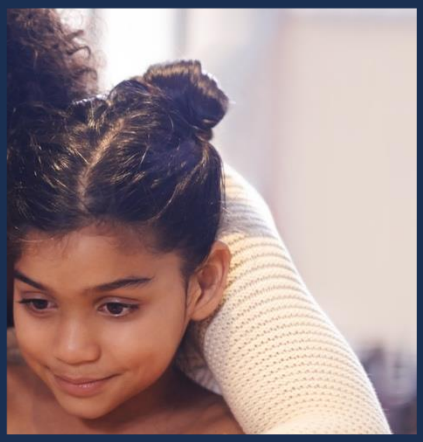
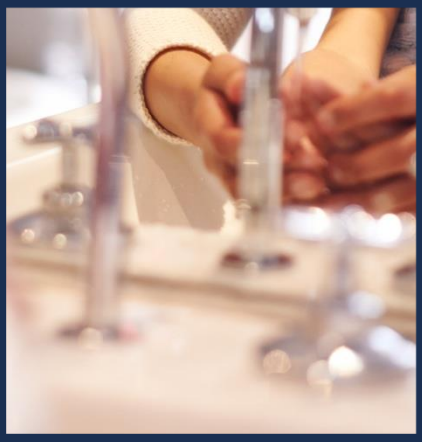
THE SCOTTISH
FUEL POVERTY
ADVISORY PANEL





Fuel poverty in rural and remote Scotland – literature review

March 2025

Contents

Key findings

This rapid evidence review analyses key topics related to rural and remote fuel poverty in Scotland. Key findings on each of these topics are provided below.

Fuel poverty and extreme fuel poverty rates in rural Scotland

- According to the 2023 Scottish House Condition Survey (SHCS), the fuel poverty rate for remote rural (44%) households was higher than all other areas except remote small towns.
- Levels of extreme fuel poverty were higher in rural areas (25%) compared to urban areas (18%) in 2023.
- In 2023, 30% of households in remote rural areas were in extreme fuel poverty.

Recommendations from key reports

Key reports by Changeworks; the Existing Homes Alliance (EHA); the Cross Party Group in the Scottish Parliament on Poverty; Tighean Innse Gall (TIG), and the Scottish Human Rights Commission were analysed to identify areas of recommendation overlap. Key areas of overlap included:

- the requirement for expanded and secure funding for energy advice services
- the need for energy efficiency grants and loans to take into account the additional installation and running costs in rural areas
- the importance of supporting local energy efficiency supply chains
- the need for energy retail market reform
- the need for regulation of currently unregulated alternative fuel sources
- the importance of maximising local energy generation benefits

Energy usage

- According to the Scottish House Condition Survey (SHCS) 2023 a higher proportion of dwellings in rural areas fall into the lowest EPC bands F and G (11% of homes in rural areas compared to 1% in urban areas).
- Local authority data from the SHCS 2017-2019 shows that Na h-Eileanan Siar has the highest percentage of dwellings in EPC bands F and G, with 18% of houses in these categories, compared to 4% in Scotland as a whole.
- According to the 2023 SHCS, 89% of dwellings in urban locations use mains gas as their primary heating fuel compared to only 40% of those in rural locations.
- It is possible to look within the rural category using 2022 survey data provided by the SHCS team within the Scottish Government. In 2022 only around one quarter (23%) of households in remote rural areas used gas as their primary heating fuel, compared to over half (58%) of households in accessible rural areas.

- 2022 data from the Department for Energy Security and Net Zero (DESNZ) shows that in Orkney and Shetland 100% of dwellings are off gas grid, this is followed by 88% of dwellings in Na h-Eileanan Siar. This is compared to 19% of dwellings in Scotland as a whole.
- 2022 data from DESNZ shows that mean domestic electricity consumption is far higher in some rural local authorities than in Scotland as a whole.

Metering

- The radio teleswitch service (RTS) meter is a type of electricity meter that operates via long-wave radio technology. The technology that supports Radio Teleswitch (RTS) meters will end on 30 June 2025. Without the technology to tell RTS meters when to switch between peak and off-peak rates, they may no longer work properly, and it may mean that a consumer's heating and hot water supply stops functioning as normal. Tariffs affected include: Comfortplus; White Meter; Total Heat Total Control; along with some Economy 7/10 tariffs.
- In most cases, RTS meters should be replaced with smart meters. In 2022, the UK Government introduced a new four-year regulatory framework with binding targets for suppliers. The government also places other obligations on suppliers, such as to take all reasonable steps to ensure smart meters operate in 'smart mode', where they send energy usage information to suppliers and display the information to consumers.
- The smart meter rollout is lagging behind in Scotland, and particularly in a number of rural local authorities. DESNZ statistics from Q1 2024 show that the proportion of smart meters in Scotland as a whole is already considerably less than that in England and Wales (51%, compared to 64% in England and 63% in Wales). Furthermore, only 10% of meters in Shetland are smart, followed by 12% in Orkney; 16% in Na h-Eileanan Siar; 27% in Argyll and Bute, and 35% in Highland. This regional variation is important because smart meters allow customers to access specialised tariffs.
- Academics and energy stakeholders have highlighted a number of issues in relation to the smart meter rollout. Jenkins et al have highlighted that the smart meter rollout may worsen the rural/urban divide. This is because access to the dedicated network connection services required for a functioning smart meter system varies widely across the UK, with notably lower accessibility outside of urban centres.
- The House of Commons Public Accounts Committee has highlighted potential challenges to first generation smart meters when the 2G and 3G mobile communication networks close. They highlight that an estimated seven million communication hubs (part of the electricity smart meters) will also need to be replaced, because they will lose functionality when the 2G and 3G mobile communications networks are closed.

- A substantial number of smart meters in the UK are not operating as smart meters. DESNZ's data shows that 3,794,000 (11%) as at the end of March 2024 are not operating in smart mode.

Debt

- Data from Citizens Advice Scotland (CAS) shows that in 2023/2024, the average energy debt clients presented to the Citizens Advice network in Scotland with was around £2,300. The average debt for people in accessible/remote rural areas who sought advice from the Citizens Advice Scotland network was £3,047, over £700 more debt on average than Scotland as a whole.

Transition to net zero

- Baker et al's research into low carbon poverty-free heating options for rural Scotland found that there will need to be a multiple-technology approach to decarbonising heat in Scotland, with no single credible solution able to meet demand in any one location.

- McCarthy et al's research into decarbonising off-grid homes in the UK highlighted the complexity and multifaceted nature of the transition to sustainable energy systems for off-grid homes. The authors argued that the process requires a nuanced approach that considers regional variations and occupant preferences. Barriers such as affordability, housing tenure, and community involvement need to be addressed to ensure the widespread adoption of low-carbon solutions.

- Four case studies focus on how renewable energy generation in rural and remote Scotland can involve and impact communities. The case studies cover the Isle of Eigg; Point and Sandwick Trust, Isle of Lewis; Shapinsay Wind Project, Orkney, and 'Glenburn Wind Development' (a pseudonym used by researchers to describe a commercial wind energy project located in an ex-mining area of Scotland).

- The case studies all demonstrate that meaningful community involvement is crucial for the success and acceptance of local renewable energy projects, whether community or privately run.

Introduction

Fuel poverty in rural and remote Scotland is one of the Scottish Fuel Poverty Advisory Panel's key themes for 2024-2025, as set out in their workplan. This literature review is intended to help inform the Panel's understanding of rural and remote fuel poverty in several key areas:

- energy usage
- metering
- debt
- the transition to net zero

The Scottish Government define rural Scotland as settlements with a population of less than 3,000. The Scottish Government's Rural and Environment Science and Analytical Services (RESAS) classifies 15 Scottish local authorities as 'mainly rural' or 'Islands and remote rural':

- Aberdeenshire
- Angus
- Argyll and Bute
- Clackmannanshire
- Dumfries and Galloway
- East Ayrshire
- East Lothian
- Na h-Eileanan Siar
- Highland
- Moray
- Orkney Islands
- Perth and Kinross
- Scottish Borders
- Shetland Islands
- South Ayrshire[1]

Where possible data is presented disaggregated to the level of these rural local authorities. However, where this is not possible data is provided using the Government's 2-fold (urban/rural) or 6-fold urban rural classification.

This review takes the form of a rapid evidence review, and it is therefore possible that some relevant sources have been missed. Google Scholar and the Scottish Government's KandE (knowledge and evidence) service were used to source relevant academic and grey literature. Statistics are sourced from Department for Energy Security and Net Zero (DESNZ) publications and from published and bespoke data from the Scottish House Condition Survey (SHCS).

This review begins by presenting contextual information on rural fuel poverty in Scotland, followed by a discussion of recommendations from key reports. Detailed

[1] Cross Party Group in Scottish Parliament on Poverty (2024) CPG-on-Poverty-Rural-Report-May-24-_DE_design.pdf (povertyalliance.org)

analysis of energy usage in rural and remote Scotland follows, as well as discussion of the challenges metering poses in rural Scotland, followed by a focus on energy debt in rural and remote Scotland. Finally, the impact of the transition to net zero in rural Scotland is discussed.

1. Rural fuel poverty in Scotland – the context

1.1 Fuel poverty and extreme fuel poverty rates

According to the 2023 Scottish House Condition Survey (SHCS), the fuel poverty rate for rural (35%) households is similar to the fuel poverty rate for urban (34%) households. However, the rate of fuel poverty for remote rural households (44%) is higher than all other areas except remote small towns (41%) which have a similar rate.[2]

Furthermore, levels of extreme fuel poverty were higher in rural areas (25%) compared to urban areas (18%) in 2023. Almost one third (30%) of households in remote rural areas were in extreme fuel poverty.[3]

The data suggests that it is higher prices, lower energy efficiency and higher energy use needs for rural communities which are the drivers fuel poverty in rural Scotland, rather than low incomes.[4] Households who are not income poor, but experience fuel poverty have a higher likelihood of living in low energy efficiency properties, using electricity for heating, and living in rural areas compared to fuel poor and income poor households and Scotland overall. A quarter (25%) of fuel poor not income poor households live in rural areas in Scotland (compared to 16% of the total Scottish population living in rural areas).[5]

The rate of fuel poverty among households using electricity as their primary heating fuel was 52%, higher than households using gas (32%), and oil (26%) but similar to households using other fuels types (49%). This reflects the higher per unit cost of electricity relative to gas and oil.[6]

1.1.1 Fuel poverty rates by local authorities

Local authority estimates of fuel poverty are produced using a three year pooled dataset to ensure sufficient sample sizes. Unfortunately, due to Covid-19 restrictions it was not possible to resume the 2020 SHCS and the 2021 SHCS was undertaken using an external+ approach.[7] However, due to the change in approach for the 2021

[2] Scottish House Condition Survey (2025) Scottish House Condition Survey: 2023 Key Findings - gov.scot
[3] Ibid
[4] Cross Party Group in Scottish Parliament on Poverty (2024) CPG-on-Poverty-Rural-Report-May-24-_DE_design.pdf (povertyalliance.org)
[5] Scottish House Condition Survey (2025) Scottish House Condition Survey: 2023 Key Findings - gov.scot
[6] Ibid
[7] The external+ approach involved an external-only inspection, supplemented with alternative sources of data, e.g., from the Energy Performance Certificate (EPC), and the householder providing information to surveyors via telephone.

SHCS, the results are not directly comparable with the National Statistics from previous waves of the survey.

The lack of SHCS data for 2020 and the enforced changes for 2021 mean that the Scottish Government cannot produce local authority estimates for 2019-2021 for two reasons. Firstly, there is no SHCS data for 2020 so it is not possible to produce a three-year average for 2019 to 2021. Secondly, the data from the 2021 external+ SHCS is not directly comparable with that for earlier years due to the methodological differences and it would not be appropriate to combine it with the data for 2019 (or earlier) to produce a multi-year average. As such, the most up-to-date local authority data from the SHCS covers 2017-2019.[8]

According to this SHCS local authority data covering the period 2017-2019[9], seven local authorities had significantly higher fuel poverty rates than the national average (24%). These were:

- Na h-Eileanan Siar (40%)
- Highland (33%)
- Argyll and Bute (32%)
- Moray (32%)
- Dundee City (31%)
- Shetland Islands (31%)
- Orkney Islands (31%)

Five local authorities had significantly lower fuel poverty rates than the national average, these were:

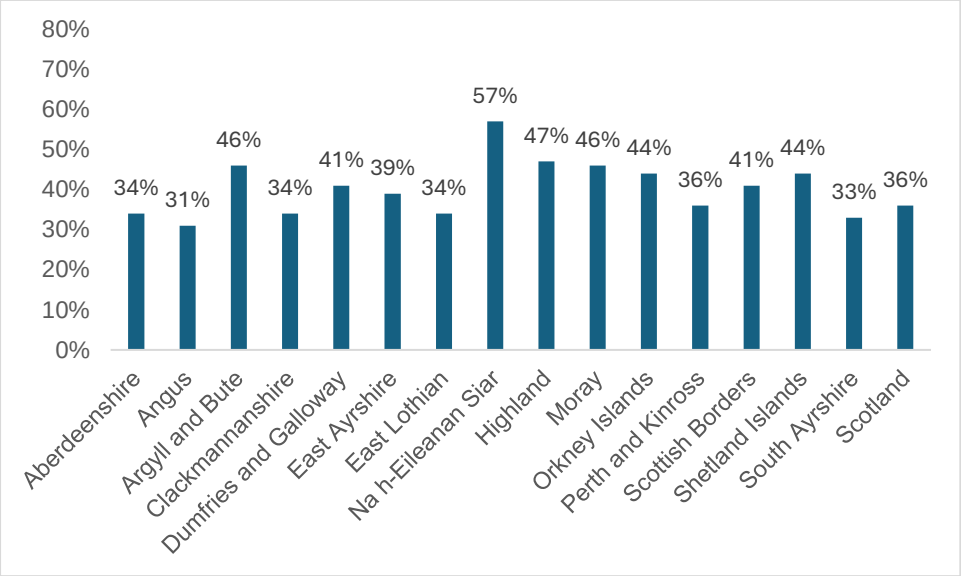
- East Renfrewshire (13%)
- West Lothian (18%)
- Midlothian (19%)
- North Lanarkshire (20%)
- City of Edinburgh (21%)[10]

Data produced by Energy Action Scotland (EAS) and published in 2023 in a Changeworks report on fuel poverty in rural Scotland[11] provides fuel poverty levels by local authority as of 1 April 2022. These estimates extrapolate the 2019 SHCS local authority level fuel poverty data using an uplift percentage estimated by the Scottish Government. The uplift sought to illustrate the impact of the energy price cap increase in April 2022. It should be noted, however, that this data is not as reliable as the outputs from SHCS. Figure 1, below, which utilises this data, shows that several rural local authorities have fuel poverty rates which are considerably higher than the Scottish average of 36%. Na-h Eileanan Siar had the highest fuel poverty rate, at 56%, followed by Highland at 47%; Argyll and Bute at 46%; Moray at

[8] Scottish Government (2021) Scottish House Condition Survey: Local Authority Analysis 2017-2019 - gov.scot
[9] Scottish Government (2021) Scottish House Condition Survey: Local Authority Analysis 2017-2019 - gov.scot
[10] Ibid
[11] Changeworks (2024) A-Perfect-Storm-Fuel-Poverty-in-Rural-Scotland.pdf (changeworks.org.uk)

46%; the Orkney Islands and the Shetland Islands each at 44%; Dumfries and Galloway at 41%, and the Scottish Borders also at 41%.

