

Experimental analysis of the impact of COVID-19 on Fuel Poverty Rates: Report

September 2020

Executive Summary

1. This paper sets out the analytical approach to, and results from, experimental analysis modelling the potential impact of COVID-19 on fuel poverty rates. The estimates are intended to provide an overall sense of the potential scale of the worst case impact due to different elements of the crisis rather than a precise estimate of the number of affected households.
2. It is important to note that the resulting fuel poverty rates for each scenario are likely to be worst case and are expected to be overestimated due to:
 - Assumptions in the modelling (e.g. spending more time in the home, increases in fuel bills and decreases in income) have been applied across a full year. Fuel poverty is calculated based on estimated annual fuel bills and self-reported annual income and it is not possible, from the survey data, to take account of income or fuel bills which vary across the year due to changes in the household's circumstances.
 - Minimum Income Standard (MIS) thresholds used in the new definition of fuel poverty may be artificially high as reduced spending on motoring, other travel costs, entertainment, recreation and holidays during Covid-19 has not been accounted for.
 - Housing costs have not been adjusted for mitigating factors such as mortgage holiday payments or rent payment schemes.
 - No attempt was taken to account for the impact of changes in energy efficiency as it was assumed that no measures were installed over the lockdown period.
 - Increases in energy use for lighting, appliances and renewables are likely to be an overestimate; some households will not require additional lighting to be on during the day and energy use for certain appliances (such as fridges and freezers) won't change with increased home occupancy.
 - When considering the impact of furlough, situations where employers topped up pay to 100% were not accounted for and income from earnings were assumed to be reduced in all cases.
 - The analysis does not take into account the support that has been provided for fuel poor households in response to the pandemic.

3. Given the rapidly changing COVID-19 situation, this modelling is based on assumptions which may quickly become out of date. These estimates are therefore based on the best available data during July 2020.
4. In 2018, the fuel poverty rate was 25% (619,000 households) and the extreme fuel poverty rate was 11% (279,000 households).
5. The increase in standard universal credit allowance from April 2020 for 12 months in response to the COVID-19 crisis may mitigate some of the impact of the crisis. Applying this increase to all households with an unemployed member in 2018 as well as adjusting incomes and fuel bills for recent changes, reduced the overall rate of fuel poverty to 24% (598,000 households) and kept extreme fuel poverty at 11% (269,000 households).
6. Using more space heating through being in the home all day is likely to result in only a small increase in energy costs and have little impact on overall fuel poverty rates (a possible additional 6,000 households in fuel poverty or 5,000 households in extreme fuel poverty). However, it is possible that using more energy for cooking, lighting and appliances will increase energy costs by a greater amount and drive more households into fuel poverty. This change on its own could increase the rate to 26% (41,000 additional households) and extreme fuel poverty rate to 12% (22,000 extra households).
7. On its own, the small increase in unemployed and economically inactive who want a job as at March-May 2020, is likely to result in only a small increase in fuel poor (14,000) and extreme fuel poor households (12,000). However, furloughing could increase fuel poverty to 26% (45,000 additional households) and extreme fuel poverty to 12% (27,000 additional households). This is due to the much higher number of furloughed employees presently than those made unemployed.
8. In combination, reduced household income and increased fuel bills taking account of March-May 2020 levels of unemployment, furlough and being in the home more could increase the fuel poverty rate to 29% (126,000 additional households) and extreme fuel poverty rate to 14% (68,000 additional households). However it is expected that rates will, in reality, be lower due to these conditions not applying across a full year: many furloughed employees will return to work and some employees will return to working in their usual locations in line with guidance no longer requiring extra energy use. Employers may also already be topping up furloughed salaries to 100%.
9. Going forward, it is likely to be the level of unemployment which drives any increase in fuel poverty. As the current furlough scheme comes to an end, some individuals will return to work while others may become unemployed. An unemployment rate of 10% could increase fuel poverty to 27% (86,000 additional households) and extreme fuel poverty to 14% (80,000 additional households). While an unemployment rate of 13% could increase the rate to 29% (136,000 additional households) and extreme fuel poverty to 16% (127,000 additional households).

10. A wide range of support was rapidly put in place by Scottish Government to support households with their energy costs, including:

- Providing an additional £42 million for the Scottish Welfare Fund which can provide crisis grants to those in immediate financial need - this can include financial support for energy costs.
- Through our Wellbeing and Supporting Communities Funds and Immediate Priorities Funds we are supporting over 100 organisations helping those struggling with their energy costs. This includes a £250,000 grant to the Fuel Bank Foundation to provide financial support to top up prepayment meters for those at risk of imminent disconnection.
- Our award winning Home Energy Scotland (HES) service has continued to provide support, helping people to understand and access support from their supplier by providing an advocacy service. It also refers people for benefit checks and signposts to other sources of support, including financial support for energy costs. They are working in partnership with the Fuelbank Foundation to ensure national access to this funding.
- Our energy efficiency schemes, Warmer Homes Scotland and Area Based Schemes are both now operating again in line with guidance and installing measures to make Scotland's homes warmer and more affordable to heat.

Sources

1. [Scottish House Condition Survey 2018.](#)
2. [NRS Estimates of Households and Dwellings in Scotland, 2019.](#)
3. [BEIS Monthly Domestic Energy Price Indices.](#)
4. [Consumer Price Index](#)
5. [Earnings and hours worked, region by occupation by two-digit SOC.](#)
6. [Universal Credit rates for 2020.](#)
7. [Office of Budget Responsibility Economic Fiscal and Outlook Tables.](#)
8. [Council tax by band 2019-20.](#)
9. [Scottish Water unmetered charges.](#)
10. [FCA mortgage lending statistics.](#)
11. [ONS Index of Private Housing Rental Prices, UK.](#)
12. [Scottish Housing Regulator Landlord Data.](#)
13. [BEIS' Energy Follow Up Survey 2011.](#)
14. [ONS regional labour market summary including unemployment rates, July version.](#)
15. [Coronavirus Job Retention Scheme Statistics, June 2020.](#)
16. [Self-Employment Income Support Scheme Statistics, June 2020.](#)
17. [OCEA Monthly Economic Brief June 2020.](#)
18. [OCEA Labour market monthly briefing, July 2020.](#)

Table 1. Estimated Fuel Poverty Rates under each Scenario

Scenario	Fuel Poverty Rate (%)	Estimated Number of Fuel Poor Households (000s)	Change in Number of Fuel Poor Households compared to Scenario A (000s)
SHCS 2018	25%	619	
Scenario A - Baseline 2019/20	24%	598	
Scenario B - Moving all households onto an Enhanced Heating Regime	24%	603	6
Scenario C - 9% increase in energy use for cooking and 24% increase for lighting, appliances and renewables	26%	638	41
Scenario D - Unemployment rate at 4.3% plus 19,100 relevant economically inactive individuals as at March-May	25%	612	14
Scenario E - Unemployment rate at 10%	27%	683	86
Scenario F - Unemployment rate at 13%	29%	733	136
Scenario G - Furlough as at End of May	26%	643	45
Scenario H - Unemployment (scenario D), furlough (scenario G) and increase in energy use (scenario B and C)	29%	724	126

Sample size of 2,905 in all scenarios. The estimated change in the number of fuel poor households is calculated on unrounded data.

Table 2. Estimated Extreme Fuel Poverty Rates under each Scenario

Scenario	Extreme Fuel Poverty Rate (%)	Estimated Number of Extreme Fuel Poor Households (000s)	Change in Number of Extreme Fuel Poor Households compared to Scenario A (000s)
SHCS 2018	11%	279	
Scenario A - Baseline 2019/20	11%	269	
Scenario B - Moving all households onto an Enhanced Heating Regime	11%	274	5
Scenario C - 9% increase in energy use for cooking and 24% increase for lighting, appliances and renewables	12%	291	22
Scenario D - Unemployment rate at 4.3% plus 19,100 relevant economically inactive individuals as at March- May	11%	281	12
Scenario E - Unemployment rate at 10%	14%	349	80
Scenario F - Unemployment rate at 13%	16%	396	127
Scenario G - Furlough as at End of May	12%	296	27
Scenario H - Unemployment (scenario D), furlough (scenario G) and increase in energy use (scenario B and C)	14%	337	68

Sample size of 2,905 in all scenarios. The estimated change in the number of fuel poor households is calculated on unrounded data.

