


A storage solution:

The role of off-peak electric heating in reducing fuel poverty



Executive summary

Fuel poverty continues to blight households across the UK. From inner-city suburbs to remote Scottish islands, Government statistics paint a bleak picture of families, couples and individuals all struggling to heat their homes due to cost.

Of course there are other factors at play. Insulation, glazing, building fabric, even the quality of installation will all affect the cost to heat a property. However, incorrect, inefficient or inadequate heating systems remain the biggest cause of financial concern in fuel poor households. This is particularly evident in electrically heated homes, but the good news is there are viable, proven responses that can help.

Clearly there is no single fix to the UK's fuel poverty epidemic, but this report highlights the most common issues faced by electrically heated homes in relation to their heating system. It also presents some of the existing technologies that could help lift almost 500,000 electrically heated households out of fuel poverty.

In doing so, it puts forward proven solutions that can help close a combined fuel poverty gap of around £160 million in England and Scotland, with demonstrable examples.

Off-peak electric heating has a major role to play in reducing UK fuel poverty. It is time to exploit the opportunities.

State of play:

Fuel poverty in England and Scotland

Using the Government's most recent data¹, 11% of households in England were living in fuel poverty in 2015, or approximately 2.5million households. The figures are even more shocking in Scotland, where almost a third of households were in fuel poverty in 2015². Of the 748,000 Scottish households living in fuel poverty, 203,000 are categorised as living in 'extreme fuel poverty', which means more than 20% of income is required to heat the property.

1. Department for Business, Energy & Industrial Strategy: Annual Fuel Poverty Statistics Report, 2017 (2015 data), June 2017
2. Scottish Government: Scottish House Condition Survey 2015

- The average fuel poverty gap in England is £353 per household
- 21.3% of households renting from a private landlord in England are fuel poor
- 23.6% of single parents with dependent children in England are living in fuel poverty
- Households in England have a total fuel poverty gap of £884 million

All figures from Department for Business, Energy & Industrial Strategy: Annual Fuel Poverty Statistics Report, 2017 (2015 data), June 2017

What is the definition of fuel poverty?

Fuel poverty in England is measured using the Low Income High Costs indicator, which considers a household to be fuel poor if:

- They have required fuel costs that are above average (the national median level)
- Were they to spend that amount, they would be left with a residual income below the official poverty line

In Scotland, a household is in fuel poverty if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income (including Housing Benefit or Income Support for Mortgage Interest) on all household fuel use.

Fuel poverty in electrically heated homes

Around 2.2million households in the UK are electrically heated, which accounts for 8.5% of all homes. This includes storage heating (1.7million), direct acting heating systems (0.5million) and heat pumps (less than 0.1million)¹.

In total, 16% of electrically heated homes in England and 50% of electrically heated homes in Scotland are living in fuel poverty - a total of 454,480 households¹.

Based on the average £353 fuel poverty gap for England, this makes an estimated accumulative fuel poverty gap of around £160million per year in electrically heated homes in England and Scotland.

Fuel poverty is not just an electric heating issue

Whilst this report focuses on the potential to reduce fuel poverty in electrically heated homes, it is important to note that 10% of mains gas fuelled households in England and 31% in Scotland are living in fuel poverty. This equates to a total of nearly 2.5 million fuel poor households heated by gas in England and Scotland¹.

Taking steps to improve the efficiency of electrically heated homes will make a difference - but electric heating systems are not alone in contributing to UK fuel poverty.

1. Ofgem: Insights paper on households with electric and other non-gas heating, 2015

Electric heating technology

The majority of whole-house electric heating systems in the UK fall under one of four categories:

Conventional static storage heaters	Draws energy during off-peak periods, released as heat through the day Technology largely unchanged since 1980s, especially older models with manual control
High heat retention heater *	Draws energy during off-peak periods Energy can be used at any time of the day or night, when required Intelligent controls which react to changes in climatic conditions and occupant behaviour
Direct acting electric heating	Direct acting electric radiators or panel heaters, no thermal storage Fast warm-up and cool-down times for individual rooms Can be disproportionately expensive if not matched to the user's lifestyle
Heat pumps	Extract energy from the air or ground to produce energy Compatible with 'wet' system radiators, but more effective with underfloor heating or fan assisted electric radiators

Each system has its own merits and different systems will be better suited to different properties based on the property type, tenure, geographical location, lifestyle of the user and other factors.