Figure 1: fuel poverty rates by rural local authorities, EAS 2022



1.2 Poverty and income inequality

Despite being more likely to be in fuel poverty, people living in rural areas in Scotland are less likely to be living in relative or severe poverty (measures which are based on income). Statistics, based on the Family Resources Survey, showing three- year estimates for the proportion of people and children in Scotland living in poverty are published annually by the Scottish Government.[12] For 2020-2023, the proportion of people living in relative poverty[13] in rural areas in Scotland was 15%, compared to 22% in urban areas. Moreover, for 2020-2023, the proportion of people living in severe poverty[14] in rural areas in Scotland was just under 1 in 10 (9%), compared to 16% in urban areas.[15]

Children in rural areas in Scotland are less likely to be living in poverty than children in urban areas. For 2020-2023, the proportion of children living in relative poverty in rural areas was 15%, compared to 20% in urban areas. Just under 1 in 10 (9%) of children in rural areas were living in severe poverty, compared to 20% in urban areas.[16]

1.3 Cost of living

The minimum cost of living in remote rural Scotland is between 15% to 30% higher than urban areas of the UK.[17] This is often referred to as 'the rural premium'.[18] Rural

[12] Scottish Government (2024) Poverty and Income Inequality in Scotland 2020-23 (data.gov.scot)
[13] Defined as below 60% of UK median income after housing costs.
[14] Defined as below 50% of UK median income after housing costs.
[15] Scottish Government (2024) Poverty and Income Inequality in Scotland 2020-23 (data.gov.scot)
[16] Ibid
[17] Scottish Government (2021) The cost of remoteness - reflecting higher living costs in remote rural Scotland when measuring fuel poverty: research report - gov.scot
[18] Cross Party Group in Scottish Parliament on Poverty (2024) CPG-on-Poverty-Rural-Report-May-24-_DE_design.pdf (povertyalliance.org)

households face increased costs across a range of goods and services. Weekly food costs are approximately up to 4% higher for remote rural communities and up to 13% on the Islands. The cost of food is not substantially higher in rural chain supermarkets. However, prices in local convenience stores (which many remote communities rely upon) are up to 44% higher in remote rural regions and 27% higher in the Islands compared with equivalent products in the supermarket.[19]

The cost of transport in rural Scotland is a substantial additional cost. Petrol prices tend to be higher in rural areas, and rural households were found to travel 2.5 miles for every mile driven by urban counterparts.[20] Furthermore, public transport links are frequently poor and rural households are often reliant on multiple vehicles in order to commute to work. These commuting distances also tend to be higher than in urban areas.[21]

There is a lack of affordable housing in rural areas, partly driven by the popularity of rural living following the pandemic, and the high numbers of second homes and short-term lets. This shortage is a barrier to recruitment for rural employers, contributes to depopulation, and inflates housing costs in rural areas.[22] Efforts to increase the supply of affordable rural housing are hampered by issues with the availability of appropriate land, the substantial extra costs both of installing infrastructure for housing development and of housebuilding itself, and the lack of competition between contractors. These challenges contribute to fuel poverty, with people often in stuck in larger dwellings which do not meet their needs.[23]

In 2021, Shucksmith et al published research focused on understanding financial hardship and vulnerability in rural areas.[24] The research, carried out between October 2019 and March 2020, focused on three case studies, two of which were in Scotland: the Isle of Harris in the Western Isles and Blairgowrie and the Glens in East Perthshire. In each location interviews and focus groups were held. In Harris the affordability of housing was a major issue mentioned by every participant. Those struggling the most to access suitable housing were newly formed, young households, whether these be single people, couples or new families. For this group, there were very few small housing units on the island and one-bed properties are almost non-existent. Shucksmith et al argue that, as a result of this, poverty is effectively ‘exported’ to the mainland where it is easier to secure affordable housing on a lower income. They highlight that serious questions remain in relation to the lack of new social housing or greater efforts to bring back the high numbers of empty

[19] Scottish Government (2021) 4. Cost of Living - Poverty in rural Scotland: evidence review - gov.scot (www.gov.scot)
[20] CMA (2022) Road fuel initial report (publishing.service.gov.uk)
[21] Scottish Government (2021) Supporting documents - The cost of remoteness - reflecting higher living costs in remote rural Scotland when measuring fuel poverty: research report - gov.scot (www.gov.scot)
[22] Changeworks (2023) A-Perfect-Storm-Fuel-Poverty-in-Rural-Scotland.pdf (changeworks.org.uk)
[23] Cross Party Group in Scottish Parliament on Poverty (2024) CPG-on-Poverty-Rural-Report-May-24-_DE_design.pdf (povertyalliance.org)
[24] Shucksmith, Mark; Chapman, Polly; Glass, Jayne (2021) ‘Rural Lives: Understanding financial hardship and vulnerability in rural areas’, Rural Lives: Understanding financial hardship and vulnerability in rural areas — SRUC, Scotland's Rural College

properties into active use and/or address the high proportion of homes used as second homes/self-catering accommodation.

2 Summary of recommendations from key reports

Over the last two years key reports focused on rural fuel poverty have been published by Changeworks[25], the Existing Homes Alliance (EHA)[26], the Cross Party Group in the Scottish Parliament on Poverty[27] (hereafter referred to as the Cross Party Group on Poverty), Tighean Innse Gall (TIG),[28] and the Scottish Human Rights Commission.[29]

Key recommendations across these reports relate to funding for energy advice services. In their report Changeworks highlight the difficulties faced by local organisations in accessing funding. Stakeholders involved in Changeworks research were concerned that funding bodies do not consider the realities of delivering fuel poverty services in rural areas, and also emphasised that more funding was needed for support organisations.[30] In their recommendations, TIG also called for Government core-funding for in-person household energy advice which is delivered by local trusted agencies.[31] EHA echoed this view, highlighting the importance of expanded, financially secure support services in rural areas, building on existing national and locally based projects.[32] The Scottish Human Rights Commission have

[25] In 2023 Changeworks published a report on the drivers, impacts and extent of fuel poverty in rural Scotland. The report findings are based on research utilising a desk-based evidence review of published research and evidence relevant to fuel poverty in rural Scotland; analysis of the Scottish House Condition Survey; interviews and workshops with householders who have a lived experience of fuel poverty, frontline advisors, and other stakeholders from a range of local and national organisations.

[26] Recommendations developed in conjunction with the Rural and Islands Housing Association Forum (RIHAF), Rural Housing Scotland, Scottish Association of Landlords, Scottish Rural Action and the Pebble Trust.

[27] In 2024 the Cross Parliamentary Group on Poverty held an inquiry on poverty in rural Scotland. Topics were explored in four evidence sessions which featured experts from across civil society, submissions of pre-written evidence from the CPG's membership, and a lived experience discussion which brought together people with experience of living on a low income in rural Scotland, MSPs and the Cabinet Secretary for Social Justice.

[28] In 2023 TIG carried out a study into the affordable warmth of homes in the Western Isles. Findings are based on a survey with over 70 open and closed questions. The sample is made up of 2,043 responses from a mix of all areas in the Western Isles.

[29] In 2024 the Scottish Human Rights Commission published a report on human rights across the Highlands and Islands. The project involved four stages: 1. Desk based research and literature review of existing published evidence. 2. Community visits across the region to speak directly to people and learn about their experiences using structured feedback mechanisms. 3. Accessing information on trends of complaints made to MSPs and the Scottish Public Services Ombudsman. 4. Analysing all the information under human rights obligations and issuing a final report with recommendations to the relevant authorities.

[30] Changeworks (2023) Fuel-Poverty-in-Rural-Scotland-The-Solutions.pdf (changeworks.org.uk)

[31] Tighean Energy Advisory Service (TEAS) (2023) Affordable Warmth at Home in the Western Isles – Tighean Innse Gall

[32] Existing Home Alliance (2022) https://existinghomesalliancescotland.co.uk/wp-content/uploads/2022/10/Rural-Homes-Just-Transition-Package.pdf

called on “duty-bearers” to enhance the accessibility, availability, acceptability, and quality of services.[33]

Another key theme was around funding for energy efficiency work. In their recommendations, EHA called for grant and loan funding that enables and facilitates the roll out of new investment models, as well as enhanced grant and loan funding to cover additional installation and running costs in rural areas.[34] In their report, TIG emphasised that energy efficiency programmes funded by the Scottish Government and utility companies to improve the fabric of homes or heating systems should allow flexibility for Island homes. They stressed that a one-size fits all approach does not take account of the different heating types, housing condition, climate, extreme exposure to high winds and driving rain experienced in the Western Isles.[35] Changeworks highlighted that in order to remove poor energy efficiency as a driver of fuel poverty, there is a need for further provision of retrofit schemes and stricter standards for new builds.[36]

Building on these energy efficiency recommendations, both EHA and Changeworks highlighted the importance of supporting local supply chains. EHA recommended that there should be a dedicated handholding service to support rural businesses that are part of the decarbonisation supply chain. They also called for streamlined accreditation with support to help rural businesses meet new requirements. [37] Changeworks also posed a number of solutions aimed at supporting local energy efficiency supply chains, these include:

- support for training and accreditation
- funding for apprenticeships in the energy supply chain
- group purchasing for small contractors
- additional engineers to install and service domestic meters
- improve accessibility of public procurement for microbusinesses[38]

Topics related to energy retail market reform were also prominent. The Scottish Human Rights Commission flagged that the absence of mains gas in certain rural areas, coupled with the lack of an equivalent electricity tariff in Scotland, poses serious risks to the health and lives of residents.[39] Changeworks’ research also highlighted the impact of high energy costs as a driver of fuel poverty in rural Scotland. They posed recommendations for reform as a means to address inequalities in the energy retail market which disproportionately impact off-gas and other rural households. There are as follows:

---

[33] Scottish Human Rights Council (2024) Economic, Social and Cultural Rights in the Highlands and Islands
[34] Ibid
[35] Tighean Energy Advisory Service (TEAS) (2024) Affordable Warmth at Home in the Western Isles – Tighean Innse Gall
[36] Changeworks (2023) Fuel-Poverty-in-Rural-Scotland-The-Solutions.pdf (changeworks.org.uk)
[37] Existing Home Alliance (2022) https://existinghomesalliancescotland.co.uk/wp-content/uploads/2022/10/Rural-Homes-Just-Transition-Package.pdf
[38] Changeworks (2023) Fuel-Poverty-in-Rural-Scotland-The-Solutions.pdf (changeworks.org.uk)
[39] Scottish Human Rights Commission (2024) Economic, Social and Cultural Rights in the Highlands and Islands

- introduce a social energy tariff
- re-evaluate standing charges
- accelerate smart meter rollout
- improve protection for restricted meter customers
- recognise regional variation in consumption[40]

In their report TIG also emphasised the need to address the inequalities in the structure of the energy market. They recommended the introduction of a fairer tariff reflecting the local generation of energy. Furthermore, TIG highlighted that any social tariff offered by utility companies should also include off gas households as a priority, or the establishment of an 'gas equivalent tariff' for off gas grid homes.[41] [42]

The Cross Party Group on Poverty recommended that the Scottish Government should lobby the UK Government to provide proper regulation of currently unregulated alternative fuel sources.[43] In addition, the Group called for the Scottish and UK Governments to introduce rural uplifts in any future energy support packages.[44]

Both Changeworks and the Cross Party Group on Poverty highlighted the importance of maximising local energy generation benefits. Stakeholders in Changeworks' research did not feel that Community Benefit Funds (CBF)[45] go far enough to ensure that communities benefit from local energy generation. As such, in their report Changeworks posed solutions aimed at reducing reliance on the national grid and associated pricing structures, and to generate income for local communities, there include:

- microgrids and heat networks - to enable the use of locally generated electricity which the national grid does not currently have the capacity to export.
- local ownership of energy assets - local ownership of electricity generation, storage assets, or heat networks can generate financial profits for communities, as well as social and environmental benefits.[46]

The Cross Party Group on Poverty highlighted that community energy schemes represent an important opportunity for rural communities to benefit from the

[40] Changeworks (2023) Fuel-Poverty-in-Rural-Scotland-The-Solutions.pdf (changeworks.org.uk)
[41] Tighean Energy Advisory Service (TEAS) (2023) Affordable Warmth at Home in the Western Isles – Tighean Innse Gall
[42] The 'Highland Energy Rebate' campaign, which was debated in Westminster Hall on the 6th of March, also advocates for a scheme that would offer financial rebates to Highland and Islands residents, offsetting the higher per-unit costs of electricity they currently face. The debate was led by Drew Hendry, the former MP for Inverness, Nairn, Badenoch and Strathspey.
[43] The Poverty and Inequality Commission have also called for more targeted support for households using off-grid fuel. In 2022, they recommended that the Scottish Government should provide a dedicated fund and interest-free loans to support households with off-grid fuel. It should also work with local partners to support the setting up of fuel buying clubs, to communities access better rates.
[44] Cross Party Group in Scottish Parliament on Poverty (2024) CPG-on-Poverty-Rural-Report-May-24-_DE_design.pdf (povertyalliance.org)
[45] Community Benefit Funds (CBF) are voluntary donations from developers for communities affected by development such as renewable energy generation.
[46] Changeworks (2023) Fuel-Poverty-in-Rural-Scotland-The-Solutions.pdf (changeworks.org.uk)

resources at their disposal. They, therefore, recommend that the Scottish Government should provide support to communities to ensure that people on low incomes play a full role in and benefit from schemes.[47]

3 Energy usage

3.1 Energy efficiency

Energy Performance Certificates (EPC) were introduced in January 2009 under the requirements of the EU Energy Performance Building Directive (EPBD). They provide energy efficiency and environmental impact ratings for buildings based on standardised usage. EPCs are required when a property is either sold or rented to a new tenant.

