Warm Homes Fund
Programme Evaluation

Abridged second interim report

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Authors

Gareth Powells, Newcastle University
Matthew Scott, National Energy Action
Helen Stockton, National Energy Action
Kevin Jobson, Energy Audit Company
Caitlin Robinson, Liverpool University

1. PROGRESS TO DATE

This report presents a summary of the findings from the second interim report of the programme wide evaluation of Affordable Warmth Solutions' (AWS) industry-funded Warm Homes Fund (WHF). The WHF is one of the largest fuel poverty programmes across Great Britain, representing private sector investment from National Grid of £150m.[1] The evaluation is being delivered over a period of 41 months by Newcastle University, National Energy Action (NEA), and Energy Audit Company (EAC), who together comprise the WHF Programme Evaluation Consortium. It involves three waves of consecutive research activity, aimed at capturing insights from different cohorts of WHF project delivery organisations and beneficiary households. At the time of writing the evaluation has just passed the halfway delivery point (month 24).

This summary report presents early and interim findings from the second wave of research. For the first time, this included two new modelling activities:

1. domestic energy use: the energy usage of beneficiary households was modelled and used to examine the impact of interventions on their fuel poverty status and running costs.
2. economic modelling: to estimate potential effects of the WHF investment on the wider UK economy.

The first interim report (April 2020) included qualitative insights from WHF beneficiary households and delivery partners.[2] At that time, very limited insights were available from the first wave of survey fieldwork. Since then, a second wave of fieldwork has been undertaken and a preliminary analysis of responses from both Wave 1 and Wave 2 is provided in this report, based on data collected to the end of March 2021.

Not included in this second interim report is analysis from the indoor environmental monitoring strand of the evaluation. Disruption resulting from the Covid-19 pandemic and limitations on home visits to place monitoring equipment meant fieldwork was delayed. This analysis will be included in the third and final interim report due in Spring 2022.

EVALUATION OBJECTIVES

- Determine the social and economic impacts from the WHF investment.
- Develop a framework of appropriate input, output and impact measures which will provide a basis on which delivery performance can be assessed.
- Determine the extent to which the support has reached the households most in need and any regional differences.
- Produce a blueprint model to inform policy makers on options for delivering future large-scale energy efficiency programmes.

COMING NEXT

- Third interim report: Spring 2022
- Final report: December 2022

2. ENERGY MODELLING: IMPACT ON FUEL POVERTY AND ENERGY CONSUMPTION

The analysis presented in this section is an interim output from innovative energy modelling and scenario forecasting. This modelling is used to calculate the impact of the WHF Category 1 and Category 2[3] interventions on fuel poverty[4] and household running costs. It uses UNO[5] software, produced by EAC, to model these indicators both before and after the installation of new heating systems and, where applicable, any other improvement measures.

The interim analysis in this section is based on the records of 9,898 homes that received Category 1 or Category 2 interventions through the Warm Homes Fund.[6] For each of these homes, two sources of data were utilised to produce the results of the energy modelling. The first is the returns data supplied to the Warm Homes Fund by individual projects, which includes the address of beneficiary households, the eligibility route for each household, what measures were installed, and the approximate ages of the residents. The address data was then used to match and extract bulk EPC data, which is available from Open Data Communities (ODC), a repository of publicly accessible data which is administered by Ministry of Housing, Communities and Local Government (MHCLG). This resulted in the final EPC dataset of 9,898 homes used in the analysis.

Each of these homes received improvements through one of four eligibility routes, and for each of these routes an income figure was assigned.[7] For the affordable warmth benefits and fuel poverty routes, a low income figure of £9,000 was chosen.[8] For ECO flex, the designated income was taken from the definition of low income used in the corresponding local authority's criteria. For the route based on the Index of Multiple Deprivation (IMD), there was not a way to directly estimate income levels. In the absence of other data, a figure of £9,000 was chosen for households that qualified through the IMD route and were recorded in WHF returns data as in receipt of benefits.[9] For households that qualified through the IMD route but were not in receipt of benefits, the national median income was used (£21,333).[10]

2.1. Analysing the effects of improvements

The improvements made to recipient homes have had a substantial effect on the required running costs of those homes. Figure 2.1. below displays the number of homes that were added or removed from each running cost band after improvements were made.

