

Estimates of fuel poverty in Northern Ireland in 2017 and 2018

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This report is based on the findings of the House Condition Survey 2016 which is published on the Housing Executive's website.

<https://www.nihe.gov.uk/Documents/Research/HCS-Main-Reports-2016/HCS-Main-Report-2016.aspx>

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Introduction & Executive Summary

In 2016 the total number of fuel poor households (using the 10% definition)¹ in Northern Ireland was estimated from the Northern Ireland House Condition Survey (NIHCS)² data as 160,000 (22% of all households).

The NIHCS 2016 main report was published in 2018. In order to provide more up to date figures, the Housing Executive commissioned the Building Research Establishment (BRE) to model estimates of the levels of fuel poverty in Northern Ireland in 2017 and 2018. Using 2016 NIHCS data as a base, BRE adjusted fuel prices and household incomes, and simulated the installation of energy efficiency improvement measures, all to 2017 and 2018 levels.

Table 1 shows that the combined effect of these three factors produced an estimated 2017 figure of 128,000 fuel poor households in Northern Ireland, equivalent to 17% of all households. In 2018, the estimated fuel poverty figure is 131,000, equivalent to 18% of all households.

Table 1: Estimates of 2017 and 2018 fuel poverty in NI, all households

Fuel poor households		2016 (Base position from NIHCS)	2017 (modelled estimates)	2018 (modelled estimates)
Full income definition ³	Number of households	160,000	128,000	131,000
	% of households	22	17	18

¹ Under the 10% fuel poverty methodology, a household is considered to be in fuel poverty if, in order to maintain a satisfactory level of heating (21°C in the main living room and 18°C in other occupied rooms), it is required to spend in excess of 10% of its household income on all fuel use.

² <https://www.nihe.gov.uk/Documents/Research/HCS-Main-Reports-2016/HCS-Main-Report-2016.aspx>

³ Gross household income is collected for the Household Reference Person and partner. This excludes housing related benefits but includes other benefits and other sources of income. Rates, the winter fuel payment, income tax, National Insurance and additional adults are factored in to create a 'basic' income variable. Housing Benefit and rates rebate are added to the basic income, and then the net rates payable are deducted to create a 'full' income variable. For more detail please see the Northern Ireland income calculation on page 137 Appendix E of the main 2016 HCS report.

Methodology & modelling outcomes

The 2016 NIHCS data has been used as a base in conjunction with the 2016 fuel poverty (10% definition) methodology⁴ to estimate the number of fuel poor households in Northern Ireland in 2017 and 2018. Fuel poverty is determined by three factors: fuel prices, household income and energy consumption (which relates to the energy efficiency of a home). It was therefore necessary to project each of these three factors in turn to estimate the 2017 and 2018 Northern Ireland fuel poverty figure from the 2016 base data.

The methodology for each stage of modelling, and the outcome for each fuel poverty factor is outlined below:

Fuel Prices

Non-metered fuels in Northern Ireland

The fuel prices for **non-metered fuels** in Northern Ireland are based upon a retrospective **three year average**⁵. An average over the three years ending in April/May of the survey year is derived from two sources: firstly, data for heating oil, house coal and smokeless fuel is obtained from Northern Ireland specific data collected by the UK Government as a component of the Consumer Price Index (CPI) survey. Secondly, prices of other non-metered fuels are obtained from the Sutherland Tables.

Metered fuels in Northern Ireland

The **gas and electricity fuel prices** (known as metered fuels) as used in the calculation of the Northern Ireland fuel poverty statistics are based upon data obtained from the UK Department of Business, Energy and Industrial Strategy (BEIS), who provide average annual prices (April to March) for gas, standard electricity and off-peak (Economy 7) by the three types of payment (direct debit, standard credit and pre-payment).

For the estimate of the 2017 and 2018 level of fuel poverty, the 2016 metered fuel prices used in the calculation of the 2016 fuel poverty statistics have been adjusted using updated domestic energy price data for electricity obtained from BEIS, and from the Sutherland Tables data for gas. The changes between 2016 and the modelled years are shown for all fuels in Table 2. The two most important fuels affecting fuel poverty in Northern Ireland are fuel oil and electricity⁶. The fuel oil prices used in the

⁴ Under the 10% fuel poverty methodology, a household is considered to be in fuel poverty if, in order to maintain a satisfactory level of heating (21°C in the main living room and 18°C in other occupied rooms), it is required to spend in excess of 10% of its household income on all fuel use.