EPCs are generated through the use of a standard calculation methodology, known as Standard Assessment Procedure (SAP). SAP is the UK Government approved way of assessing the energy performance of a dwelling, taking into account the energy needed for space and water heating, ventilation and lighting and, where relevant, energy generated by renewables.

The Energy Efficiency Rating (EER) is expressed on a scale of 1-100 where a dwelling with a rating of 1 will have very poor energy efficiency and higher fuel bills, while 100 represents very high energy efficiency and lower fuel bills. Ratings can exceed 100 where the dwelling generates more energy than it uses.

Ratings are adjusted for floor area so that they are essentially independent of dwelling size for a given built form.

For Energy Performance Certificates EERs are presented over 7 bands, labelled A to G. Band A represents low energy cost and high energy efficiency, while band G denotes high energy cost (and low energy efficiency).[48]

According to the SHCS 2023, houses in rural areas are less energy efficient. In 2023, the mean energy efficiency for houses in rural areas was 60.4, compared to 69.2[49] in urban areas.[50] In rural areas, the energy efficiency of houses were as follows:

- one third (36%) of houses were in EPC bands A, B or C, compared to 60% in urban areas
- over half (53%) of houses were in EPC bands D or E, compared to 39% in urban areas
- 11% of houses were in EPC bands F and G, compared to 1% in urban areas

Looking more closely at properties in the lower EPC bands F and G, which made up 3% of all properties in Scotland in 2023. These properties are more likely to be pre-

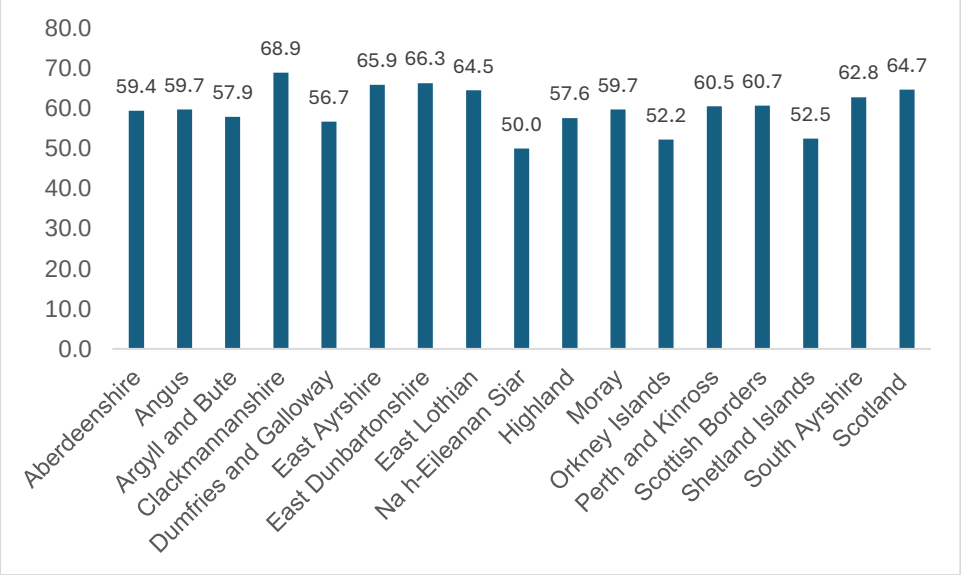
[47] Cross Party Group in Scottish Parliament on Poverty (2024) CPG-on-Poverty-Rural-Report-May-24-_DE_design.pdf (povertyalliance.org)
[48] Scottish Government (2025) Scottish House Condition Survey: 2023 Key Findings - gov.scot
[49] Using the SAP 2012 methodology.
[50] Scottish Government (2025) Scottish House Condition Survey: 2023 Key Findings - gov.scot

1919 dwellings (9%), non-gas heated properties (10% for electric, 20% for oil and 8% for other fuels), detached properties (6%), off gas grid properties (17%), and, as already stated, located in rural areas (11%).[51]

3.1.1 Energy efficiency by local authority

Figure 2, below, uses data from the 2017-2019 SHCS to show the mean energy efficiency rating of dwellings in rural local authorities in Scotland compared to Scotland as a whole. Several local authorities have mean energy efficiency ratings that are substantially below the Scottish mean of 64.7. Na h-Eileanan Siar has the lowest mean energy efficiency rating at 50.0, followed by the Orkney Island (52.2), the Shetland Islands (52.5). Dumfries and Galloway, Highland, Argyll and Bute, Aberdeenshire, and Moray all also have mean energy efficiency ratings of less than 60.0.

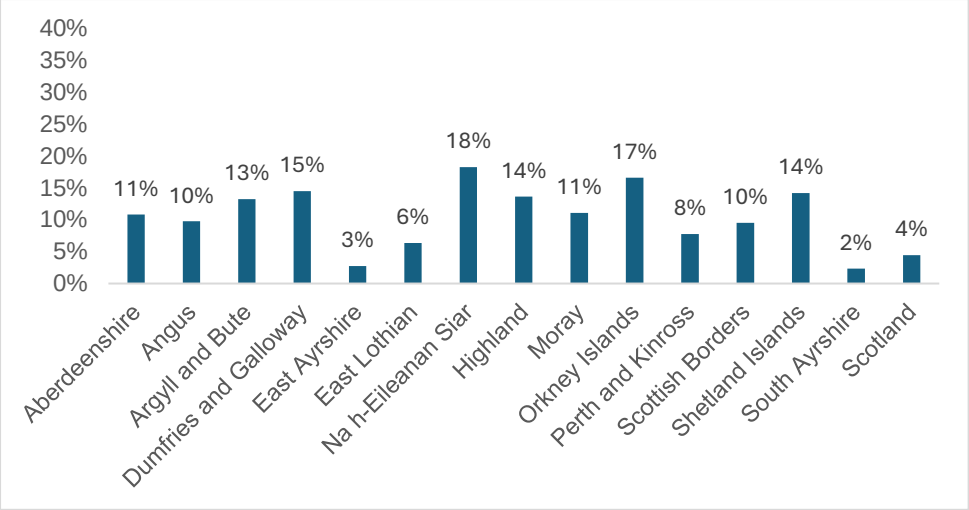
Figure 2: Mean energy efficiency rating (SAP 2012) by local authorities defined as rural by the Scottish Government, SHCS 2017-2019



Looking at energy efficiency from another angle, figure 3, below, shows the percentage of dwellings in rural local authorities with energy efficiency ratings of F or G, compared to Scotland as a whole. In Scotland as a whole, 4% of dwellings have energy efficiency ratings of F or G. Na h-Eileanan Siar has the highest percentage of dwellings with energy efficiency ratings of F or G (18%), followed by the Orkney Islands (17%), Dumfries and Galloway (15%), Highland (14%), Shetland Islands (14%), Argyll and Bute (13%), Aberdeenshire (11%), Moray (11%), Angus (10%), and the Scottish Borders (10%).

Figure 3: percentage of dwellings in rural local authorities with energy efficiency ratings of F or G (SAP 2012), SHCS 2017-2019

[51] Ibid



3.2 Heating type

The SHCS collects data on heating type and heating fuel. Figure 4, below, uses data from the 2022 survey to demonstrate that households living in rural Scotland were less likely to have a boiler (including gas, oil, LPG) than households living in urban areas (79% versus 90%). Rural households are more likely to have storage heating within their home (11% versus 5%) or have a heating system categorised as 'other'[52] (6% versus 2%).

Figure 4: Primary form of heating, by urban/rural, SHCS 2022

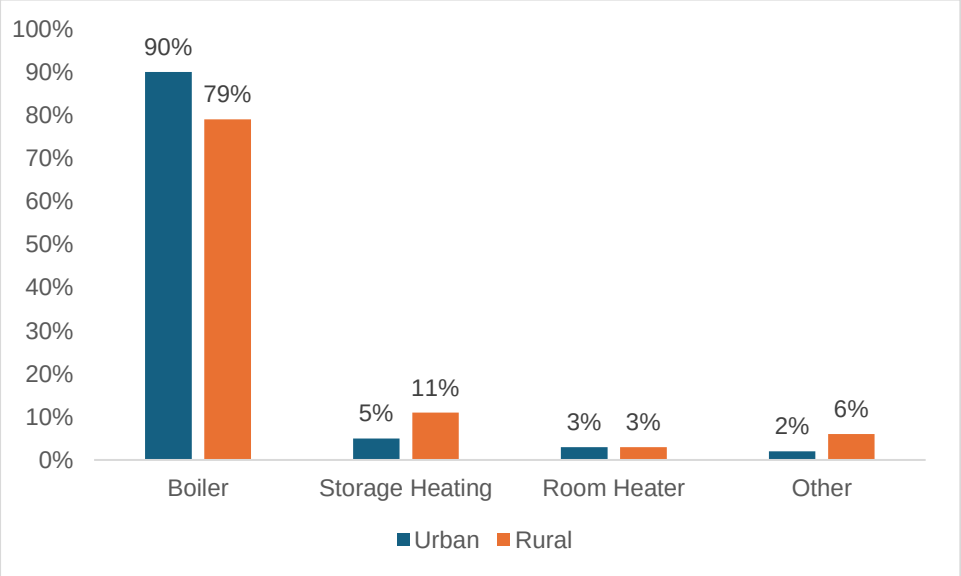


Figure 5, below, shows households' primary form of heating broken down by rural categories. In 2022, just under two thirds (65%) of households in remote rural areas have boilers compared to 86% of households in accessible rural areas. Households in remote rural areas are significantly more likely to have storage heating (20%) and

[52] The 'other' category includes community heating, warm air system, heat pump, heat pump with MCS certificate, and room heater (back boilers not radiators).

‘other’ heating types (10%), compared to accessible rural households (6% and 4% respectively).

Figure 5: Primary form of heating, by rural categories, SHCS 2022

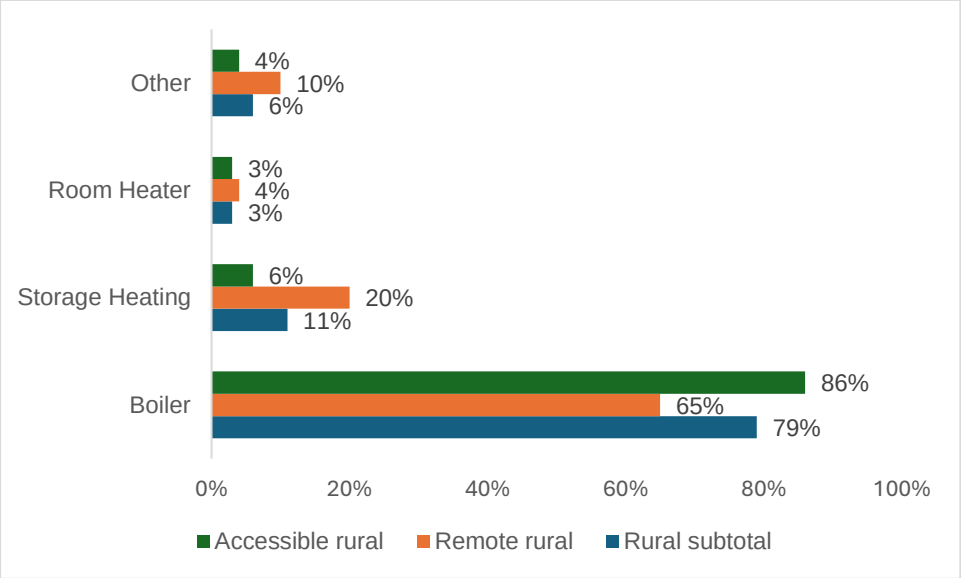
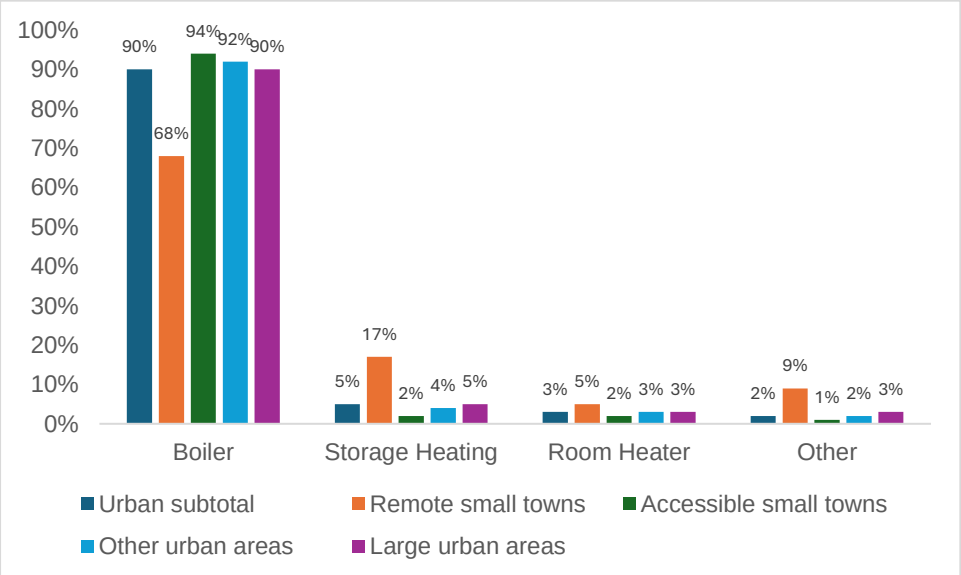


Figure 6, below, shows that there are also substantial variations in heating forms by urban categories. Remote small towns are significantly less likely to have a boiler (68%) than all other urban area categories and are significantly more likely to have storage heating (17%) or ‘other’ heating (9%).