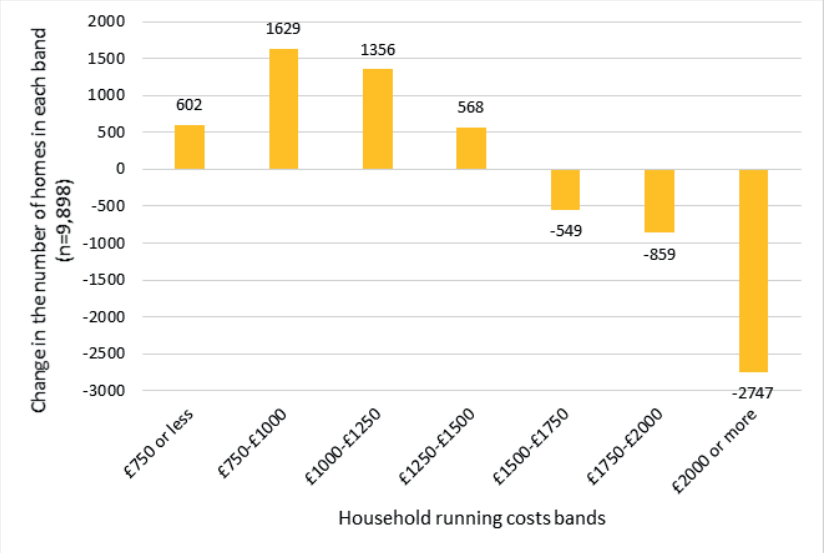


Figure 2.1. shows the number of homes that were added or removed from each running cost band after improvements were made. It shows that the number of homes with running costs above £1,500 decreased by 4,155 (42%).

Before making improvements over 3,000 (30.3%) homes had annual running costs above £2,000[11] and after making improvements the number of homes left in this band was fewer than 400 (~4%). Mean annual running costs shifted from £1,853 to £1,227, or to put it another way, on average the installation of a new heating system **saved households £626 per year**.

The large drop in running costs is attributed to the installation of more efficient heating systems, moving homes from the high-cost brackets to the low-cost ones. This resulted in the average fuel poverty gap[12] reducing from £852 to £298. For some households (approximately 4,000), this was not sufficient to lift them out of fuel poverty. However, the reduction in the average fuel poverty gap of over £500 (65%) greatly reduced the severity of fuel poverty experienced by these households.

Overall, the number of households in fuel poverty (LIHC) was reduced by 33.8% (from 6,094 households to 4,031 households), and as the analysis of the median fuel poverty gap reveals, for those that remained fuel poor, the severity was substantially reduced. Pre-intervention 61.6% of households met the definition of fuel poverty (LIHC) whereas post-intervention 40.7% did so.

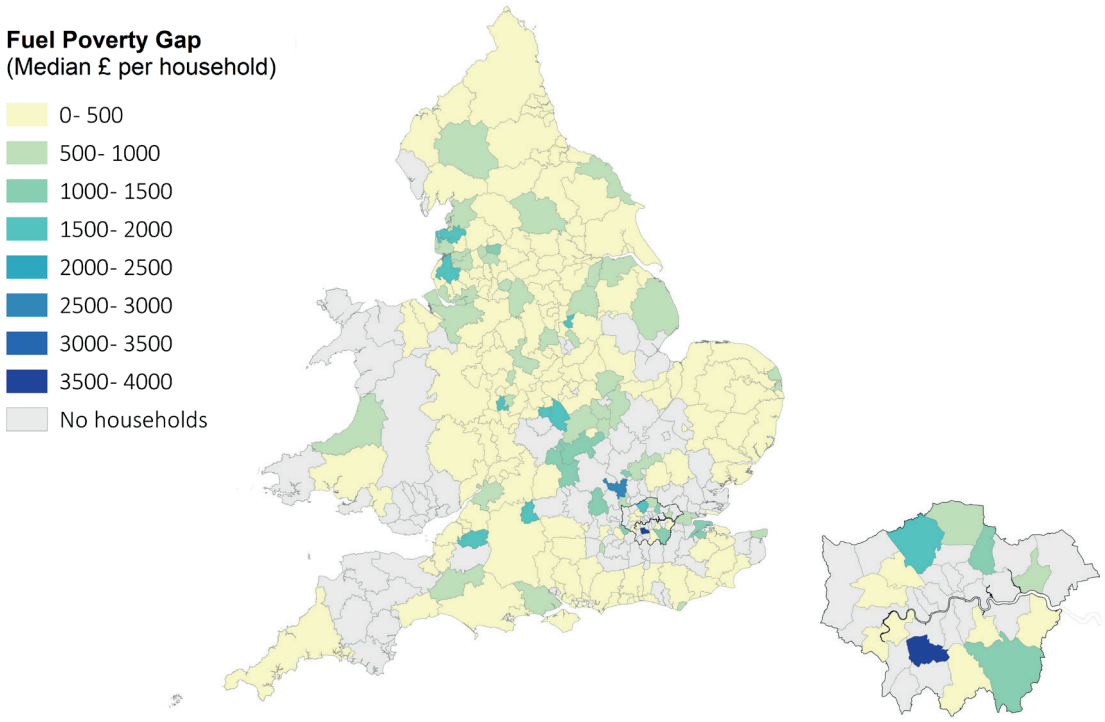
Required running costs were reduced by £626pa (average)

The average fuel poverty gap was reduced by 65% (average)

Fuel poverty was reduced by a third

The flow of households from one quadrant of the fuel poverty indicator to another post-intervention is shown in Figure 2.2. below, and in Figure 2.3. the median reduction in fuel poverty gap is shown for local authorities with WHF projects in England and Wales.

Figure 2.2. Sankey diagram showing the flow of households from each quadrant of the Low Income High Costs fuel poverty indicator after their installation. It shows that while approximately two thirds of LIHC households remained in that quadrant post-intervention, approximately one third were moved into the Low Income Low Costs quadrant, and thus out of fuel poverty.



