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How To Support Lower-Income Homes In The Heat Transition

September 2026

EXECUTIVE SUMMARY | CONTEXT

The Warm Homes Plan makes clear the importance of moving homes to clean heating. Homes and buildings account for around one fifth of UK emissions, whilst reliance on volatile international fossil-fuel markets leaves households exposed to price shocks. But more than half of households in the lowest-income fifth, the lowest of five equal income groups in the English Housing Survey (EHS), live in homes where installing an individual heat pump may be less straightforward. This does not mean those homes cannot use a heat pump. It means practical barriers around space, control of the building or the existing heating system can make an individual installation more difficult.

WHEN HEAT PUMPS AREN'T PRACTICAL

Lack of Outdoor Space

Noise Concerns

Heritage/Planning Restrictions

Leasehold Constraints in Flats

HOW HEAT BATTERIES SOLVE SPACE CONSTRAINTS

- Sit Indoors
- No External Fan
- Connect to Existing Radiators
- Avoid Major Pipework Changes

A fair transition therefore depends on whether households can access another practical and affordable clean-heating option when needed.

Consumers get the best outcome when the technology fits the home. For many homes that will be a heat pump. In some dense urban areas a heat network or shared building system may be better. In other homes a heat battery can remove practical barriers because it needs no outdoor unit and can often work with existing radiators and pipework. Technical feasibility is only the first step to identifying the right heating solution for the right home and therefore, public policy must support households to install the technology that is most suited to their specific circumstances.

These practical barriers are not evenly distributed. Lower-income households and renters are much more likely to live in homes where they overlap, and the same housing pattern is more common in more deprived constituencies. **That creates the distributional question at the heart of the report: whether the households most likely to need flexibility in the route to clean heat are also being asked to absorb the largest additional upfront cost.**

EXECUTIVE SUMMARY | FINDINGS

Lower-income households are around three times as likely to live in these homes

In the EHS 57.6% of households in the lowest-income fifth live in a flat or a home below 70 m² with its own heating system, compared with 18.7% in the highest-income fifth. These are characteristics that can make an individual heat-pump installation less straightforward.

Renters are more likely to live in these homes and have less control over what is installed

64.6% of social renters and 60.6% of private renters live in these homes, compared with 25.3% of owner occupiers. Housing providers and landlords therefore have a central role in whether renters can access a practical and affordable clean-heating option.

The same housing pattern is more common in more deprived constituencies

In the most income-deprived fifth of Westminster constituencies, 46.8% of properties in the Energy Performance Certificate (EPC) dataset are flats or homes below 70 m² with a boiler, electric storage heating or direct electric heating, compared with 33.1% in the least deprived fifth.

Policy turns a small cost difference into a much larger household bill

In DESNZ's modelled example, for a gas-heated, mid-terrace home, a heat pump costs £9,300 and a heat battery £10,200 before support. After the announced grants, the household contribution is £1,800 and £7,700 respectively. A £900 difference in installation cost becomes a £5,900 difference in what the household pays.

For a lower-income benchmark group, the heat-battery contribution is close to half of annual income after housing costs

In the second-lowest DWP income group, the illustrative £7,700 heat-battery contribution represents 44.7% of annual income after housing costs, compared with 10.4% for the heat pump contribution. That is four times the income burden.

Policy adds a second cost difference

Standalone heat batteries remain subject to 20% VAT, increasing the relative cost further.

EXECUTIVE SUMMARY | RECOMMENDATIONS

Equalise grant support

DESNZ should provide a £7,500 grant for qualifying heat batteries used for central heating once the required standards are in place, with deeper support where the amount left for the household to pay remains unaffordable.

Align VAT treatment

HM Treasury should extend VAT relief to qualifying standalone heat batteries so tax treatment does not create an additional cost difference.

Target additional support where needed

DESNZ should provide deeper financial support where households cannot afford the remaining upfront contribution, particularly in lower-income households.

Improve housing suitability modelling

DESNZ should model practical delivery as well as thermal capability, including flats, small homes, rented or leasehold properties where practical barriers can overlap.

Ensure technology-neutral policy design

Support should reflect the clean-heating option that works best for the home, including heat networks where they are the best solution, rather than defaulting to a single technology.

Public policy should support households to install the clean-heating technology that is most suited to their specific circumstances, on comparable and affordable financial terms.

EXECUTIVE SUMMARY | KEY STATS

THE POLICY-CREATED AFFORDABILITY GAP

HEAT PUMP ROUTE

£7,500

GRANT
0% VAT
Total Cost Difference:
+£9,300

HEAT BATTERY ROUTE

£2,500

GRANT
20% VAT (Penalty)
Total Cost Difference:
+£10,200

A £900 Cost Difference Becomes a £5,900 Burden

While heat pumps receive substantial support, heat batteries receive 66% less funding despite filling a critical gap.

