Indicators and trends

Monitoring climate change adaptation

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Indicator name				Version
CRS61 Number of households in fuel poverty				July 2018
Indicator type:	**Risk/opportunity**	**Impact**	**Action**	
	X			

SCCAP Theme	SCCAP Objective	CCRA risk/opportunity
Climate Ready Society	S2: Increase the awareness of the impacts of climate change to enable people to adapt to future extreme weather events B3: Increase the resilience of buildings and infrastructure networks to sustain and enhance the benefits and services provided	ENr1: Fuel poverty (people affected)

At a glance

- A household is in fuel poverty if more than 10% of its income is spent on fuel and power.
- Fuel poverty rates are driven by household income and the cost of fuel, offset by the energy efficiency of the housing fabric and to a lesser extent household appliances.
- The projected increase in mean winter temperatures due to climate change may mitigate fuel poverty to some extent. However, rural/exposed areas are likely to become wetter and windier, offsetting some of the benefits.

Latest Figure	Trend
In 2016, 26.5% of Scottish households were in fuel poverty (649,000 households). Fuel poverty fell by around 4 percentage points (equivalent to around 99,000 households) from 2015 – 2016.	Following a sustained increase from 2003/04 to 2013, the fuel poverty rate has since fallen year on year. In 2016 it was at the lowest rate recorded since 2005/06. Trends in underlying causes: Household income: increase Energy efficiency: on-going improvement Fuel price: decrease

Why is this indicator important?

After transport, housing costs including fuel and power are the second most significant element of household expenditure in Scotland, accounting for 13% of average household spend. Of this, around half is attributable to fuel and power, which is equivalent to some 6% of total household spend and on average around £1,300 p.a. per household (ONS, 2014). Households in fuel poverty in Scotland are identified as those spending over 10% of their income on fuel and power.

Our understanding of how climate change may affect fuel poverty rates requires consideration of the underlying factors that contribute to it: household income, energy efficiency of the housing fabric and to a lesser extent household appliances and above all, the cost of fuel. The state of repair of a dwelling may also contribute to fuel poverty but is considered separately (*CRS58: Number of Households falling below SHQS and Tolerable Standard*) as it also has consequences for health and well-being.

Changes in mean winter and summer temperatures will contribute to this complex suite of drivers, resulting in changes in fuel use for heating, affecting expenditure on domestic energy. Increased mean winter temperature could result in a reduction in fuel use, which would positively contribute to the eradication of fuel poverty, a target identified in the Housing (Scotland) Act 2001 as well as to the emissions reduction target of the Climate Change (Scotland) Act 2009.

Related indicators:
CRS8: *Excess deaths due to extreme temperatures*
CRS58: *Number of households/people falling below the SHQS & Tolerable Standard*
CRS62: *Domestic debt held with energy companies for the supply of electricity and gas*
CRS64: *Uptake of energy efficiency measures*
BB20: *Energy performance of Scottish housing stock.*

What is happening now?

At the end of 2016, the number of households reported to be in fuel poverty had decreased against 2015 numbers by 99,000 to 649,000 – 26.5% of the households in Scotland. This is the lowest rate recorded by the survey since 2005/06. Of these households, 183,000 (7.5%) were in extreme fuel poverty, using 20% or more of their income to meet fuel costs (SHCS, 2017a).

Fuel poverty rates are influenced by:

1. Household Income

In nominal terms, average household income increased by 1.9% over the 12 months to the end of 2016 (SHCS, 2017a). Using equivalised income[1], median household income increased by 2% (equivalent to £10 per week) in 2014-17, compared to 2013-16 (3 year averaged estimates) (Scottish Government, 2018a). The increase is not evenly distributed across income deciles, with higher incomes increasing more than the lower deciles (CXC, 2015; Scottish Government, 2018a).

2. Energy Efficiency

Improvement in the energy efficiency of the housing stock focuses on both increasing the thermal efficiency of the building by insulating the building fabric and improving the energy efficiency of electrical devices used within a household. The effect of these measures is aggregated in the assessment of housing stock using Energy Performance Certificates (EPCs)[2]. In 2016, 39% of all Scottish dwellings were in EPC Band C or better. Median energy efficiency rating (EER) has improved to 66 (based on SAP 2012) in 2016, which remains in Band 'D' (SHCS, 2017a) (Indicators *BB20a* and *CRS64* provide the underlying detail).