2.3. Map showing the median reduction in the fuel poverty gap in local authorities with WHF projects in England and Wales, mapped in increments of £500.

3. ECONOMIC IMPACT OF THE WARM HOMES FUND

Understanding the impact of the WHF beyond the immediate grant recipients and beneficiary households forms a part of the evaluation's impact assessment. One strand of this is an assessment of the wider economic impact of the programme's £150m investment. Economic impact analysis was undertaken using ONS multiplier coefficients that consider how money is spent, re-spent and circulated in the economy, in order to estimate the wider impacts on different economic sectors.

As part of this, a social accounting matrix (SAM) was used to model the likely re-spending of household income, as well as the effects of the reductions in spending by energy firms. A SAM provides summary data on the flows of money between different actors (e.g., firms, households, government) in an economy. The SAM used in this analysis was developed and published by researchers at Strathclyde University,[13] and was chosen primarily because it is the only British SAM which disaggregates households into income groups. The approach taken here is informed by SAM-based modelling of the wider economic impacts of energy efficiency policy undertaken by colleagues at Strathclyde University and well-established approaches to estimating economic multiplier effects.[14] This disaggregation enables an analysis which is attuned to the re-spending of the low income households targeted by the WHF.

The findings presented in this section are interim and should be treated as 'in progress'. The evaluation team will continue to work with more data and to refine the methodology. However, to date, two effects have been observed:

3.1. Capital expenditure to enable the benefits (effect one)

The first effect of the WHF is a transfer of capital into three sectors: housing, construction and installation (of measures) which created a boost in demand in these sectors. The analysis of direct and indirect effects throughout the economy suggests that the transfer of this investment (capital expenditure) will create around **£100m of increased demand across the economy, over and above the eventual investment of £150m.**

Negative multiplier effects		Positive multiplier effects	
Reduced Gross Surplus in Economy (industry profit donated to the WHF)	-£150m	New demand in construction and retrofit sectors	£150m
Total multiplier effects of this reduction in industry profit	-£207m	Total multiplier effects of this increased demand	£307m
Negative multiplier coefficient	-1.38	Positive multiplier coefficient	2.04
Net economic effect of the capital investment	£100m demand boost		

Table 3.1. Interim and provisional economic impact analysis of capital expenditure using ONS multiplier coefficients.

As Table 3.1. above shows, this effect has been caused because the positive multiplier coefficient for the housing, construction, and installer sectors is greater than the negative multiplier coefficient. Accordingly, the positive economic effect of the investment in these sectors is greater than the negative multiplier effects, resulting in a positive net economic effect of a £100m demand boost in

the economy compared to what would have happened had the WHF not been funded. In addition, the grant funding distributed by the WHF has been used to enable match-funded projects and installations. Quantifying the total value of the leveraged funding, and the wider economic impact after multiplier effects of that larger sum will be considered in future analyses, data permitting.

3.2. Realising the benefits of reduced running costs (effect two)

The second effect observed is an annual reduction in the flow of money from low income households to energy companies due to reduced running costs associated with new heating systems. Recognising that there will likely be a post-intervention rebound effect (savings taken in comfort), a coefficient estimated at 0.25 has been accounted for.[15] That is, energy demand has reduced, thus energy bills are lower than they would have been otherwise. But, as well as reduced running costs, the investment has allowed for higher standards of thermal comfort (warmth). While we cannot be certain about the extent of this rebound effect, the 0.25 co-efficient applied means that we can estimate a reduction in spending of 75% of the modelled running cost reduction to account for savings taken in comfort. Overall, the net economic effect of the energy interventions, accounting for negative multipliers (of reduced money flowing to energy supply companies) and positive multipliers (of increased disposable income for consumers) it is estimated that the **WHF investment has stimulated £900,000 (net) in increased demand in the economy, annually** (see Table 3.2. below).

Negative multiplier effects		**Positive multiplier effects**	
Initial reduced annual demand for energy services	-£3.4m	Initial increased annual disposable income	£3.4m
1st Round: Reduced annual spending as a result	-£2.2m	1st Round: Annual re-spending	£2.7m
2nd Round: Multiplied reduced annual re-spending	-£2.6m	2nd Round: Multiplied annual re-spending	£2.9m
Total reduction in re-spending	-£4.8m	Total re-spending	£5.7m
Direct to indirect effects coefficient	-2.40	Direct to indirect effects coefficient	2.67
Net economic effect of energy interventions over 10 years	**£900k increased demand in the economy annually**		

Table 3.2. Interim and provisional economic impact analysis of the effects of the changes to household running costs.

3.3. Redistribution of demand in the economy

While the aggregate impacts of the WHF grants are summarised above, the ways in which the WHF measures have led to different economic impacts for different sectors of the economy can be assessed by showing which sectors have experienced boosted and reduced demand because of the WHF funding (see Table 3.3. below). These effects are perhaps the most significant as they show the likely impacts of the funding across the economy rather than net aggregate effects.