POLICY ASKS: A FAIRER TRANSITION

Grant Parity: £7,500 for Heat Batteries

Match the Boiler Upgrade Scheme grant for qualifying heat batteries to ensure the most workable route is also the most affordable.

Remove the VAT Disparity

Extend 8% VAT to standalone heat batteries to level the playing field with other clean-heat technologies.

Deeper Support for the Vulnerable

Extend 8% VAT to standalone heat batteries to level the playing field with other clean-heat technologies.

57.6%

Lowest Income Quintile Face Housing Constraints

Compare to 18.7% of the highest income quintile; the households least able to pay are the most likely to need alternative pathways.

46%

of UK families have under £1,500 in savings

Making the £7,700 residual cost of a heat battery an insurmountable barrier without parity in support.

CONTENTS

Three questions sit at the heart of this report:

1. **Need**: What is the right technology for the right home?
2. **Affordability**: What upfront contribution is expected of homes suited to heat batteries?
3. **Fairness**: What impact does current policy design have on questions of equality?

Together, these questions test whether consumer choice in the Warm Homes Plan is real in practice. A pathway that a household cannot or struggles to install or finance is not a meaningful choice.

INTRODUCTION

Homes and buildings account for around one fifth of UK emissions. Government is therefore seeking to move homes towards clean heating through the Boiler Upgrade Scheme (BUS), the Warm Homes Plan and other policies. BUS provides £7,500 towards air-to-water and ground-source heat pumps and aims to deliver more than 450,000 heat-pump installations a year by 2030. Heat networks remain an important part of the wider strategy, particularly in dense urban areas. The question for this report is not whether households should simply remain on their existing fossil fuel system, but whether the transition offers each home a practical and affordable clean-heating option.

Consumers should be able to use the clean-heating technology that best fits their home. For many homes that will be an individual heat pump. In some dense urban areas a heat network or shared system may be better. Elsewhere age, space, planning, leases, heritage, rurality, and the cost or disruption of enabling work can make a standard installation harder to deliver. The policy question is whether households can access the right solution on fair terms, not whether one technology can theoretically serve most homes..

What is a heat battery?

A heat battery is an appliance that stores energy as heat and releases it later for space heating or hot water.

They can be charged in two main ways. A direct heat battery, the focus of this report, converts electricity into heat within the appliance. An indirect heat battery stores heat supplied by another technology, such as a heat pump or solar-thermal system.

By storing heat, electrically charged heat batteries do not have to use electricity at the same time as the household needs heating. They can instead charge when electricity is cheaper or more abundant, which has the added system benefit of helping to reduce demand at peak times.

Heat batteries offer more practical advantages too. The battery itself does not require an outdoor unit, and some designs can store substantial amounts of heat in a relatively compact space. Heat batteries can also often work with existing heating and hot-water systems, potentially reducing the need for alterations to the home.

1.NEED: FINDING THE RIGHT TECHNOLOGY FOR THE RIGHT HOME

DESNZ modelling found that a low- or high-temperature heat pump could meet the thermal needs of 98% of fossil-fuel-heated homes with that figure based on two metrics: peak heat loss and electricity-supply capacity. It does **not** test whether:

1. There is space for an outdoor unit;
2. The household controls the relevant wall or land;
3. Any enabling work is required; or
4. The household can finance the installation.

Evidence from the DESNZ-funded Heat Pump Ready programme shows that technical capability is only part of the picture. Projects also had to consider whether homes had enough space, whether installations would require disruptive work, whether residents could afford the remaining cost and whether they were willing and able to navigate the installation process.

A heat pump may therefore be capable of heating a home while still being difficult to install or finance in practice.

For some homes, a direct heat battery may offer a more practical alternative because it does not require an outdoor unit and can often work with existing radiators and pipework.

Heat batteries are not the answer in every case. In many flats a heat network, shared ground loop or individual heat pump may be better. Rather than promoting any single technology, the ‘Need’ question simply asks a narrower fairness question: if government recognises that homes need different routes, why should a household receive much less help because its most workable route stores heat rather than extracts it?

