiency, low carbon transport and sustainable energy use to address the climate emergency.

Our work focuses on reaching net zero targets by taking action to reduce energy consumption, installing new infrastructure and accelerating a move to sustainable, low carbon lifestyles.

A trusted, independent voice, we have over 25 years' sector experience. We provide leadership and expertise to deliver the benefits of achieving carbon reduction targets: warmer homes, cleaner air, healthier populations, a resilient economy and a stable climate.

We empower householders to make better choices, deliver transformative programmes for governments and support businesses and community groups with strategy, research and assurance – enabling everyone to play their part in building a sustainable future.



Call for evidence: Heat Pumps

In October 2020, the Business, Energy and Industrial Strategy (BEIS) Committee issued a [call for evidence](#)¹ for an [inquiry](#) into heat pumps as part of a wider inquiry into work into decarbonising heat in homes. The terms of reference for the enquiry are outlined below and our response to each of these questions can be found overleaf.

The key issues which this inquiry will examine includes:

- What has been the impact of past and current policies for low carbon heat, and what lessons can be learnt, including examples from devolved administrations and international comparators?
- What key policies, priorities and timelines should be included in the Government's forthcoming 'Buildings and Heat Strategy' to ensure that the UK is on track to deliver Net Zero? What are the most urgent decisions and actions that need to be taken over the course of this Parliament (by 2024)?
- Which technologies are the most viable to deliver the decarbonisation of heating, and what would be the most appropriate mix of technologies across the UK?
- What are the barriers to scaling up low carbon heating technologies? What is needed to overcome these barriers?
- How can the costs of decarbonising heat be distributed fairly across consumers, taxpayers, business and government, taking account of the fuel poor and communities affected by the transition? What is the impact of the existing distribution of environmental levies across electricity, gas and fuel bills on drivers for switching to low carbon heating, and should this distribution be reviewed?
- What incentives and regulatory measures should be employed to encourage and ensure households take up low carbon heat, and how will these need to vary for different household types?
- What action is required to ensure that households are engaged, informed, supported and protected during the transition to low carbon heat, including measures to minimise disruption in homes and to maintain consumer choice?
- Where should responsibility lie for the governance, coordination and delivery of low carbon heating? What will these organisations need in order to deliver such responsibilities?

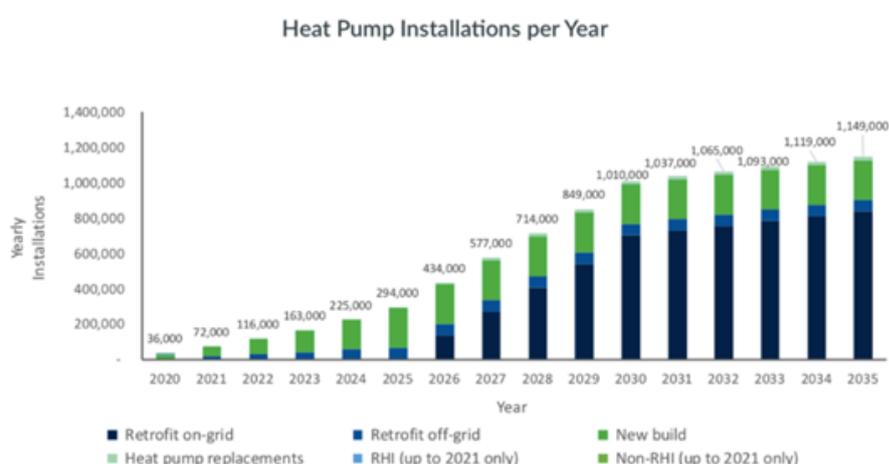
¹ <https://committees.parliament.uk/committee/365/business-energy-and-industrial-strategy-committee/news/119747/committee-launch-decarbonising-heat-in-homes-inquiry/>

Summary of our response

Past policy initiatives in this area show that demand-led schemes (where consumers take up changes based on incentives), will not deliver the *transformational* change required to roll out low-carbon heating to 29 million homes in less than 30 years.

The Climate Change Committee ([CCC](#)) recommends that heat pump deployment increases from 27,000 now (2019) to 1 million units per year by 2030². Assuming a deployment trajectory like the one below, this could involve going from 250,000 installed heat pumps to around 3.3 million (cumulative) in a decade – a huge increase.

Fig. 1: HPA deployment trajectory scaling to 1 million units per year by 2030 ([HPA, 2020](#))



This scale of change will require regulation, an attractive customer proposition and support to make it an easy process for both homeowners and tenants. It should include supporting households with the upfront cost of changing to a heat pump as well as wider system changes so that bills are lower than with conventional heating.

How could this be achieved?

The CCC’s [6th Carbon Budget](#) modelling (Balanced Pathway) indicates that the total cost of upgrading homes (averaging £10,000 per home, assuming a mainly electrified pathway) will be less than the cumulative energy bill savings by 2050.