Introduction

11. This paper sets out the analytical approach to, and results from, experimental analysis modelling the potential impact of COVID-19 on fuel poverty rates.
12. The estimates are intended to provide an overall sense of the potential scale of the worst case impact due to different elements of the crisis rather than a precise estimate of the number of affected households.
13. In the following analysis, various scenarios were considered to take account of changes in home occupancy, employment and rates of furlough:

- a. Scenario A - Baseline 2019/20

The following scenarios are standalone, showing the impact of each individual change on fuel poverty rates:

- b. Scenario B - Moving all households onto an Enhanced Heating Regime
- c. Scenario C - 9% increase in energy use for cooking and 24% increase in energy use for lighting, appliances and renewables
- d. Scenario D - Unemployment as at March-May; unemployment rate at 4.3% plus 19,100 individuals newly categorised as economically inactive but who have a relevant reason relating to wanting a job.
- e. Scenario E - Unemployment rate at 10%
- f. Scenario F - Unemployment rate at 13%
- g. Scenario G - Furlough as at end of May; 774,200 individuals through the Coronavirus Job Retention Scheme and Self-Employment Income Support Scheme

The final scenario, H, combines B, C, D and G to present the potential impact on fuel poverty should March-May levels of unemployment, furlough and estimated energy use be applied across an entire year.

- h. Scenario H - Moving all households onto an Enhanced Heating Regime (scenario B), 9% increase in energy use for cooking and 24% increase in energy use for lighting, appliances and renewables (scenario C), unemployment rate at 4.3% plus an additional 19,100 individuals newly categorised as economically inactive but who have a relevant reason relating to wanting a job (scenario D) and 774,200 individuals furloughed (scenario G).

Assumptions underpinning analysis and associated limitations

14. Given the rapidly changing COVID-19 situation, assumptions are required for modelling purposes which may quickly become out of date. These are reviewed regularly and updated as required to take account of new information.
15. Fuel poverty is calculated based on estimated annual fuel bills and self-reported annual income using data from the Scottish House Condition Survey (SHCS). It is not possible, based on the survey data, to take account of annual income or annual fuel bills which may vary across the year due to changes in the household's circumstances. Scenarios about income or fuel bills under COVID-19 are therefore assumed to apply across a full year and this may lead to under-estimates of household income or over-estimates of fuel bills in instances where households are only temporarily experiencing a loss of income or only temporarily spending more time in the home during the immediate lockdown period. In addition, as lockdown occurred when the weather was generally mild, the energy required to heat the home, and hence associated costs, may be overestimated in some scenarios. This assumption already exists in the calculation of fuel poverty as the household's circumstances at the time of interview, such as employment status and income of household members, are assumed to remain the same for the entire year.
16. Whether or not a household is considered to be living in fuel poverty depends on a comparison to 90% of the Minimum Income Standard (MIS) threshold for the household type (with an uplift in rural areas). This standard contains budgets for motoring, other travel costs, entertainment, recreation and holidays. For many households, it is likely that limited funds are being spent on these activities during the lockdown¹. MIS thresholds may therefore be artificially high in these circumstances and this may result in an over-estimate of modelled fuel poverty. Similarly, factors such as mortgage holiday payments or rent payment schemes are not taken into account.
17. Where detailed analysis is undertaken in scenarios B to H, further modelling of income changes are only applied to relevant households in the 2018 SHCS where the highest income householder (HIH) and/or their spouse were in some form of employment. It is assumed that the income of those in receipt of pensions or with an income source other than earnings or benefits are unaffected.
18. Income data from the SHCS has traditionally only collected data about the HIH and/or spouse. Therefore published fuel poverty rates and those calculated through these scenarios do not take account of the income of other household

¹ In 2018, the weekly MIS budget for a working age couple with no children was £318.10 (after housing, childcare and fuel costs). If the costs for certain elements of 'other travel' (holiday and social related) and of 'social and cultural participation' (entertainment, recreation and holiday related) were also deducted, this would bring the weekly budget down to £231.91. <https://www.lboro.ac.uk/research/crsp/mis/results/>

members. New data has been collected on the income of other household members from the 2018 survey onwards and a future development of our fuel poverty statistics will be to take account of this additional income.

19. In the following modelling, as only the employment status and income of the HH and their spouse has been considered, demographic breakdowns may not be representative of the entire population. For example, individuals aged 16-24 may be underrepresented in breakdowns of those modelled as on furlough as although 14% of households in SHCS 2018 contain a household member aged 16-24, only 4% of households had an HH or spouse aged 16-24. This means, for example, that individuals in this age group who are living with parents or in multiple occupancy households are unlikely to be captured. In addition, some of these individuals may primarily be recorded as full-time students in the survey therefore any changes to their employment status will not be accounted for. Conversely, individuals aged over 24 may be overrepresented in breakdowns of those modelled as on furlough.
20. The main focus of the analysis is on the impact of changes in household income which is expected to be the biggest driver of increases in fuel poverty during this period. The other likely driver of change during COVID-19 is higher fuel bills through spending more time in the home. Increased heating is unlikely to have a big impact on our modelled energy bills since older and vulnerable households are already assumed to be in the home for longer² and at higher temperatures, accounting for 48% of households in SHCS 2018. For most households the main increase is likely to be in energy use for lights, appliances, renewables and cooking although this makes up only a small proportion of overall energy consumption (13%).
21. No attempt was taken at this stage to account for the impact of any changes in energy efficiency when adjusting 2018 data to reflect the most recent data pre-COVID-19, or during the COVID-19 lockdown as it was assumed that no measures were installed during this period.
22. The analysis does not take into account the support that has been provided for fuel poor households in response to the pandemic, outlined in the conclusions.
23. The above assumptions mean that the resulting fuel poverty rates for each scenario are expected to be overestimates.

Methodology

24. Under each scenario, the relevant underlying data which feeds into the fuel poverty calculation was adjusted to reflect the changes being considered using the most appropriate data sources available.

² In relation to the heating regimes, longer hours are considered to be 16 hours every day whereas standard hours are considered to be 9 hours during weekdays and 16 hours on weekends.

25. The fuel poverty status of each household was then re-calculated, incorporating the modelled data, and weighted fuel poverty rates for Scotland were produced.

1. Scenario A - Baseline 2019/20

26. The latest available data from the SHCS relates to 2018. Therefore, where appropriate, this was adjusted to reflect the most recent data prior to modelling the impact of various employment and energy usage scenarios. This included:

- a. Updating the survey grossing weights so that estimates of household counts reflected the NRS household counts for 2019³.
- b. Re-calculating modelled fuel bills by adjusting the 2018 fuel prices to reflect the period March 2019 - February 2020 according to changes in BEIS fuel price indices by fuel type⁴ (see Annex Table A1 for scaling factors). Standing charges were adjusted by increasing in line with consumer price inflation (CPI) to March 2019 - February 2020⁵.
- c. The value of the Warm Homes Discount (WHD) rebate in 2019 (£140) was subtracted from the total cost of the modelled energy requirement for all households who were selected through the simulation method as beneficiaries from the scheme, in the same way as currently undertaken for fuel poverty monitoring⁶.
- d. Taking account of changes in household incomes, after council tax and housing costs. This uses different factors to adjust:
 - Employment income - through increasing earnings by income decile in line with ONS' Average Weekly Earnings by region data to reflect the period 2019⁷ (see Annex Table A2 for scaling factors),
 - Benefit income - Dependent on the type of benefit received, the amount received may increase or decrease at different rates. However, for simplicity, they are treated as one type of benefit and are simply inflated by increasing in line with CPI to March 2019 -