1.NEED: FINDING THE RIGHT TECHNOLOGY FOR THE RIGHT HOME

WHERE A DIRECT HEAT BATTERY CAN REDUCE PRACTICAL BARRIERS

PRACTICAL BARRIER	HOW A HEAT BATTERY CAN HELP
No acceptable outdoor location, or close neighbours	A direct heat battery is installed indoors and has no outdoor unit, avoiding the need to find suitable external space and removing outdoor operating noise.
Planning and heritage restrictions on external equipment	Because no outdoor unit is required, installation generally involves fewer changes to the outside of the building. This can avoid some planning and heritage restrictions, although normal requirements for internal work still apply.
Cost and disruption of changes to radiators, pipework or hot-water provision	Affecting fewer parts of the building may make installation simpler in rented and leasehold homes. Landlord or freeholder consent, and any necessary electrical work, may still be required.
Leasehold consent or limited control over walls, roof and land	Heat batteries can often connect to existing water-based systems, including radiators and underfloor heating. Some can supply hot water in a similar way to a conventional combi boiler, reducing the need to replace radiators/pipework, subject to system design and requirements.

Therefore, we can make two conclusions:

1. **Technical feasibility is only the first step to identifying the right heating solution for the right home; and**
2. **Public policy must support households to install the technology that is most suited to their specific circumstances.**

Now that we have identified the practical barriers that may face homes when deciding on how to decarbonise their heat supply, we must investigate how current public policy impacts the affordability of heat decarbonisation for these homes.

2.AFFORDABILITY: UPFRONT CONTRIBUTIONS EXPECTED OF HOMES SUITED TO HEAT BATTERIES

FLATS SHOW WHERE PRACTICAL BARRIERS CONVERGE

Flats are not a monolith; many are suitable for individual or communal heat pumps, shared loops or heat networks. Nevertheless, they represent the clearest large group where factors such as limited external space, proximity to neighbours and restricted control over the building often converge. According to ADE analysis of the 2022 to 2023 English Housing Survey (EHS), 34.3% of households in the lowest-income group live in flats, compared with only 12.5% in the highest-income group. Furthermore, 71.2% of households in flats are social or private renters.

These figures highlight that low-income households are more likely to live in flats and small terraces, which may face greater challenges in accessing certain heating technologies due to limited control over building infrastructure and external space. Similarly, when considering small terraces, we observe a comparable pattern in income distribution. According to the same survey, 51.3% of households living in small terraces are in the lowest 40% of the income distribution, compared with just 15.6% of households residing in detached homes.

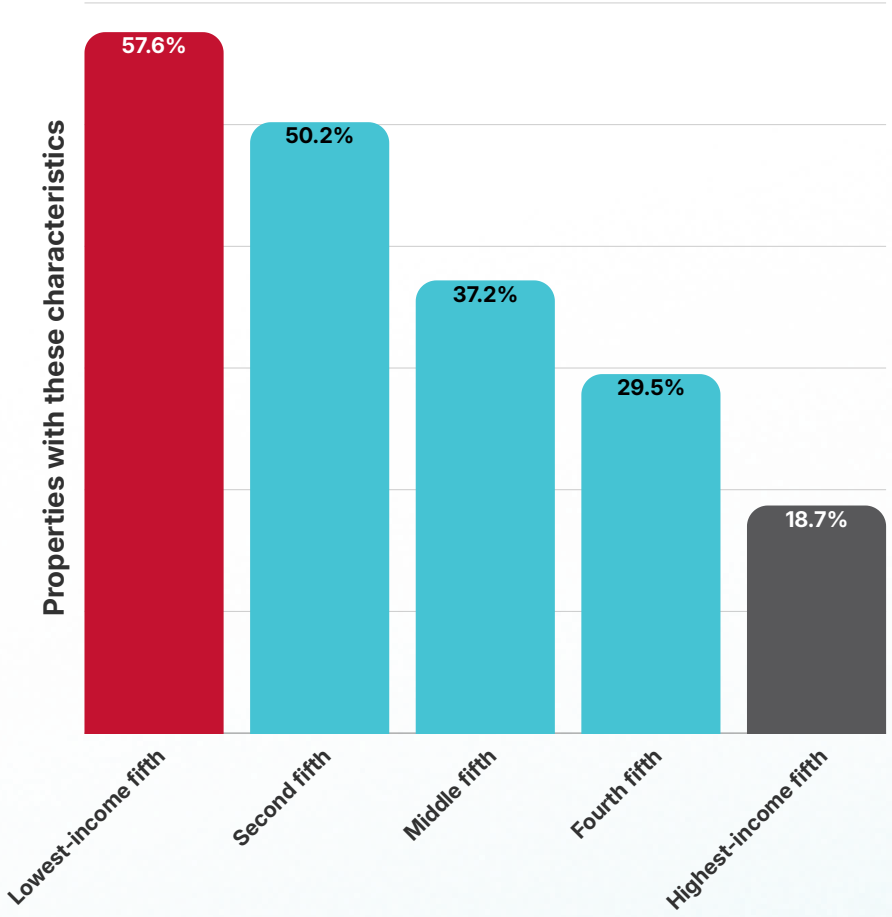
This concentration of low-income households in flats and small terraces is highly relevant for housing policy and energy solutions, as it underscores the need for targeted approaches to improve energy efficiency and heating access in these settings, where technical and practical constraints may be more pronounced.