Figure 6: Primary form of heating, by urban categories, SHCS 2022

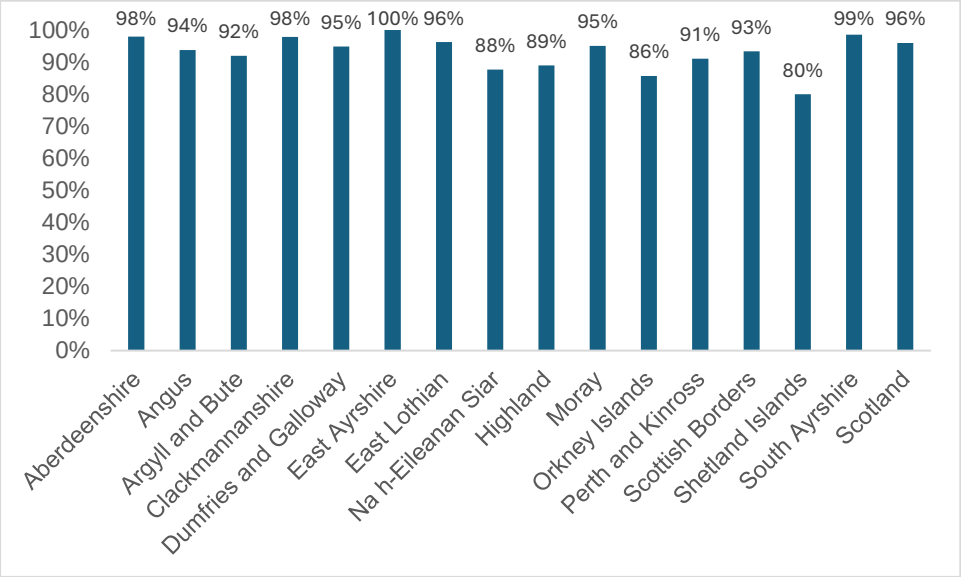


3.2.1 Central heating

Figure 7, below, shows the percentage of dwellings in rural local authorities in Scotland with full central heating, compared to Scotland as a whole. 96% of dwellings in Scotland have full central heating. Dwellings in the Shetland Islands have the lowest incidence of full central heating, at 80%. This is followed by

dwellings in the Orkney Islands (86%), Na h-Eileanan Siar (88%), and Highland (89%).

Figure 7: Percentage of dwellings in rural local authorities in Scotland with full central heating, SHCS 2017-2019



3.3 Primary heating fuel

According to the 2023 SHCS[53], 89% of dwellings in urban locations use mains gas as their primary heating fuel compared to only 40% of those in rural locations. By contrast, there are higher rates of electricity and oil as primary heating fuel in rural locations, 23% and 29%, respectively, compared to urban locations where electricity is used in 8% and oil in 1% of dwellings.

It is possible to look within rural areas using 2022 data which was provided by the SHCS team. Figure 8, below, shows that only around one quarter (23%) of households in remote rural areas use gas as their primary heating fuel, compared to over half (58%) of households in accessible rural areas. Remote rural households are more likely to use oil as their primary heating fuel (32% compared to 24%) or electric heating (37% compared to 15%).

[53] Scottish Government (2025) Scottish House Condition Survey: 2023 Key Findings

Figure 8: Primary heating fuel, by rural categories, SHCS 2022

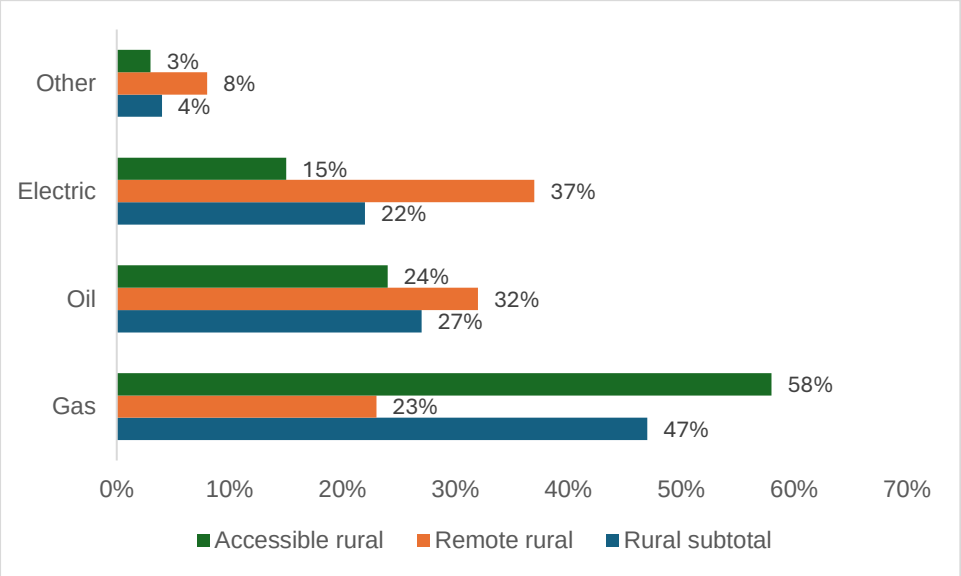
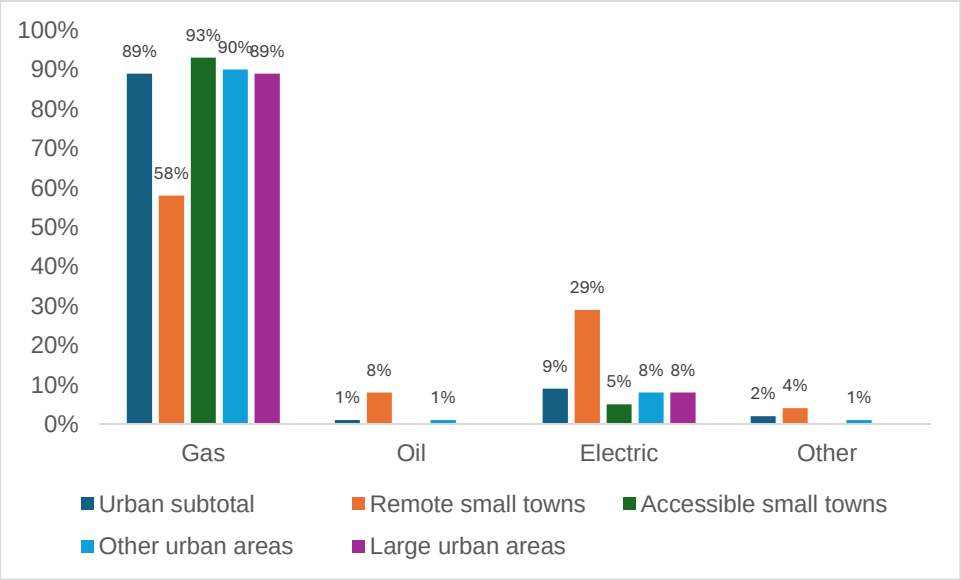


Figure 9, below, shows that amongst urban categories, households in remote small towns are significantly less likely to use gas as their primary heating type (58%) compared to all other urban areas. They are more likely to use oil (8%) or electric heating (29%).

Figure 9: Primary heating fuel, by urban categories, SHCS 2022



Between late 2019 and early 2020, Ipsos MORI were commissioned by the Scottish Government to undertake qualitative research into the lived experiences of fuel poverty in Scotland.[54] Interviews were carried out with 40 participants living in households categorised as in either fuel poverty or extreme fuel poverty. Recruitment was carried out by telephone using recontacts from the 2016, 2017 and 2018 Scottish Household Survey (SHS) (of which the SHCS is a module). There

[54] Scottish Government (2020) Acknowledgements - Lived experience of fuel poverty: research - gov.scot (www.gov.scot)

were three stages to the fieldwork: a 20 to 30-minute telephone interview; a heating diary task; and a second 60 to 90-minute interview.

Participants were recruited from across Scotland based on a range of criteria:

- type of location (large urban, other urban/non-remote rural, and remote rural and small towns)
- level of fuel poverty (fuel poor and extreme fuel poor as per the latest definitions)
- households in fuel poverty where an EHR was applicable
- household type (35+ with no children under 16 at home, families with children aged 6-16, families with children aged 5 and under, and young adult households – under 35 with no children at home)
- tenure, to cover homeowners, those renting privately from a landlord (referred to in this report as “private renters”) and those renting from a local authority or housing association (referred to as “social renters”)
- dwelling type (e.g. tenement flat or detached house)
- main heating fuel (e.g. mains gas, electricity, sold fuel)

The research found that all of those using oil and solid fuel as the main heating source were in remote rural locations.

Participants using oil central heating with radiators all lived in remote rural areas, including islands. They were generally content with their system and felt it was easy to control using thermostats. However, those on lower incomes commented on the rising price of oil and the need to budget carefully. These participants spoke about their heating system with a level of resignation and acceptance that, although it was expensive, it was part of living in a remote location. At times, oil central heating was supplemented with solid fuel to help keep the cost of central heating down.

One participant said:

> “Yes, I do [limit use of the oil heating system] I don't have it on any time during the day. I would like to but it's too expensive… Well, I've got my [coal] stove on and I just stay in the living room.” Pamela, 35+ no children, owner occupier, remote rural, fuel poverty and enhanced heating regime.[55]

Another said:

> “With oil, you pay the going price or you don't get it, as simple as that. You take what they are offering or you [go without], you have very little option. There are only two or three suppliers here. I have always stuck with the same one, because I feel it is better the devil you know.” John, 35+ no children, owner occupier, remote rural, extreme fuel poverty and enhanced heating regime.[56]

[55] Scottish Government (2020) Acknowledgements - Lived experience of fuel poverty: research - gov.scot (www.gov.scot)
[56] Ibid

As with those using oil central heating, all those who used solid fuel as their main source of heating lived in remote rural locations. They were generally quite satisfied with it as a heating system, particularly if their main fire or stove could heat radiators elsewhere in their home. Positive aspects included the level of warmth it provided and the manageability of the cost compared with oil which was perceived to be more expensive. Smokeless fuel was mentioned by some as being a better option than normal coal or wood because, while more expensive, it burned for longer.

One participant was keen not to move from solid fuel because it was their personal preference and the only type of heating they had ever had. Another described having a dispute with her local authority in order to get the solid fuel system that she wanted (one that heated radiators and hot water too). However, one respondent reported wanting to change from a combination of solid fuel and electric heating to gas central heating but felt restricted from doing so because of the costs involved.[57]

The TIG Energy Advisory Service carried out a study into the affordable warmth of homes in the Western Isles in April 2023.[58] Data was collected through a postal/online survey sent out to homes in the Western Isles. Responses were received from 2,043 households, which represents around one in six of approximately 12,000 occupied homes in the Western Isles. In order to assess fuel poverty rates, the fuel poverty calculation applied to a sample of 367 households who provided sufficiently detailed information.

Of the respondents to TIG's survey, 48% had oil central heating, and a further 31% used electric heating. Of these, 67% of electric heated households were in fuel poverty with 56% of electric heated homes in extreme fuel poverty. Oil central heating was lower at 52% in fuel poverty and 40% in extreme fuel poverty, with gas showing the lowest rate of fuel poverty with 59% in fuel poverty and 37% in extreme fuel poverty.