Redistributive effects of the capital expenditure	Redistributive effects of the reduced running costs
The £150m investment when considered as 'income' for suppliers (of interventions) is re-spent and circulates in the economy. Where this circulates is not evenly distributed, but provisionally those sectors where re-spending is most likely to occur include: ➢ Labour (pointing to jobs creation) ➢ Building construction sectors ➢ Gross operating surplus ➢ Services	The energy bill savings also have the effect of creating a re-spending boost in the economy over several rounds. The distribution of this throughout different sectors of the economy has also been estimated. Of the total bill savings, £2.7m is modelled to have been re-spent in the economy in a first round of re-spending. This re-spent disposable income then creates multiplier effects throughout the economy, in a second round of economic impacts valued at £2.9m. The reverse of this effect is that spending by energy companies is reduced. The sectors impacted by these positive and negative multiplier effects are different: **Sectors primarily benefiting from household re-spending:** ➢ Services sector ➢ Accommodation and food services ➢ Wholesale and retail **Sectors primarily impacted by reduced spending by energy companies:** ➢ Energy industry

Table 3.3. Redistribution of demand in the economy

3.4. Targeting low income households

Finally, a comparison was made between the modelled economic impacts of the WHF measures, and the likely impacts they would have had were they not targeted at low income households. The SAM used in this analysis disaggregates the spending patterns of households by income quintile, resulting in five income groups with observably different spending patterns, rates of saving and taxation liabilities. In other words, boosting the incomes of households with different incomes leads to different economic impacts, and this can be modelled by the SAM.

Targeting low income households creates a boost in economic demand that is 19.1% greater than no targeting

This preliminary analysis shows that the targeting of interventions at low income households boosts demand in the economy more than would have been likely had measures been targeted at average income homes (£5.6m compared to £4.7m). This difference can be explained by the different sectors of the economy in which low income households spend disposable income, the proportion of income paid in tax, and their propensity to spend rather than save, compared to average income households. Because of this, interventions targeted at this group do not just help the beneficiaries themselves, they have stronger economic benefits for the wider economy compared to untargeted interventions.

4. BENEFICIARY HOUSEHOLD SURVEY ANALYSIS

To date, 2,573 questionnaires have been distributed to beneficiaries of 19 WHF projects as part of Wave 2 of the household survey fieldwork. At the time of writing, 465 responses have been received, with 403 of these included for analysis in this interim report. In line with the evaluation's aim of providing a cumulative analysis of impacts, questionnaire data from Wave 1 was also included within this analysis. Consequently, the total number of questionnaires analysed in this section is 472. Interim analysis of these questionnaire responses shows a range of positive impacts on WHF beneficiary households that complement the findings of the energy modelling and economic modelling.

4.1. Affordable Warmth

Post-intervention, WHF households were significantly more likely to report improvement in their ability to achieve affordable warmth. **The proportion that said they could keep their whole house warm following intervention increased more than threefold – from 21.6% to 78.6%** (see Figure 4.1.).

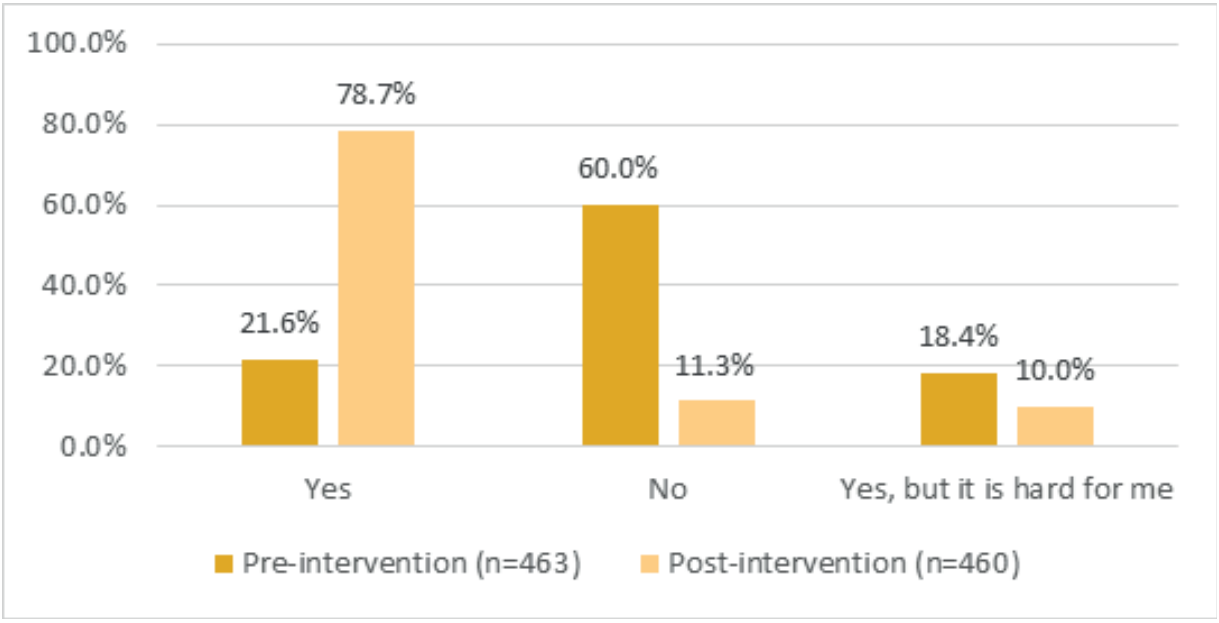


Figure 4.1. Before and after you received your new measures/health and energy-related support, could you/can you keep your whole house warm when it was/is cold outside?