LOWER-INCOME HOUSEHOLDS ARE MUCH MORE LIKELY TO LIVE IN THESE HOMES

We identified households living in a flat, or in a home below 70 m^2, that also has its own heating system. These homes are more likely to combine limited space, restricted control over the building and an existing heating system that may need alteration. This does not show that they cannot use a heat pump. It identifies homes where installing an individual heat pump may be more complicated, disruptive or expensive.

2.AFFORDABILITY: UPFRONT CONTRIBUTIONS EXPECTED OF HOMES SUITED TO HEAT BATTERIES

FLATS OR HOMES BELOW 70M² WITH AN INDIVIDUAL BOILER/WET-RADIATOR, STORAGE OR DIRECT-ELECTRIC HEATING SYSTEM



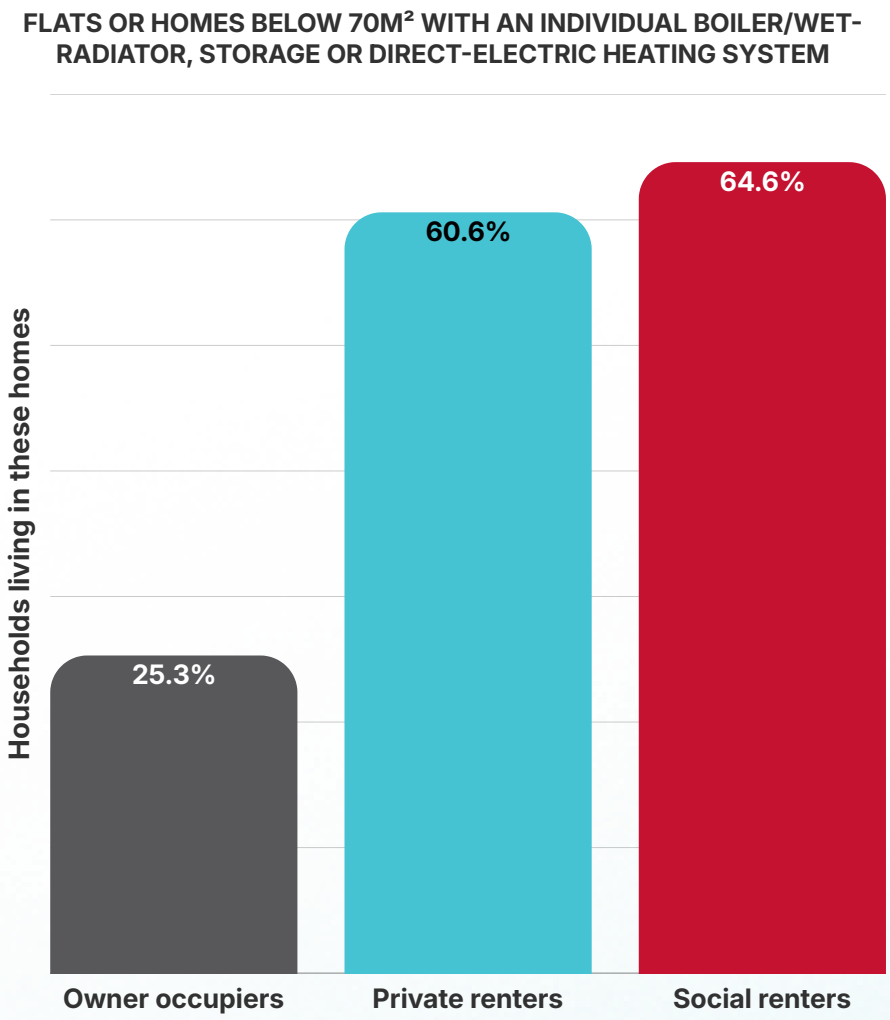
Source: ADE: Demand analysis of the 2022 to 2023 English Housing Survey. Household-weighted estimates.

The EHS divides households into five equal-sized groups based on gross household income. More than half of households in the lowest-income group, 57.6%, live in these homes. The proportion falls steadily as income rises and reaches just 18.7% among the highest-income group. In other words, the lowest-income households are about three times as likely as the highest-income households to live in housing where an individual heat-pump installation may be less straightforward.

RENTERS FACE BOTH GREATER EXPOSURE AND LESS CONTROL

The landlord will usually make the investment decision in a rented home, rather than the tenant. But tenants still experience the consequences: they have little control over whether their heating is upgraded, which technology is selected, how disruptive the work is or what the resulting energy bills will be. This matters because 64.6% of social renters and 60.6% of private renters live in the homes identified by our analysis, compared with 25.3% of owner occupiers. Housing providers and landlords will therefore be central to ensuring that renters are offered a practical and affordable route to clean heat.