The overall incidences of renewable energy contributing to householders' heating was reported at 14% of respondents. Among those respondents, 59% had air source heating installed in their homes, with a significant proportion of these being Hebridean Housing Partnership (HHP) social tenants. Among householders with air source heating, 53% were HHP tenants and 34% were owner occupiers.[59]

3.4 Off gas grid

Figure 10 below shows that in Scotland as a whole 19% of dwellings are off gas grid. In Shetland and Orkney 100% of dwellings are off gas grid. Na h-Eileanan Siar has the next highest percentage of dwellings off gas grid, at 88%, followed by Highland (62%) and Argyll and Bute (56%).[60]

---

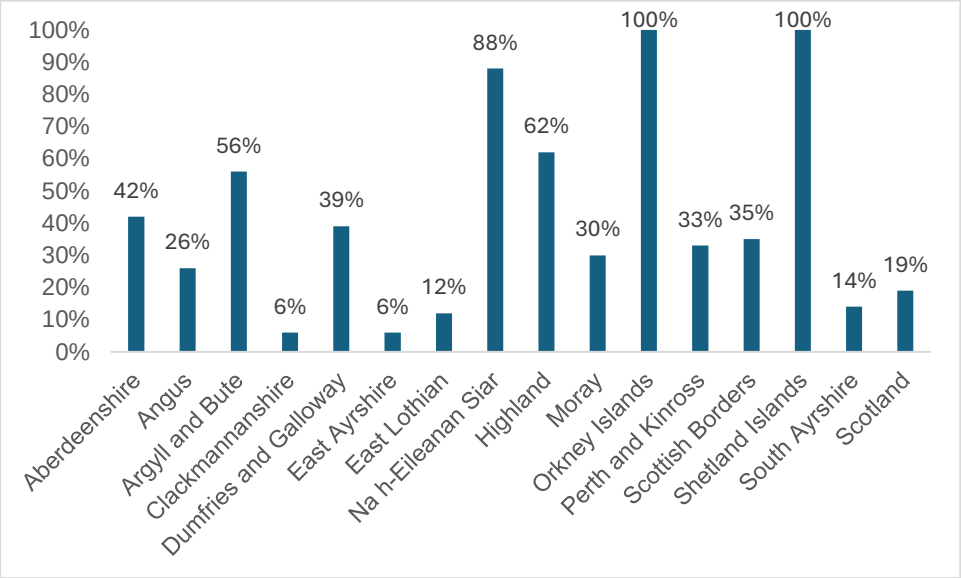
[57] Ibid

[58] Tighean Energy Advisory Service (TEAS) (2023), Affordable Warmth at Home in the Western Isles – Tighean Innse Gall

[59] Tighean Energy Advisory Service (TEAS) (2023), Affordable Warmth at Home in the Western Isles – Tighean Innse Gall

[60] According to the Expert Commission on Energy Regulation, Scotland has five Statutory Independent Undertakings (SIUs) for gas supplies that are operating gas networks not connected by

Figure 10: percentage of dwellings in rural Scottish local authorities which are off gas grid, DESNZ subnational estimates of domestic properties not on the gas grid, 2022[61]



According to the Cross Party Group in the Scottish Parliament on Poverty, electricity is three to four times more expensive than mains gas per kilowatt-hour (kWH); and oil, LPG and solid fuels are around twice as expensive per kWH than mains gas. In addition, they come with costs for transportation and minimum spend requirements to buy fuel in bulk. Oil, LPG and solid fuels are not regulated, and there is minimal competition in the market meaning prices remain high. Payment for alternative fuels is often required up front and minimum order levels can be as much as £500. For those on low incomes in particular, this is an example of an intersection between the rural premium - the higher cost of living rurally - and the poverty premium – the extra costs people on low incomes and in poverty pay for essential products and services.[62]

3.5 Electricity consumption

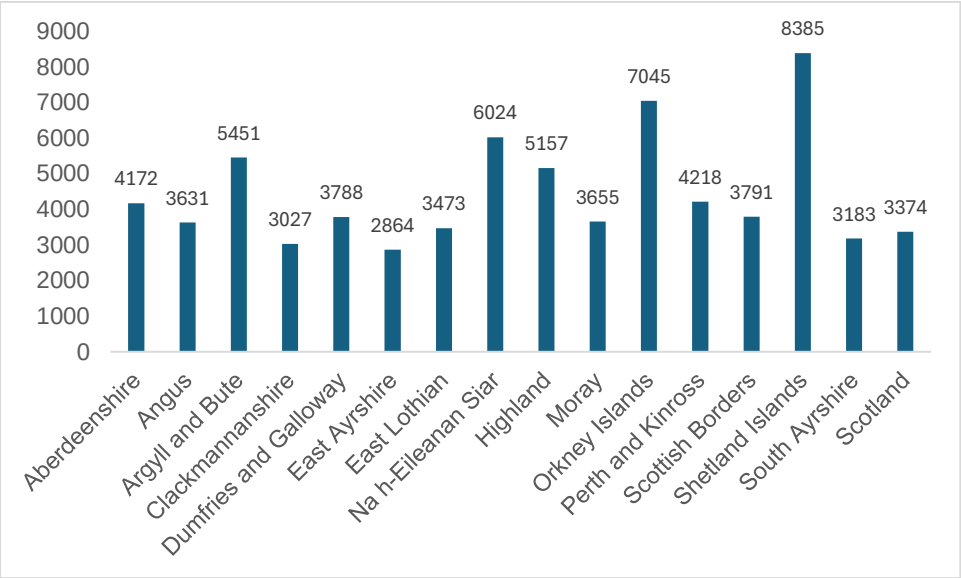
Figure 11, below, shows that mean domestic electricity consumption is far higher in some rural local authorities than in Scotland as a whole. In Scotland as a whole the mean consumption is 3374 KWh, compared to 8385 KWh in the Shetland Islands; 7045 in the Orkney Islands; 6024 KWh in Na h-Eileanan Siar; 5157 KWh in Highland; 5451 KWh in Argyll and Bute; 4218 KWh in Perth and Kinross, and 412 KWh in Aberdeenshire.

pipeline to the rest of the network. Four (Campbeltown, Oban, Wick and Thurso) use Liquefied Natural Gas (LNG) and one (Stornoway) uses Liquefied Petroleum Gas (LPG).

[61] Department for Energy Security and Net Zero (2024) Sub-national estimates of properties not connected to the gas network - GOV.UK (www.gov.uk)

[62] Cross Party Group in the Scottish Parliament on Poverty (2024) CPG-on-Poverty-Rural-Report-May-24-_DE_design.pdf (povertyalliance.org)

Figure 11: mean domestic electricity consumption (KWh per household) by rural Scottish local authorities, DESNZ 2022[63]



It should be noted that, while electricity consumption is higher in some rural local authorities, self-rationing of electricity may be taking place. Self-rationing is when a household cannot (or does not) heat their home to the temperatures necessary for good health and wellbeing as recommended by the World Health Organisation and/or limits the use of other energy services.[64] Research from the Scottish Fuel Poverty Advisory Panel[65] and Changeworks[66] highlight that this is a particular problem in rural areas, where households view themselves as more 'hardy' or 'resilient' to local climates.[67]

4 Metering

4.1 Radio Teleswitch Service (RTS) switch off

The RTS was established and fully operational in 1984. Its purpose was to manage the load on the electricity network and enable the switching on/off of large numbers of night-storage heaters/water heating via a specific RTS electricity meter. This stems from historic arrangements to make costs cheaper/more attractive at certain times of day. It also helps manage the network through staggering load to prevent sudden increases in demand on fragile electricity networks.[68]

The RTS meter is a type of electricity meter that operates via long-wave radio technology. The service is a legacy industry-run service which supports versions of multi-rate, or other complex meter types with certain functions such as switching

[63] Department for Energy Security and Net Zero (2024) Regional and local authority electricity consumption statistics - GOV.UK (www.gov.uk)
[64] Scottish Fuel Poverty Advisory Panel (2023) Energy rationing an increasing coping mechanism for dealing with fuel poverty - Fuel Poverty Scotland (fuelpovertypanel.scot)
[65] Ibid
[66] Changeworks (2023) A-Perfect-Storm-Fuel-Poverty-in-Rural-Scotland.pdf (changeworks.org.uk)
[67] Ibid
[68] Scottish Federation of Housing Associations (2022) 97469.pdf (sfha.co.uk)

between peak and off-peak rates or turning on heating or hot water. Meters are switched between rates via a signal transmitted from radio masts, with many of these meters located in central and northern Scotland, as well as some areas of England and Wales.[69] The previous incumbent[70] electricity suppliers utilised this type of meter to offer special electricity tariffs aimed at those customers who are completely reliant on electricity for heating their homes. Many consumers have remained on this type of tariff with the incumbent electricity supplier and unable to switch supplier because almost all non-incumbent suppliers do not offer electricity tariffs of this type.[71]

The RTS system is now very old and relies on what is regarded as obsolete technology. The technology that supports Radio Teleswitch (RTS) meters will end on 30 June 2025. Without the technology to tell RTS meters when to switch between peak and off-peak rates they may no longer work properly, this may mean that:

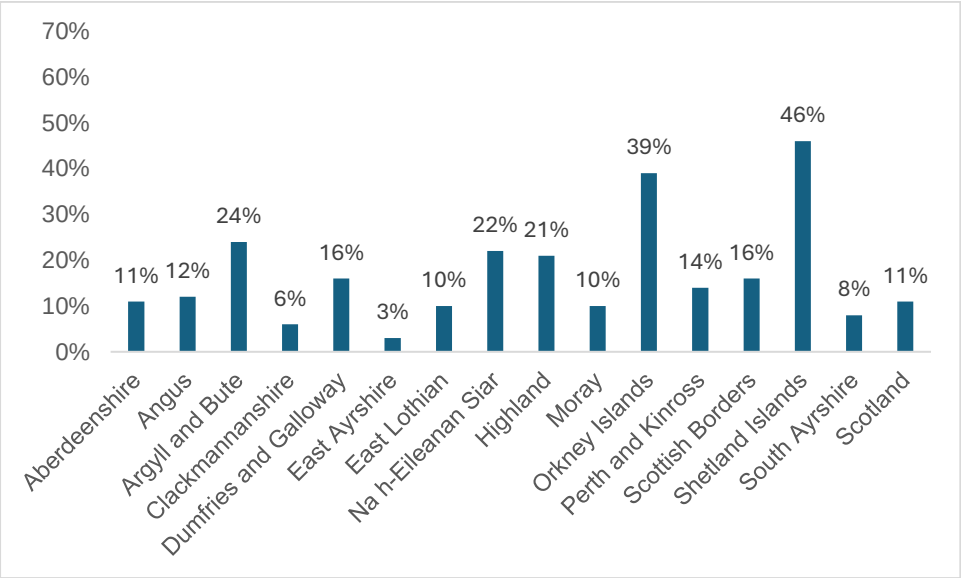
- a consumer's heating and hot water may be left continually on or off
- a consumer's electric storage heating may charge at the wrong time of day, possibly leading to higher bills
- suppliers may be unable to confirm a consumer's electricity usage during peak or off-peak times, and electricity costs may be higher than before.[72]

The types of tariffs impacted are those designed specifically for customers who rely on electricity for their heating/hot-water needs – tariffs such as: Comfortplus; White Meter; Total Heat Total Control; along with some Economy 7/10 tariffs.[73] Ofgem expects electricity suppliers to replace all RTS meters before the technology supporting RTS ends in June 2025.[74] Energy Action Scotland estimate that the RTS switch off will affect the electric heating systems of 250,000 households in Scotland.[75]

Figure 12, below, shows the proportion of domestic electricity meters which are Economy 7 meters. In Scotland as a whole the proportion is 11%, this is compared to 12% in England and Wales. The proportion of Economy 7 meters is particularly high in the Shetland Islands (46%) and the Orkney Islands (39%) but is also high in Argyll and Bute (24%); Na h-Eileanan Siar (22%), and Highland (21%).

[69] Ofgem (2024) Smart Meter Rollout: Open Letter on the roll out of smart meters for Prepayment and Radio Teleswitch (RTS) customers (ofgem.gov.uk)
[70] 'Incumbent' refers to the six largest energy suppliers.
[71] Scottish Federation of Housing Associations (2022) 97469.pdf (sfha.co.uk)
[72] Replacing your Radio Teleswitch electricity meter | Ofgem
[73] Scottish Federation of Housing Associations (2022) 97469.pdf (sfha.co.uk)
[74] Replacing your Radio Teleswitch electricity meter | Ofgem
[75] Energy Action Scotland (2024) Energy-Action-Scotland-2024-Manifesto-25-June.pdf (eas.org.uk)

Figure 12: Proportion of domestic electricity meters which are Economy 7 meters by Scottish rural local authorities, DESNZ 2022[76]



4.2 Smart meters

In most cases, RTS meters should be replaced with smart meters. Smart meters offer consumers with RTS meters a long-term solution as the functionality of switching between rates will be controlled via the smart meter and will not be reliant on the current legacy service. It will also enable consumers with these types of meters access to smart specific products and tariffs.[77] For prepayment customers specifically, Ofgem highlight that smart prepayment meters enable consumers to improve their energy efficiency through real time usage information. They allow consumers more options to top-up, including online via an online account or mobile application, via phone and in shops. They highlight that smart prepayment meters also allow suppliers to identify early signs of customer self-disconnection and take proactive measures to support customers.[78]

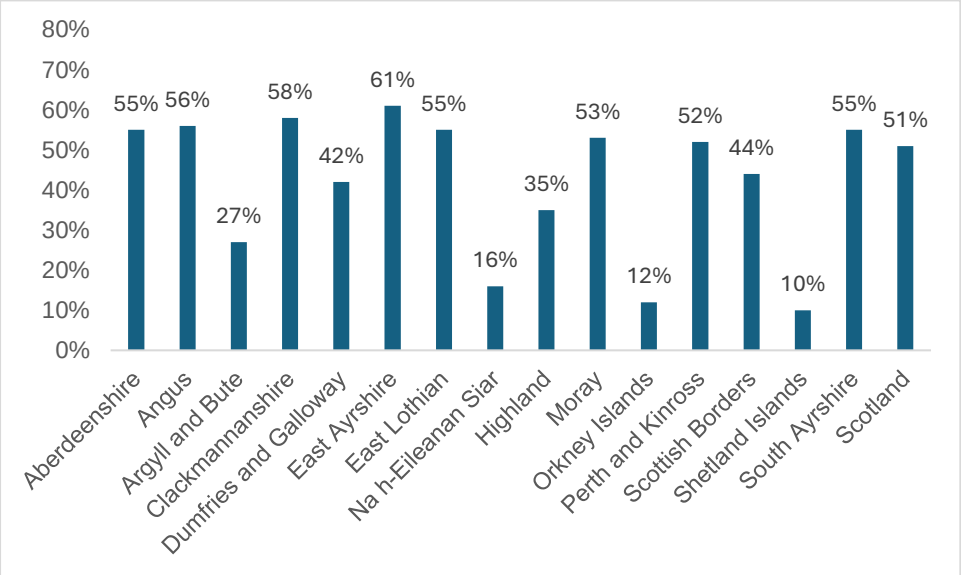
In 2022, the UK Government introduced a new four-year regulatory framework with binding targets for suppliers. The government also places other obligations on suppliers, such as to take all reasonable steps to ensure smart meters operate in 'smart mode', where they send energy usage information to suppliers and display the information to consumers.[79]

Figure 13, below, shows statistics from Q1 2024 on the proportion of domestic electricity smart meters operated by all energy suppliers. The proportion of smart meters in Scotland as a whole is already considerably less than the proportion for England and Wales (51%, compared to 64% in England and 63% in Wales). In a

[76] Department for Energy Security and Net Zero (2024) Regional and local authority electricity consumption statistics - GOV.UK (www.gov.uk)
[77] Ofgem (2024) Smart Meter Rollout: Open Letter on the roll out of smart meters for Prepayment and Radio Teleswitch (RTS) customers (ofgem.gov.uk)
[78] Ibid
[79] Smart meter transition and the Data Communications Company (DCC) - Supplier Smart Metering Installation Targets | Ofgem

number of rural local authorities this proportion is even lower. Only 10% of meters in Shetland are smart, followed by 12% in Orkney; 16% in Na h-Eileanan Siar; 27% in Argyll and Bute, and 35% in Highland.