³ Grossing scaling factor of 859.078; NRS Estimates of Households and Dwellings in Scotland, 2019: <https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/households/household-estimates/2019>

⁴ BEIS Monthly Domestic Energy Price Indices: <https://www.gov.uk/government/statistical-data-sets/monthly-domestic-energy-price-stastics>

⁵ Scaling factor of 1.021; CPI index, where 2015 = 100: <https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/d7bt/mm23>

⁶ SHCS Methodology Notes 2018, Chapter 4.2.1: <https://www.gov.scot/publications/scottish-house-condition-survey-methodology-notes-2018/>

⁷ Earnings and hours worked, region by occupation by two-digit SOC: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/regionbyoccupation2digitsocashetable3>

February 2020⁸ to reflect the most recent data prior to modelling the impact of various scenarios. The exception to this was for housing benefit where, for households which indicate this covers full rent, housing benefit was scaled up in the same magnitude as the households' housing costs (see below),

- Employment-related benefit income - the UK government increased the standard universal credit allowance from April 2020 for 12 months in response to the COVID-19 crisis⁹. To account for this, in addition to increasing benefit income in line with CPI, annual income from benefits was increased by £767.34¹⁰ for all households in receipt of an employment-related benefit¹¹,
- Income from savings and other sources - through uprating by changes in nominal gross domestic product (GDP) figures for the UK to reflect the period 2019¹²,
- Council tax - by applying the average changes in council tax across local authorities and council tax bands to 2019/20 rates¹³, including water and waste charges¹⁴ (see Annex Table A3 for scaling factors),
- Mortgage costs were unchanged because there have been no significant difference in mortgage interest rates since 2018 up to March 2020, with the average interest rate on existing mortgages in the UK decreasing by just 0.08 percentage points from 2018 to 2019¹⁵.
- Private rented sector (PRS) rents - increased in line with the ONS rental index to March 2019 - February 2020¹⁶.

⁸ Scaling factor of 1.021; CPI index, where 2015 = 100:

<https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/d7bt/mm23>

⁹ Universal credit rates for 2020 <https://www.gov.uk/universal-credit/what-youll-get>

¹⁰ After taking the CPI increase of 2.1% into account, the standard allowance increase between the CPI-adjusted 2018/19 rates and the 2020/21 rates equated to £85.26 per month. This was assumed to be applied from April 2020 to December 2020 (9 months) in the year 2020. Universal credit rates for 2018:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/792946/Benefit_and_pension_rates_2019.pdf

Universal credit rates for 2020/21: <https://www.gov.uk/government/publications/benefit-and-pension-rates-2020-to-2021/benefit-and-pension-rates-2020-to-2021#universal-credit>

¹¹ Households where the HH and/or spouse is in receipt of at least one of: Universal Credit, Child Tax Credit, Housing Benefit, Income Support, income-based Job Seekers Allowance, income-based Employment Support Allowance and Working Tax Credit.

¹² Scaling factor of 1.033; Sourced from OBR economic fiscal and outlook tables: <https://obr.uk/efo/economic-and-fiscal-outlook-march-2020/>

¹³ Council tax by band 2019-20: <https://www.gov.scot/publications/council-tax-datasets/>

¹⁴ Scottish Water unmetered charges: <https://www.scottishwater.co.uk/your-home/your-charges/your-charges-2019-2020/unmetered-charges-2019---2020>

¹⁵ Sourced from FCA mortgage lending statistics: <https://www.fca.org.uk/data/mortgage-lending-statistics>

¹⁶ Scaling factor of 1.009; ONS Index of Private Housing Rental Prices, UK: <https://www.ons.gov.uk/economy/inflationandpriceindices/bulletins/indexofprivatehousingrentalprices/april2020>

- Social sector rents - due to a lag in the publication of social rent data, 2019/20 average rent figures are not due for publication until later in the year. Therefore social sector rental figures were increased by 2.7%, the Scottish Housing Regulator (SHR) average weekly rent increase over the period 2014/15 to 2018/19¹⁷.
- e. Upscaling benefits received for a care need or disability by increasing in line with CPI to March 2019 - February 2020¹⁸ as described in 19d.
 - f. Updating MIS thresholds to 2019 figures in the same way as currently undertaken for fuel poverty monitoring¹⁹. The UK MIS figures were obtained from annual budgets produced by the Centre for Research in Social Policy at Loughborough University²⁰. MIS values for 2019 by household type were calculated from these annual budgets after the deduction of: council tax, water and sewerage charges, rent costs, childcare costs and fuel costs. Each household was then assigned the correct MIS value, with an uplift applied to remote rural, remote small town and island households as currently undertaken for fuel poverty monitoring²¹.
27. No attempt was taken at this stage to account for the impact of any changes in energy efficiency (e.g. measures installed since 2018)²². There is little year-on-year change in energy efficiency with 44% of Scottish homes rated as EPC band C or better in SHCS 2018, similar to 2017 (42%).
28. Further modelling used this adjusted dataset (which reflects the most recent data available) as the baseline for comparison when considering the impact on fuel poverty rates of various scenarios.
- ## 2. Scenario B - Moving all households onto an Enhanced Heating Regime
29. In order to model the impact of household members staying at home all day on energy usage for space heating and resulting fuel poverty rates, households were moved onto an enhanced heating regime which included longer hours for space heating and fuel bills were recalculated. No changes to running costs for any other end use have been applied in this scenario.

¹⁷ Sourced from the SHR social landlord portal: <https://www.housingregulator.gov.scot/>

¹⁸ Scaling factor of 1.021; CPI index, where 2015 = 100:

<https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/d7bt/mm23>

¹⁹ SHCS Methodology Notes 2018, Chapter 4.6: <https://www.gov.scot/publications/scottish-house-condition-survey-methodology-notes-2018/>

²⁰ Annual budgets: <https://www.lboro.ac.uk/research/crsp/mis/results/>

²¹ SHCS Methodology Notes 2018, Chapter 4.6.1: <https://www.gov.scot/publications/scottish-house-condition-survey-methodology-notes-2018/>

²² This could be incorporated in future improvements to the model, learning from approaches taken in England for projecting energy efficiency and fuel poverty, Chapter 7: <https://www.gov.uk/government/publications/fuel-poverty-statistics-methodology-handbook>

30. The increased fuel bills of households were calculated by applying the average change in running costs between heating regimes in SHCS 2017 data²³ by household type and dwelling type to the baseline dataset (see Annex Table A4 for scaling factors). For each household, in addition to household and dwelling type, this depended on which heating regime they were already on and which they were moved to:

- a. There were no changes made to the fuel bills of households where at least one member of the household was aged 75 plus or had a long-term sickness or disability as they were already on enhanced heating regime 1²⁴, which includes longer hours and increased temperatures.
- b. The fuel bills for households where at least one member of the household was in receipt of benefits received for a care need or disability were increased by the average change in running costs between the standard heating regime²⁵ and enhanced heating regime 1 since the Fuel Poverty (Enhanced Heating) (Scotland) Regulations 2020²⁶ specifies that these households require both longer hours and increased temperatures.
- c. The fuel bills for all other households were increased by the average change in running costs between the standard heating regime and enhanced heating regime 3²⁷, which includes longer hours but not increased temperatures.

This adds, on average, £71 to the annual modelled fuel bills of those households moved to alternative regimes.

31. The recalculation of household fuel bills was the only change implemented in this scenario.

3. Scenario C - 9% increase in energy use for cooking and 24% increase in energy use for lighting, appliances and renewables

32. In order to model the impact of household members staying at home all day on energy usage for cooking, lighting, appliances and renewables and resulting fuel poverty rates, running costs for these end uses were increased by 9% for cooking and 24% for lighting, appliances and renewables. Fuel bills were then

²³ Annual running cost data was not available for all four heating regimes set out in the Fuel Poverty (Enhanced Heating) (Scotland) Regulations 2020 in SHCS 2018.