2. AFFORDABILITY: UPFRONT CONTRIBUTIONS EXPECTED OF HOMES SUITED TO HEAT BATTERIES

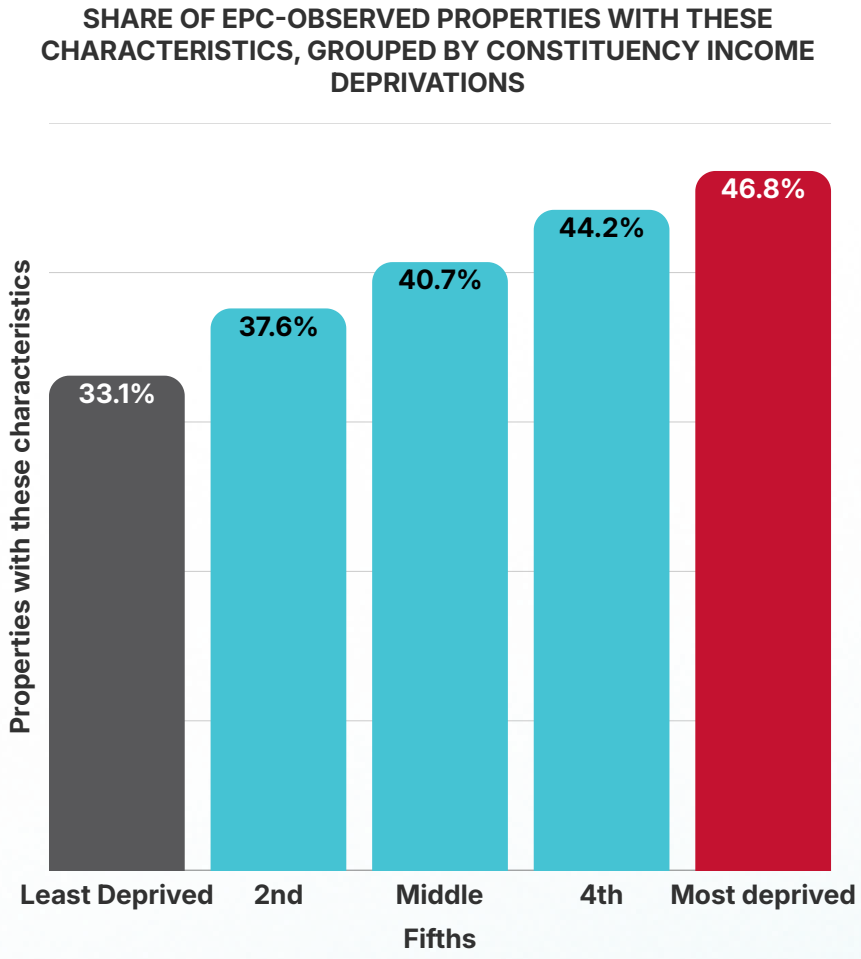


Source: ADE: Demand analysis of the 2022 to 2023 English Housing Survey. Household-weighted estimates.

THESE HOUSING CHARACTERISTICS ARE MORE COMMON IN MORE DEPRIVED CONSTITUENCIES

The household analysis uses EHS data, while the geographic analysis uses English EPC records and the English Indices of Deprivation. To make the two analyses comparable, the EPC analysis identifies flats or homes below 70 m² that also have a boiler, electric storage heating or direct electric heating. In the most income-deprived group of Westminster constituencies, 46.8% of EPC-observed properties have these characteristics, compared with 33.1% in the least deprived group. Across 13,333,070 properties in the processed EPC dataset, 5,436,341, or 40.8%, meet the definition. Islington North has the highest observed share at 77.0%, while Birmingham Ladywood has the largest observed number at 39,398 properties.

2. AFFORDABILITY: UPFRONT CONTRIBUTIONS EXPECTED OF HOMES SUITED TO HEAT BATTERIES



Source: ADE: Demand analysis of processed domestic EPC data and the English Indices of Deprivation 2025.

The EHS and EPC results answer different parts of the same question. The EHS shows who is more likely to live in flats or smaller homes with an individual heating system. The EPC and deprivation analysis shows where that same housing pattern is concentrated. Both point in the same direction, without treating area deprivation as a substitute for household income.

From the foregoing, we can make the following conclusions regarding the groups most likely to live in smaller homes that are more likely to face some of the practical barriers identified in the 'Need' section:

- **More than half of the lowest-income group, 57.6%, live in these homes;**
- **64.6% of social renters and 60.6% of private renters live in these homes and have far less control over their heat decarbonisation options; and**
- **In the most deprived English constituencies, almost half of homes (46.8%) have these characteristics.**

We must now show how the Need-Affordability interface is impacted by current Government policy for heat decarbonisation and its implications on Fairness.