This suggests that it would be feasible for the Government to set up a long-term loan scheme to help households with the upfront cost of heat pumps, with the energy bill savings used to repay the loans (and this revenue stream used to support future customers). As the market matures, the cost of heat pumps would reduce and the bill

² A week after this submission, the government committed to increase heat pump sales to 600,000/year by 2028: [The Ten Point Plan for a Green Industrial Revolution \(HTML version\) – GOV.UK \(www.gov.uk\)](#)

savings increase. This means that, whilst early individual loans may not ‘pay back’ from the bill savings, a stock-wide loan fund, over a sufficient time period could. Whilst a long-term approach would be needed, the investment scale and timeframe would be in line with other infrastructure projects (such as energy network investment). As retrofit is both labour and capital-intensive however, it would deliver a higher level of jobs (along with economic benefits such as VAT and income-tax revenue) with the initial investment functioning as an economic stimulus.

Will this be enough to encourage households to change their heating?

Experience shows that people can be reluctant to install unfamiliar or potentially disruptive measures in their homes and the current economic situation may make households wary of taking out new loans. Finance here then needs to be attractive. We recommend loans that are very low-interest and publicly backed, with a ‘shared-savings’ approach where loan repayments are set below (for example, half of) the forecast bill savings. This would enable the homeowner to upgrade their heating with no/ little upfront cost and lower energy bills.³

Whilst the necessary scale-up rate for heat pumps will be challenging, the right combination of regulation, impartial advice for householders and an attractive customer proposition (such as no upfront cost and lower bills) would drive change.

³ The exception here would be where customers opted to ‘spend’ all or part of their bill ‘saving’ on heating their home for longer.

1. Lessons from past policies

This section provides an overview of what we consider to be the key lessons from past policies, from the devolved administrations and international comparators:

- i) Regulatory drivers
- ii) Attractive customer proposition
- iii) Technical standards/ quality systems
- iv) Clear information and a simple customer interface

We have used past policies from both UK and EU programmes to illustrate these

Lesson 1: Regulation and standards

The low uptake of heat and energy efficiency measures via consumer-led schemes such as the Green Deal and the Renewable Heat Incentive highlight the need for underlying regulation. This need to supplement consumer incentives and support with mandation is highlighted by the Scottish Government in their [proposals](#) to require all homes to reach a minimum standard (of Energy Performance Certificate [EPC] Band 'C') at sale. This position has been consistently recommended by the government's formal advisors, the [CCC](#).

Regulation has already 'quietly' transformed the market for the following:

- [Condensing boilers](#) – following regulation in 2005, most boilers are now efficient condensing boilers. This compares with the market-led rollout of central heating which took over 50 years.
- [Lighting and white goods and appliances](#): This analysis by [Carbon Brief](#) highlights the key role that EU product regulation has played. Whilst the UK's success in reducing emissions from the power sector is generally attributed to supply-side changes (increase in renewables, decrease in coal), half of the reduction is due to lower-capita generation (this has dropped by a quarter since 2005). Whilst the off-shoring of energy-intensive industries is also a factor, low-energy lighting has cut electricity use here by up to 90% whilst there has been a 75% reduction for newer "white goods.

How important is choice in domestic heating?

Regulating what homeowners can do in their homes is often seen as difficult but most people don't actively choose their heating system – they are restricted by the options where they live (whether they have a gas connection or not for example). Most inherit a system when they move in and replace it on a like-for-like basis when it fails.

Whilst there will be a role for consumer choice in some areas, there won't be in others. For example, in areas with a heat network (existing or planned), each building owner opting out of the scheme increases the costs for those remaining in it. Similarly, encouraging heat pump take-up in the early action areas (off-grid homes and new build) will not be possible at the scale required without new regulation to make heat pumps the default option where they are suitable.

Do we want 'choice'? [Citizen's Advice](#)⁴ suggest that the public is more interested in 'protection' around heat price and quality than 'choice' in the energy market. For example, despite a decade of encouragement to get us to 'shop around', [Ofgem data](#) shows that 47 percent of households have never switched energy supplier. Whilst switching is lowest (as expected) amongst the 5.3 million households who are digitally excluded, a large number of respondents aged 16 to 34 also do not engage. Potentially then an offer that restricted choice of heating system but guaranteed stable or lower energy bills would be largely accepted by the public.

The need for regulation is further highlighted by the schemes below:

i) Domestic Renewable Heat Incentive (DRHI)

The DRHI provides quarterly payments over a seven years to homeowners installing heat pumps, biomass or solar thermal. The 2020 [report](#)⁵ shows that whilst 50 percent of the measures installed under the scheme (45,000) have been heat pumps, these accounted for just 20 percent of the revenue payments. The scheme's stated aim was to '*prepare the market for mass roll out in the 2020s*' (DECC, 2013) but the delivery has been significantly lower than forecast with the [National Audit Office](#)⁶ (2018) forecasting that it would deliver just 15 percent of its original heat target.