Respondents also reported improvements in how comfortable the temperature is in their home, how well their house keeps the heat in, how much control they have over their heating system, and how easy they find their heating system to use. The data also shows that **approximately half of respondents found their energy bills easier to afford following their intervention.** Indeed, analysis shows that 48.4% of respondents felt their energy bills are now more affordable compared to before they received support from their respective WHF projects. Just over a quarter (27.9%) felt there had been no change, and a smaller proportion of 9.6% felt there had been an increase in the cost of their energy compared to before they received support. Finally, 13.6% responded that it was too early to tell whether their interventions would result in changes in energy affordability. It is likely that this small proportion of households were not able to assess any changes to their energy bill as they had not yet received a bill for the period since intervention, and/or did not have the heating system installed for a long enough period.

There were also significant and welcome reductions in energy rationing practices (e.g. using the heating less often than would be liked), financial vulnerability, and levels of financial stress and worry. While rationing practices have not been eliminated, there have been substantial reductions in the most frequent and arguably most harmful forms of rationing. Taken as a whole, evidence to date suggests that **WHF funded support has helped facilitate household budgets that are less pressured, less stressful to manage, and less likely to require harmful rationing practices to stay out of the red**.

4.2. Health and wellbeing

Given the challenges of the pandemic, it is noteworthy that 42.8% of respondents rated their mental health as much better or a little better than before their WHF intervention, and only 5.9% rated their mental health as worse than before. Furthermore, exactly half of respondents rated their physical health as much better or a little better than before (see Figure 4.2. below).

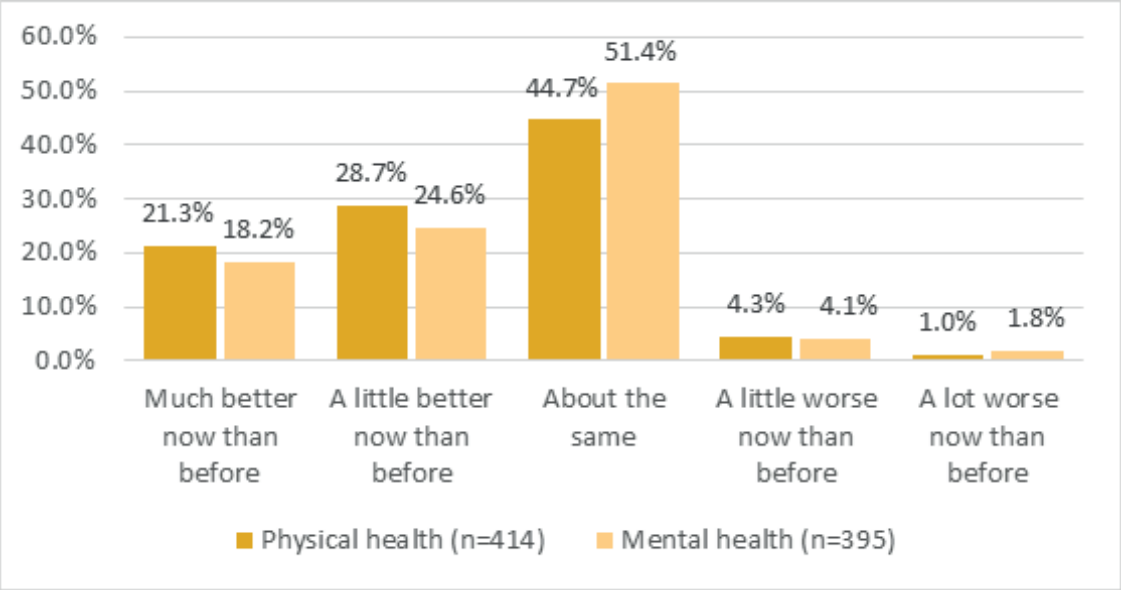


Figure 4.2. Compared to before you received your energy related measures/health and/or energy related support, how would you now describe the physical health and mental health of your household in general?

Any improvements in physical and/or mental health cannot be definitively tied to the WHF funded interventions received by households. Notably, however, just over 60% of respondents said it was probable or very probable that positive changes in their mental and physical health were because of the support they received, with approximately 30% suggesting that they were not sure, but that it was possible. Further quantitative analysis will attempt to disaggregate perceived improvements in physical and mental health by health condition and further qualitative research will explore this in detail. For now, **it can be concluded that the majority of respondents who experienced positive changes in mental or physical health thought it was probable or very probable this happened because of the WHF funded support they received**, a finding which correlates with the qualitative evidence presented in the first interim report.