TO NOTE: THE PATTERN IS NOT UNIQUELY ENGLISH

Our household-level analysis is based on the English Housing Survey. However, the same **constrained housing archetypes exist across Great Britain** and can be identified in Wales and Scotland using EPC and census data.

Wales

The same housing characteristics can be identified in Welsh EPC data.

Across 992,364 unique Welsh properties in the EPC dataset, 293,940, or 29.6% have these characteristics.

Cardiff South and Penarth has the highest observed share among Welsh Westminster constituencies, at 48.9%, representing 19,179 properties in the EPC dataset. It also has the largest observed number of properties with these characteristics.

Scotland

Scotland contains a large stock of homes with similar characteristics.

- **831,500 households (32.4%)** live in tenements or purpose-built flats
- **862,397 households** live in flats, maisonettes or apartments
- Around **63% of flat households are rented or rent-free**.
- These housing types share key constrains relevant to clean heat deployment, including limited external space, shared fabric, and reduced ability to make individual retrofit decisions.

Fuel poverty data reinforces the scale of exposure:

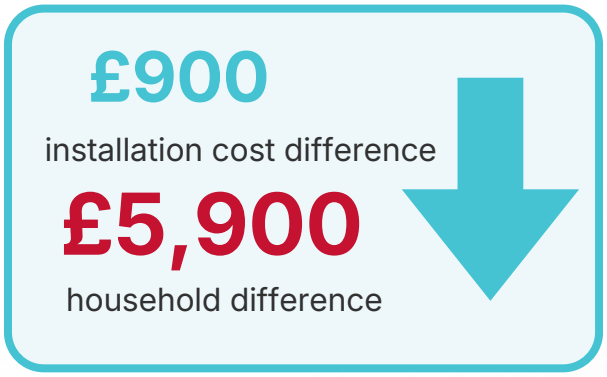
- **732,000 households** are fuel poor
- **357,000** are in extreme fuel poverty
- Flat households account for **~302,000 (41%)** of fuel-poor households
- Electricity-heated homes have a **42% fuel poverty rate vs 27% for gas**

Scotland also operates a different support system, with the **Home Energy Scotland Grant and Loan offering up to £7,500 for heat pumps**, so comparisons with England must reflect devolved policy.

What this shows - The English analysis demonstrates the **income and tenure gradient.** Wales and Scotland show that the **same physical housing constraints exist at scale across Great Britain**.

3.FAIRNESS: IDENTIFYING HOW COSTS FALL ACROSS DIFFERENT HOMES

DESNZ models installation costs across three illustrative home types: a smaller on-gas mid-terrace, a larger on-gas detached home, and a larger off-gas detached home. In the smaller mid-terrace example, the two technologies have similar modelled installation costs: £9,300 for the heat pump and £10,200 for the heat battery. The difference is £900. But the heat pump receives a £7,500 grant while the announced heat-battery grant is £2,500. After support, the household would therefore pay £1,800 for the heat pump or £7,700 for the heat battery. Policy turns a £900 difference in installation cost into a £5,900 difference in what the household has to find.



	HEAT PUMP	HEAT BATTERY	DIFFERENCE
Installed cost	£9,300	£10,200	Heat battery costs £900 more
BUS grant	£7,500	£2,500	Heat-pump grant is £5,000 larger
Left to pay	£1,800	£7,700	Heat-battery household pays £5,900 more