⁵ A three year average is used is to make the data more representative and reduce the variability or fluctuations of very high and very low oil prices.

⁶ See the fuel poverty ready reckoner for the relative effect of fuel price changes on fuel poverty: <https://www.nihe.gov.uk/Working-With-Us/Research/House-Condition-Survey>

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calculations show a significant decrease from 2016 values for both 2017 and 2018 of 14% and 16% respectively. The 2016 to 2017 period shows small decreases in the price of electricity, but the period 2016 to 2018 shows increases.

The percentage difference between 2016 and 2017 and 2018 in the household fuel expenditure varies at different rates for households depending on the fuel type used. On average, applying the fuel price changes alone from 2016 to 2017 decreased the overall mean household fuel expenditure in Northern Ireland from £1,525 to £1,423 in 2017, the equivalent of a 7% decrease. Applying the fuel price changes alone from 2016 to 2018 decreased the mean fuel expenditure from £1,525 to £1,473, equivalent to a 3% decrease.

Table 2: Change in the Northern Ireland fuel prices used in modelling, 2016 to 2017 and 2018

Fuel	% change between 2016 and 2017	% change between 2016 and 2018
Bulk LPG	-4	-6
Bottled gas	-5	-5
Oil	-14	-16
Coal	+2	+3
Smokeless fuel	-2	-4
Anthracite	-3	-5
Wood	+2	+5
Communal heat	0	+8
Gas ⁷	+8	+18
Electricity (standard) ⁷	-3	+6
Electricity (economy 7 - day) ⁷	-3	+4
Electricity (economy 7 - night) ⁷	-3	+12

⁷ The price changes shown are for standard credit payment method. Equivalent changes were applied for direct debit and pre-payment methods within the analysis.

Income

Income does not change at a flat rate across all households, as different types of households receive different types of income sources e.g. benefits, employment income, private pensions etc. Therefore, the projected 2017 and 2018 household incomes varied at different rates for different types of households depending on their income sources.

To project the 2016 household incomes to 2017 and 2018 levels, different income uplifts were applied to the components that make up the household income (as summarised in Table 3) and the 'full' and 'basic' household income⁸ were recalculated incorporating the 2016 adjustments.

On average, applying the income changes from 2016 to 2017 increased the overall mean net household income in Northern Ireland (under the full income definition) from £23,820 to £23,901.

Between 2016 and 2018 the mean income changed from £23,820 to £24,371.

Table 3: Adjustments made to the components of income to project 2017 and 2018 income levels

Income component	2017 and 2018 projections
Estimated employment income for each adult household member (based on working status/benefit receipt)	Using data from the Annual Survey of Hours and Earnings (ASHE) ⁹ , the percentage change in the median income between April 2016 each of the modelled years by age and full-time/part-time work was determined the rates were applied to the 2016 data as applicable (figures ranging from 7.2% to -8.5%).
Benefit income	From 2016 to both of the modelled years the majority of means tested benefits were frozen. As a result, no changes to the amounts of benefits received were made.
Winter Fuel Payment (WFP)	No change occurred in the WFP rates between 2016 and the two modelled years, therefore no adjustment was made to this amount.
Rates (deduction from household income)	The 2017 and 2018 Domestic poundage values were used to calculate 2017 and 2018 annual domestic rate bill
Rates rebate	The 2017 and 2018 rate rebate amounts were applied at the same ratio of rates as used in 2016.
Additional adult income	Inflated in line with the change in the net income of the HRP and partner of the household.

⁸ The full income definition is the method used to calculate the published 2016 Northern Ireland fuel poverty figures in the Northern Ireland House Condition Survey (NIHCS) 2016 Main Report. See <https://www.nihe.gov.uk/Documents/Research/HCS-Main-Reports-2016/HCS-Main-Report-2016.aspx>

⁹ ASHE data can be found on the Office for National Statistics website -<http://www.statistics.gov.uk/>

Energy Efficiency Projections

Between 2016 and the two modelled years, changes in fuel prices and incomes would have had an effect on most households but in this relatively brief period, only a minority of households would have installed an energy efficiency upgrade to their home e.g. cavity wall insulation or loft insulation. To incorporate the estimated effect of energy efficiency improvements in the 2016 fuel poverty update involved a two stage process:

- Stage 1 – Identification of the energy efficiency improvement measures to be installed in the 2017 and 2018 fuel poverty update and an estimation of the number of installations in the home in this period.
- Stage 2 – Identification of suitable households for the energy efficiency upgrades and simulation of the energy efficiency improvement (in terms of reduced energy consumption) for the selected cases.