The scheme has seen heat pump sales increase by just fifty percent (from 18,000 in 2012 to 27,000 in 2019) meaning heat pumps still account for less than 2 percent of the heat market compared to 1.7 million gas boiler sales. More significantly perhaps, [BEIS data](#)⁷ suggests that only 27 percent of the public are aware of them. It's hard to conclude that the sector has moved decisively nearer to '*mass market rollout in the 2020s*' as a result of this incentive scheme

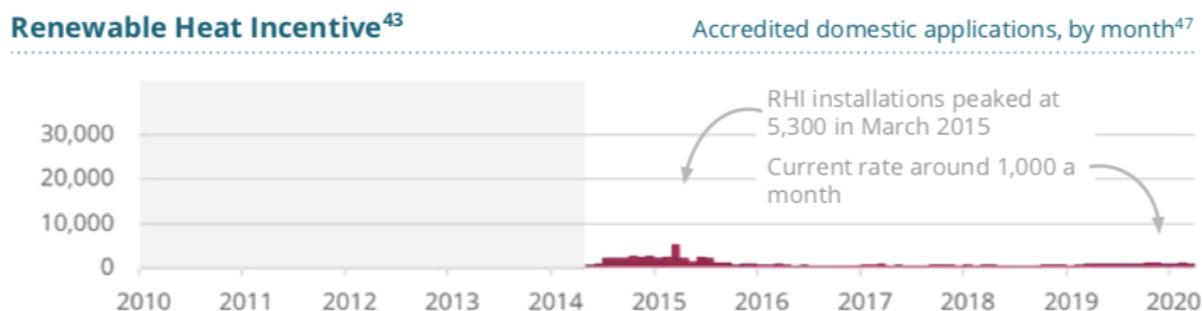
⁴ <https://www.citizensadvice.org.uk/about-us/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/taking-the-temperature-consumer-choice-and-low-carbon-heating/>

⁵ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881634/changes-to-rhi-impact-assessment.pdf

⁶ <https://www.nao.org.uk/report/low-carbon-heating-of-homes-and-businesses-and-the-renewable-heat-incentive/>

⁷ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/776657/BEIS_Public_Attitudes_Tracker_-_Wave_28_-_key_findings.pdf

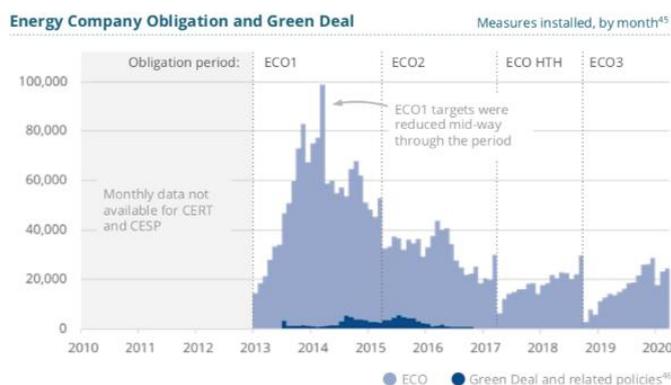
Figure 1: Take up of the DRHI (Source: [Citizens Advice, 2020](#))



ii) Energy efficiency schemes

The chart from [Citizens Advice](#) below shows the take-up of the main policies to encourage domestic energy efficiency since 2013. Whilst the Green Deal was expected to stimulate the 14 million retrofits, it delivered only 14,000 upgrades. The scheme pioneered a new loan mechanism that was linked to the property and allowed households to retrofit their home at no upfront cost.

Figure 2: Take up of the energy efficiency schemes (Source: [Citizens Advice, 2020](#))



As the **£55 billion** spent last year on refurbishment clearly shows however, access to finance is not the main barrier for 'able to pay' households. The issue is that, unlike work to extensions, kitchen and bathrooms, spend here is not seen an 'investment' and in the absence of a requirement, most households will not act because the perceived rewards (improved comfort and bill savings) do not outweigh the disruption and the potential risk. Despite various schemes offering free measures over the years, one third of cavity walls are unfilled and fifth percent of lofts are under-insulated.

iii) Feed-in-Tariff

The Feed-in-Tariff scheme offered households payments for generating and export electricity from (mainly) solar electric panels. There was a very high take-up in 2011 when

a drop in unit costs increased the returns and simple pay-back on the schemes to 8.45 percent and [8.4](#) respectively. Whilst the tariff was reduced successively after this, the Solar Trade Association estimates that the scheme delivered [900,000](#) domestic and community installations (compared to RHI's 45,000 heat pumps) and high public support for the technology. Whilst the price fall is a factor, it is only part of the story (the RHI gives a higher average [12 percent return](#)). Unlike many energy efficiency measures and heat pumps, solar is 'plug and play' – causing little internal disruption, and is perceived as low-risk (whilst poorly installed insulation or heating can cause damp or mould or result in unreliable or unaffordable heating and hot water). The popularity of 'plug and play' technologies suggest that market-led mass deployment could be feasible in a relatively short time with consistent government support. It also suggests that homeowners need a higher level of support and protection for measures perceived to be 'disruptive' or 'risky'.

