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OF YORKSHIRE COUNCIL

# Exploring the Impact of Energy Efficient Measures on Health Outcomes in Rural Communities- a postnote

Report as of **july 31, 2025**

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# Background

- Energy efficiency reduces waste, emissions, and costs while improving living conditions.
- Technologies include solar panels, heat pumps, efficient cookstoves, and improved insulation.
- Rural areas face higher fuel poverty due to poor insulation, outdated heating, and off-grid status.
- Indoor air pollution from traditional fuels increases respiratory and cardiovascular risks.

## Box 1: Current Picture

- **2.2 million households** are in fuel poverty; rural areas are most affected (DBEIS, 2022).
- **Over 40% of rural homes** use oil, coal, or wood for heating (Baltruszewicz et al., 2022).
- Poor insulation contributes to **excess winter deaths**, especially in rural areas (National Institute for Health and Care Excellence, 2019).
- **Energy-efficient technology uptake** (e.g., heat pumps, solar) is **below 15%** in rural communities (English Housing Survey, 2023).

# Research Aim & Objectives

## Box 2: Study aims

- To investigate how the installation of energy-efficient measures, such as air-source heat pumps, solar panels, and enhanced insulation, can help reduce fuel poverty in rural households while contributing to decarbonisation efforts.
- To explore the potential health benefits of these measures, focusing on both physical health and mental wellbeing

## Box 3: Research Questions

- How do energy-efficient measures affect fuel poverty in rural communities?
- What is the impact of energy-efficient measures on the physical health of residents (e.g., respiratory conditions, cardiovascular health)?
- How do energy-efficient measures contribute to improved mental health and wellbeing (e.g., reduced stress from energy costs, increased comfort)?

## Methods

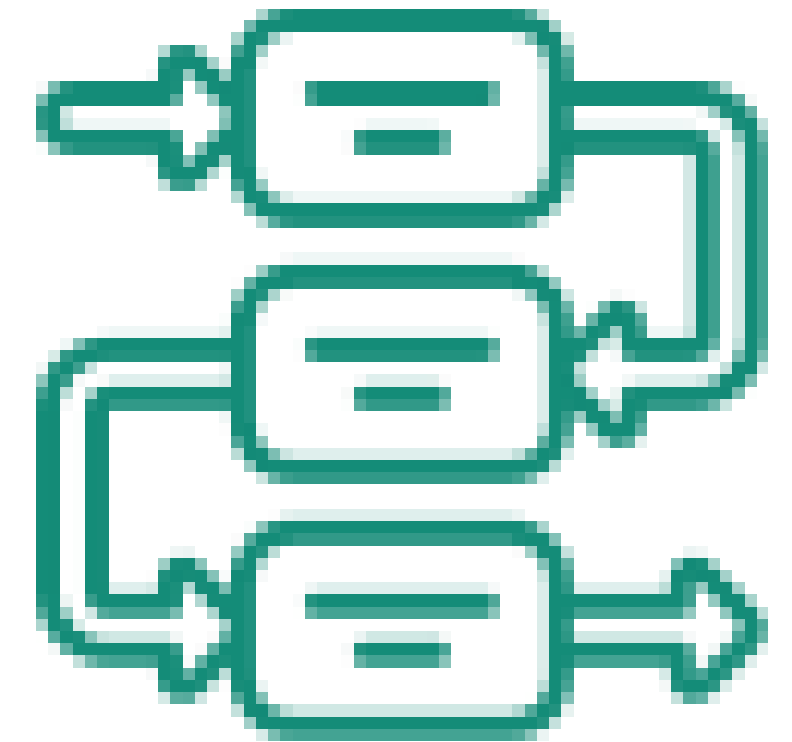


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**Data collection:** April–July 2025 through Smart–Survey.

**Data storage and analysis:** Data was anonymised and stored on the councils systems, in compliance with the ERYC policies. Data cleaning and preparation for analysis were done as per Saunders et al., 2019.