Lastly, it is worth noting that a large proportion of the questionnaire responses included in this analysis were from households surveyed after the beginning of the Covid-19 pandemic (i.e., in Wave 2 of fieldwork). This suggests that **Wave 2 beneficiary households have been helped to be warmer and**

healthier at home at the exact time they have been forced to spend more time at home, and at a time when additional pressure has been placed on their health, particularly their mental health, by the pandemic.

4.3. Scheme satisfaction

Lastly, **overall satisfaction levels were high**. Just under 90% of respondents said they were satisfied or very satisfied with the scheme overall. Satisfaction with other aspects of scheme delivery such as communication (77%), standard of works (80%), and quality of advice (72%) were also high. While these results are positive overall, the ≈10% of respondents who were dissatisfied with different elements of their WHF project should be examined in more detail. Any issues these respondents experienced will be explored in further quantitative analysis and in upcoming qualitative interviews with beneficiaries.

5. CONCLUSIONS AND NEXT STEPS

5.1. Interim conclusions

At this interim stage in the evaluation, it is too early to derive firm conclusions against the aims and objectives stated in the introduction. However, at this point the following conclusions are emerging.

WHF interventions are lifting households out of fuel poverty, and reducing the severity of fuel poverty among others

Energy modelling analysis has shown that the improvements made to beneficiary homes have had a substantial effect on the required running costs and fuel poverty status of those homes. After improvements were made, the number of homes with running costs above £1,500 decreased by 4,155 (42%), and on average the installation of a new heating system saved households £626 per year. This brought thousands of households out of fuel poverty and even for those households who remained fuel poor, as defined under the LIHC definition, a very significant reduction to their depth of fuel poverty (average fuel poverty gap) post-intervention was achieved. In total, the number of households in fuel poverty (LIHC) reduced by 33.8% (from 6,094 households to 4,031 households), and the average fuel poverty gap reduced from £852 to £298 – a reduction of over £500 - for those still defined as fuel poor. Further analysis will disaggregate these changes by funding Category and technology type, and will explore any patterns or relationships in the data.

The WHF investment has produced greater demand in the national economy, greater than it would have been had the programme not been targeted at low income households

Drawing on the outputs of the energy modelling, innovative economic modelling estimates that the transfer of investment from National Grid into the housing, construction, and installation sectors appears to have created around £100m of increased demand across the economy, over and above the eventual total investment of £150m. In addition, the modelling suggests around £900,000 of increased demand in the economy annually stemming from reductions in household running costs, which leads to beneficiary households having more income to spend in other parts of the economy.

From this, it has been possible to estimate the possible impacts of the WHF had it not been tightly targeted at low income households. Boosting the incomes of households in the lower quintile of the income distribution leads to different economic impacts than if any boost was distributed

evenly across all households, due to different spending and saving patterns and different levels of taxation associated with different income groups. The modelling suggests that targeting low income households creates a boost in economic demand that is around 19% greater than if the funding was untargeted. Put differently, interventions targeted at this group do not just help the beneficiaries themselves, they have stronger economic benefits for the wider economy compared to untargeted interventions. The outputs of the economic modelling are provisional, and will continue to be refined as the evaluation moves into its final stages. However, it is apparent that as well as reducing levels of fuel poverty, targeting energy efficiency measures and heating system installations at low income households creates bigger and broader economic impacts than if these measures had been untargeted.

Beneficiary households are three times as likely to report that they keep comfortably warm at home post-intervention

The outputs of the energy and economic modelling are complemented by the findings from the household survey. This analysis shows that the proportion of respondents who said they could keep their whole house warm increased more than threefold, from 21.6% to 78.6%, and approximately half of respondents found their energy bills easier to afford after receiving an intervention. There were also welcome reductions in the self-reported frequency of energy rationing practices and levels of financial vulnerability, suggesting that the WHF has been crucial to facilitating households budgets that do not require harmful rationing practices to remain manageable.

WHF interventions are improving physical and mental health

Lastly and perhaps most notably, 40-50% of respondents said their physical and/or mental health was now better than before their WHF intervention, with just over 60% of these attributing this change to their WHF intervention. For those surveyed in Spring 2021 in particular, this suggests that beneficiary homes have become warmer and healthier at the exact juncture their occupants have been forced to spend more time in those homes, and at a time when severe pressure has been exerted on their health, especially their mental health, by the ongoing pandemic.

5.2. Next steps

At the time of writing, fieldwork and analysis from Wave 2 of the research activity is ongoing. The evaluation team is currently concluding a series of qualitative, in-depth interviews with WHF beneficiary households. A second wave of interviews with WHF project delivery personnel is also in progress. These activities will contribute directly to the development of holistic case studies that will illustrate the multiple trajectories taken by different projects, from project inception through to delivery and impact at the operational and household levels. These case studies will feature in the final report.