Figure 3: Take up of the FIT (Source: [Citizens Advice, 2020](#))



Lesson 2: Heat pumps need to save consumers money

As highlighted above, there needs to be a clear benefit to acting. [Research](#) by Citizen's Advice into consumer attitudes to heat included this summing up from a participant:

"It's got to be clear and it's got to tell me how it's going to make a difference. I know it's going to save the environment, I get that. But, and this is going to sound a bit selfish, what am I going to benefit from changing this?" (Leeds, lower income)

Experience from Sweden and Finland shows that once fossil fuel heating is no longer the cheapest option, the market can change rapidly.

Lesson 3: Quality standards to build consumer trust

This 2016 [UKERC](#)⁸ paper reviewing the success of European policy in deploying heat pumps concludes that the success of incentives is dependent, in the longer term, on having standards in place for manufacturing, installation and maintenance.

The authors explain, for example, how a surge in German market following the introduction of a tax credit scheme, saw a crash in the mid-1980s, attributed in part to poor installations, a lack of maintenance and low installer experience.

The paper lists successful mechanisms used to improve quality standards including:

- [National heat pump associations](#)
- [Test centres](#) to monitor heat pump performance (Sweden).
- [Quality labels](#) (Switzerland in 1998 and Sweden in 2005)
- [An independent complaints board or 'Heat Pump Court'](#) to address litigation cases relating to the false claims of installers about heat pump performance (Sweden). Court decisions here were made public so that the relevant companies were 'named and shamed'

Lesson 4: A clear and simple customer journey

There needs to be a clear customer journey, designed around the user, with a simple interface, strong consumer protection and end-to-end support.

Good practice in the devolved administrations: Home Energy Scotland

The Scottish Government offers a variety of schemes to tackle fuel poverty and reduce domestic emissions. It keeps things easy for the consumer by having a single simple interface - [Home Energy Scotland](#). Funded by the Scottish Government, and managed by the Energy Saving Trust, Home Energy Scotland is a network of local advice centres covering all of Scotland.

Home Energy Scotland's expert advisors help over 90,000 households each year supporting them to understand options for retrofitting their homes, connecting them to relevant finance (the various grant funds or the Scottish Governments [zero percent interest loans, cash back offers and equity loans](#)) and supporting them with after-care.

⁸ <https://d2e1qxpsswcpgz.cloudfront.net/uploads/2020/03/heat-what-works-working-paper.pdf>

England: Increasing fragmentation makes it hard for the public to engage

The emerging picture in England is of multiple, overlapping grant schemes: Green Homes Grant (GHG) and the local authority variant (GHG LADs), Energy Company Obligation (ECO), Renewable Heat Incentive (RHI) and anticipated Home Upgrade Grant (HUG)

ECO: The issue can be seen in a microcosm with the ECO scheme. Paid for through an energy bill levy, the scheme is best suited to low-cost, high-impact single measures such as loft and cavity wall insulation. However, the need to minimise overheads (and therefore impact on bill payers) leads to a scheme that is confusing for the end-user (low-income households).

Put homeowners back in control: BEIS are currently looking at how the scheme could be revised to deliver whole-house retrofit rather than single measures. Increasing the complexity of the scheme however, would increase costs and reduce the volume of low-income households that can benefit.

A better approach might be to strip it right back and fund vouchers as with the Green Homes Grant scheme. This would minimise overheads and put households in control of spending their voucher with their choice of accredited installers on a relevant measure identified in their [PAS2035 home retrofit plan](#).

2. Priorities to 2024

Heat and Buildings Strategy

This should focus on providing a clear pathway for decarbonising heat by 2050 with clear interim timelines and dates for new regulation on:

- i) New build / conversions
The government's proposed changes to the building regulations ([Future Homes Standard](#)) rule out fossil-fuel heating from 2025. It is important that this is confirmed as soon as possible (we would support an earlier date of 2023) to allow supply chains to adjust. There also needs to be a similar upgrade to the regulations governing conversions given the increasing number of non-domestic properties that are being converted into homes.
- ii) Phasing-out replacement oil, coal and LPG heating in homes off the gas grid
Government has committed to this before 2030. We support a date of 2027/8.
- iii) Phase out date for gas heating in homes on the gas grid.
The 15-year lifetime of conventional boilers suggests 2035 is the latest date compatible with net zero by 2050. We would support an earlier date of 2032.
- iv) Mortgage providers to increase the average energy efficiency of their stock
Government has stated an intent to introduce a new requirement on mortgage providers
- v) Energy efficiency in buildings
One-third of the stock is owned outright. This includes around 5 million homes in England rated EPC 'D' and below. A regulatory driver, (such as minimum energy standards at sale and rent) would ensure improvement happens at the scale required. Demand-led schemes do not deliver at this rate.
- vi) Date(s) for decommissioning all/ part of the gas network
The CCC highlights the need for key decisions here before 2030

Developing the transformative delivery programme from 2025

The primary focus of this parliamentary term should be on developing a transformative delivery programme for low-carbon heat. This should be founded on 'fair transition' principles in which all households will:

- i) Be financially supported to upgrade their heating
- ii) Retain a portion of the lower energy bills (unless opting to increase heat) with the rest used to repay the financial support given
- iii) Have recourse to adequate redress if quality standards fall short.