²⁴ Enhanced heating regime 1, where living rooms (zone 1) are heated to 23°C and the rest of the dwelling (zone 2) is heated to 20°C for 16 hours every day.

²⁵ Standard heating regime, where living rooms (zone 1) are heated to 21°C and the rest of the dwelling (zone 2) is heated to 18°C for 9 hours during weekdays and 16 hours on weekends.

²⁶ The Fuel Poverty (Enhanced Heating) (Scotland) Regulations 2020:
<http://www.legislation.gov.uk/ssi/2020/58/contents/made>

²⁷ Enhanced heating regime 3, where living rooms (zone 1) are heated to 21°C and the rest of the dwelling (zone 2) is heated to 18°C for 16 hours every day.

recalculated for all households. No changes to running costs for space or hot water heating have been applied in this scenario.

33. In this scenario, it is assumed that energy use for cooking increases in line with the difference in mean cooking usage between households where no one is in during the day on a weekday and those where someone is in from BEIS' Energy Follow-Up Survey (EFUS) 2011²⁸. Energy use for lighting, appliances and renewables is assumed to increase in line with the difference in the number of hours of TV use between households where no one is in during the day on a weekday and those where someone is in from the EFUS 2011²⁹, scaled down to the proportion of this combined end use which can be attributed to appliances in the SHCS 2018³⁰. These increases have been assumed to be applicable across the entire year.
34. Annual running costs for these uses were first scaled up in line with the baseline fuel costs described in Scenario A. Cooking was scaled up dependent on the type of cooker in the dwelling (whether gas or electric or a combination) and lighting, appliances and renewables were scaled up in line with the increase in electricity (see Annex Table A1 for scaling factors).
35. 9% and 24% of the relevant figures were then taken and added to the total annual running costs and the fuel poverty status of each household was recalculated. This resulted, on average, in £121 being added to households' modelled annual fuel bills.
36. The recalculation of household fuel bills was the only change implemented in this scenario.

4. Scenario D - Unemployment as at March-May; unemployment rate at 4.3% plus 19,100 individuals newly categorised as economically inactive but who have a relevant reason relating to wanting a job.

37. In order to model the impact of changes in unemployment as at the March-May on fuel poverty rates, employed HH and/or spouses were randomly assigned as unemployed according to the increase in estimated unemployment rate and those newly economically inactive who want a job and are discouraged workers

²⁸ 9% is the average increase in usage between households where no one is in during the day on a weekday and those where someone is in across oven, hob and microwave usage. EFUS 2011 Report 9 Table 19:

<https://www.gov.uk/government/statistics/energy-follow-up-survey-efus-2011>

²⁹ 32% is the average increase in hours of TV usage between households where no one is in during the day on a weekday and those where someone is in. EFUS 2011 Report 9 Table 24:

<https://www.gov.uk/government/statistics/energy-follow-up-survey-efus-2011>

³⁰ It is acknowledged that the increase in hours of TV use as a proxy for increase in lighting, appliances and renewables may be an overestimate; some households won't require additional lighting to be on during the day and energy use for certain appliances (such as fridges and freezers) won't change with increased home occupancy hence the figure was scaled down. The proportion of annual running costs for lighting, appliances and renewables which can be attributed to appliances is 75% in SHCS 2018. Therefore, the increase in TV usage hours was scaled down by 0.75 to get a final figure of 24% increase in running costs for lighting, appliances and renewables.

or other individuals, as described in detail below. For these individuals, income from earnings were adjusted to zero, household income from employment-related benefits³¹ was set to the average for the relevant group (see paragraph 44) and total household income was recalculated.

38. It should be noted that only income from the HIH and/or spouse is used in the calculation of fuel poverty therefore only the income from the HIH and spouse has been considered in this scenario as detailed in paragraph 15.
39. The unemployment rate³² in Scotland was 4.3% (119,900 individuals) between March-May 2020³³. As the SHCS is a household survey, the number of unemployed individuals was converted to households for further analysis. The ratio of unemployed households³⁴ to unemployed individuals in the SHCS 2018 was used to determine a scaling factor of 1.028³⁵. This was then applied to convert the number of unemployed individuals from the ONS labour force survey to households. The number of households in the SHCS where the HIH and/or spouse were already unemployed was removed from this value to get the number of newly unemployed households (16,500).
40. The ONS unemployment rate above is measured through the Labour Force Survey (LFS) and follows the internationally agreed definition recommended by the International Labour Organisation (ILO). It counts individuals without a job who have been actively seeking work within the last four weeks and are available to start work within the next 2 weeks, or are out of work, have found a job and are waiting to start it in the next 2 weeks. In this scenario, in order to also account for appropriate increases in individuals who were not in employment and not actively seeking work but who want a job, the percentage of economically inactive discouraged workers³⁶ and other individuals³⁷ in the UK who want a job was applied to the change in number of economically inactive individuals in Scotland between December 2019 - February 2020 and March-May 2020 to give an additional 19,100 relevant newly out of work individuals³⁸. This

³¹ Employment-related benefits include: Universal Credit, Child Tax Credit, Housing Benefit, Income Support, income-based Job Seekers Allowance, income-based Employment Support Allowance and Working Tax Credit.

³² The unemployment rate is defined as the number of people aged 16 and over without a job who have been actively seeking work within the last four weeks and are available to start work within the next two weeks divided by all those aged 16 and over are economically active (in employment plus unemployed).

³³ ONS regional labour market summary including unemployment rates, July version:

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/nationallabourmarketsummarybyregions01>

³⁴ Unemployed households are defined as those where the HIH is unemployed and seeking work in single adult households and either or both the HIH and spouse are unemployed and seeking work in all other households.

³⁵ Calculated as: (all unemployed households + households where both the HIH and spouse are unemployed)/all unemployed households

³⁶ Discouraged workers are defined as persons not in the labour force who are not seeking work as they believe that there is no work available but who desire to work.

³⁷ Other individuals include those who: are awaiting the results of a job application, have not yet started looking for work, do not need employment, have given an uncategorised reason for being economically inactive or have not given a reason for being economically inactive.

³⁸ Data on economically inactive individuals who want a job by reason is not available for Scotland therefore the relevant percentages for the UK was used as a proxy and applied to the economically inactive Scottish

figure was converted to the number of newly out of work households using the 1.028 scaling factor and added to the newly unemployed figure to give the total additional number of households containing a member to be randomly assigned as unemployed in the dataset: 35,100 households.

41. All households in the SHCS dataset where the HIH and/or spouse were employed were flagged. A series of runs were made, where samples were drawn at random from the pool of flagged households. Each random assignment was run 100 times. In order to more accurately represent the split of unemployment across households, the percentage of both unemployed in a couple household, one unemployed individual in a couple household and unemployed single adult households from the SHCS 2018 was used to constrain the size of each sample selected. It was specified that a minimum of 2.8% (1,000 households) had both the HIH and spouse assigned as unemployed, then 48.3% (16,900 households) had either or both³⁹ of the HIH and spouse from a couple randomly assigned as unemployed and 48.9% (17,200 households) were assigned to single adult households.
42. Due to limitations in the available SHCS data⁴⁰, the random assignment was not targeted to specific groups. In order to account for differences across employment sectors the best representative run of the demographics of unemployed households was selected by comparing each run to known demographic breakdowns of interest. In this scenario, the run was selected where the split of who in the household was assigned unemployed and the sector the HIH worked in best matched the split of who was unemployed in the SHCS 2018⁴¹ and those furloughed by sector^{42,43}.

population. ONS labour market survey economic inactivity by reason (seasonally adjusted), July version: <https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/economicinactivity/datasets/economicinactivitybyreasonseasonallyadjustedinac01sa>

ONS regional labour market summary including level of economically inactive, July version: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/nationallabourmarketsummarybyregions01>

³⁹ Due to the method of random assignment, it was possible for both individuals to be assigned as unemployed over and above the number specified. This was considered when selecting the best random assignment run to move forward with.