More widely, the analysis presented in this report, in combination with the changing contexts and priorities of national and devolved energy policy, will feed into the final stages of the evaluation. Most prominently, the evaluation team will soon begin work on developing a 'blueprint' to inform policymakers, practitioners, and relevant actors across industry on the options for delivering large-scale energy efficiency and fuel poverty programmes in the future. The development of the blueprint will take place in consultation with the WHF team and will integrate data and insight from every strand of the evaluation, including the testimonies and experiences of WHF projects and beneficiary

households. The blueprint will also be informed by statistical analysis of the evaluation's large energy performance dataset and modelled outputs to identify the factors associated with the greatest social, economic and environmental impacts.

Next steps will also involve analysis to understand the issue of churn among fuel-poor households, and the extent to which WHF beneficiary households were futureproofed from fuel poverty. Churn refers to the likelihood of households falling in and out of fuel poverty year on year, depending on the interaction of fuel prices, household incomes, the national median income, and the overall poverty line. Successive increases to the energy price cap in 2021 and the £20 Universal Credit uplift have both underscored the vulnerability of households in or at risk of fuel poverty to fluctuations in energy costs and income changes. At the same time, much of the analysis conducted so far presents a snapshot of a households' circumstances at a particular point in time, typically just before and after measures have been installed or an intervention has taken place. This means any possible longer-term impact of the WHF on households is not accounted for. To address this, the evaluation will calculate and estimate:

- Fuel poverty status before measures were installed
- Fuel poverty status immediately after measures were installed
- Fuel poverty status after two years
- Fuel poverty status after five years
- Fuel poverty status after ten years

This analysis will enable an assessment of the extent to which the WHF has futureproofed households from fuel poverty, and will inform thinking about scenarios based on different possible changes in income and fuel prices in the future.

Finally, the evaluation will begin integrating and synthesising data from the different strands of analysis discussed in this report. Until now, the strands of analysis have proceeded in relative isolation, with, for example, the household questionnaire findings examined separately to the energy modelling outputs. In the coming months the evaluation will draw together these strands to build an innovative, multi-layered analysis of specific intervention types, household characteristics, and impacts. This will enable a qualification of the outputs of the energy and economic modelling (e.g. an assessment of the extent to which modelled changes in household running costs reflects actual and perceived energy bill savings reported by households), as well as a continual refinement of emerging conclusions (e.g. an assessment of the extent to which the characteristics of households qualifying through specific eligibility routes correlates with the targeting methods and experiences of project delivery personnel). This process of triangulation will cement the validity of the final evaluation conclusions and the development of a blueprint for future policy intervention by ensuring that the findings are based on a convergence of data from each strand of analysis and consultation with stakeholders.

Endnotes

1 The WHF was established in 2017 and is administered by Community Interest Company Affordable Warmth Solutions.

2 WHF Programme Evaluation Consortium (2020) Abridged interim report.

3 Category 1 is focused on urban homes and communities, primarily through first time gas central heating systems; Category 2 is focused on rural homes and off gas communities, primarily through 'non-gas' solutions such as LPG or heat pumps. The WHF includes two further categories: Category 3, which is focused on advice, health, and energy efficiency related solutions to fuel poverty, and Category 3 (Park Homes), which is focused on the extension of mains gas to park home sites. Future modelling will examine the impact of Category 3 interventions on household incomes, and further quantitative analysis will disaggregate questionnaire findings by WHF funding Category.

4 Analysis is based on the Low Income High Cost (LIHC) definition of fuel poverty. In 2021 a new definition of fuel poverty was introduced by the UK government for England. This new definition is known as Low Income, Low Energy Efficiency (LILEE). The WHF however, is predicated on the previous LIHC definition and delivery to date has been based on it. For the final report results using both definitions will be published.

5 UNO is a domestic energy efficiency database software package that is used by local authorities and other housing providers across the country to model the energy performance of their housing stock.

6 However, this analysis currently excludes Scotland as the EPC data required for the calculations is not yet available.

7 The eligibility criteria used by the WHF are as follows: 1) affordable warmth benefits, whereby one or more of the household occupants is in receipt of a means-tested benefit; 2) ECO flex, whereby the household qualifies for assistance through meeting the local authority's flexible eligibility criteria; 3) fuel poverty, whereby the household has had a fuel poverty assessment carried out; 4) Index of Multiple Deprivation, whereby the household is located in a Lower Super Output Area which is in the top 25% of most deprived areas in the country.

8 Household occupants in receipt of means tested benefits are highly likely to meet the low income requirement of fuel poverty calculations, as are households that had already been assessed as fuel poor. £9,000 was therefore chosen as a suitably low income for these eligibility routes. The £9,000 value was chosen based on an analysis of household incomes and benefit eligibility carried out as part of a study into the effectiveness of LIHC assessment tools. For more information on this study see Moore, R; Wilkinson, B. and Jobson, K. (2017) An Assessment Tool for Low Income/High Costs (LIHC) Fuel Poverty (Three-stage Project) Research Report to the Joseph Rowntree Foundation, Citizens Advice, National Energy Action and EAGA Charitable Trust.