3. Fuel Price Index

The Fuel Price Index (based on the fuel mix required by the average Scottish household) fell by 5.6% in 2015 and 5.4% in 2016. Most Scottish households (79%) heat their properties with gas (SHCS, 2017a).

[1] Adjusted to account for variation in the size and composition of the household

[2] EPCs are required whenever a building is sold or rented to a new tenant.

What has happened in the past?

Trends in fuel poverty from 2003/04 are shown in Fig. 1. While the picture is slightly complicated by methodological changes (the fuel costs method in 2011, and energy modelling changes in 2010 and again from 2014), the general trend in fuel poverty was increasing from 2003 to 2013. Subsequently, rates have fallen for three consecutive years to 2016. Rates of extreme fuel poverty have similarly decreased since 2013. After peaking in 2014, the fuel price index fell in 2015 and again in 2016.

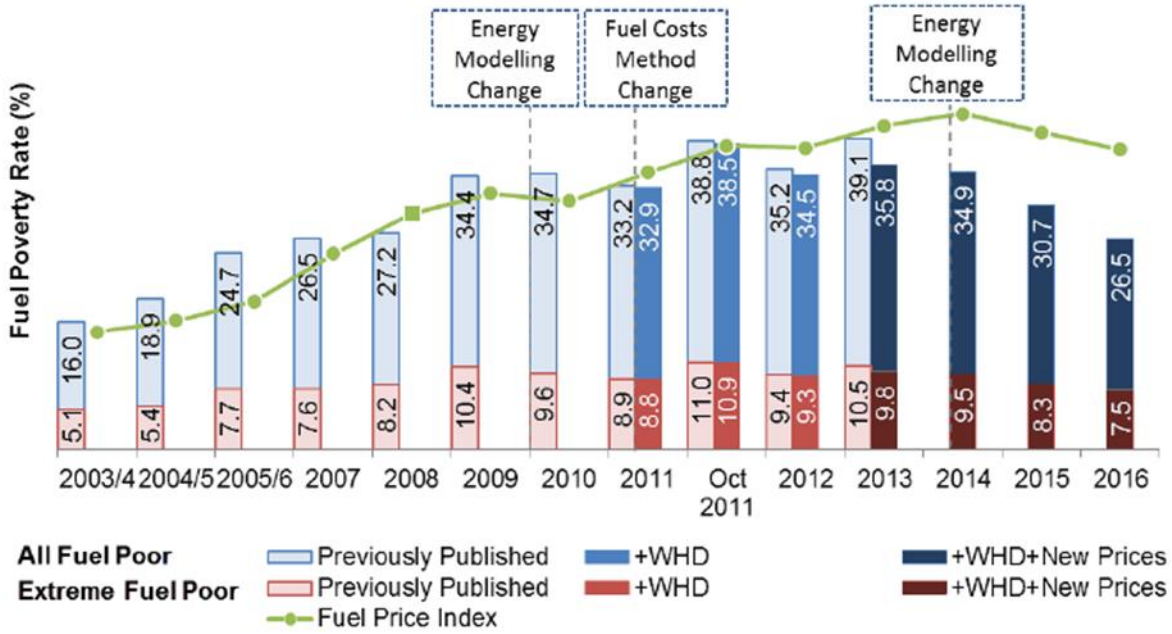

Figure 1: Trend in Fuel Poverty and Extreme Fuel Poverty 2003/4 - 2016 (SHCS, 2017a)

What is projected to happen in the future?

Policy

The Fuel Poverty (Target, Definition and Strategy) (Scotland) Bill was published on 27 June 2018, together with the draft Fuel Poverty Strategy for Scotland. The Bill has three key aims: (i) to set a new target for fuel poverty; (ii) introduce a new definition of fuel poverty that will focus Scottish Government support on those who need it most, no matter where they live in Scotland; and (iii) mandate the production of a new long-term fuel poverty strategy (Scottish Government, 2018b).