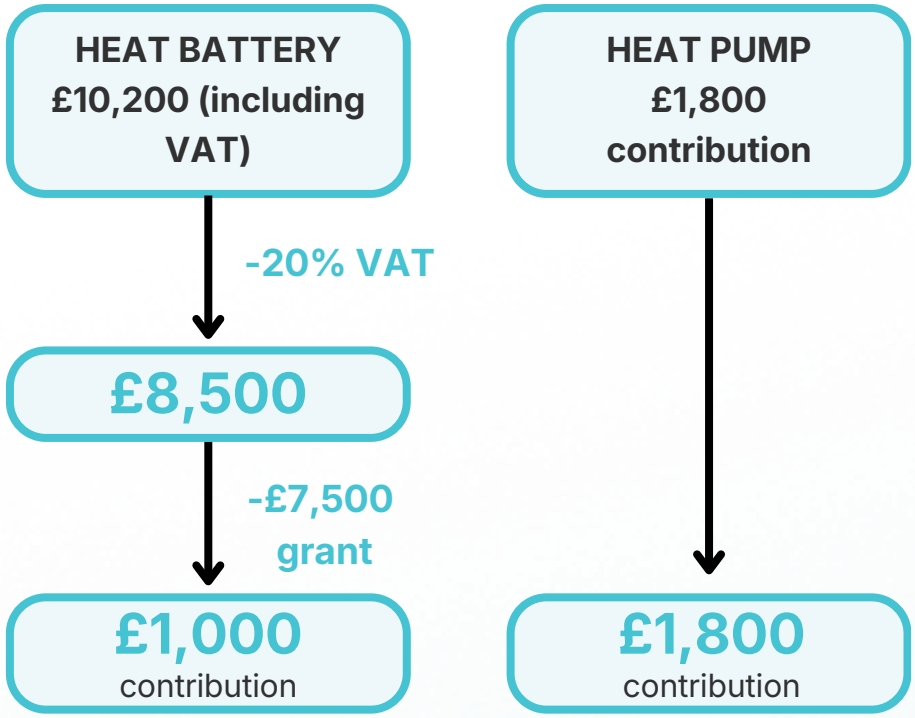
The precise gap varies with the property. Across DESNZ's three published home examples, the heat-battery household contribution remains higher after support, but the gap ranges from £600 to £5,900. A major limitation is that DESNZ does not publish a comparable cost example for a flat or leasehold home, so the smaller-home figure should not be generalised to flats or to the housing stock as a whole. That missing example is itself important: current modelling does not capture the homes where practical barriers most often overlap.

3.FAIRNESS: IDENTIFYING HOW COSTS FALL ACROSS DIFFERENT HOMES

VAT treatment adds a second policy difference. DESNZ's £10,200 heat-battery estimate includes 20% VAT. Removing it reduces the modelled cost to £8,500. With a £7,500 grant, the household contribution would fall to £1,000, below the £1,800 heat-pump contribution in the same scenario. Equal grant support and equal VAT treatment would therefore close the illustrative gap without requiring heat batteries to be cheaper than heat pumps in every home.

A HEAT BATTERY COULD REQUIRE ALMOST HALF A LOWER-INCOME HOUSEHOLD'S ANNUAL INCOME

The same upfront payment places a much greater burden on a household with a low income. Department for Work and Pensions (DWP) data divides people into ten equal-sized groups according to their household income after housing costs, from lowest to highest. We use the second-lowest income group as an illustrative lower-income benchmark because the lowest can include unusually low or temporarily negative reported incomes. Median annual income after housing costs in this group is £17,228. A £7,700 heat-battery contribution would equal 44.7% of that income, compared with 10.4% for the £1,800 heat-pump contribution. This is an illustration of affordability, not a claim that every household in this income group would need a heat battery.



EQUAL GRANT AND EQUAL VAT TREATMENT NARROWS THE ILLUSTRATIVE GAP

3.FAIRNESS: IDENTIFYING HOW COSTS FALL ACROSS DIFFERENT HOMES

INCOME GROUP	MEDIAN ANNUAL INCOME AFTER HOUSING COSTS	£1,800 HEAT PUMP	£7,700 HEAT BATTERY
Second-lowest tenth	£17,228	10.4%	44.7%
Middle tenth	£30,108	6.0%	25.6%
Highest tenth	£80,608	2.2%	9.6%

Income is only part of the picture. Eighteen per cent of UK families have no savings and 46% have less than £1,500. Among lone-parent families, 79% have less than £1,500. A £7,700 contribution therefore exceeds the savings held by almost half of families before any enabling work is considered.

CURRENT DELIVERY ALREADY SKEWS TOWARDS BETTER-RESOURCED HOUSEHOLDS

The 2024 BUS evaluation found that 57% of surveyed property owners had an annual household income of £52,000 or more, and 69% used savings, investments or current income to meet the remaining cost. The evaluation notes that lower-income households unable to secure finance may never have reached installation. Private renters face a different form of vulnerability. They have England's highest fuel-poverty rate by tenure, at 17.2%, and account for 34.1% of fuel-poor households despite representing 18.7% of households. The housing groups in which space and control barriers most often overlap are therefore also heavily represented by people with less control and greater exposure to high energy costs.

Therefore, we can make the following conclusions:

1. **Current Government policy disproportionately supports technologies that tend to be more suited to higher-income homes;**
2. **Under current policy, a heat battery could require almost half a lower-income household's annual income; and**
3. **The households facing the support gap are least able to absorb it.**

CONCLUSION AND RECOMMENDATIONS

Consolidating the above, we can make the following conclusions:

- Households with the least ability to meet a large upfront cost are also the most likely to live in homes where an individual heat-pump installation may be less straightforward.

- **57.6% of households** in the lowest-income group live in homes with these characteristics, compared with **18.7% in the highest-income group**.