⁴⁰ Targeted assignment by employment sector was not feasible using SHCS data as in some cases sample sizes were too small for sub-sampling below national level. In addition, required data on sector of employment is only available for the HIH and not the spouse.

⁴¹ HIH, spouse or both plus single households or couple households

⁴² Employment sector data is only available for the HIH in the SHCS. Split of furlough by sector was used as a proxy for unemployment due to a lack of sector breakdowns available for newly unemployed individuals.

Number of employments furloughed and claims to the self-employment income support scheme by sector:

<https://www.gov.uk/government/statistics/coronavirus-job-retention-scheme-statistics-june-2020>
<https://www.gov.uk/government/statistics/self-employment-income-support-scheme-statistics-june-2020>

⁴³ Further information has since become available on the demographics of unemployed individuals during the COVID-19 crisis such as the spread of unemployment by earnings quintile from a Resolution Foundation survey in May 2020: <https://www.resolutionfoundation.org/app/uploads/2020/05/The-effect-of-the-coronavirus-crisis-on-workers.pdf>. This could be incorporated in future improvements to the model in selecting the most representative run.

43. Income from earnings for the individuals assigned as unemployed were reduced to zero and the household earnings variable was recalculated from the HH and spouse earnings income.
44. The employment-related benefit income of newly assigned unemployed households was calculated by applying the average employment-related benefit income received by unemployed households in SHCS 2016-2018 data (after adjustments were made to the baseline data as described in 19d⁴⁴) by household type, if the household is paying rent and the individuals unemployed. The income from all other benefit income was unchanged. Total household benefit income was then recalculated from the employment-related benefit income plus all other benefit income received. Some of those assigned as newly unemployed may not be eligible for support due to their spouse's income being too high or due to having high levels of household savings. It was not possible to allow for these individual level situations although it has been accounted for at population level by using the average benefit income from the SHCS 2018.
45. Household income, after council tax and housing costs, was computed using the new earnings and benefit income data. No other variables were altered in this scenario.

5. Scenario E - Unemployment rate at 10%

46. A rate of 10% unemployment is based on the outlook for the labour market set out in the Chief Economist's Monthly Economic Brief for June⁴⁵. A rate of 10% broadly reflects the potential unemployment level at the end of 2020 in a scenario where the economy recovers gradually from the pandemic. In this scenario, it is assumed that all newly unemployed individuals are economically active and seeking work therefore the unemployment level does not include those who are economically inactive and not actively seeking work but want a job⁴⁶.
47. In order to model the impact of a 10% unemployment rate in Scotland on fuel poverty rates, employed HH and/or spouses were randomly assigned as unemployed according to the estimated increase in unemployment as described in detail in Scenario D. For these individuals, income from earnings were adjusted to zero, household income from employment-related benefits was set to the average for the relevant group (see paragraph 44) and total household income was recalculated.

⁴⁴ There was a benefit freeze between April 2016 and March 2020 so employment-related benefits for 2016 and 2017 were scaled up as with 2018 benefit income as described in 19.d. The exception to this is for housing benefit where, for households which indicate this covers full rent, housing benefit was scaled up in the same magnitude as the households housing costs.

⁴⁵ OCEA Monthly Economic Brief June 2020: <https://www.gov.scot/publications/monthly-economic-brief-2/>

⁴⁶ Long-term trends suggest that any decreases in employment generally lead to increases in unemployment with little impact on economic inactivity. OCEA Labour market monthly briefing, July 2020 charts 1.11-1.13: <https://www.gov.scot/publications/labour-market-monthly-briefing-july-2020/>

48. The methodology in assigning unemployment and recalculating household income was as described in Scenario D but with a different estimated number of additional unemployed households to be assigned.
49. The number of economically active individuals in Scotland was 2.78 million in March 2020⁴⁷, therefore a 10% unemployment rate would equal 277,900 individuals. As the SHCS is a household survey, the number of unemployed individuals was converted to households using a scaling factor of 1.028 as described in Scenario D. The number of households in the SHCS where the HIH and/or spouse were already unemployed was removed from this value to give the additional number of households containing a member to be randomly assigned as unemployed in the dataset: 170,100 households.
50. All households in the SHCS dataset where the HIH and/or spouse were employed were flagged and a series of runs were made as described in Scenario D. 2.8% (4,800 households) had both the HIH and spouse assigned as unemployed, 48.3% (82,100 households) had either or both⁴⁸ of the HIH and spouse from a couple randomly assigned as unemployed and 48.9% (83,300 households) were assigned to single adult households.

6. Scenario F - Unemployment at 13%

51. A rate of 13% unemployment is based on the outlook for the labour market set out in the Chief Economist's Monthly Economic Brief for June⁴⁹. A rate of 13% represents potential unemployment at the end of 2020 in a scenario where a high proportion of furloughed workers lose their jobs as the scheme is phased out. In this scenario, it is assumed that all newly unemployed individuals are economically active and seeking work therefore the unemployment level does not include those who are economically inactive and not actively seeking work but want a job⁵⁰.
52. In order to model the impact of a 13% unemployment rate in Scotland on fuel poverty rates, employed HIH and/or spouses were randomly assigned as unemployed according to the estimated increase in unemployment as described in detail in Scenario D. For these individuals, income from earnings were adjusted to zero, household income from employment-related benefits was set to the average for the relevant group (see paragraph 44) and total household income was recalculated.

⁴⁷ONS regional labour market summary including number of individuals economically active: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/nationallabourmarketsummarybyregions01>

⁴⁸ Due to the method of random assignment, it was possible for both individuals to be assigned as unemployed over and above the number specified. This was considered when selecting the best random assignment run to move forward with.

⁴⁹ OCEA Monthly Economic Brief June 2020: <https://www.gov.scot/publications/monthly-economic-brief-2/>

⁵⁰ Long-term trends suggest that any decreases in employment generally lead to increases in unemployment with little impact on economic inactivity. OCEA Labour market monthly briefing, July 2020 charts 1.11-1.13: <https://www.gov.scot/publications/labour-market-monthly-briefing-july-2020/>

53. The methodology in assigning unemployment and recalculating household income was the same as Scenario D but with a different estimated number of additional unemployed households to be assigned.
54. The number of economically active individuals in Scotland was 2.78 million in March 2020⁵¹, therefore a 13% unemployment rate would equal 369,600 individuals. As the SHCS is a household survey, the number of unemployed individuals was converted to households using a scaling factor of 1.028 as described in Scenario D. The number of households in the SHCS where the HIH and/or spouse were already unemployed was removed from this value to give the additional number of households containing a member to be randomly assigned as unemployed in the dataset: 259,300 households.
55. All households in the SHCS dataset where the HIH and/or spouse were employed were flagged and a series of runs were made as described in Scenario D. 2.8% (7,300 households) had both the HIH and spouse assigned as unemployed, 48.3% (125,200 households) had either or both⁵² of the HIH and spouse from a couple randomly assigned as unemployed and 48.9% (126,900 households) were assigned to single adult households.

7. Scenario G - Furlough as at end of May

56. In order to model the impact of the furlough situation as at the end of May on fuel poverty rates, full- or part-time employed HIH's and/or spouses were randomly assigned to the job retention scheme and self-employed HIH's and/or spouses were randomly assigned to the self-employment income support scheme according to the estimated number of claims. For these individuals income from earnings were adjusted and total household income was recalculated.
57. Due to the uncertainty around how and when the schemes will end, alongside what will happen to those furloughed once the schemes end, any changes to income were assumed to apply across the entire year. In addition, it was assumed that all income from earnings were reduced and situations where employers topped up pay to 100% were not taken into account.
58. In Scotland, by the end of May 2020, the number furloughed through the Coronavirus Job Retention Scheme was 628,200 individuals⁵³ and the number of claims for the self-employment income support scheme was 146,000 individuals⁵⁴. As the SHCS is a household survey, the number of individuals was

⁵¹ONS regional labour market summary including number of individuals economically active: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/nationallabourmarketsummarybyregions01>

⁵² Due to the method of random assignment, it was possible for both individuals to be assigned as unemployed over and above the number specified. This was considered when selecting the best random assignment run to move forward with.