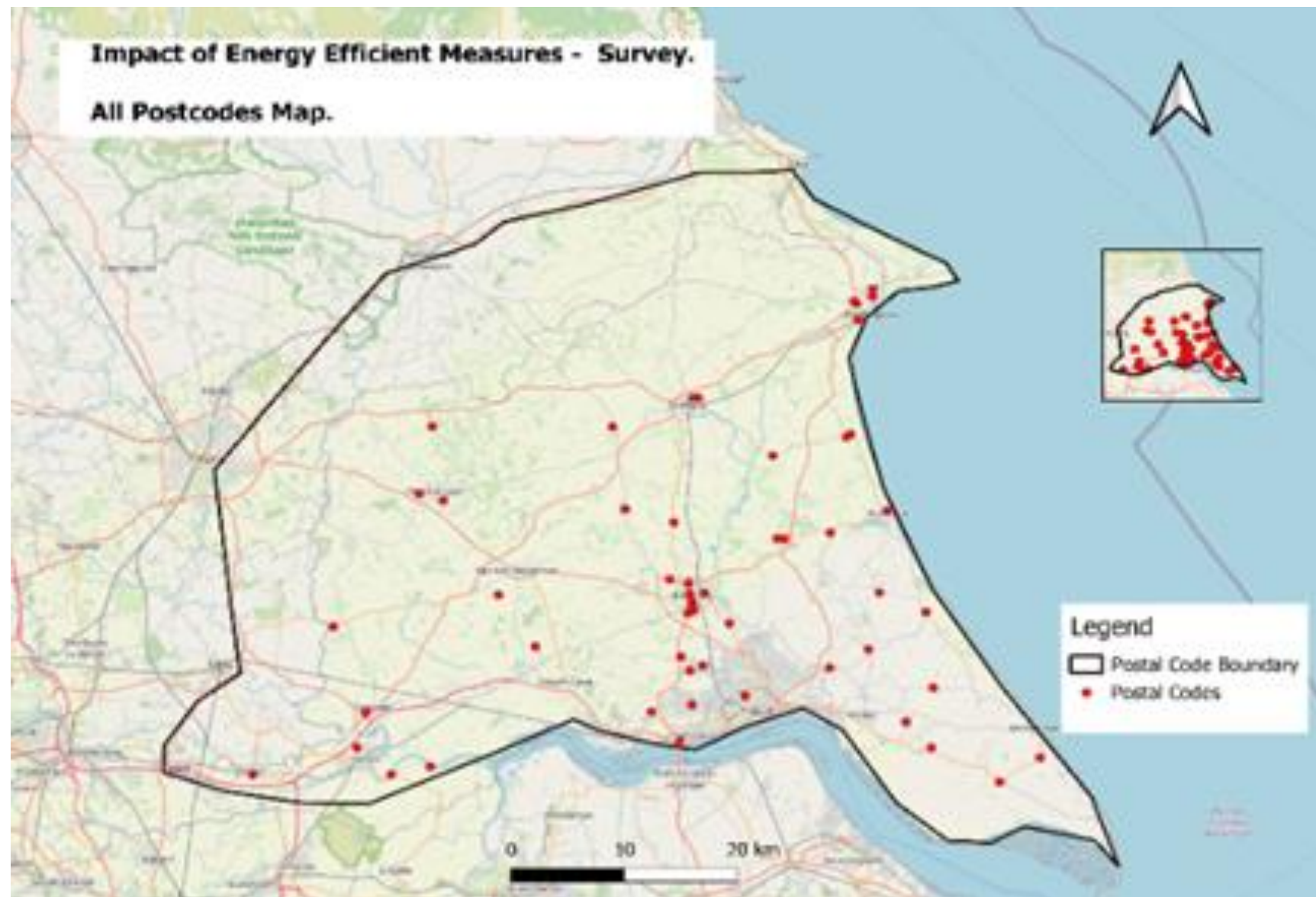
**Governance:** This project was approved by the ERYC



# Results

## Participant numbers and locations

Representative sample across the Sampled Area (Figure 1 and Box 4).



**Figure 1: Maps including the postcodes from all survey respondents as red dots.**

### Box 4: Participant demographics

- 70 residents aged 18 and above participated in the study across multiple rural areas.
- **Housing types:** Most lived in detached (37%) or semi-detached homes (30%).
- **Ownership:** 79% of participants lived in privately owned homes.
- **Gender:** 52% female, 45% male, 3% identified as non-binary or preferred not to say.
- **Ethnicity:** 88% identified as White; others included Black British and Asian British.
- **Age distribution:** The Majority (61%) were aged between 45–74 years.
- **Disability status:** 68% reported no disability; common conditions included mental health and long-standing health issues.