This aligns with the notion of fairness highlighted by the [Climate Assembly](#), in which the change should be fair and everyone supported to make the changes. The best way of managing this complex undertaking might be via a single delivery body (such as the Olympic Delivery body) with a remit to enable mass-market delivery from 2025.

Key tasks for a delivery body

- i) Provide finance: Work with the Green Finance sector to determine the financial mechanism(s) for meeting the cost differential between incumbent heating systems and the low carbon alternatives. Set up the mechanism for sharing the cost savings.
- ii) Reduce cost of electricity: Work with the Treasury and Ofgem to implement changes to increase the competitiveness of electricity compared to other heating fuels.
- iii) Build capacity, bring down costs and improve quality standards: For heat pumps, we strongly support the agreement of a sector deal between government and the full range of key stakeholders to bring down costs and increase quality, jobs, skills and apprenticeships in line with agreed targets.
- iv) Regional/ local energy area plans: there is an urgent need to determine a framework for regional heat plans including public engagement. We would support a target to have these complete by 2025.
- v) Improve information for consumers: The public need to be provided with clear information on what to do. Once the regional/ local plans are in place, this information could be fed into Building Retrofit Plans produced via the PAS2035 process or into digital Green Building Passports to supplement Energy

Performance Certificates. The energy efficiency and low carbon heat readiness measures will vary depending on the heat solution.

- vi) New Advice Service: Commission a net zero homes advice service to engage households with the change process, support and inform them on their customer journey and ensure swift countering of any misunderstandings.

Delivery: rapid growth in new build and off-gas grid homes

Alongside this there should be a focus on delivery in the 'no-regret' early action areas of new homes and homes not connected to the gas grid. The offer to consumers should be attractive along with a strong focus on quality standards. An initial focus on social housing would support this. When the framework is set up, we would support devolution of targets and funding to a more regional level.

Technologies

Our view is that, whilst low carbon gases (such as hydrogen) could play a useful supporting role in decarbonising heating, the current uncertainties around safety, running costs and timescales suggest that energy efficiency, heat pumps (including hybrid systems) and heat networks will be the least-cost pathway to decarbonising heat (with direct electric heating in space-constrained properties and some use of biomass in hard-to-insulate, off-grid properties).

Our view aligns with the position set out by UK Energy Research Centre (UKERC) [here](#)⁹

We think the key barriers are the lack of a coherent framework on heat; the current high costs and the low awareness of the public.

⁹ <https://ukerc.ac.uk/publications/net-zero-heating/>

3. Tackling low awareness

Currently there is a very limited awareness of the need for low-carbon heating. This [survey](#)¹⁰ by the Energy Systems Catapult found that half the respondents were not even aware that gas boilers contribute to climate change. The CCC's latest [Progress Report](#)¹¹ highlighted this as the key barrier to low carbon heat.

Whilst reducing costs (capital and running costs) is necessary to build the market, equal attention must be paid to building consumer awareness. Heating is an emotional as much as an economic decision and, from our practical experience of helping homeowners adjust to low carbon heating, this will require a concerted approach to 'hand-hold' consumers throughout the transition. Moving from a gas boiler to an electric heat pump is not 'plug and play.' It is shift from a rapid response high-temperature approach to one based on low-temperature heating over a longer period. This shift and the behaviour change required to optimise bills savings/ earnings from future electricity flexibility markets may be challenging for consumers (particularly those already marginalised by the energy market).

The government's emerging customer journey for retrofit (a digital advice platform and the PAS2035 quality framework for installing measures) is unlikely to be sufficient to provide sufficient support and reassurance needed for homeowners and tenants, particularly for the 5.3 million currently classed as digitally excluded.

Our key recommendations here are for:

- A government-backed communication campaign alongside the lines of the digital switchover to provide the narrative around the low-carbon heat transition.
- A government-backed advice service to supplement the digital advice platform ([Simple Energy Advice](#)). This would be able to listen and respond (by phone, email, and potentially home visits), to households and to tailor their advice to the household's specific situation (home, condition, household, region) to support them with starting on their PAS2035 process and then to re-engage for future measures. There are different ways to deliver this but we recommend central coordination to ensure consistent advice and quality, combined with regional/ local delivery (heat pathways are likely to have a strong regional dimension).

¹⁰ <https://es.catapult.org.uk/news/1-in-2-not-aware-of-gas-boilers-climate-impact-survey/>

¹¹ <https://www.theccc.org.uk/publication/reducing-uk-emissions-2020-progress-report-to-parliament/>

4. How can costs be reduced?

Experience from Sweden and Finland shows that once fossil-fuel heating is no longer the cheapest option, the market can change rapidly. There are two main aspects here – reducing the high capital cost and increasing the differential in running costs

Capital costs

Energy Saving Trust [data](#)¹² shows that air source heat pumps cost £9,000 –11,000 (compared to £2,300 for a gas boiler). The changes below could save 55 percent (£4,500) on a £10,000 cost.