Figure 13: The proportion of domestic electricity smart meters operated by all energy suppliers by Scottish rural local authorities, DESNZ 2024[80]



4.2.1 Smart meter roll out

The UK Government has set targets and established roles and responsibilities for the national rollout of smart meters. The Department for Energy Security & Net Zero (DESNZ) is leading and monitoring the rollout. It has also set rules and standards to ensure that consumers are protected. These include rules around technical standards for the equipment and making sure the needs of vulnerable people are met. The energy regulator, Ofgem, is responsible for making sure consumers are protected. They'll ensure that the energy suppliers stick to the standards set out in the Consolidated Metering Code of Practices (CoMCoP). They are also responsible for the governance of the Smart Energy Code which the Data Communications Company, the energy suppliers and the network operators have signed up to.[81]

Ofgem have highlighted that the roll out of smart meters for RTS consumers has progressed at a considerably slower pace than expected.[82] During Q1 2024, a total of 780,800 smart and advanced meters were installed by large energy suppliers across Great Britain; a 10% decrease on the previous quarter and an 11% decrease on the same quarter in 2023.[83]

[80] Department for Energy Security and Net Zero (2024) https://www.gov.uk/government/statistics/smart-meters-in-great-britain-quarterly-update-march-2024
[81] About the national smart meter rollout | Smart Energy GB
[82] Department for Energy Security and Net Zero (2024) https://www.gov.uk/government/statistics/smart-meters-in-great-britain-quarterly-update-march-2024
[83] Department for Energy Security and Net Zero (2024) Q1 2024 Smart Meters Statistics Report (publishing.service.gov.uk)

Ofgem analysis has shown significant variation in supplier RTS meter replacement progress. Some suppliers have performed better than others when replacing RTS meters with a smart meter, with some suppliers replacing over 75% of their RTS portfolio, whilst others have replaced less than 10%. Ofgem highlight that consumers who remain on traditional RTS meters are not only being left at a disadvantage, as they are unable to take advantage of the benefits smart meters bring but may also be exposed to risks should their meter not be replaced prior to the closing of the legacy service.[84]

Energy Action Scotland (EAS) echo Ofgem's view. They emphasise that energy companies should be compelled to increase the pace of smart meter roll out to households currently using RTS meters, prioritising those households who are at risk of disconnection from supply and households most likely to suffer from increased costs associated with this loss of service. EAS argue that there is a genuine risk to life in the event of a catastrophic loss of supply. They argue that the UK Government must ensure that Ofgem protects households affected.[85]

The House of Commons Committee of Public Accounts published a report on the rollout of smart meters in October 2023.[86] It highlighted variation in smart meter uptake across geographic areas (London and rural areas have lower take up), and demographic groups (lower uptake among the young, female, those on low incomes, and private renters; higher uptake amongst older, male, those on higher incomes, and homeowners). The Committee highlight a number of concerns and make recommendations on how to tackle these, including:

1. Progress rolling out smart meters is too slow and the DESNZ has not done enough to ensure consumers are convinced of their benefits. DESNZ should work with Smart Energy GB to review its public engagement strategy.

2. Smart meters are not achieving the consumer benefits they are supposed to and are benefitting certain, often wealthier consumers more than others. DESNZ should update its evidence base on the benefits consumers are actually receiving and carry out further assessment of how to maximise the benefits of the smart meter network for all consumers.

3. DESNZ has limited understanding of why smart meter coverage is lower in some areas - particularly London, rural and remote areas - compared to others. DESNZ should set out in its Treasury Minute response how it will: a) increase its understanding of the reasons for variation in geographic coverage, and what it is doing to increase smart meter uptake in those areas that are lagging behind; b) set out how those households who are unable to install smart meters will be supported.

[84] Department for Energy Security and Net Zero (2024) https://www.gov.uk/government/statistics/smart-meters-in-great-britain-quarterly-update-march-2024
[85] Energy Action Scotland (2024) Energy-Action-Scotland-2024-Manifesto-25-June.pdf (eas.org.uk)
[86] House of Commons Committee of Public Accounts (2023) Update on the rollout of smart meters (parliament.uk)

4. Ofgem risks neglecting the importance of consumer engagement and behaviour change by focusing on penalising suppliers for missing targets. Ofgem should consider how its approach to regulating suppliers, on both the rollout and in relation to net zero more widely, takes account of the need for suppliers to engage their customers to promote behaviour change.

5. Too many smart meters are not fully functioning and millions more will be impacted when the 2G and 3G mobile communication networks close.[87] DESNZ and Ofgem should set out: a) what they will do to ensure suppliers assign more importance than at present to replacing those smart meters (and their in-home displays) not functioning properly; b) a timetable for replacing the communication hub element of smart meters that will lose functionality when the 2G and 3G mobile networks are switched off; c) measures to ensure that suppliers use future-proofed technology.[88]

These points are echoed by Citizens Advice, who commissioned Savanta to undertake a survey of 4,000 adults in GB to help them understand the consumer experiences of smart meters.[89] The research took place between August 2023 and October 2023, and was augmented by Citizen Advice's own insights from contacts to the Citizens Advice Consumer Service, cases from the Extra Help Unit, data from their Energy Satisfaction survey, and past research into consumer experiences with smart meters. Citizen Advice highlight that the people they help with smart meter problems often say these have not been addressed promptly by suppliers, causing distrust and disengagement. These issues are leading to negative media stories and word-of-mouth that smart meters are not reliable, reducing enthusiasm to have one installed among those who don't yet.

Citizens Advice are calling for new 'Guaranteed Standards' that require suppliers to install and operate meters properly, investigate and address problems in a timely way, and provide compensation when this doesn't happen.[90]

4.2.2 Smart meter network coverage

At the moment, it is only possible to get a smart meter if a consumer lives in an area that's covered by the smart meter network. This is because energy suppliers need this network to send information to your smart meter. This information includes telling the meters when to switch between off-peak and peak pricing. However, two solutions are being looked at. Either suppliers will work out a different way to communicate with smart meters, or suppliers will offer pre-programmed smart meters that have pre-set off-peak and peak switching times.[91]

---

[87] According to Ofcom, each mobile provider is setting its own timetable for its 3G network switch-off. For example: Vodafone completed its switch-off in early 2024; EE completed its switch-off in early 2024; Three expects to switch-off by the end of 2024; O2 is planning to switch-off in 2025.
[88] House of Commons Committee of Public Accounts (2023) Update on the rollout of smart meters (parliament.uk)
[89] Citizens Advice (2024) Get Smarter: Ensuring people benefit from smart meters (ctfassets.net)
[90] Ibid
[91] RTS Shutdown (Radio Teleswitch Service) | What to do (changeworks.org.uk)

Smart meters do not rely on wi-fi to send signals. Instead, they include a communications hub which connects the smart meter to the in-home display as well as a secure national smart meter network (currently made up of mobile phone or radio masts).[92] First generation smart meters rely on mobile telephone reception, and as a result if a household is located in an area with poor signal it may experience difficulties sending reading to their energy supplier. If this is the case the consumer may need to contact their energy supplier to insist that they install a second generation meter, known as SMETS2. A SMETS2 meter is not reliant upon the mobile phone network and Smart Energy GB estimates that by the end of the rollout this network will have coverage of 99.25% of Great Britain.[93]

Jenkins et al have highlighted that the smart meter rollout may worsen the rural/urban divide.[94] This is because access to the dedicated network connection services required for a functioning smart meter system varies widely across the UK, with notably lower accessibility outside of urban centres. Furthermore, the housing stock in rural areas is often more challenging to access, meaning that installation often requires more travel mileage and person hours. The result of this is a focus by energy companies on 'easy to manage' areas with well-established delivery and logistic networks and larger installation volumes.[95]

As previously discussed, the House of Commons Public Accounts Committee has highlighted potential challenges to first generation smart meters when the 2G and 3G mobile communication networks close. They highlight that an estimated seven million communications hubs (part of the electricity smart meters) will also need to be replaced, because they will lose functionality when the 2G and 3G mobile communications networks are closed. The costs of these upgrades could be very significant, and, like other costs of the rollout, are ultimately passed on to billpayers.[96]

As a part of the Scottish 4G Infill (S4GI) Programme evaluation, the Scottish Government commissioned the Scottish Futures Trust to carry out primary research on the impact of the programme. The Scottish Government's Scottish 4G Infill Programme (S4GI) is a £28.75 million initiative delivering 4G infrastructure and services in 55 mobile "notspots" in rural and island parts of Scotland.

The methodology was as follow:

- stage one: online and paper-based survey of residents and businesses in the areas affected by the delivery of the S4GI programme
- stage two: follow up focus groups with residents and businesses identified during stage one

---

[92] How do smart meters send readings? | Smart DCC
[93] Our FAQs - How do smart meters work? | Smart Energy GB
[94] Kirsten E.G. Jenkins; Benjamin K. Sovacool; Sabine Hielscher (2019) 'The United Kingdom smart meter rollout through an energy justice lens', in *Transitions in Energy Efficiency and Demand, 9780815356783_text.pdf (oapen.org)*
[95] Ibid
[96] House of Commons Committee of Public Accounts (2023) Update on the rollout of smart meters (parliament.uk)

One focus group participant highlighted that the SG4I Programme has not improved connectivity, for either improved broadband services or through mobile 4G. The participant described themselves as being:

> "disadvantaged and discriminated against because of their location, and economically disadvantaged as if the signal was better, this would remove the need to pay for a landline."[97]

4.2.3 Other smart meter issues

As well as network coverage and roll out issues, consumers have faced other issues in relation to smart meters. In June 2023, the National Audit Office (NAO) published its assessment of DESNZ's progress on the smart meter rollout.[98] The National Audit Office applied a value for money approach to government expenditure on smart meters. They highlighted technical smart meter issues faced by some consumers. Firstly, some smart meters are not operating in smart mode. Of installed gas and electricity smart meters in domestic properties, DESNZ's data shows that 3,794,000 (11%) as at the end of March 2024[99] are not operating in smart mode and are effectively indistinguishable from a traditional meter, meaning that they do not send energy use information to suppliers and may not display this to consumers. This is because, for example, the meters are still waiting to be commissioned (such as in new build premises) or due to communication issues. Stakeholders also told NAO of their concerns that the target framework incentivises suppliers to prioritise installing new smart meters, rather than fixing issues with previously installed smart meters.[100]

Citizens Advice have highlighted that when smart meters don't work properly it can put consumers at risk of receiving estimated or catch up bills, often without warning. Unexpected bills impact consumers' ability to budget and can cause people to fall into debt. Meters not working properly can also prevent people from using smart energy services like Time of Use and export tariffs, which are needed to make the most efficient use of low carbon technologies like electric vehicles and solar panels.[101]

Secondly, there are issues with first-generation smart meters not retaining smart function when switching suppliers. As of 5 May 2023, around four million first-generation smart meters had not yet been migrated on to the central platform service by suppliers to ensure they maintain smart capability even if consumers switch supplier, despite a government requirement that this be complete by the end of 2022. According to Citizens Advice, in September 2022, the central platform service provider told DESNZ that technical limitations meant that it may not be possible to migrate more than 500,000 first-generation meters.

Finally, there are a number of other technical issues affecting smart meters. In August 2022, a survey of 1,580 adults for Smart Energy GB found 37% of

---

[97] Scottish Government (2024) scottish-4g-infill-programme-evaluation-final-report.pdf (www.gov.scot)
[98] National Audit Office (2023) Update on the rollout of smart meters - NAO report
[99] Department for Energy Security and Net Zero (2024) Q1 2024 Smart Meters Statistics Report (publishing.service.gov.uk)
[100] National Audit Office (2023) Update on the rollout of smart meters - NAO report
[101] Citizens Advice (2024) Get Smarter: Ensuring people benefit from smart meters (ctfassets.net)

respondents with smart meters claimed to have had an issue with their meter at some point following its installation, including no automatic readings, inaccurate bills and the smart meter or in-home display not showing information. DESNZ believes this overstates the true number of consumers who have experienced issues as, for example, the data were collected at a time of increased concerns in the energy market.[102]

5 Debt

Data from Ofgem shows that the total value of energy debt and arrears owed by customers to suppliers across Great Britain has risen substantially since 2018. After sustained increases during 2021 and the first half of 2022, the value stayed relatively steady until Q1 2023, after which it has risen sharply. Between Q4 2023 and Q1 2024, it rose by 7%, from £3.10bn to £3.32bn.[103]

Data from Citizens Advice Scotland (CAS) shows that in 2023/2024, the average energy debt clients presented with to the Citizens Advice network in Scotland was around £2,300.[104] The data highlights the acute challenges faced in rural areas, where clients had by far the largest level of energy debt. The average debt for people in accessible/remote rural areas who sought advice from the Citizens Advice Scotland network was £3,047, over £700 more debt on average than Scotland as a whole.