# Key Findings -Fuel Poverty

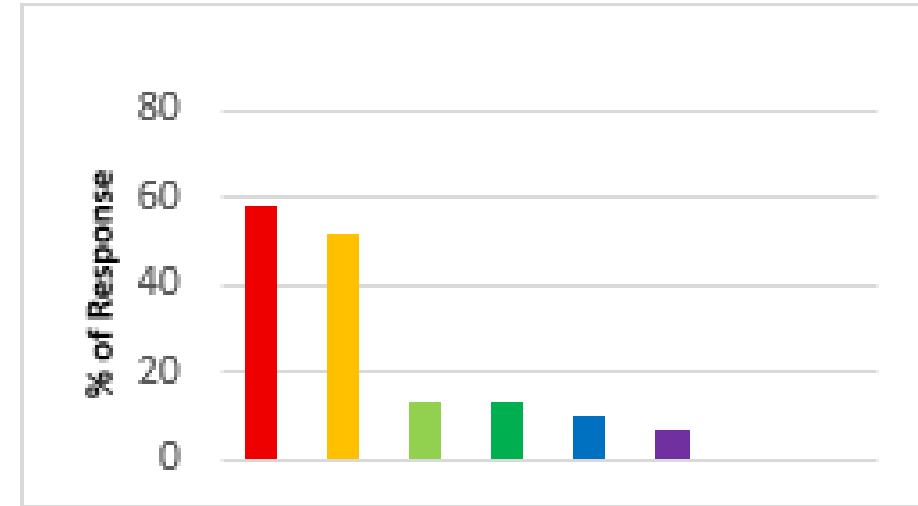


## RQ1:How do energy-efficient measures affect fuel poverty in rural communities?

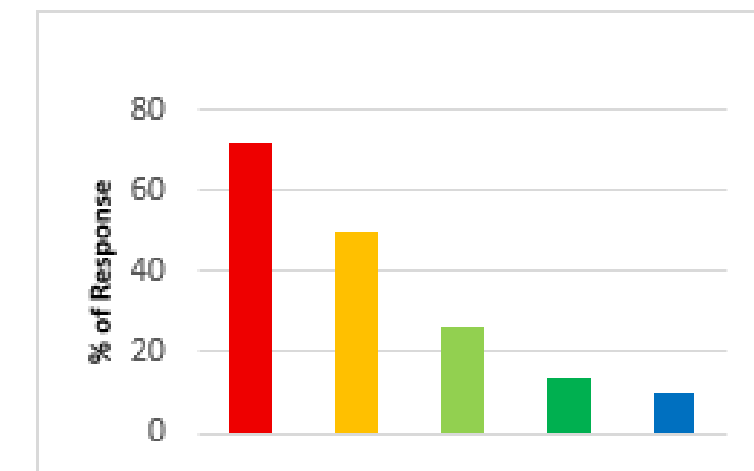
Gas and grid electricity are the primary energy sources used in respondents' households (**Figure 1**).

60.3% of respondents did not indicate whether they are likely to install energy-efficient measures in the next three years (**Figure 4**).

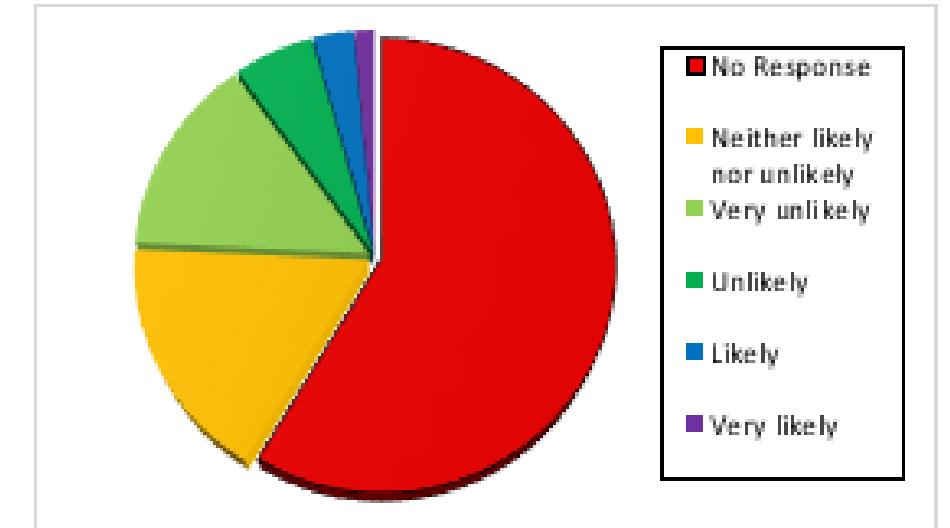
Financial support, such as subsidies or loans, is the most requested intervention to increase the adoption of energy-efficient measures in the community (**Figure 6**).