Three main stream energy efficiency measures were identified to incorporate into the 2017 and 2018 fuel poverty estimates: loft insulation, cavity wall insulation and heating system improvements.

Projections on the likely number of energy efficiency improvements installed in the periods between 2017 and 2018 were based upon trends of changes in these items between 2011 and 2016 NIHCS survey data. The estimated number of installations of each type of measure is shown in Table 4 below.

Table 4: Estimated improvement measure installations in Northern Ireland households, 2016 to 2017 and 2018

Improvement measure	Number of installations modelled - 2016 to 2017	Number of installations modelled - 2016 to 2018
Cavity Wall Insulation (CWI) – added to households with unfilled cavity walls	3,000	6,000
Loft insulation – added to households with a suitable loft space and where there is less than or equal to 150mm of insulation present	22,000	44,000
Gas/oil condensing boiler – added to households that require a heating system upgrade	38,000	76,000

Reduced household energy consumption was simulated by incorporating the energy efficiency improvements identified in Table 4 into the 2016 base data using the following method.

1. A case requiring CWI was selected at random in the dataset for improvement. Further cases were randomly selected until 3,000 in 2017 or 6,000 in 2018 households were assigned the CWI improvement measure in the dataset.

2. Households selected for CWI were also assigned the loft insulation upgrade if applicable.
3. The remaining loft insulation improvements were randomly assigned to households requiring the upgrade until 22,000 in 2017 and 44,000 in 2018 households were assigned the loft insulation improvement measure.
4. Heating system upgrades were treated independently of the CWI and loft insulation improvement measures. A case requiring the heating system upgrade was selected at random in the dataset for improvement. Further cases were randomly selected until 38,000 households in 2017 and 76,000 households in 2018 were assigned the heating system improvement measure.
5. Once all of the identified improvement measures had been assigned, the energy consumption of the household was re-calculated where applicable to take into account the energy improvement upgrades.
6. The fuel poverty status for each case was re-calculated based upon the 2017 or 2018 projected incomes, the 2017 or 2018 projected fuel prices and the 2017 or 2018 projected energy consumption (that incorporated the energy improvement upgrades) and an overall level of fuel poverty was determined.

Because of the random nature of the selection process, the procedure above was repeated 100 times. An average fuel poverty figure and an average fuel poverty figure for private/social households was determined for the 100 runs and the run corresponding the most to the average fuel poverty values was selected.

Conclusion and recommendations

The 2017 and 2018 Northern Ireland fuel poverty indicators have been estimated by modelling the changes in 2017 and 2018 fuel prices, household incomes and energy consumption as detailed above under both the full income definition, i.e. the published method for reporting, and the basic income definition, i.e. where the household income does not include housing related benefits or deduct rates (Table 5).

Table 5: Estimates of 2017 and 2018 fuel poverty in NI (by factor), all households

Fuel poor households		2016 (Base position)	2017 fuel price and income only	2017 fuel price, income and improvement measures	2018 fuel price and income only	2018 fuel price, income and improvement measures
Full income definition	Number of households	160,000	132,000	128,000	140,000	131,000
	% of households	22	18	17	19	18

Compared to 2016, the combined effect of the estimated 2017 fuel prices and household income led to a large decrease of 28,000 fuel poor households, falling from 160,000 to 132,000. This period saw large falls in the price of oil (-14%), as observed using the three year retrospective average used in the fuel poverty statistics. This large drop in the price of the primary fuel used in Northern Ireland, alongside the relatively stable prices of other fuels and relatively stable income levels, led to a fall in fuel poverty.