- Economies of scale: The [CCC](#)¹³ estimate at least a 20 percent drop.
- Energy efficiency: [Carbon Trust](#)¹⁴ research suggests that better energy efficiency (equivalent to EPC 'C') can reduce costs by around 20 percent (smaller unit cost and reduced cost on 'enabling' works such as larger radiators/ pipework).
- VAT: since 2019, a 20 percent VAT rate applies for part/ all of installations (it varies). Reducing this to 5 percent would simplify it and provide an immediate saving.
- Lifetime costs: On average, boilers are replaced every [13](#)¹⁵ years (with warranties from 2 to 10 years), whereas heat pumps are replaced between 15–20 years. Selling heat pumps with longer warranties would increase the value proposition.

Operational costs

- Rewarding flexibility: Switching to a Time-of-use tariff (TOU) and changing heating patterns can reduce running costs by between 23– 46 percent ([UKERC](#)¹⁶, [Carbon Trust](#)¹⁷). As flexibility markets develop, aggregated consumer demand would be able to support grid-balancing, reducing costs elsewhere.
- Shift the cost of environmental and social levies away from electricity: UK has below average gas prices but above average electricity prices ([Ofgem](#), 2020) partly because almost all the policy costs in this area sit on electricity – making up 23 percent of the unit cost (but only 2 percent of gas). This distribution needs urgent review. Germany has shifted part of the levy cost to general taxation.

¹² <https://energysavingtrust.org.uk/advice/air-source-heat-pumps/>

¹³ <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>

¹⁴ <https://www.carbontrust.com/resources/heat-pump-retrofit-in-london>

¹⁵ <https://www.bsria.com/doc/VBVwkr/>

¹⁶ <https://ukerc.ac.uk/publications/net-zero-heating/>

¹⁷ <https://www.carbontrust.com/resources/heat-pump-retrofit-in-london>

5. Electricity bill levies

5.1 Overview of current levy package

The main approach to financing the decarbonisation of electricity has been via levies on electricity. Electricity bill payers currently pay about £7 billion a year for this which is likely to increase to £12 billion by 2030. As well as these direct decarbonisation costs, consumers pay for a range of other social and environmental policies, like energy efficiency, financial assistance to vulnerable consumers, and smart meters.

Overall, the current levy scheme has had a positive impact for the average consumer. Whilst levies currently add about 13 percent to bills (£146, based on [Ofgem's](#)¹⁸ latest estimate of average bills), this is outweighed by the average bill savings from improved energy efficiency from schemes funded through the levies since 2008 (£290).

However, this focus on the *average* impact obscures the impact on low-income households upon whom energy bill levies can have a regressive impact. As an example, a low-income household who received the Warm Homes Discount (WHD) to support with bill cost but has never received any support to upgrade their insulation/ heating through a levy-funded scheme would contribute £146 a year in levy payments but receive £140 in WHD – a £5 loss.

4.1 Distributional impacts

Energy bill levies are regressive because energy costs accounts for a larger share of the household budget in low-income households (10 percent of the lowest decile households but only 1.5 percent of the most affluent). Lower-income households are also less able to make physical changes to their home so it can stay warm with less heating (lower access to finance and information or, for tenants, lack of ownership).

In this report, [Reducing inequality resulting from UK low-carbon policy](#),¹⁹ the authors explain that 2016, the poorest 10 percent of households contributed £271 million towards low-carbon policy costs, whereas over the same period, the revenue recycled to the poorest homes was £220 million. This is also a point about what types of programmes levies are used for – currently only 17 percent of the levy revenue is used to support low-income households (12 percent on demand reduction measures under ECO and 5

¹⁸ <https://www.theccc.org.uk/publication/energy-prices-and-bills-report-2017/>

¹⁹ <https://www.tandfonline.com/doi/full/10.1080/14693062.2020.1773754?scroll=top&needAccess=true>

percent on reducing the cost of energy bills through the Warm Homes Discount). This highlights that levies are more suited to programmes that support low-income households and those that reduce demand (and therefore consumer costs lessening the impact of the levy). In the example above, for example, whilst the low-income group as a whole has paid out more than it has received directly, the households who have received insulation will gain from the year-on-year bill reduction.

4.1.1 Current levies disincentivise heat pumps

As highlighted earlier, these levies predominantly sit on the electricity bill which artificially inflates the cost of electricity. Removing or reducing this levy cost will be important for improving the economic case for heat pumps. [Barrett and Owen](#), in the report cited above, suggest moving these costs to general taxation on the grounds of fairness. Their modelling suggests that this would save the lowest income group £98 a year with the highest income group paying an additional £458 a year. However, whilst *'A saving of £98 a year for the lowest income households could make a significant difference to their welfare, while an additional cost of £9 a week for the households with the highest income is relatively small'*.