CAS argue that the surge in energy debt in rural communities implies that rurality – or issues attendant to living in rural areas like low-quality housing stock, digital exclusion and difficulty accessing services – is contributing to affordability and debt challenges. They recognise that suppliers are trying to help customers in debt but highlight that suppliers have designed and implemented policies and procedures that are not consistent across the industry. As such, CAS argue that Ofgem should play a leading role in establishing robust and consistent industry-wide approaches towards people struggling with some level of fuel debt.[105]

6 Transition to net zero

6.1 Decarbonising rural homes

In 2019 Calor commissioned Baker et al, researchers at Common Weal, Glasgow Caledonian University, and the Energy Poverty Research initiative, to undertake research on low carbon, poverty-free heating options for rural Scotland.[106] The research analyses relevant evidence in order to assess the strengths and weaknesses of low-carbon heating options. Ultimately, the researchers argue that there will need to be multiple-technology approach to decarbonising heat in Scotland, with no single credible solution able to meet demand in any one location.

---

[102] National Audit Office (2023) Update on the rollout of smart meters - NAO report
[103] Ofgem (2024) Debt and Arrears Indicators | Ofgem
[104] Citizens Advice Scotland (2024) cas_affordability_and_debt_response_may_2024.pdf
[105] Ibid
[106] Keith Baker; Ron Mould; Craig Dalzell; Jonathan Shafi (2019) Carbon-free-Poverty-free.pdf (commonweal.scot)

Although not specifically focused on rural Scotland, the research does have a number of findings which are highly relevant, and these are as follows:

- Electricity is cheap to install and familiar to users, but it is very expensive to run and ties household emissions to that of the electricity grid. Some emerging technologies such as infrared have some potential applications (particularly in solid stone-wall dwellings) but are probably not optimal for most housing.

- Household-mounted solar thermal is cheap to install, cheap to generate and highly flexible, but a standard installation will not meet 100% of heating need (particularly in properties which share a roof) and would require the additional installation of heat storage or for changes in occupants' habits and behaviours. Large-array solar thermal has even more advantages than household-mounted, producing very cheap heating that can be stored and is capable of providing over half of heating requirement, but it requires a district heating system to distribute the heat.

- There are a variety of biogas and waste incineration options including anaerobic digestion of waste and the use of biomass to generate bioLPG. It has the advantage of being an easy, direct replacement for natural gas and oil but government support will be required to incentivise the development of domestic sources of bioLPG supply.

- Both ground-source and air-source heat pumps have a role to play but are site specific, have long repayment times and all require an additional heating source to top up the heat level (which usually involves non-renewable heating sources). Larger scale heat pumps attached to district heating schemes have much higher efficiency.

- Hydrogen can be used as a direct gas replacement but is very expensive to produce and large-scale deployment would almost certainly rely on carbon capture and storage (CCS) and would compete with other uses for hydrogen such as transport. However, this is a better option for communities which have excess renewable electricity supplies, such as islands with limited capacity to export to the grid.

- Wood fuel biomass has significant scope to replace existing heat sources at a fairly competitive price, but its use in urban areas will be limited by pollution legislation and it would be imperative to ensure a reliable domestic supply chain for the fuel source.[107]

The research draws attention to the fact that there is limited capacity in some locations on the electricity grid to supply substantial increases in electrical heating. In particular, it highlights the circumstances of communities in areas where the potential

[107] Ibid

renewable electricity generation capacity is high, but where the export capacity of the grid is currently constrained, and the different legislative options necessary and/or available for decarbonising heat and other energy supplies in these areas.[108]

In June 2024 McCarthy et al from Sheffield Hallam University undertook a rapid evidence review on options for decarbonising off-grid homes in the UK, exploring key considerations, challenges, and drivers.[109] The evidence reviewed by the authors highlights the complexity and multifaceted nature of the transition to sustainable energy systems for off-grid homes, requiring a nuanced approach that considers regional variations and occupant preferences.

- Air Source Heat Pumps are increasingly being adopted but come with high upfront costs and may not be feasible for lower-income households.
- Ground Source Heat Pumps (GSHPs) offer high efficiency but require ample outdoor space.
- Various decarbonisation pathways, including electrification, mixed technology switches, and the use of BioLPG boilers, are being explored.

Yet the authors argue that barriers such as affordability, housing tenure, and community involvement need to be addressed to ensure the widespread adoption of low-carbon solutions. McCarthy et al highlight that understanding the potential consumer experience with different technologies in off-grid decarbonisation transitions is a crucial but currently under researched area. Echoing the key finding from Baker et al's research, the authors argue that solutions must be diverse and tailored to different scenarios and occupant groups, and involve various stakeholders like governments, local councils, and consumer advocacy organisations.[110]

McCarthy et al give the example of the Isle of Eigg to demonstrate successful off-grid renewable energy systems showcasing the potential of community-driven initiatives. They emphasise that community involvement is crucial for sharing knowledge and experiences during the transition to new energy systems.[111]

The Scottish Government requires new buildings to use 'zero direct emissions heating' (ZDEH) systems from 2024, as part of the New Build Heat Standard regulation. In 2022, ClimateXChange commissioned Delta-EE and Changeworks, on behalf of the Scottish Government, to undertake research to understand which zero direct emissions technologies are best suited to the unique consumer and geographical characteristics of Scottish islands and remote communities.[112] This research utilised a combination of a literature review and interviews with local authorities, housing associations, builders and heating installation and maintenance companies who operate in these areas. Overall, the research found that the uptake of ZDEH technologies in new buildings in island and remote areas of Scotland do not

[108] Ibid
[109] Lindsey McCarthy; Yael Arbell; Aimee Ambrose; Tim Ashworth; Simon Lannon; Rokia Raslan; Ella Schaefer (2024) decarbonising-off-grid-homes-rapid-evidence-review.pdf (shu.ac.uk)
[110] Ibid
[111] Ibid
[112] ClimateXChange (2022) Zero emissions heating in new buildings across Scottish Islands (ed.ac.uk)

face more significant barriers than in other parts of Scotland. It was found that island regions are ahead of the legislation in terms of installing ZDEH technologies in new build properties. These technologies include electric storage heaters, direct electric heaters, electric boiler, air and ground source heat pumps. Many communities began installing ZDEH systems a decade ago because there is no connection to the mains gas network. Furthermore, the research found that Island communities are already implementing lessons learned from the use of ZDEH technologies. As standard, heat pumps installed in coastal and island locations are coated with enhanced corrosion protection to shield against coastal weather.

However, costs are a significant factor when selecting a ZDEH technology for social housing due to pressured budgets. The main cost pressures come from higher maintenance costs and additional travel requirements to island and remote locations for specialist contractors. A lack of sufficient specialists across these regions could be a constraining factor in both newbuild and retrofit situations. While there are specialists across Scotland, including on islands and in remote locations, many are reluctant to travel from the mainland to island regions due to the additional cost of travel and accommodation.[113]

6.2 Renewable energy generation and rural communities

6.2.1 Policy background

Community benefits are a renewable industry led voluntary initiative to support communities – often in the form of fund. The intention is for these benefits to offer an opportunity for communities to work with renewable energy businesses for the long-term benefit of the community.

In the Scottish Energy Strategy, published in 2017, the Scottish Government set out its expectation that energy developers should continue to offer meaningful community benefits in line with its Good Practice Principles. The Principles split ownership of onshore renewables into two categories, private ownership and community and locally owned:

- Private ownership projects are owned by a developer but should provide monetary benefits of £5000 per MW installed capacity to nearby communities for the lifetime of the windfarm, known as community benefit payments. These payments are not a legal obligation but are strongly encouraged by the Scottish Government. In addition, they also suggest that other onshore technologies should aspire to this level.[114]

- “Community and locally owned” projects are defined by the Scottish Government as those owned by a community group, farm estate, local authority, or any other local business. However, some researchers suggest that a project can only be considered community-owned if it is not driven by

[113] Ibid

[114] In 2021 the UK Government published updated Good Practice Guidance for England. This guidance advised that a Community Benefit Fund “can take the form of a fixed annual sum paid per MW of installed onshore wind capacity, a variable annual payment linked to profit or electricity output measures, lump-sum payments, or a blend of all three” but stopped short of a recommended value.

private profits and is owned and managed by the local community but can operate in collaboration with other organisations.[115]

In 2019, the Scottish Government published guidance on good practice for shared ownership of onshore renewable energy developments. This document defines shared ownership as "any structure which involves a community group as a financial partner benefitting over the lifetime of a renewable energy project."[116]

In 2023, the Scottish Government published its Draft Energy Strategy and Just Transition Plan. This document stated that the Scottish Government is currently updating their Good Practice Principles of Community Benefit.

In the Draft Energy Strategy and Just Transition Plan, the Scottish Government set out their ambition for 2 GW of community owned energy by 2030. In order to achieve this, they stated that they will encourage developers to offer community benefit and shared ownership opportunities as standard on all new renewable energy projects – including repowering and extensions to existing projects. The Scottish Government aims to incentivise community benefits by giving up to 100% non-domestic rates relief to renewable energy generators who provide community benefits - giving at least 15% of annual profit to a community organisation or so much of the annual profit as is attributable to at least 0.5 megawatt of the total installed capacity of the project.[117]

In 2013, the Scottish Government established Local Energy Scotland to manage the Community and Renewable Energy Scheme (CARES). CARES supports communities to engage with, participate in, and benefit from the transition to net zero emissions. Local Energy Scotland is a consortium made up of the following organisation:

- Energy Saving Trust
- Changeworks
- The Energy Agency
- SCARF
- With support for delivery from Ricardo Energy & Environment and QMPF[118]

Local Energy Scotland hosts the Community Benefits Register, which shows renewable energy projects in Scotland, and allows developers and communities to upload community benefit details attached to these projects. The Register also details fund spend and provides ideas and advice for communities looking to ensure their funds are spent wisely. According to the Register, the average community value

[115] Hogan, J. L. (2024). Why does community ownership foster greater acceptance of renewable projects? Investigating energy justice explanations. *Local Environment*, *29*(9), 1221–1243. https://doi.org/10.1080/13549839.2024.2360716
[116] Scottish Government (2019) Shared Ownership of Onshore Renewable Energy Developments - gov.scot (www.gov.scot)
[117] Scottish Government (2023) Draft Energy Strategy and Just Transition Plan - gov.scot (www.gov.scot)
[118] Administering and managing CARES · Local Energy Scotland

from recent projects was £5,000 per Mw per year, and the total benefits committed in the last year was £26,358.006.[119]

6.2.2 Case studies

Below are selected case studies focused on how renewable energy generation in rural Scotland can involve and impact communities. All four of the case studies coalesce around one key point: meaningful community involvement is crucial for the success and acceptance of local renewable energy projects, whether community or privately run.

Case study 1: Isle of Eigg[120] [121]

The Isle of Eigg, an inner Hebridean island, is unconnected to the mainland grid. The community purchased the island in 1997 and developed a ten- year plan for its future. Eigg, with 37 households and five commercial properties, established an off-grid renewable energy system to overcome challenges of individual diesel generators. The system includes solar, hydro, wind, and battery storage, providing 90 per cent of electricity from renewable sources. The off-grid system, costing £1.66 million, proved more financially feasible than a £4-5 million mainland connection. Funding sources included Highlands and Islands Community Energy Company, European Regional Development Fund, and others. Eigg Electric Limited, a subsidiary of the Isle of Eigg Heritage Trust, owns and maintains the system. A four-person maintenance team ensures its consistent and safe operation. All islanders have 24-hour electricity, with a 5kW cap per household to reduce reliance on diesel generators. Smart meters monitor usage, and residents voluntarily reduce consumption based on a traffic light system. The system aims to be financially self-sufficient, with income from the Renewables Obligation Certificate scheme and a 20p per unit electricity tariff. A 2015 assessment of the Isle of Eigg off-grid system by Chimel and Bhattacharya revealed that residents on the island were enjoying a reliable supply of electricity that meets their energy needs, while having a significantly reduced carbon footprint.

Yadoo et al conclude that community involvement is crucial for the success of local renewable energy projects. McCarthy et al highlight that for communities to gain full benefits from renewable energy, they must be key instigators and drivers behind local renewable energy development. The authors argue that the top-down centralised approach in the UK contrasts with the bottom-up nature of successful community projects like the Isle of Eigg's. Yadoo et al note that for such projects to

[119] Community Benefits Map · Local Energy Scotland

[120] Yadoo, A., Gormally, A., & Cruickshank, H. (2011). Low-carbon off-grid electrification for rural areas in the United Kingdom: Lessons from the developing world. Energy Policy, 39, 6400-6407, cited in Lindsey McCarthy; Yael Arbell; Aimee Ambrose; Tim Ashworth; Simon Lannon; Rokia Raslan; Ella Schaefer (2024) decarbonising-off-grid-homes-rapid-evidence-review.pdf (shu.ac.uk)

[121] Chmiel, Z., & Bhattacharyya, S. (2015). Analysis of off-grid electricity system at Isle of Eigg (Scotland): Lessons for developing countries. Renewable Energy, 81, 578-588, cited in Lindsey McCarthy; Yael Arbell; Aimee Ambrose; Tim Ashworth; Simon Lannon; Rokia Raslan; Ella Schaefer (2024) decarbonising-off-grid-homes-rapid-evidence-review.pdf (shu.ac.uk)

work, more decision-making power should be devolved to regional planning authorities and local communities.