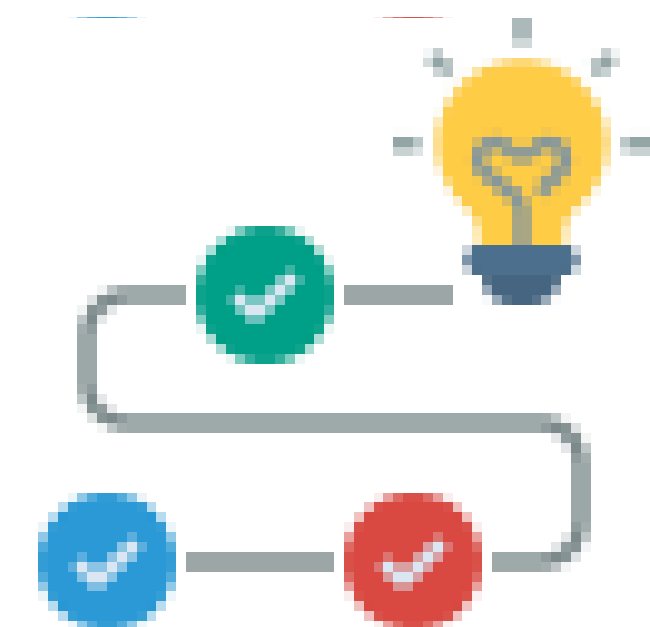
**Figure 1:** Household energy sources used (from left to right): 1) Gas - Traditional Boiler — 58.6%, 2) Grid electricity — 52.9%, 3) Wood — 12.9%, 4) Oil — 12.9%, 5) Other — 10.0%, 6) Solar Energy — 7.1%, 7) Biomass — 0.0%, 8) Unsure — 0.0%



**Figure 6:** Helpful support and interventions for adopting energy-efficient measures (from top to bottom): 1) Financial subsidies or loans — 72.2%, 2) Access to affordable technology — 50.0%, 3) Community-based initiatives and training — 26.4%, 4) Educational programs on health benefits — 13.9%, 5) Other — 9.7%.



**Figure 4:** Likelihood of installing energy-efficient measures in the next 3 years (from top to bottom): 1) No Response / No sure — 60.3%, 2) Neither likely nor unlikely — 14.7%, 3) Very unlikely — 14.7%, 4) Unlikely — 5.9%, 5) Likely — 2.9%, 6) Very likely — 1.5%



# Key Findings -Physical Health



**RQ2: What is the impact of energy-efficient measures on the physical health of residents?**

**28.2%** of respondents reported joint or muscle pains in the last three years (**Figure 7**).

Improved health was the main health improvement reported by residents and in community health (**Figures 10 and 11**).

Respiratory problems and joint or muscle pains were the most prominent health issues experienced before the installation of energy-efficient measures. (**Figure 8**).