*Dimplex Quantum remains the only heating system categorised as a 'high heat retention heater' according to SAP 2012 specification criteria.

Closing the £160million gap

If we can improve the efficiency of electrically heated homes, we can reduce a combined £160 million fuel poverty gap for more than 450,000 households in England and Wales.

Of course, there are other factors outside of the heating system that can contribute to a household living in fuel poverty. Insulation, glazing and building fabric, for example, can all play a part, especially in older homes. The fact remains, however, that too many households are living with outdated or ineffective heating systems in electrically heated homes.

In fact, due to their inherent reliability the average storage heater in the UK is more than 20 years old, and around 70% of the UK's installed storage heaters are of the old, manually-controlled type.

Added value

The societal impact of lifting households out of fuel poverty extends beyond the pockets of that individual household. By reducing this £160million fuel poverty gap, we could:

Reduce excess winter deaths:

In 2014/15, the number of excess winter deaths was recorded at 49,260, of which around 14,780 were due to people living in cold homes.

Improve population health and wellbeing:

Living in fuel poverty is shown to contribute to anxiety and stress, as well as affecting a wide range of medical conditions including asthma. In some cases heating upgrades have been compared to 'prescriptions'.

Clearly, reducing the fuel poverty gap would deliver a significant cost benefit to the NHS.

The fuel poverty gap

The difference between a household's typical energy bill and the value that their bill would need to be in order for that household to come out of fuel poverty.

Responses

There are two main reasons why people are left paying over the odds for their electric heating system. Let's examine the issues and how they could be resolved using existing, proven, viable technologies.

1. Outdated technology

The issue

Of the 1.7million homes in the UK with electric storage heating, 63% have a heating system which is more than 12 years old¹. It is perhaps no surprise therefore, that seven out of ten storage heaters are manually operated¹.

The issue here is simple. In more than one million homes in the UK, legacy electric heating systems installed more than 12 years ago have become outdated and inefficient. These homeowners, private tenants and social housing tenants are unable to take advantage of the cost, comfort and controllability benefits of modern appliances.

The response

Independent research² shows the annual cost to heat a 90m² three-bedroom semi-detached house built with typical 1960s Building Regulations using manual charge storage heating and panel convector heaters on Economy 7 tariff is £1,542.

1. Ofgem: Insights paper on households with electric and other non-gas heating, 2015
2. Independent research undertaken by Advanced Control Partnerships Ltd in 2014, calculated using SAP 2012

Replacing the manual charge storage heating with high heat retention heaters such as Dimplex Quantum (at an approximate cost of £2,100 based on three heaters, including installation) would reduce the annual running cost by £418. over the typical **20 year** lifespan of the heaters.



This is a total of £8,360 over the typical 20 year lifespan of the heaters and in almost all cases would lift the household out of fuel poverty.

The Department for Communities and Local Government estimates that around 65% of all storage heated homes would benefit in EPC and fuel poverty terms from an upgrade to a high heat retention heater like Dimplex Quantum.

Responses

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2. Incorrect specification

The issue

The other main reason why electrically heated households experience disproportionate heating bills is due to incorrect specification of the heating system. An increasing number of households, particularly those in the private rental sector, use only direct acting heating systems, which can mean they are paying over the odds if it has not been correctly matched to the lifestyle of the user.

This is evident in the following statistics:

- 13% of homes in England and 48% of households in Scotland with electric storage heating are living in fuel poverty
- 23% of homes in England and 68% of households in Scotland with electric direct acting heating are living in fuel poverty

The issue here is in the specification of the heating system, not in its quality or cost. Direct acting heating appliances have their purposes; they are best suited to very well insulated properties, or in conservatories, bathrooms and bedrooms where heat is required in short bursts rather than throughout the day.