⁵³ HMRC Coronavirus Job Retention Scheme Statistics June 2020: <https://www.gov.uk/government/statistics/coronavirus-job-retention-scheme-statistics-june-2020>

⁵⁴ HMRC Self-Employment Income Support Scheme Statistics June 2020:

converted to households using a scaling factor of 1.028 as described in Scenario D; 611,000 households for furlough and 142,000 households for the self-employment support scheme. However, it is acknowledged that the ratio of individuals to households in the furlough circumstances may be higher and this could be revisited in future iterations as more data becomes available.

59. All households in the SHCS dataset where the HIH and/or spouse were employed were flagged; one flag for full- or part-time employed and one flag for self-employed. A series of runs were made, where samples were drawn at random from the appropriate pool of flagged households: the full- or part-time flagged for assignment to the furlough scheme and the self-employed flagged for assignment to the self-employment income support scheme. Each random assignment was run 100 times. The percentage of both unemployed in a couple household compared to one individual unemployed in a couple or single adult household from the SHCS 2018 was used as a proxy for furloughed individuals to constrain the size of each sample selected. 2.8% (17,200 full-or part-time flagged households and 4,000 self-employed flagged households) had both the HIH and spouse assigned as furloughed and 97.2% (593,800 full-or part-time flagged households and 138,000 self-employed flagged households) had either or both⁵⁵ of the HIH and spouse from a couple or single adult household randomly assigned.
60. Due to limitations in the available SHCS data⁵⁶, the random assignment was not targeted to specific groups. In order to account for differences across employment sectors the best representative run of the demographics of newly furloughed households was selected by comparing each run to known demographic breakdowns of interest. In this scenario, the run was selected where the split of who in the household was assigned furloughed and the sector the HIH worked in best matched the split of who was unemployed in the SHCS 2018⁵⁷ and those furloughed by sector⁵⁸.
61. It should be noted that 14% of households had both the HIH and spouse assigned as on furlough; this is higher than the 2.8% specified above. In all 100 random runs, the percentage of households where both were assigned as on furlough

<https://www.gov.uk/government/statistics/self-employment-income-support-scheme-statistics-june-2020>

⁵⁵ Due to the method of random assignment, it was possible for both individuals to be assigned as unemployed over and above the number specified. This was considered when selecting the best random assignment run to move forward with.

⁵⁶ Targeted assignment by employment sector was not feasible using SHCS data as in some cases sample sizes were too small for sub-sampling below national level. In addition, required data on sector of employment is only available for the HIH and not the spouse.

⁵⁷ Due to a lack of this information on those furloughed, who was unemployed in SHCS 2018 was used as a proxy: 2.8% both in a couple and 97.2% in either a couple or a single adult household.

⁵⁸ Employment sector data is only available for the HIH in the SHCS. Number of employments furloughed and claims to the self-employment income support scheme by sector:

<https://www.gov.uk/government/statistics/coronavirus-job-retention-scheme-statistics-june-2020>

<https://www.gov.uk/government/statistics/self-employment-income-support-scheme-statistics-june-2020>

was above 9% and is likely due to the high number of those to be assigned as on furlough.

62. Income from earnings for the individuals assigned as furloughed were reduced to 80%. Earnings for assigned individuals where 80% was above the scheme cap were set to the scheme cap of £30,000 a year (equivalent to £2,500 a month). The household earnings variable was then recalculated from the HIH and spouse earnings income.

63. Household income, after council tax and housing costs, was computed using the new earnings income data. No other variables were altered in this scenario.

8. Scenario H - Moving all households onto an Enhanced Heating Regime (scenario B), 9% increase in energy use for cooking and 24% increase in energy use for lighting, appliances and renewables (scenario C), unemployment rate at 4.3% plus an additional 19,100 individuals newly categorised as economically inactive but who have a relevant reason relating to wanting a job (scenario D) and 774,200 individuals furloughed (scenario G)

64. Scenario H is a combined scenario looking at the impact on fuel poverty should March-May levels of unemployment (scenario D), furlough (scenario G) and estimated energy use (scenario B and C) be applied across an entire year. In order to model the impact on fuel poverty rates, a number of steps were taken as described in previous scenarios.

65. The best representative run of randomly assigned unemployment in scenario D was used in the current scenario so that the unemployment status of households stayed the same in both scenarios. In this scenario, the unemployment level includes those who are unemployed and relevant economically inactive individuals who want a job as described in scenario D. Remaining households where the HIH and/or spouse were employed, and had not been assigned as unemployed, were then randomly assigned as on furlough and the best representative run of the demographics of newly assigned furloughed households was selected as described in scenario G.

66. Once income from earnings and benefits had been adjusted for the appropriate households as described in scenario D and G, total household income was recalculated.

67. In addition to changes in income, household fuel bills were recalculated due to increased energy usage for space heating, cooking, lighting, appliances and renewables as described in scenarios B and C. The combination of both scenarios gives a potential average annual increase in fuel bills of around £200 for households which move onto an enhanced heating regime and around £113 for households which were already on an enhanced heating regime, simply from being in the home more. This is comparable with other sources which predict

an increase of between £16 a month (£192 per year)⁵⁹ and £32 a month (£384 per year)⁶⁰ in energy bills due to spending more time in the home. Whilst the latter figure is higher than our estimates, this is likely to be because our fuel poverty measures are based on modelled energy use according to set heating regimes which households may not themselves employ currently.

68. The fuel poverty status of each household was recalculated using the updated household income and fuel bill figures.

⁵⁹ Uswitch research. <https://www.uswitch.com/gas-electricity/news/2020/06/09/post-lockdown-bill-shock/>

⁶⁰ A recent survey by compare the market found that 72% of households have seen an increase in their energy usage since lockdown began and that they face an average increase of over £32 per month (£384 per year) in energy bills. <https://www.cas.org.uk/news/new-survey-reveals-high-cost-energy-bills-during-lockdown>

Results

Table 1. Estimated Fuel Poverty Rates under each Scenario

Scenario	Fuel Poverty Rate (%)	Estimated Number of Fuel Poor Households (000s)	Change in Number of Fuel Poor Households compared to Scenario A (000s)
SHCS 2018	25%	619	
Scenario A - Baseline 2019/20	24%	598	
Scenario B - Moving all households onto an Enhanced Heating Regime	24%	603	6
Scenario C - 9% increase in energy use for cooking and 24% increase for lighting, appliances and renewables	26%	638	41
Scenario D - Unemployment rate at 4.3% plus 19,100 relevant economically inactive individuals as at March-May	25%	612	14
Scenario E - Unemployment rate at 10%	27%	683	86
Scenario F - Unemployment rate at 13%	29%	733	136
Scenario G - Furlough as at End of May	26%	643	45
Scenario H - Unemployment (scenario D), furlough (scenario G) and increase in energy use (scenario B and C)	29%	724	126

Sample size of 2,905 in all scenarios. The estimated change in the number of fuel poor households is calculated on unrounded data.