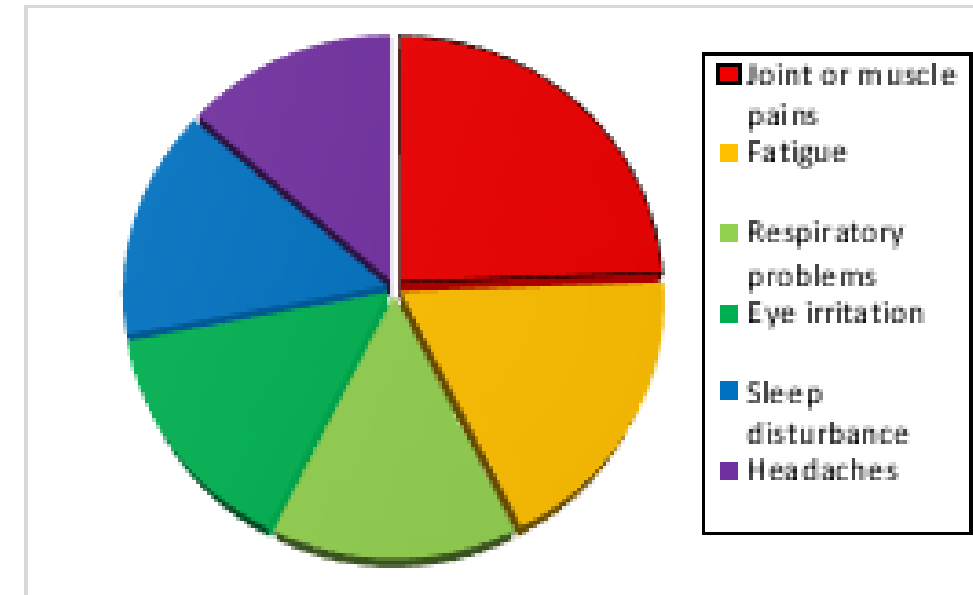


Figure 7: Health issues experienced in the last 3 years

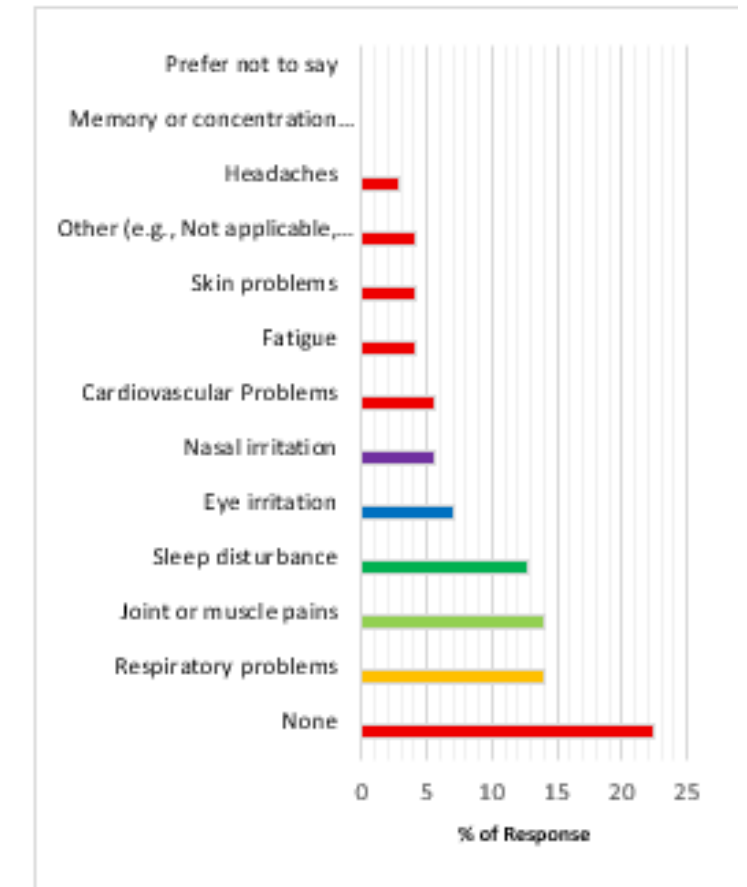


Figure 8: Health issues experienced before installation of energy-efficient measures