Case study 2: Point and Sandwick Trust, Isle of Lewis

Point and Sandwick Trust (PST) is an active charitable organisation that promotes and funds community projects in Point and Sandwick, and the wider Western Isles. The Trust built and operates the UK's biggest community wind farm, Beinn Ghrideag, a ten year project which is now one of the most successful income generators in the Western Isles. Funding managed by the Trust is gifted entirely from the profit created by ownership and operation of the 100% community-owned wind farm.[122]

Beinn Ghrideag has three wind turbines, with a capacity of 9 MW, which became operational in 2015. The project cost over £14 million, and results in £900,000 per year for the local community, increasing to £2 million per year in net income when loans are paid off.[123] The money raised can be spent across the wider Western Isles, and has long-term partnerships with Point Community Council, Sandwick Community Council and Sandwick North St Grazings Committee. It also has project-specific partnerships with Bethesda Hospice; the Woodland Trust and Point and Sandwick Energy Support Unit.[124]

In 2020 the Point and Sandwick Trust commissioned Inverness Impact Hub to undertake an independent evaluation of the social impact of the Trust.[125] The evaluation utilised:

- interviews with members from the PST board

- an online survey completed by 37 organisations and community groups that have received funding from PST

- an online survey with 34 recipients of funding through the Croft Woodlands Scheme

- an online community survey which attracted 34 responses

- interviews with 9 stakeholder and local bodies

The evaluation found that there had been a spend of £2,389,000 over 5 years, including £639,299 to 6 core-funded organisations and a further £756,722 invested in 61 community-based organisations. Furthermore, there was a leverage-in of over £1 million and a further £1,249,075 brought in by TIG in home energy grants etc. This created or sustained 32 full time jobs, as well as 25 part time jobs, plus the establishment of private nursery businesses. Over 40% of this investment was in the Point and Sandwick area, 25%+ in Point and Sandwick and Lewis, and 30%+ in

[122] History of Point & Sandwick Trust | Point and Sandwick Trust
[123] Hogan, J. L. (2024). Why does community ownership foster greater acceptance of renewable projects? Investigating energy justice explanations. *Local Environment*, *29*(9), 1221–1243. https://doi.org/10.1080/13549839.2024.2360716
[124] What we fund - Point and Sandwick Trust
[125] Point and Sandwick Trust (2020) PST-Social-Impact-Report-2020-1.pdf (pointandsandwick.co.uk)

Point and Sandwick and islands wide. Grant recipients and beneficiaries also reported a number of intangible benefits, including more informal social interaction, increased community and individual beneficiary confidence, improved health, and reduced social isolation.[126]

In 2024, Jessica L. Hogan, an academic at the University of St Andrews, published research focused on public acceptance of renewable projects.[127] The research utilised a postal survey of residents in Scotland, of which 186 lived in the vicinity of Point and Sandwick. These responses were then used in a Multigroup-Structural Equation Model[128]. The research found that public acceptance of the project was not associated with how fair the benefits were. Rather, involvement in the project was valued more highly and was, indeed, expected by residents. Point and Sandwick, as a community owned project, did have greater community acceptance compared to the privately-owned project included in Hogan's study.[129]

Case study 3: Shapinsay Wind Project, Orkney

The Shapinsay Wind Turbine is a 900 Kw community wind project on the Scottish island of Shapinsay, part of the Orkney Islands. The turbine is operated by Shapinsay Renewables Ltd (SRL) and is wholly owned by Shapinsay Development Trust (SDT). SRL operates the turbine with the purpose of passing the profit generated to SDT for the benefit of the community of Shapinsay. The reason for this separate company is that it operates on a commercial basis. This allows it to make profit, be vat registered, and to account for its trading activities wholly separately from SDT, which is a charity.[130]

In 2020 Esther C. van der Wall, academic at the University of Groningen, undertook an evaluation of the Shapinsay project[131] Data was collected during a two week fieldwork visit to Shapinsay, and was sourced through the following methods:

- 12 interviews with employees of the SDT (2), current and previous board members of the SDT and its trading subsidiary SRL (6), and representatives of the Community Council, Orkney Islands Council, Community Energy Scotland, and Highlands and Islands Enterprise (4).

- A survey (response rate of 33 out of approximately 130 households) exploring the impacts of the project on residents.

[126] Ibid
[127] Hogan, J. L. (2024). Why does community ownership foster greater acceptance of renewable projects? Investigating energy justice explanations. *Local Environment*, *29*(9), 1221–1243.
[128] Multigroup-structural equation modelling is a statistical technique that tests separate structural models in two or more groups.
[129] Ibid
[130] Shapinsay Renewables Ltd - Shapinsay
[131] Esther C. Van der Wall (2020) 'Local impact of community renewable energy: A case study of an Orcadian community-led wind scheme', *Energy Policy* 138

- A theory of change workshop with project representatives and members of the community.

The research found that the biggest changes residents experienced were either direct or indirect effects of the renewable energy revenues. The turbine income was predominantly used to finance transport services, which had many positive flow-on effects. One of these flow-on effects was a modest strengthening of the social cohesion as residents feel more connected to each other and to Mainland Orkney. In particular having access to services outwith Shapinsay at times not covered by the regular ferry was highly valued. Also, the skills development, the jobs created, and the development of renewable energy knowledge and transferable skills by SDT and SRL members were identified as beneficial outcomes.[132]

There were few negative impacts of the project identified. The turbine was generally not perceived as a major intrusion into the landscape. Furthermore, resistance and negative effects on the social cohesion of the community during the development process was limited and short-lived, because of the early start of the engagement process and the decision-making power that was given to the community regarding the decision to progress the turbine or not.

However, the author does caution that, despite the largely positive outcomes of Shapinsay's turbine, the more significant the positive effects are for a community renewable energy community the greater the dependence is when the installed technology cannot meet its production targets, or if subsidies for renewable energy dry up in the future reducing the revenue stream from renewable energy.[133]

Case study 4: Glenburn Wind Development

In their study into the local perceptions of the provision of community benefits from a commercial wind energy project, Macdonald et al, academics at the University of Edinburgh and the University of the Highlands and Islands, present the example of Glenburn Wind Development.[134] Glenburn is a pseudonym used to ensure the anonymity of community members. Glenburn is a wind development surrounded by several ex-mining communities, with a total population of approximately 28,000 residents. Glenburn was chosen by Macdonald et al because, although there were a number of operational wind farms in the surrounding areas, Glenburn had experienced the largest amount of opposition within the local community to community benefits.

The initial planning application for a wind farm on the Glenburn site was rejected by the local authority in 2008, after information sessions were held within the local communities and a statutory consultation was conducted

[132] Ibid
[133] Ibid
[134] Macdonald, C., Glass, J., & Creamer, E. (2017). What Is the Benefit of Community Benefits? Exploring Local Perceptions of the Provision of Community Benefits from a Commercial Wind Energy Project. *Scottish Geographical Journal*, *133*(3–4), 172–191. https://doi.org/10.1080/14702541.2017.1406132

with community councils. This local rejection was subsequently overruled by the Scottish Government in 2009 and the development received planning consent. The development has been operational since 2012. Due to the timing of the development, it preceded the establishment of the Scottish Government's Good Practice Principles for the provision of community benefits from onshore wind.

The development at Glenburn had an installed capacity of 24 MW, and the developer opted to provide a community benefit package of £2,000 per MW per year (a decision made without consulting the local community). As this was index-linked, this sum increased to an overall annual payment of £54,000 per year[135], but was still considerably lower than the Scottish Government recommendation at the time. The community fund collected from these payments was administered by Glenburn Community Trust (GCT), made up of four representatives from the local area.

Macdonald et al carried out interviews with 12 stakeholders in the case study area during June and July 2014. These stakeholders included community council members, local residents, MSPs, local councillors and a developer. A GCT meeting and a community council meeting were also observed by the researchers. The study found that there was a feeling of 'disconnect' between the community benefits package offered and the preferences of the community concerning what they wanted and needed. This issue may be attributed to the primary use of community councils as the vehicle for community engagement, as employing such a narrow channel of engagement as a proxy for the community removed the potential for community-wide communication and cooperation.

A recurrent theme evident throughout the interviews was a perception of the developer as 'big business' which held the money and power to control and influence participatory and planning decisions to suit its own specific commercial agenda. There was a failure on the part of the developer to incorporate the concerns of community members who voiced negative opinions.

The case study highlights that the diverse interests of a community need to be incorporated into the management of a fund, through broadened community participation and decision-making processes. According to the interviewees in this study, the community as a whole did not feel empowered, or feel a sense of ownership over the community benefit or the associated decisions being made. Therefore, the way in which the benefits were being distributed, and the types of projects being funded (described as intangible, invisible and/or short-term, rather than legacy projects) has served to highlight – rather than resolve – issues of equity and powerlessness amongst those members of the community who are not linked directly with those involved in managing the fund.[136]

[135] This was the case in 2014, when the study was carried out.

[136] Macdonald, C., Glass, J., & Creamer, E. (2017). What Is the Benefit of Community Benefits? Exploring Local Perceptions of the Provision of Community Benefits from a Commercial Wind Energy Project. *Scottish Geographical Journal*, *133*(3–4), 172–191. https://doi.org/10.1080/14702541.2017.1406132

Glossary

Air source heat pump - An air source heat pump transfers heat from the outside air to water. This in turn heats rooms in your home via radiators or underfloor heating. It can also heat water stored in a hot water cylinder for your hot taps, showers, and baths.[137]

BioLPG – propane produced from renewable feedstocks such as plant and vegetable waste material.

Carbon capture and storage – is a climate change mitigation technology where CO_2 is captured from power plants and other industrial processes instead of being emitted to the atmosphere. The captured CO_2 is then stored in the subsurface with the goal of keeping it out of the atmosphere indefinitely.[138]

Economy 7 (E7) meter and tariff – E7 energy tariffs charge electricity at a cheaper rate during off-peak hours. The tariff is named Economy 7 after the seven-hour window at night when energy is charged at a cheaper rate. Typically, this window runs from 12:00am to 07:00am, but times may vary between suppliers. While electricity is cheaper on an Economy 7 tariff during Economy 7 off-peak times, this does not mean that this tariff will work out cheaper overall. An Economy 7 tariff might charge at a higher rate for peak-time energy compared to a standard tariff. You must have a specific E7 meter installed to access the tariff.[139]

Economy 10 (E10) meter and tariff – Economy 10 tariffs are very similar to Economy 7 tariffs but offer energy consumers 10 hours of cheaper electricity rather than 7. However, standing charges can be higher on an E10 meter.[140]

Ground source heat pump – as with air source heat pump, but heat is absorbed from the ground? rather than from outside air.[141]

Microbusinesses – Micro businesses are very small companies. A business will be a microbusiness if it has any two of the following: a turnover of £632,000 or less; £316,000 or less on its balance sheet; 10 employees or less.[142]**Smart Metering Equipment Technical Specification (SMETS)1 smart meter** – SMETS1 meters were the first generation of smart meters installed from 2013. They were fitted with the same kind of 3G sim cards that came in mobile phones. This was so smart meters could send readings to an energy company automatically. However, this caused problems when consumers switched suppliers.[143]

SMETS2 smart meter – are compatible across energy suppliers because their software lets them communicate with other SMETS2s. Allows a consumer to switch supplier and keep their smart meter, along with its features.

---

[137] Air source heat pumps - Energy Saving Trust
[138] Carbon Capture and Storage - an overview | ScienceDirect Topics
[139] What is Economy 7? | Economy 7 & 10 tariffs | Smart Energy GB
[140] What is Economy 7? | Economy 7 & 10 tariffs | Smart Energy GB
[141] Air source vs ground source heat pumps - Energy Saving Trust
[142] Prepare annual accounts for a private limited company: Micro-entities, small and dormant companies - GOV.UK (www.gov.uk)
[143] A Guide to SMETS1 and SMETS 2 smart meters | OVO Energy

Solar thermal – solar thermal technologies convert solar radiation into heat that either can be directly utilized for various applications or can be transformed into electricity to serve any purpose as deemed from conventional electricity.[144]

Theory of change – a theory that explains who and why a policy or programme leads to outcomes and impacts.

Total Heat Total Control (THTC) tariff and meter - If a home is all-electric and in the north of Scotland, it could be on a THTC tariff. With THTC there are two meters. One is for off-peak energy you use and the other records all normal usage like lights, kitchen appliances and sockets. Energy used on the normal meter costs more than standard rate.[145]

Value for money assessment – a concept used to assess how well organisations optimise their costs and maximise their impact to achieve their goals.

White meter - white meters, which are usually found in Scotland, are commonly known as Economy 7 meters in England. They ensure that a consumer is offered one rate during the day and another for use during the night, or at off-peak times. However, while Economy 7 meters offer seven hours of off-peak rates, white meters offer eight hours. Like an Economy 7 tariff, a white meter requires a different kind of meter to be installed at your property, which can cost money. This means white meter tariffs can also be difficult to switch to and from.[146]

Wood fuel biomass – a timber-derived product that can be converted to energy through direct combustion or gasification, to solid fuel through pelletising, or to liquid fuel through several processes.

Zero direct emissions heating systems – heating systems which do not emit greenhouse gases during normal operation.

[144] Solar Thermal Energy - an overview | ScienceDirect Topics
[145] THTC and other two meter tariffs | OVO Energy
[146] White meters explained - Uswitch