The estimates to 2018 also showed a large decrease following fuel price and income changes, albeit a slightly smaller fall than seen for the 2017 estimate. The number of households in fuel poverty fell from 160,000 in 2016 to 140,000 in 2018. This period saw large falls in the price of oil (-16%), as observed using the three year retrospective average used in the fuel poverty statistics, but these were accompanied by rises in the price of electricity relative to 2016, which rose by up to 12%. This is compared to the falls seen between 2016 and 2017. As a result, the increase in the electricity price somewhat counteracted the fall in oil price, leading to a smaller reduction in fuel poverty than seen between 2016 and 2017.

When also incorporating the estimated installation of cavity wall insulation, loft insulation and heating system upgrades between 2016 and 2017 the estimated number of fuel poor households reduces to 128,000, a drop of an additional 4,000 fuel poor households compared to fuel prices and income alone. For the 2018 estimate, the level of fuel poverty falls by an additional 9,000 households following energy efficiency measures. This reduces the level of fuel poverty to approximately 131,000 households.

Assumptions

In the creation of the estimated 2017 and 2018 fuel poverty results the following assumptions were used:

- The number of households remained constant.
- The household composition remained constant.
- The employment status of individuals remained constant.

Appendix A – User Guide

Method

The BRE 'Estimates of fuel poverty in Northern Ireland in 2017 and 2018 methodology' comprises of:

- Data modelling of the 2016 NIHCS to simulate a 2017 and 2018 position
 - The 2016 NIHCS data is adjusted to account for:
 - Changes in fuel prices between 2016 and both 2017 and 2018
 - Changes in income between 2016 and both 2017 and 2018
 - Improvements in energy efficiency between 2016 and both 2017 and 2018
 - Following these adjustments, the number of households in fuel poverty is calculated for 2017 and 2018.

To aid understanding, further information about the methodology along with the various outputs is contained in the body of the report - see page 3.

For more information on fuel poverty and how it is measured see Appendix E page 136 of the main 2016 NIHCS report.

<https://www.nihe.gov.uk/Documents/Research/HCS-Main-Reports-2016/HCS-Main-Report-2016.aspx>

Quality information

The quality assurance of the modelling work used to produce this report focused on ensuring that the data translation and modelling processes were performed correctly, to provide accurate and reliable results. The process of development and the creation of results followed an internal procedure so the work undertaken could be reviewed and assessed by project managers.

Examples of the quality assurance undertaken to validate the model and results included:

- Updating and revising the methodology using the latest assumptions for this area of work;
- Checking of transformations undertaken and mathematical formulae;
- Internal checks of data inputs to assure translation was completed correctly;
- Checks of correct units for calculations;
- Check correct and latest external data sources were used;
- Sense check of results;
- Internal review of results and reporting.

Surveyors working on the 2016 NIHCS received training and support to help ensure their collection of energy related data were consistent and robust. A re-fresher training session in 2016 explained the principles, how the form should be completed as well as conducting practical exercises with feedback sessions. While these measures ensure a good level of consistency in judgements, some surveyor variability is to be expected.

Strengths and weaknesses

Strengths

The basis of this report is the 2016 NIHCS dataset. All results should be taken in the context of this background, and the survey and modelling assumptions which occur within these. Consistency with this approach is a strength of the modelling undertaken.

The bases of most assumptions are large scale and high quality national statistics; e.g. the Annual Survey of Hours and Earnings (ASHE) or Quarterly Energy Prices (QEP).

The size of the sample for the NI House Condition Survey 2016 was 3,000 addresses. A weighting and grossing process translated the information gathered into figures that reflected the real world.¹⁰ This provided robust data at Northern Ireland level.

See Appendix A page 88 of the main 2016 House Condition Survey report for more information on for the survey's user guide.

<https://www.nihe.gov.uk/Documents/Research/HCS-Main-Reports-2016/HCS-Main-Report-2016.aspx>

Weaknesses

There is limited data available on the number of energy efficiency installations, and no attempt has been made to target these measures at particular household groups in this approach. The impact of energy efficiency improvements over this relatively short period is small, and it is unlikely that this assumption will have a large effect.

No attempt has been made to include the effect of new properties and demographic change over this period. This effect should also be relatively small due to the relatively short time period modelled.

¹⁰ Further information on the sampling, and weighting and grossing processes for the Northern Ireland House Condition Survey 2016 is available in the report.

<https://www.nihe.gov.uk/Documents/Research/HCS-Main-Reports-2016/HCS-Main-Report-2016.aspx>