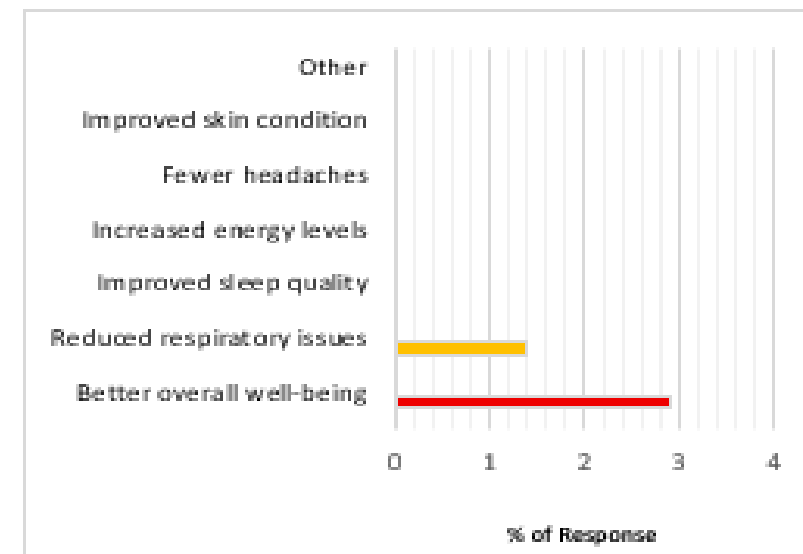


Figure 10: Specific health improvements observed (from top to bottom): 1) Better overall well-being — 2.9%, 2) Reduced respiratory issues — 1.4%, 3) Improved sleep quality — 0.0%, 4) Increased energy levels — 0.0%, 5) Fewer headaches — 0.0%, 6) Improved skin condition — 0.0%, 7) Other — 0.0%



Figure 11: Specific health improvements observed (from top to bottom): 1) Better overall well-being — 2.9%, 2) Reduced respiratory issues — 1.4%, 3) Improved sleep quality — 0.0%, 4) Increased energy levels — 0.0%, 5) Fewer headaches — 0.0%, 6) Improved skin condition — 0.0%, 7) Other — 0.0%

# Key Findings -Mental Health & Wellbeing

## RQ3: How do energy-efficient measures contribute to improved mental health and wellbeing?

Improved air quality was the most predominantly perceived benefit, cited by nearly half (45.8%) of the survey respondents. **(Figure 12)**

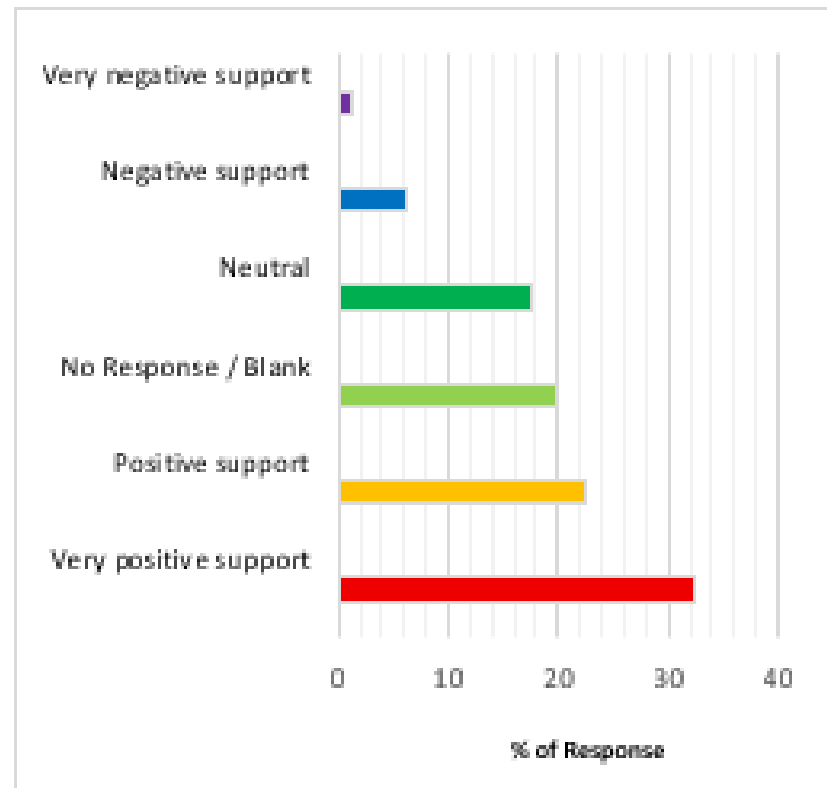


Figure 14: Perceptions of the environmental impact of energy-efficient measures.