- Renters are much more likely than owner occupiers to live in these homes, and the same housing characteristics are more common in the most income-deprived English constituencies.

- These households do not all need heat batteries, but they are least well served by a policy that assumes every household can follow the same route or finance a large alternative contribution.

- Government's own figures show the consequence. In the smallest modelled home, **a £900 difference in installation cost becomes a £5,900 difference after support**.

- In DWP's second-lowest income group, the illustrative heat-battery contribution is **44.7% of annual income** after housing costs.

- A nominal alternative is not a fair option if households cannot afford to use it when it is the most workable choice for their home.

- A fair policy does not need heat batteries to be right everywhere. It needs them to be properly supported where they are the most workable option.

- Matching the grant, removing the VAT disparity and targeting deeper help at households least able to pay would turn a recognised alternative into a deliverable one.

No household should have to devote a larger share of its income to decarbonising its heating simply because its home faces greater practical barriers to the route receiving the most public support.

CONCLUSION AND RECOMMENDATIONS

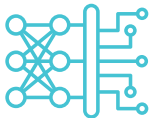
Therefore, we make the following recommendations to ensure a fairer approach to clean heat:

1. DESNZ should match support to the practical clean-heat route

Lower-income and rented households are more exposed to housing circumstances where the mainstream individual route can be constrained. DESNZ should provide a £7,500 grant for qualifying heat batteries used for central heating once the required standards are in place, with deeper support where the amount left for the household to pay remains unaffordable.

2. HM Treasury should align VAT treatment

The current tax treatment adds to the cost difference identified in the smaller-home example. HM Treasury should extend VAT relief to qualifying standalone heat batteries so tax treatment does not create an additional barrier.



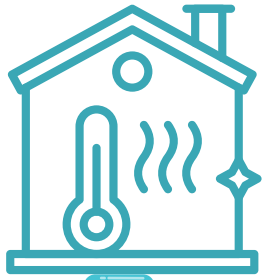
3. DESNZ should model whether clean heat can be delivered in practice, not just whether a technology can meet a home's heat demand

Flats and leasehold homes can combine practical barriers around space and control, yet DESNZ publishes no comparable cost example for a flat or leasehold home. DESNZ should add these home types to its cost modelling and assess heat networks, shared loops, individual heat pumps and heat batteries as realistic solutions for dense housing.

4. DESNZ and NESO should represent flexible thermal storage in system planning

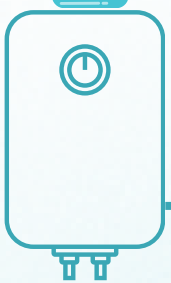
Heat batteries can shift electricity demand away from the time heat is used. Government cost modelling, tariff design and Regional Energy Strategic Plans should reflect that capability alongside technology efficiency and network impacts.

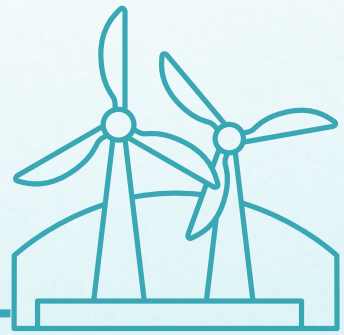
APPENDIX - WIDER BENEFITS



Heat batteries do more than provide another way to decarbonise home heating. They separate the time electricity is used from the time heat is needed. A battery can charge when power is cheaper or more abundant and release the stored heat later, without asking the household to change when it heats its home. That flexibility can make better use of renewable generation, ease pressure on local networks and help households avoid peak prices.

Running cost depends on tariff and control assumptions as well as technology efficiency. DESNZ models Economy 7 cases, while a smart appliance can respond to prices through the day. The policy implication is not that heat batteries will always be cheaper to run. It is that government cost modelling, tariff interoperability and Regional Energy Strategic Plans (RESPs) should represent the ability of thermal storage to shift electricity demand in time.





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How To Support Lower-Income Homes In The Heat Transition

ABOUT ADE: DEMAND

We seek a complete re-imagining of the role of demand in our energy system so that:

1. Demand is given equal consideration to generation
2. Every household, commercial business and industrial site has a commercially viable path to decarbonisation
3. Energy users and their assets have a day job - they shouldn't have to work around the energy system, the energy system should work around them
4. Millions of users with automated energy provision can play a major part in keeping the lights on

Without this, we are rapidly moving towards a system that is more expensive and less reliable.

LEAD AUTHOR

KEVIN O'SHEA | Policy Officer

AUTHORS

SARAH HONAN | Head of ADE: Demand

PHILIP NICHOLSON | Research & Insights Lead

DESIGNER AND PRESS CONTACT

MURAT OMERCIK | External Affairs Manager

External.Affairs@theade.co.uk

ade Demand