The proposed statutory target is for not more than 5% of households to be in fuel poverty by 2040. This target 'recognises that there will always be households that move in and out of fuel poverty due to changes in their income and energy costs' (ibid).

The Bill acknowledges the need to address all four drivers of fuel poverty: energy efficiency; income; energy costs; and how energy is used in the home. It further acknowledges that achieving the target will require concerted action not just from the Scottish Government, home owners and tenants, but also by local authorities, landlords and the third sector (ibid).

The Energy Efficient Scotland Route Map[3] provides the delivery mechanism for improving energy efficiency, while the Scottish Government's customer-facing home energy efficiency programmes, Home Energy Scotland (HES), will continue to provide householders with advice on the best use of

[3] https://beta.gov.scot/publications/energy-efficient-scotland-route-map/

energy, and on energy efficiency schemes and funding mechanisms.

The draft Strategy also proposes actions to reduce poverty and maximise household incomes, including those set out on the Fairer Scotland Action Plan[4] and the Tackling Child Poverty Delivery Plan[5], together with the creation of jobs in a low carbon economy. Fuel prices are a crucial driver of fuel poverty; however as energy policy is decided by the UK Government, the Scottish Government has limited influence over fuel prices.

Fuel Price

The Fuel Price Index fell in 2015 and 2016, however since then oil prices in particular have rebounded. In February 2018, a UK Parliament research briefing noted that the medium to long-term pressures on fuel prices were mixed, with falling wholesale prices offset by increasing infrastructure costs (House of Commons Library, 2018).

In the longer term, household energy prices are expected to rise as electricity-generating assets reach the end of life and have to be replaced. Torness and Hunterston will be decommissioned in 2023 with no plans currently to replace nuclear capacity. Longannet was decommissioned in March 2016 leaving only Peterhead (a gas fired 3.5GW plant) after 2025 plus additional imported electricity (sitting at only 0.6% in 2013) with potentially significant implications for energy security[6]. Inevitably then energy prices are expected to continue to rise as electricity-generating assets reach the end of life and have to be replaced.

Electricity Market Reform (EMR) will attempt to introduce more liquidity into a wholesale market dominated by just 6 generators by incentivising the development of these and other types of low carbon technologies and low carbon generation. Complementary policies will help also to clarify the role of demand-side response, storage and interconnection, and the development of a smarter grid.

The cost-benefit of unconventional fuels remains contested with hydraulic fracturing (fracking) subject to moratorium, while the full lifecycle environmental, economic and social impacts are more fully evaluated, and underground gasification at an even earlier stage of development. Subsidies to the fossil fuel industry are currently six times that to the renewables industry, amounting to £2.6Bn p.a. through different tax instruments (Whitley, 2014). This in itself is a financial constraint on the research and development required to achieve cost-effective supply-side targets in renewable electricity, heat and transport that could complement domestic demand management.

Energy supply and demand

Removing fossil fuel subsidies could accelerate renewables installed capacity. The justification of fossil fuel subsidies on economic grounds may become moot with falling oil price - and corresponding job losses/reduced investment – exacerbated by divestment in fossil fuels creating a class of stranded assets. The decommissioning of fossil fuel based power stations in Scotland will increase the need for imported energy, if biomass and hydro cannot cover the baseload. Maintaining the current levels of exports – 28% of total electricity generated in 2013 (Scottish Government, 2015a) - depends in a large part on the strategic direction of the National Grid.

Scottish Government continues to address the energy demand side, not least in developing energy storage technologies (Scottish Government, 2010a; 2014c). The SSHS also signposts the Energy

[4] http://www.gov.scot/Publications/2016/10/9964

[5] http://www.gov.scot/Publications/2018/03/2911

[6] Cockenzie, a coal-fired power station closed in March 2013 having used up its operating hours under the Large Plan Combustion Directive (2001/80/EC).