6. Financing a ‘fair transition’

Options include levies, general taxation, carbon pricing or government borrowing:

- i) Consumer levies: The scale of investment required (£10bn a year from 2027 and 2048) and the regressive impact make levies the *least* good option.
- ii) General taxation: this would be a more equitable approach but might meet public resistance (if viewed as an additional tax burden).
- iii) Carbon pricing: a carbon price for heating (to reflect the relative carbon content of different fuels) will be needed for net zero to send a clear signal to the market and consumers to change behaviour. However, it is vital that this is done in a way that does not reduce heating affordability, particularly for low-income household – for example, with a carbon price that either followed or went hand-in-hand with a retrofit programme to bring overall demand down (by bringing all homes up to an adequate level). For a carbon price to be fair, all households need to be able to take act without compromising on heat.

A progressive approach such as this by [LSE](#)²⁰ could also raise revenue (£5 billion a year) to support with the transition and compensate those at risk of fuel poverty. Whilst the LSE proposals would compensate households currently in fuel poverty, we think the proposals would need to go further to ensure that heating is affordable for all.

- iv) Government borrowing: Home retrofit performs strongly as an effective economic stimulus (as this [paper](#)²¹ co-authored by the Nobel prize-winning economist, Joseph Stiglitz highlights).
- v) Using a revolving loan-fund approach: low-cost loans could be used to support households to upgrade their heating with the repayments used to support future loans. This is explained in detail overleaf.

²⁰ <http://www.lse.ac.uk/GranthamInstitute/publication/distributional-impacts-of-a-carbon-tax-in-the-uk/>

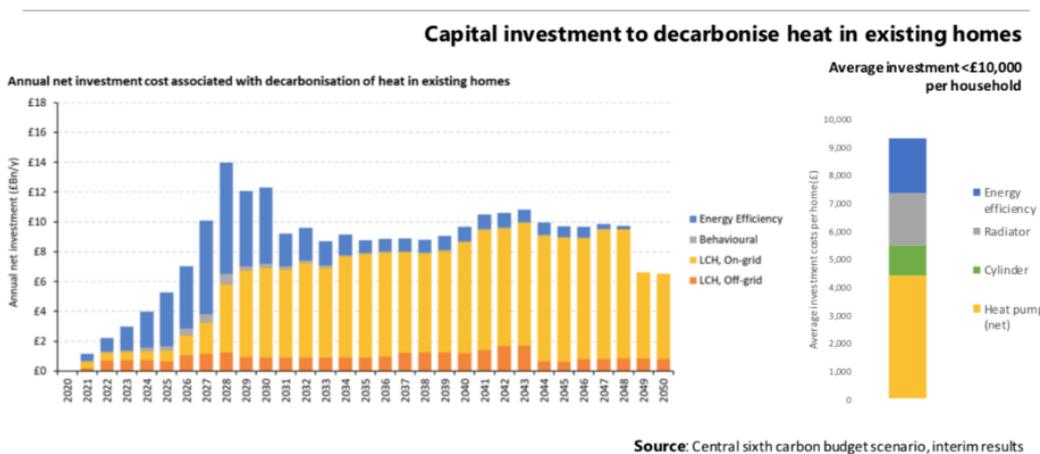
²¹ <https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf>

7. A revolving loan-fund approach

The chart below (6th Budget, December 2020) shows the capital investment required to decarbonise home heating (based on their Central Scenario which largely rests on energy efficiency, electric heat pumps and heat networks).

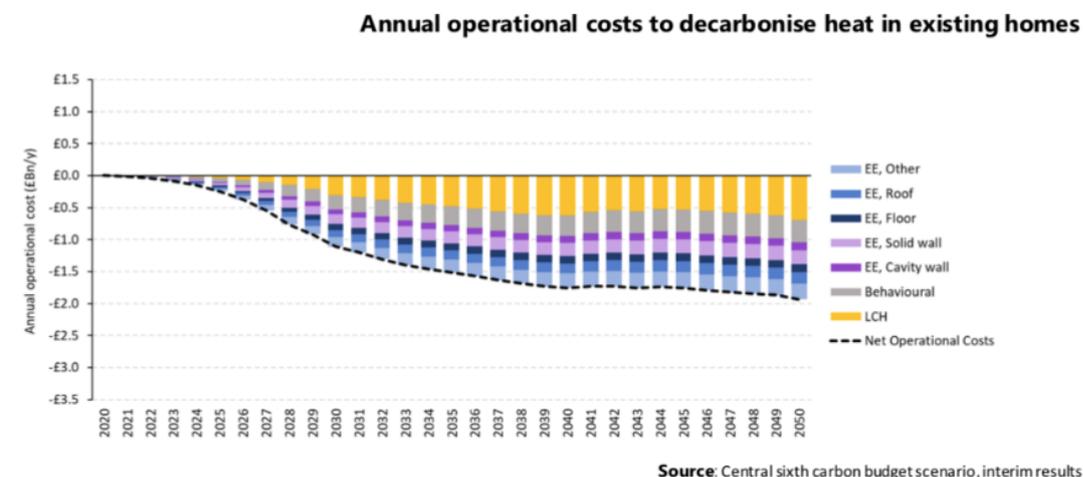
The average net investment required to retrofit each home (energy efficiency + heating) is £10,000 per home. The total investment builds from £1bn in 2021 to £6bn in 2025, peaking at £14bn in 2030. Between 2031 and 2048, investment is relatively stable ranging from £9bn to £11bn, falling to £6bn in 2049 and 2050.