Table 2. Estimated Extreme Fuel Poverty Rates under each Scenario

Scenario	Extreme Fuel Poverty Rate (%)	Estimated Number of Extreme Fuel Poor Households (000s)	Change in Number of Extreme Fuel Poor Households compared to Scenario A (000s)
SHCS 2018	11%	279	
Scenario A - Baseline 2019/20	11%	269	
Scenario B - Moving all households onto an Enhanced Heating Regime	11%	274	5
Scenario C - 9% increase in energy use for cooking and 24% increase for lighting, appliances and renewables	12%	291	22
Scenario D - Unemployment rate at 4.3% plus 19,100 relevant economically inactive individuals as at March- May	11%	281	12
Scenario E - Unemployment rate at 10%	14%	349	80
Scenario F - Unemployment rate at 13%	16%	396	127
Scenario G - Furlough as at End of May	12%	296	27
Scenario H - Unemployment (scenario D), furlough (scenario G) and increase in energy use (scenario B and C)	14%	337	68

Sample size of 2,905 in all scenarios. The estimated change in the number of fuel poor households is calculated on unrounded data.

Table 3. Estimated Average Annual Running Costs under relevant Scenarios for all households

Scenario	All Households		Fuel Poor Households		Extreme Fuel Poor Households	
	Average annual running costs (£)	Sample Size	Average annual running costs (£)	Sample Size	Average annual running costs (£)	Sample Size
SHCS 2018	1710	2905	1761	732	2194	347
Scenario A - Baseline 2019/20	1771	2905	1862	707	2354	332
Scenario C - 9% increase in energy use for cooking and 24% increase for lighting, appliances and renewables	1892	2905	1938	748	2433	361
Scenario H - Unemployment (scenario D), furlough (scenario G) and increase in energy use (scenario B and C)	1929	2905	1957	845	2419	418

Table 4. Estimated Average Annual Running Costs under relevant Scenarios for households which moved onto an Enhanced Heating Regime

Scenario	All Households moved onto an Enhanced Heating Regime		Fuel Poor Households moved onto an Enhanced Heating Regime		Extreme Fuel Poor Households moved onto an Enhanced Heating Regime	
	Average annual running costs (£)	Sample Size	Average annual running costs (£)	Sample Size	Average annual running costs (£)	Sample Size
Scenario A - Baseline 2019/20	1703	1521	1710	275	2134	129
Scenario B - Moving all households onto an Enhanced Heating Regime	1774	1521	1770	281	2203	135
Scenario H - Unemployment (scenario D), furlough (scenario G) and increase in energy use (scenario B and C)	1903	1521	1889	369	2280	180

69. Table 1 and Table 2 show the estimated fuel poverty and extreme fuel poverty rates in Scotland under each modelled scenario, alongside the estimated number of households this would equate to. Table 3 shows the estimated annual running costs for all, fuel poor and extreme fuel poor households in

Scotland in the scenarios A, C and H. Table 4 shows the estimated annual running costs for all, fuel poor and extreme fuel poor households which were moved onto an enhanced heating regime in Scotland in the scenarios B and H.

70. In all cases, due to the assumptions and caveats set out earlier in the paper, these are expected to be overestimates of the rate of fuel poverty and could be considered the worst case outcome for each scenario.
71. Scenario A indicates a baseline fuel poverty rate of 24% (598,000 households) and extreme fuel poverty rate of 11% (269,000 households). The decrease in the fuel poverty rate compared to the published 2018 rate is largely due to the increase in the benefit income of households in receipt of an employment-related benefit. This was applied to account for the increase in standard universal credit allowance introduced by the UK government from April 2020 for 12 months in response to the COVID-19 crisis. The increase in average running costs is due to the increase in electricity, solid fuel and other fuel prices.
72. Scenario B indicates that household members being at home all day and using more energy for space heating is likely to have little impact on overall fuel poverty rates although it does have a small increase in annual running costs. Moving all households onto an enhanced heating regime which includes a longer hours element resulted in estimated fuel poverty and extreme fuel poverty rates remaining at 24% (603,000 households) and 11% (274,000 households), respectively, although there was an additional 6,000 households in fuel poverty of which there was an increase of 5,000 households in extreme fuel poverty compared to the baseline. For all households which were moved onto an enhanced heating regime, the average annual running costs increased by £71 overall with a £59 increase for fuel poor and £69 increase for extreme fuel poor households. The difference in the increase in annual running costs between fuel poor and extreme fuel poor households compared to households overall is due to the characteristics of fuel poor households. For example, their dwellings tend to be smaller therefore any increase in their energy usage, and associated running costs, is lower than Scotland overall.
73. Scenario C indicates that household members being at home all day and using 9% more energy for cooking and 24% more energy for lighting, appliances and renewables is likely to have an impact on overall fuel poverty rates and increase annual average running costs. This results in estimated fuel poverty and extreme fuel poverty rates of 26% (638,000 households) and 12% (291,000 households), respectively. This is an estimated increase of 41,000 households in fuel poverty of which there was an increase of 22,000 households in extreme fuel poverty compared to the baseline. The average annual running costs increased by £121 overall with a £76 increase for fuel poor and £79 increase for extreme fuel poor households. The difference in the increase in annual running costs between fuel poor and extreme fuel poor households compared to households overall is due to the characteristics of fuel poor households. For example, their dwellings tend to be smaller therefore any increases in their energy usage, and associated running costs, which takes into account

information such as floor area, are lower than Scotland overall. In this scenario it is assumed that the increase in energy use for these reasons apply across the entire year.

74. As expected, increasing rates of unemployment had the greatest effect on fuel poverty in scenarios E and F although unemployment as at March-May; unemployment rate at 4.3% plus 19,100 (relevant economically inactive but want a job) individuals in scenario D had little impact.
75. In scenario D where unemployment (those unemployed plus those relevant individuals that are economically inactive but want a job) remained at a similar level to that at March-May for an entire year, the fuel poverty rate increased to 25% (612,000 households) and the extreme fuel poverty rate remained at 11% (281,000 households). This is an estimated increase of 14,000 households in fuel poverty of which there was an increase of 12,000 households in extreme fuel poverty compared to the baseline.
76. In scenario E, where unemployment rates increased to 10% for an entire year, the fuel poverty rate increased to 27% (683,000 households) and the extreme fuel poverty rate increased to 14% (349,000 households). This is an estimated increase of 86,000 households in fuel poverty of which there was an increase of 80,000 households in extreme fuel poverty compared to the baseline.
77. Similarly, in scenario F where unemployment rates increased to 13% for an entire year, the fuel poverty rate increased to 29% (733,000 households) and the extreme fuel poverty rate increased to 16% (396,000 households). This is an estimated increase of 136,000 households in fuel poverty of which there was an increase of 127,000 households in extreme fuel poverty compared to the baseline.
78. Reduced household income due to household members being furloughed in scenario G increased the fuel poverty rate to 26% (643,000 households), and the extreme fuel poverty rate to 12% (296,000 households). This is an estimated increase of 45,000 households in fuel poverty of which there was an increase of 27,000 households in extreme fuel poverty compared to the baseline.
79. Reduced household income and increased fuel bills, taking March-May levels of unemployment, furlough and estimated energy use and applying across an entire year, increased the fuel poverty rate to 29% (724,000 households), and the extreme fuel poverty rate to 14% (337,000 households) in scenario H. This is an estimated increase of 126,000 households in fuel poverty of which there was an increase of 68,000 households in extreme fuel poverty compared to the baseline.
80. In scenario H, the average annual running costs increased by £158 overall with a £95 increase for fuel poor and £65 increase for extreme fuel poor households. Looking just at households which were moved onto an enhanced heating regime, the average annual running costs increased by £200 overall with a £179 increase for fuel poor and £146 increase for extreme fuel poor households. The

difference in the increase in annual running costs between fuel poor and extreme fuel poor households compared to households overall is due to the characteristics of fuel poor households. For example, their dwellings tend to be smaller therefore any increases in their energy usage, and associated running costs, which takes into account information such as floor area, are lower than Scotland overall. This is comparable with other sources which predict an increase of between £16 a month (£192 per year)⁶¹ and £32 a month (£384 per year)⁶² in energy bills due to spending more time in the home. Whilst the latter figure is higher than our estimates, this is likely to be because our fuel poverty measures are based on modelled energy use according to set heating regimes which households may not themselves employ currently.