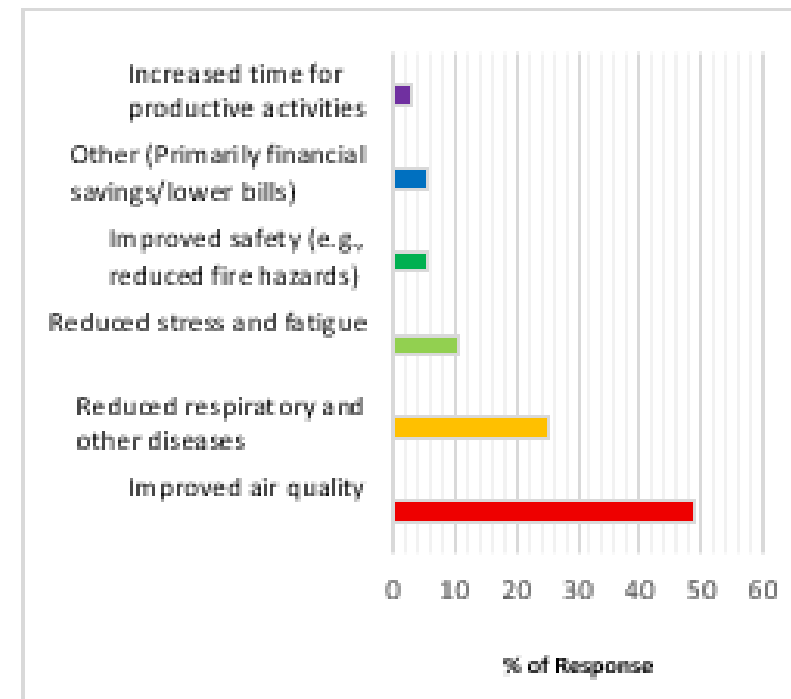


Figure 12: Perceived community benefits of energy-efficient measures: improved air quality (45.8%), reduced respiratory and other diseases (25.0%), reduced stress and fatigue (20.8%), improved safety (15.3%), other benefits including financial savings (15.3%), and increased time for productive activities (5.6%)

### Box 7: Regression analysis. Our models show that:

- Adoption of energy-efficient measures (e.g., insulation, solar panels, heat pumps) is associated with lower household energy costs, which in turn eases fuel poverty, especially in rural areas where traditional fuels dominate.
- Reduced exposure to indoor air pollution and improved thermal comfort show potential correlations with fewer respiratory issues and better overall wellbeing, though measurable impacts are limited because many households have not yet installed the measures.
- Financial savings and improved home comfort from energy efficiency are linked to lower stress and fatigue, suggesting an indirect but positive effect on mental health.

# Key Findings - Testimonials, Barriers & Challenges



## Box 5: Testimonials – The Impact of Energy Efficiency on Quality of Life

- **Financial Impact:** ‘Reduced heating bills so therefore more disposable income’; ‘Slashed energy bill by two thirds, relieving financial stress’; ‘I can’t afford to use the gas central heating unless the cold weather is extreme.’
- **Home Comfort and Living Environment:** ‘Secondary double glazing Warmer Quieter’; ‘Home is continuously warm, no cold to hot cycle’; ‘Improved comfort with energy efficient measures’; ‘Warmer and dryer house’.
- **Issues with Technology and Measures:** ‘Old double glazing lets in drafts; cavity wall insulation no longer works. Place is very cold, except in summer’; ‘The air source heat pump heating system is slow to respond...The bungalow is damp...consequently we have to run a dehumidifier most days and that is expensive.’
- **Community and Neighborly Impact:** ‘My neighbour installed a wood burning stove in his ground floor extension which fills my house with soot and smoke... He is happy because he says he is saving a fortune on gas whilst he burns any rubbish he finds



## Box 6: Testimonials – Other Suggested Support and Interventions

- **Improved Regulation and Installer Oversight:** ‘Significant oversight of installers. Our East Riding based ASHP installer was a disaster. Trading Standards need to be fully up to speed on these systems and be willing to step in and pressure installers to rectify substandard installations.’
- **Responsibility of Landlords and Building Managers:** ‘Building managers should explore solar panels or heat sink technology’; ‘Educate the leaseholder that solar panels are a good thing for residents’; ‘Convince the landlord?’
- **Direct Financial Support:** ‘Grants’
- **Property-Specific Technical Guidance:** ‘We are told our rooms in the roof are not suitable for insulation, except perhaps the exterior of the dormer roof and windows.’