Efficiency Standard for Social Housing (EESSH) (Scottish Government, 2014b) and the Regulation of Energy Efficiency Standards in the Private Sector (REEPS) with a consultation due in 2015[7]. Many of these solutions are urban-centric (Scottish Government, 2014a). The 1.5TWh heat to be delivered by district heating to 40,000 homes by 2020 supported by the District Heating Loan Fund will not contribute to efficient heat supply in rural settings where higher rates of fuel poverty are found - in 2016 the rural fuel poverty rate was 37% compared to 24% in urban areas (SHCS, 2017).

Increasing mean temperatures

Met Office data[8] show that annual mean winter temperatures in Scotland since the beginning of the millennium have been in the range of 0.4°C and 4.3°C. Mean winter temperature is likely to rise by between 1°C and 3°C by 2050 in the low emissions scenario and 2°C and 5°C for the same period in the high emissions scenario[9] (UKCP09, 2009). If this is indeed the case then the need for heating fuels in winter would likely decrease with corresponding reductions in fuel poverty. More work would be required to quantify the effect.

Mean summer temperature is likely to rise by between 1°C and 5°C by 2050 in the low emissions scenario and 2°C and 7°C for the same period in the high emissions scenario[10]. This may have implications for air quality and overheating in certain building types, which would have a negative consequence for fuel poverty. Again, more work will be required to quantify the effect but based on current projections this would seem to be minimal.

Based on current evidence, any increase in cooling degree-days[11] is unlikely to be significant or widespread in the medium term (to 2027). Where overheating does occur it will probably remain localised to particular urban dwelling types, resulting in additional fuel costs for cooling. Longer term (to 2080) urban overheating is likely to become more commonplace.

Patterns of change

Between 2015 and 2016:

- Fuel poverty rates in the private sector reduced from 30% to 25%. However, the rate in the social sector, 32%, is similar to the previous year.
- In urban households fuel poverty fell by 6 percentage points to 24%, while rates in rural households are unchanged at 37%.
- The fuel poverty rate among households with gas as the primary heating fuel dropped from 27% to 23%, probably due to gas prices falling more rapidly than in the previous year.
- Older households make up 48% of fuel poor households; 10% are families with children. 58% are owner-occupiers and 70% live in houses.
- Some 47% of fuel poor households have incomes above the poverty threshold (SHCS, 2017a).

Regional variation

There is substantial variability in the distribution of fuel poverty by local authority area, shown in Figure 2.

[7] http://www.gov.scot/Topics/Built-Environment/Housing/sustainable/Energy-efficiency-private-sector-homes

[8] http://www.metoffice.gov.uk/pub/data/weather/uk/climate/datasets/Tmean/date/Scotland.txt

[9] http://ukclimateprojections.metoffice.gov.uk/23667?emission=low http://ukclimateprojections.metoffice.gov.uk/23667?emission=high

[10] http://ukclimateprojections.metoffice.gov.uk/23892?emission=low http://ukclimateprojections.metoffice.gov.uk/23892?emission=high

[11] The day-by-day sum of the mean number of degrees by which the temperature is more than 22°C