The key to cost-effective electric heating, however, is to match a combination of high heat retention and direct acting appliances to the lifestyle of the user.

The response

Independent research¹ shows that the annual cost to heat a 90m² three-bedroom semi-detached house (built with typical 1960s Building Regulations) using only direct acting electric radiators is £2,099, based on a standard tariff.

1. Independent research undertaken by Advanced Control Partnerships Ltd in 2014, calculated using SAP 2012

If two or three of the heaters were upgraded to high heat retention heaters,

the household could save up to £975 per year on heating bills, or a total of **£19,500** over the typical **20 year** lifespan of the heaters.



These upgrades would cost somewhere in the region of £1,400 - £2,100 including installation, dependent on if two or three heaters were required.

A helping hand? Funding support

This report demonstrates the ongoing savings that could be made by upgrading an electric heating system with high heat retention heaters. Inevitably this does not come without a cost and whilst it is lower than the cost of connecting gas and installing a new gas central heating system (where it is practical to do so), it is still a substantial capital investment for any homeowner or landlord.

Having shown the demonstrable improvements that could be made, the answer should lie in any one of a number of Government funding support programmes schemes, designed to facilitate energy efficiency improvements in UK homes.

However, there is not currently enough support for electrically heated homes.

Even though an enormous number of people in electrically heated homes have no other viable fuel option, electric heating systems are either excluded from some of the UK's most successful energy efficiency improvement funding programmes, such as the Warm Homes fund, or the scoring method or qualification criteria are too difficult to meet, as in the case of the Energy Company Obligation "ECO2t" HHCRO scheme administered by Ofgem.

As a result, these schemes are failing to offer support to many homes which need it most - missing the opportunity to contribute towards closing a £160million fuel poverty gap.

Case study: Electric heating upgrades

Partially upgrading a system of manual electric storage heaters to a combination of Dimplex Quantum and Q-Rad heaters is all it took for homeowner *Amy Ahmed-Dolphin* to cut her heating bills by more than £500 per year – and improve comfort and controllability too.

Amy bought her first house in 2004, a two-bedroom, ex-local authority, end of terrace property in the picturesque hamlet of Rowington, Warwickshire. Due to its rural location the majority of the village is situated off the gas grid, including the Ahmed-Dolphin home, which was heated using manual electric night storage heater technology dating back around 30 years.

After 11 years in the house, Amy and her husband Saleem researched how they could reduce heating bills in the 1960s property, which also suffers heat loss due to poor insulation.

They discovered Dimplex Quantum, a unique off-peak system which enables users to store energy during cheaper, off-peak periods and use it when they want it, through the day and night. With the support of the Dimplex heating design team, Amy replaced one of the three storage heaters with a Dimplex Quantum heater, added a further Quantum heater to the kitchen, and also added a Dimplex Q-Rad electric radiator in the hallway.

She said: *“At the point we upgraded the heating system, we were paying an average direct debit of £119 per month to the energy company. Now, we’ve dropped to an average of less than £73 per month. That’s a saving of more than £500 across the year – and on those calculations we’re expecting the upgrade to pay for itself in around five years.*

“And the best thing of all is that we didn’t even have to replace all the heaters. We upgraded one storage heater and added new appliances in the kitchen and the hall, but we kept the original storage heaters in the two upstairs bedrooms. And the results still surpassed our expectations.”

Conclusion

Fuel poverty remains a serious issue in the UK. For young and old, families and couples, the disproportionate cost of heating can cause stress, illness and worse.

But this report shows it does not have to be the case in electrically heated homes. The technologies are available, the payback periods are justifiable and the ongoing savings that can be achieved are real.

By extending funding support for energy efficiency improvements to electrically heated homes, we could facilitate millions of additional electric heating upgrades. We could replace the ageing storage heating systems and address the incorrect specifications which are contributing to a fuel poverty gap of around £160million. And we could improve daily life for millions of homeowners, private tenants and social housing residents across the UK.

The role of off-peak electric heating in reducing fuel poverty

This report was compiled by
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