## Box 8: Main messages

- Improved financial well-being, resulting from reduced energy bills, is a primary driver of enhanced quality of life and reduced stress for those who have adopted new measures.
- A critical lack of trust and reliable information serves as a major non-financial barrier, with residents reporting negative experiences with contractors and difficulty finding independent, credible advice.
- The effectiveness of energy-efficient measures is not guaranteed; some households experience negative consequences, such as technical problems with new systems or the poor performance of older installations, which can worsen their living conditions.
- There is a clear need for systemic interventions, as individual action is often insufficient. Respondents overwhelmingly call for financial support, such as grants and loans, to enable broader adoption.
- Energy choices have a distinct community dimension, where the actions of one household can directly impact the health and comfort of neighbors, highlighting the need for policies that consider these external effects.

# Study Limitations and Implications for Future Research

- The nine-week survey period and small sample size (70 participants) limit the generalisability of findings across the East Riding of Yorkshire.
- The concentrated age range restricts the ability to explore generational differences in awareness, uptake, and experiences.
- The short data collection window may have missed seasonal variations in household energy use and comfort.
- Voluntary participation introduces potential self-selection bias, as those already interested in energy efficiency may have been more likely to engage.
- Findings rely on self-reported data, which may be influenced by recall inaccuracies or social desirability bias.
- Future research should broaden the sample size and demographic diversity to improve representativeness.
- Extending data collection across multiple seasons would provide a clearer understanding of environmental and behavioural influences.
- Mixed-method approaches—such as interviews, home energy assessments, and energy performance data—would strengthen the validity of findings.
- Comparative studies across different local authorities could reveal how policy, housing stock, and socio-economic factors influence outcomes.
- Further evidence is needed to support the development of targeted, equitable interventions to reduce fuel poverty and improve health outcomes in rural communities.

# Conclusion

- Financial Stress and Health: A clear link exists between financial relief from lower energy bills and improved mental well-being, indicating that economic benefits are a key pathway to health improvements.
- The High-Cost Barrier: The most significant obstacle to adopting energy-efficient measures is the high initial financial investment, which limits access for many households, particularly those with lower incomes.
- A Pervasive Information Gap: There is a notable lack of trusted, independent advice available to homeowners, which is compounded by negative experiences with contractors and a desire for better industry oversight.
- Risk of Negative Outcomes: The installation of energy-efficient measures is not without risk; some households report technical failures, poor performance of older systems, or unintended consequences like dampness.
- Necessity of Systemic Support: The findings strongly indicate that individual willpower is insufficient to drive change. There is an overwhelming demand for systemic support, primarily through financial subsidies and loans.
- Community-Level Impact: Energy choices have consequences that extend beyond the individual household, as the actions of one neighbor can directly affect the health and comfort of others in the community.

# Policy Recommendations



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- Rural Home Energy Support Programme—Provide targeted grants, low-interest loans, and subsidies to reduce financial barriers prioritising rural off-grid communities and older residents.
- Trusted Installer & Oversight Framework—Create a vetted list of approved installers, introduce quality-assurance inspections, and strengthen Trading Standards involvement.
- Community Energy Advice Service—Deploy local energy-health advisors offering home assessments, funding guidance, and cold-home health support through community hubs.
- Seasonal Monitoring & Cold-Home Intervention—Track winter vulnerabilities and integrate findings into Public Health/Adult Social Care responses.
- Property-Specific Retrofit Pathways—Provide tailored technical guidance for rural housing types (solid wall, bungalows, converted farm buildings).
- Regulation of Neighbourhood Impacts—Strengthen oversight of solid-fuel burning, smoke nuisance, and air-quality risks.
- Whole-Village Retrofit Pilots—Coordinate community-level retrofit schemes to achieve economies of scale.
- Integrate Fuel Poverty into Public Health Strategy—Recognise energy efficiency as a health intervention addressing stress, respiratory health, and wellbeing.

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