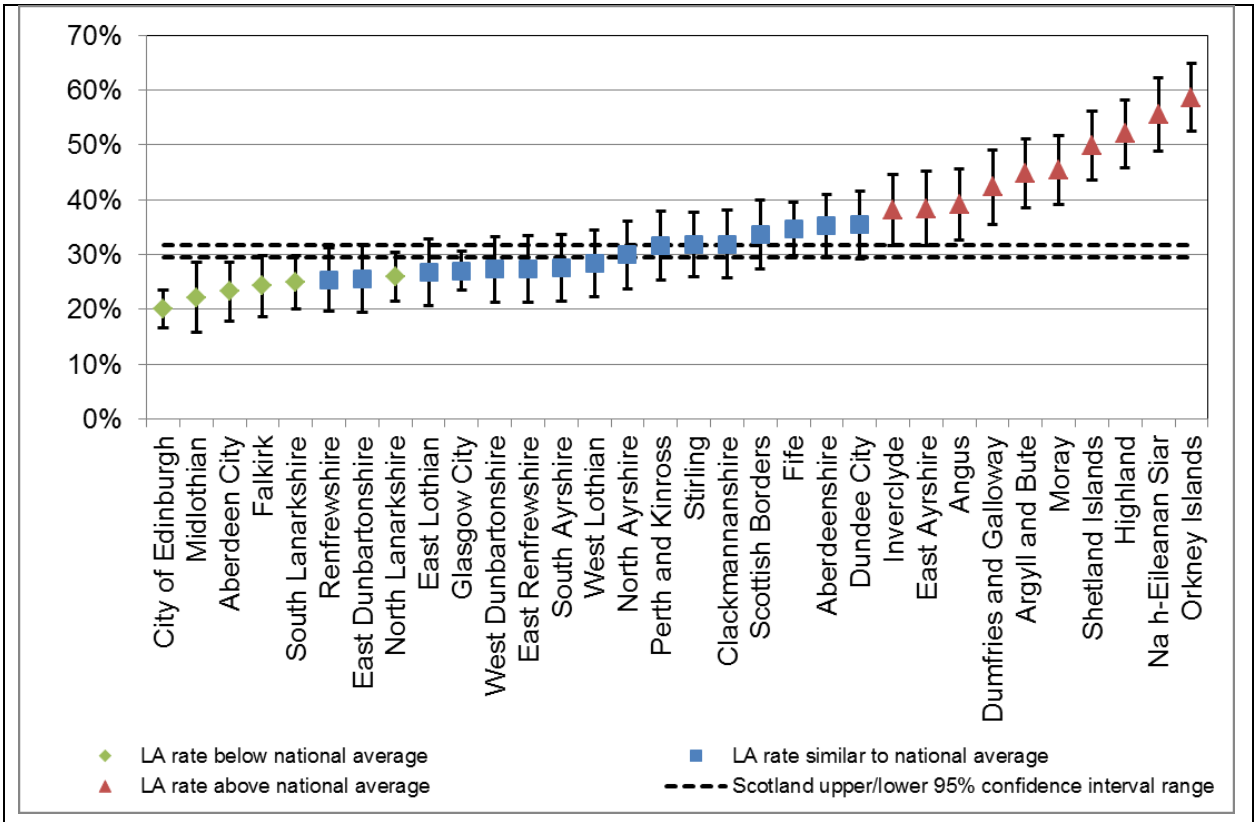

Figure 2: Percent of dwellings in Fuel Poverty by local authority, compared to the Scotland average (SHCS, 2018)

The highest fuel poverty rates were in Orkney Islands (59%); Na h-Eileanan Siar (56%), Shetland Islands (50%); and Moray (45%), while the lowest rates were in City of Edinburgh (20%); Midlothian (22%); Aberdeen City (23%); and Falkirk (24%).

Some of the local authority areas with the highest rates of fuel poverty, including Orkney Islands, Na h-Eileanan Siar, and Shetland Islands, also had a higher than average proportion of energy inefficient dwellings (rated EPC F or G); while some with relatively low fuel poverty rates, including the City of Edinburgh and Falkirk, had a higher than average proportion of more energy efficient properties (rated EPC B or C) (SHCS, 2018).

Interpretation of indicator trends

The decrease in the price of domestic fuels accounted for nearly two-thirds (2.7 percentage points) of the reduction in fuel poverty rates between 2015 and 2016. A further third (1.5 percentage points) is attributable to improvements in energy efficiency, and the reminder by the increase in household incomes (SHCS, 2017a).

Limitations

1. The model for estimating household energy consumption (BREDEM 2012) was updated for the analysis of data from 2014 onwards. This change increases the estimated fuel poverty energy requirement by around 2%, and thus has a small effect on estimated levels of fuel poverty. Therefore the data for 2014 onwards is not fully comparable with previous years (SHCS, 2017b).
2. The accuracy of EPCs based on SAP is frequently challenged by practitioners. SAPs make a number of assumptions about standard occupancy rates, locations, heating patterns and similar. National Home Energy Ratings (NHER), which are still reported as emulated figures through the SHCS are

more detailed in their consideration of differences between properties, providing a more accurate estimate of energy used, CO_2 emissions and running costs[12].
Mueller et al. (SHCS, 2014) provide a model of the relative influence of the underlying drivers on fuel poverty rates for 2012/13. This model could usefully be applied to understanding these influences over the entire time series; further investigation would be required.