Conclusions

81. Out of all the scenarios, increasing the unemployment rate to 13% (scenario F) and associated loss of income through COVID-19 had the largest impact on fuel poverty rates with an estimated additional 136,000 households in fuel poverty.
82. Any increase in fuel bills due to increased space heating had little impact on fuel poverty rates on its own in scenario B. In contrast, increases in fuel bills due to increasing use of energy for cooking, lighting, appliances and renewables in scenario C did impact fuel poverty rates. Increasing such energy use impacts all households and, in the scenario modelling, fuel bill increases have not been offset by any changes to income. In addition, electricity makes up the majority of fuel for these end uses and associated electricity prices are high and have increased since 2018 by 8.7% (see Annex A1 for fuel price scaling factors).
83. Decreases in income due to furlough in scenario G also impacted fuel poverty rates, although not as much as in the unemployment scenarios E and F. This is to be expected as, in spite of the large number of households affected, the furlough schemes maintain 80% of income.
84. Scenario H combining changes in employment and energy use had a large impact on the fuel poverty rate with an estimated additional 126,000 households in fuel poverty. This is to be expected as increasing fuel bills alongside decreasing income is likely to push some households into fuel poverty when on their own one change may not have as big an impact. This scenario takes March-May levels of unemployment and furlough, alongside estimated increases in energy use, and assumes that this holds across the entire year. This should be taken into consideration when interpreting the results as fluctuations in employment status of individuals or use of energy because of relaxation of lockdown restrictions and warm weather have not been accounted for.

⁶¹ Uswitch research. <https://www.uswitch.com/gas-electricity/news/2020/06/09/post-lockdown-bill-shock/>

⁶² A recent survey by compare the market found that 72% of households have seen an increase in their energy usage since lockdown began and that they face an average increase of over £32 per month (£384 per year) in energy bills. <https://www.cas.org.uk/news/new-survey-reveals-high-cost-energy-bills-during-lockdown>

85. A wide range of support was rapidly put in place by Scottish Government to support households with their energy costs, including:

- Providing an additional £42 million for the Scottish Welfare Fund which can provide crisis grants to those in immediate financial need - this can include financial support for energy costs.
- Through our Wellbeing and Supporting Communities Funds and Immediate Priorities Funds we are supporting over 100 organisations helping those struggling with their energy costs. This includes a £250,000 grant to the Fuel Bank Foundation to provide financial support to top up prepayment meters for those at risk of imminent disconnection.
- Our award winning Home Energy Scotland (HES) service has continued to provide support, helping people to understand and access support from their supplier by providing an advocacy service. It also refers people for benefit checks and signposts to other sources of support, including financial support for energy costs. They are working in partnership with the Fuelbank Foundation to ensure national access to this funding.
- Our energy efficiency schemes, Warmer Homes Scotland and Area Based Schemes are both now operating again in line with guidance and installing measures to make Scotland's homes warmer and more affordable to heat.

Annex

A1. Fuel prices scaling factors applied in Scenario A

Fuel Type	Scaling Factor ¹
Gas	0.996
Electricity	1.087
Liquid fuels	0.972
Solid fuels	1.042
Other Domestic fuels	1.045

¹Change in BEIS fuel price indices between 2018 and March 2019 - February 2020.

A2. Earned income scaling factors applied in Scenario A

Income Decile	Scaling Factor ¹
1	1.053
2	1.056
3	1.052
4	1.039
5	1.036
6	1.037
7	1.031
8	1.034
9	1.021
10	1.021

¹Change in ONS' Average Weekly Earnings for Scotland by income decile between 2018 and 2019.

A3. Council tax scaling factors applied in Scenario A

Local Authority	Council Tax Band							
	A	B	C	D	E	F	G	H
Aberdeen City	1.037	1.037	1.037	1.037	1.038	1.038	1.038	1.039
Aberdeenshire	1.026	1.026	1.026	1.026	1.026	1.026	1.027	1.027
Angus	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.027
Argyll & Bute	1.040	1.040	1.040	1.040	1.040	1.040	1.040	1.041
City of Edinburgh	1.026	1.026	1.026	1.026	1.026	1.027	1.027	1.027
Clackmannanshire	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.034
Dumfries & Galloway	1.039	1.039	1.039	1.039	1.039	1.040	1.040	1.040
Dundee City	1.026	1.026	1.026	1.026	1.026	1.026	1.027	1.027
East Ayrshire	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.035
East Dunbartonshire	1.033	1.033	1.033	1.033	1.034	1.034	1.034	1.034
East Lothian	1.039	1.039	1.039	1.039	1.040	1.040	1.040	1.040
East Renfrewshire	1.026	1.026	1.026	1.026	1.026	1.026	1.027	1.027
Falkirk	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.027
Fife	1.026	1.026	1.026	1.026	1.026	1.026	1.027	1.027
Glasgow City	1.027	1.027	1.027	1.027	1.027	1.027	1.027	1.027
Highland	1.026	1.026	1.026	1.026	1.026	1.027	1.027	1.027
Inverclyde	1.039	1.039	1.039	1.039	1.040	1.040	1.040	1.041
Midlothian	1.039	1.039	1.039	1.039	1.040	1.040	1.040	1.041
Moray	1.039	1.039	1.039	1.039	1.040	1.040	1.040	1.041
Na h-Eileanan Siar	1.039	1.039	1.039	1.039	1.039	1.039	1.040	1.040
North Ayrshire	1.039	1.039	1.039	1.039	1.040	1.040	1.040	1.041
North Lanarkshire	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.027
Orkney Islands	1.039	1.039	1.039	1.039	1.039	1.039	1.040	1.040
Perth & Kinross	1.033	1.033	1.033	1.033	1.033	1.034	1.034	1.034
Renfrewshire	1.039	1.039	1.039	1.039	1.040	1.040	1.040	1.040
Scottish Borders	1.033	1.033	1.033	1.033	1.034	1.034	1.034	1.034
Shetland Islands	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.027
South Ayrshire	1.039	1.039	1.039	1.039	1.040	1.040	1.040	1.041
South Lanarkshire	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.027
Stirling	1.034	1.034	1.034	1.034	1.034	1.034	1.034	1.035
West Dunbartonshire	1.026	1.026	1.026	1.026	1.026	1.026	1.027	1.027
West Lothian	1.039	1.039	1.039	1.039	1.040	1.040	1.040	1.040

Change in council tax, water and waste charges across local authorities and council tax bands to 2019/20.

A4. Annual running costs scaling factors applied in Scenario B

Scaling Factor	Household Type	Dwelling Type				
		Detached	Semi-detached	Terraced	Tenement	Other flats
Scaling factor between the standard heating regime and enhanced heating regime 1 ¹	Single adult	2.404	2.387	2.361	2.315	2.320
	Small adult	2.407	2.385	2.387	2.264	2.331
	Single parent	2.331	2.322	2.313	2.275	2.213
	Small family	2.371	2.350	2.331	2.228	2.281
	Large family	2.349	2.310	2.292	2.929	2.310
	Large adult	2.395	2.364	2.309	2.360	2.217
	Older smaller	2.432	2.400	2.385	2.246	2.284
	Single older	2.469	2.413	2.395	2.274	2.333
Scaling factor between the standard heating regime and enhanced heating regime 3 ²	Single adult	2.081	2.082	2.079	2.070	2.076
	Small adult	2.099	2.096	2.096	2.048	2.073
	Single parent	2.072	2.060	2.067	2.061	2.040
	Small family	2.086	2.084	2.069	2.044	2.062
	Large family	2.080	2.071	2.066	2.647	2.077
	Large adult	2.087	2.080	2.059	2.111	2.028
	Older smaller	2.105	2.094	2.091	2.032	2.041
	Single older	2.123	2.099	2.091	2.049	2.077

¹Applied to households where at least one member of the household was in receipt of benefits received for a care need or disability.

²Applied to all other households initially on the standard heating regime.