9 Project return data includes a column recording whether or not a household occupant is in receipt of benefits. However, it is unknown whether the benefits received by the household occupant refers to a means tested benefit, or a benefit largely unrelated to income (such as child benefit). In the absence of other data, it was assumed that this record refers to a means tested benefit, and an income estimate of £9,000 was therefore used. This figure is based on the same reasoning discussed in footnote 8 above.

10 The median income figure is taken from the 2019 English Housing Survey.

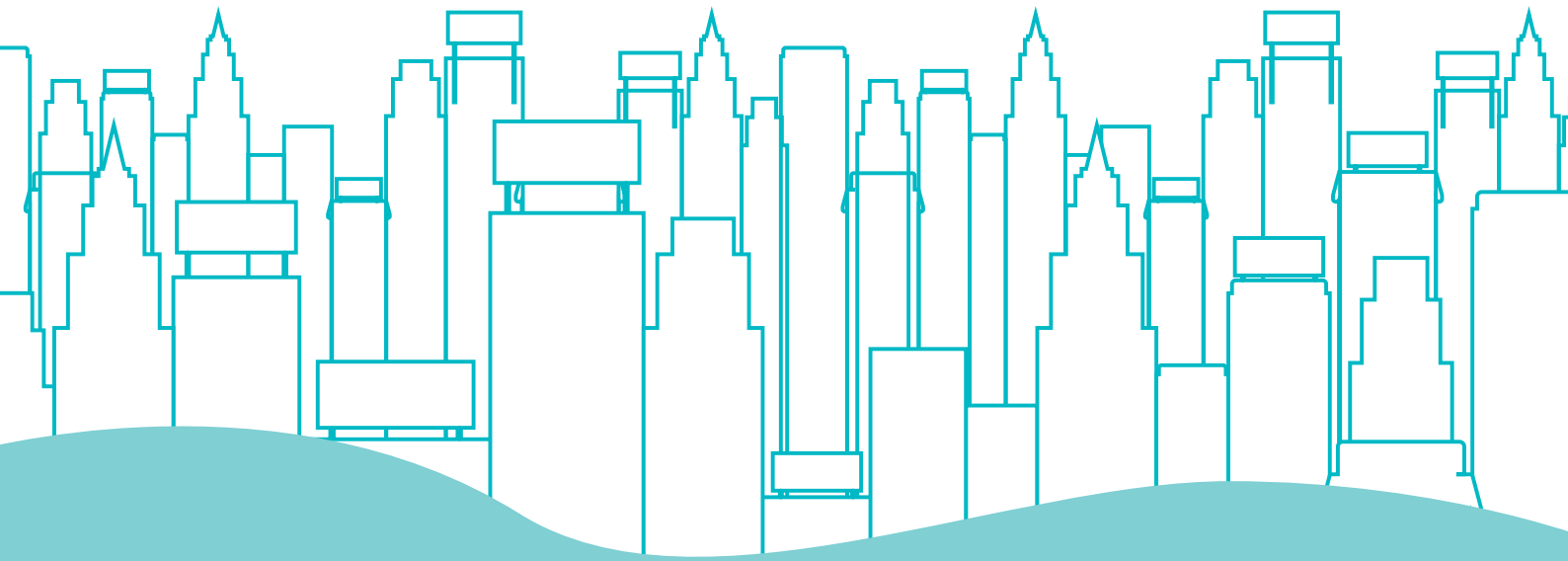
11 The national average is approximately £1223 per year. This analysis was undertaken before the announcement, in August 2021, that the energy price cap would be increased by £139 for direct debit customers and £153 for prepayment customers. Future fuel poverty scenario and churn analysis will estimate the extent to which changing energy prices and incomes impact on the fuel poverty status of households over a longer period of time.

12 The amount the running costs would have to drop by for the home not to be considered fuel poor anymore. It is used as a measure of the severity of fuel poverty.

13 Katris, A; Figus, G. and Greig, A. (2019) The 2013 Social Accounting Matrix for Scotland disaggregated by household income quintiles.

14 For examples of energy research that has used this approach, see: Figus, G; Lecca, P; McGregor, P. and Turner, K. (2019) Energy efficiency as an instrument of regional development policy? The impact of regional fiscal autonomy, Regional Studies 53 (6): 815-825; Katris, A; Turner, K. and Vishwakarma, K. (2020) Funding UK Residential Energy Efficiency: The economy-wide impacts of ECO and its alternatives. Policy briefing, University of Strathclyde.

15 This coefficient is based on a review of the relevant academic literature. See Barker, T; Ekins, P. and Foxon, T. (2007) The macro-economic rebound effect and the UK economy, Energy Policy 35 (10): 4935-4946; Sorrell, S; Dimitropoulos, J. and Sommerville, M. (2009) Empirical estimates of the direct rebound effect: A review, Energy Policy 37 (4): 1356-1371; Gillingham, K; Kotchen, M.J; Rapson, D.S. and Wagner, G. (2013) The rebound effect is overplayed, Nature 493 (7433): 475-476.



Action for Warm Homes

NATIONAL ENERGY ACTION

The national fuel poverty and energy efficiency charity

West One, Forth Banks, Newcastle upon Tyne, NE1 3PA

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