References

Building Research Establishment (BRE) (2009) *The Government's Standard Assessment Procedure for the Energy Rating of Dwellings (revised 2011)*, available at: www.bre.co.uk/filelibrary/SAP/2009/SAP-2009_9-90.pdf

ClimateXChange (CXC) (2015) *Household income and fuel poverty*. ClimateXChange internal briefing note.

House of Commons Library (2018) *Energy prices,* UK Parliament. Available at https://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN04153#fullreport (accessed July 2018)

ONS (2014) *How has Household Spending Changed over Time?,* available at: http://www.ons.gov.uk/ons/rel/family-spending/family-spending/2014-edition/sty-the-headlines.html

Scottish Government (2010a) *Conserve and Save: Energy Efficiency Action Plan for Scotland*, available at: www.gov.scot/Resource/Doc/326979/0105437.pdf.

Scottish Government (2013a) *Building Standards Technical Handbook – Domestic Energy*, available at: www.gov.scot/Resource/0045/00459729.pdf (accessed 23 February 2015).

Scottish Government (2013b) *Scotland's Sustainable Housing Strategy*, available at: www.gov.scot/Resource/0042/00425697.pdf

Scottish Government (2014a), *Poverty and Income Inequality in Scotland 2012/13 (2014)*, available at: www.gov.scot/Resource/0045/00454875.pdf (accessed 18 February 2015).

Scottish Government (2014b) *The Energy Efficiency Standard for Social Housing (EESSH): background and guidance for social landlords*, available at /www.gov.scot/Resource/0044/00447123.pdf

Scottish Government (2014c) *Towards Decarbonising Heat: Maximising the Opportunities for Scotland*. Draft Heat Generation Policy Statement (for Consultation), available at: www.gov.scot/Resource/0044/00445639.pdf.

Scottish Government (2017) Consultation on a Fuel Poverty Strategy for Scotland, available at http://www.gov.scot/Publications/2017/11/6179 (accessed June 2018).

[12] The Standard Assessment Procedure (SAP) is used predominantly to assess the energy ratings of new homes. Its climate data is based on Latitude 53.4°N (Nottingham), which is arguably not useful for Scotland, especially Highlands & Islands. The National Home Energy Rating (NHER), which preceded SAP, takes into account both occupancy and exposure.

rdSAP is a quick assessment technique used for existing dwellings based on a set of standard assumptions. Hard to treat homes are by their nature 'non standard'. rdSAP also makes assumptions about the heating regime which may not apply for those in fuel poverty and post-intervention assessments may show the same or more energy use to achieve comfort levels which are un-quantified in the method (Kelly et al., 2011)

Scottish Government (2018a) *Poverty & Income Inequality in Scotland: 2014-17,* available at http://www.gov.scot/Publications/2018/03/3017 (accessed June 2018).

Scottish Government (2018b) *Fuel Poverty (Target, Definition and Strategy) (Scotland) Bill 2018: guide,* available at https://beta.gov.scot/publications/guide-fuel-poverty-target-definition-strategy-scotland-bill-2018/ (accessed July 2018).

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SHCS (2017a) *Scottish Housing Conditions Survey 2016, Key Findings*. Available at: http://www.gov.scot/Publications/2017/12/5401/348224 (accessed June 2018)

SHCS (2017b) *SHCS Methodology Notes 2016*. Available at: http://www.gov.scot/Topics/Statistics/SHCS/Downloads/MethodologyNotes2016 (accessed July 2018)

SHCS (2018) *Key results from the Scottish House Condition Survey (SHCS) Local Authority tables 2014-2016*. Available at: http://www.gov.scot/Resource/0053/00532144.pdf (accessed July 2018)

UKCP09 (2009) Jenkins, G., Perry, M. and Prior J. *The Climate of the United Kingdom and Recent Trends*. Hadley Centre, Met Office, Exeter. Available at: http://ukclimateprojections.metoffice.gov.uk/media.jsp?mediaid=87933&filetype=pdf . (Accessed 23 Jan 2015).