Figure 4: Capital investment required to decarbonise heating



The next CCC chart shows the operational savings. By 2025 there is a net gain of £0.5bn per year rising to £1bn by 2030 (outweighing the £14bn investment costs for that year). From 2032 onwards, the net gain increases to £1.5bn and then £2bn each year.

Figure 5: Operational savings from decarbonising heating



We think that the CCC's findings, combined with the consensus on the need for government borrowing as economic stimulus, present a strong case for financing low-carbon heat on an 'invest to save' basis. This approach is well established as a means of financing energy efficiency (for example, the [Salix loan fund](#) and [Energy Performance Contracting](#) approaches).

Whilst the Energy Saving Trust has not carried out detailed modelling, the initial findings suggest that it would be possible for the government to recoup its upfront investment (or much of it) via this route (the increased VAT revenue, even at a lower rate of 5 percent, could supplement it).

The government already has a 'pay back' mechanism available – the 2013 [Green Deal](#) scheme made it possible for loan payments to sit on the property and be repaid through a surcharge on the electricity bill. An issue with the Green Deal approach was households had to repay 100 percent of the modelled savings for each measure. This meant that where the modelled savings were based on households under-heating their home (as fuel-poor households tend to), they could end up with higher bills. A better approach would be a '[shared savings](#)' approach where part of the modelled bill saving was retained by the household and part repaid.

Note: the modelled savings should not include potential savings from participating in emerging flexibility markets [such as time of use tariffs, demand switching etc. Otherwise this would penalise those less able to take part whilst still reducing the incentive to participate for those who are able.

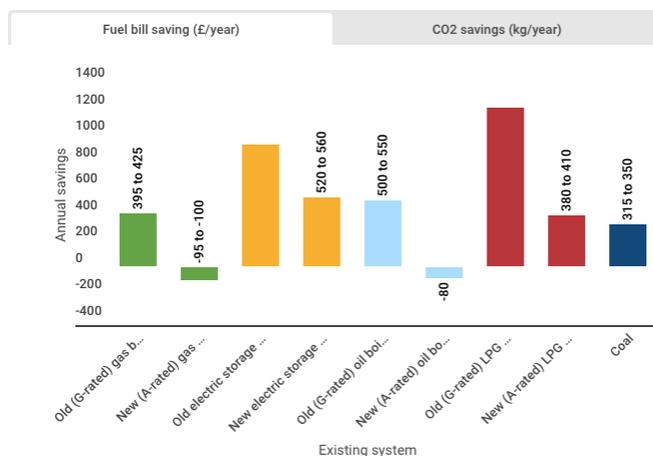
In the early years of the scheme, the public fund would be paying a high level of subsidy for each system and receiving a low level of repayments. However, as the scheme progressed and more systems were installed, each at a lower capital cost with a higher repayment rate, this would improve. The approach could be continued with replacement heat pumps installed in the late 2030s, where the 'pay-back' per system would be much better.

Energy Saving Trust [data](#) shows that the average cost of installing an air source heat pump (ASHP) (including any enabling costs like pipework changes and larger radiators) ranges from [£9-11,000](#).²² Assuming £10,000, this is £7,000 higher than the cost of a replacement oil boiler. On current rates, this switch would save the household around £500 per year (£7,500 over its 15 year lifetime).

²² <https://energysavingtrust.org.uk/advice/air-source-heat-pumps/>

Fig. 3: Comparison of running costs in heating systems (Energy Saving Trust, 2020)

Potential annual savings of installing a standard air source heat pump in an average sized, four-bedroom detached home.



Our proposal would require the government fund to provide an upfront loan of £7,000. Over a 15 year period, the fund would be repaid £3,750 in total (£250/ yr.). Here, the fund would make a net loss of £3,250 (more if the cost of capital is included). However, when the system was replaced in 2036, the economics would be very different. Economies of scale, reduced VAT etc. would mean the capital cost was significantly lower – for example, £5,000. Similar, the removal of the levies on electricity, carbon pricing and VAT changes could have increased the bill saving (compared to the oil reference system) to £1,000 per year). This time then, the government fund would pay out £2,000 in upfront costs but recoup £7,500 over the lifetime of the measure. This profit of £5,500 would outweigh the loss made on the previous system.

Conclusion

An innovative approach to financing, as outlined above, could deliver for the economy as a whole and for jobs, whilst ensuring that the transition is fair and equitable (designing out fuel poverty).

Most importantly perhaps, it has the best chance (of the options explored) of appealing to the 29 million homeowners and their tenants who need to make the changes. As the participant in the [Citizen's Advice](#)²³ research quoted earlier said:

*"I know it's going to save the environment ...
But ...what am I going to benefit from changing this?"*

²³ <https://www.citizensadvice.org.uk/about-us/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/taking-the-temperature-consumer-choice-and-low-carbon-heating/>