Whitley, S. (2014) *Time to Change the Game. Fossil Fuel Subsidies and Climate*. ODI, London. Available at: www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8668.pdf

Further information

Fuel Poverty Forum: www.gov.scot/Topics/Built-Environment/Housing/warmhomes/fuelpoverty/ScottishFuelPovertyForum

Heat Network Partnership: www.districtheatingscotland.com

Draft Fuel Poverty Strategy for Scotland 2018: https://beta.gov.scot/publications/draft-fuel-poverty-scotland-2018/

Policy: Home energy and fuel poverty: https://beta.gov.scot/policies/home-energy-and-fuel-poverty/fuel-poverty/

Acknowledgements

Author of 2016 indicator document: Mike Bonaventura (Crichton Carbon Centre)

Appendix One: Indicator metadata and methodology

Table 1: Indicator metadata

	Metadata
Title of the indicator	CRS61 - number of households in fuel poverty
Indicator contact: Organisation or individual/s responsible for the indicator	Ruth Monfries, Royal Botanic Garden Edinburgh/ClimateXChange
Indicator data source	Scottish Housing Conditions Survey
Data link: URL for retrieving the indicator primary indicator data.	SHCS 2016 Key Findings: http://www.gov.scot/Publications/2017/12/5401/downloads

Table 2: Indicator data

	Indicator data
Temporal coverage: Start and end dates, identifying any significant data gaps.	2003/04 – 2015/16
Frequency of updates: Planned or potential updates	Annual
Spatial coverage: Maximum area for which data is available	Scotland
Uncertainties: Uncertainty issues arising from e.g. data collection, aggregation of data, data gaps	
Spatial resolution: Scale/unit for which data is collected	Local Authority area
Categorical resolution: Potential for disaggregation of data into categories	Local Authority
Data accessibility: Restrictions on usage, relevant terms & conditions	Publicly available, free of charge

Table 3 Contributing data sources

Contributing data sources
Data sets used to create the indicator data, the organisation responsible for them and any URLs which provide access to the data.

Scottish Government: Scottish Housing Conditions Survey data and tables: http://www.scotland.gov.uk/Topics/Statistics/SHCS/DataAccess. Scottish Government: Poverty and Income Inequality in Scotland 2012/13 (2014): www.gov.scot/Resource/0045/00454875.pdf [Table A8]. Scottish Government: Scottish Housing Conditions Survey Local Authority analyses: http://www.scotland.gov.uk/Topics/Statistics/SHCS/keyanalyses

Table 4 Indicator methodology

Indicator methodology The methodology used to create the indicator data
For details see *SHCS Methodology Notes 2016*: http://www.gov.scot/Topics/Statistics/SHCS/Downloads/MethodologyNotes2016 (SHCS, 2017b). **Fuel Poverty** A household is in fuel poverty if, in order to maintain an adequate standard of warmth and other uses of energy in the home, it would be required to spend more than 10% of its income (including Housing Benefit or Income Support for Mortgage Interest) on all household fuel use (SHCS, 2017b). *Fuel Poverty* is defined by the ratio: *Modelled Fuel Cost (modelled energy requirement x price) / Household Income* The model for estimating household energy consumption (BREDEM 2012) was updated for the analysis of data from 2014 onwards. This change increases the estimated fuel poverty energy requirement by around 2%, and thus has a small effect on estimated levels of fuel poverty. Therefore the data for 2014 onwards is not fully comparable with previous years (SHCS, 2017b). **Energy Performance Certificates [EPCs]** EPCs are generated through the use of a standard calculation methodology, known as Standard Assessment Procedure (SAP) which assesses the energy performance of a building, taking into account the energy needed for space and water heating, ventilation and lighting and, where relevant, energy generated by renewables. Outputs include the Energy Efficiency Rating (EER) and Environmental Impact Rating (EIR) - carbon emissions from fuels for lighting, heating, hot water and ventilation - of the dwelling (BRE, 2009). Earlier SHCSs presented energy efficiency data in terms of National Home Energy Ratings (NHERs). This has been superseded by SAP 2009. Mueller et al. (SHCS, 2014) provide some basis for continuity through an approximate NHER indicator.