

Research Note:

Estimating the number of off-gas grid homes in England using alternative fuels for heating that are eligible for the Home Upgrade Grant (HUG)

November 2022

Author: Vinal K Karania, Research Manager

Summary

There are between 2.8 million and 3.2 million off-gas grid homes in England, representing around 12% to 13% of all homes in England. These homes do not have a physical connection to the mains gas network so do not receive gas from the National Grid.

Between 1.1 million and 1.4 million off-gas grid homes rely on alternative fuels as their main fuel for heating. Alternative fuels for heating include heating oil, house coal, smokeless fuel, wood, propane, bulk LPG, community heating from boilers/CHP/waste heat and anthracite nuts. These fuels are alternatives to the use of mains gas and electricity for home heating systems.

The Home Upgrade Grant (HUG) is designed to support lower-income owner-occupied or privately rented off-gas grid homes that have an energy efficiency rating of Band D to G to improve their energy efficiency. Between 380,000 and 530,000 homes in England relying on alternative fuels to heat their homes could be eligible for support from the HUG scheme.

We estimate that £1 billion would pay for 65,000 off-gas grid homes to be upgraded to an energy efficiency rating of Band C. At an annual rate of 65,000 homes, all off-gas homes relying on alternative fuels for their main fuel for heating in England, that are eligible for support through the HUG scheme could be upgraded by the end of 2031-32.

To achieve this there is a need to set out a longer-term commitment, both in terms of the eligibility criteria and the funding that will be available through the HUG scheme. A period of certainty provides opportunities to lock in the cost of upgrading eligible homes or hedging against significant price increases, and a sustained period of activity of this kind can lead to economies of scale and innovation that can either reduce the cost or increase the number of homes that can be upgraded for the same budget.

Introduction

The Home Upgrade Grant (HUG) is a government-funded scheme to improve the energy efficiency rating of lower-income owner-occupied or privately rented off-gas grid homes in England to a minimum of energy efficiency rating of Band C. The government aims through this scheme to support as many eligible homes as '*reasonably practical*' by 2030.

The first phase of this scheme, HUG Phase 1, has been allocated £1.1bn with delivery between January 2022 and March 2023. The second phase of this scheme, HUG Phase 2, has been allocated up to £700m with delivery between April 2023 and March 2025. HUG Phase 2 builds on HUG Phase 1 and will provide continuity for Local Authorities currently delivering HUG phase 1 to carry on providing upgrades in their area, and for Local Authorities not participating in Phase 1 to start delivering upgrades in their area.

Further phases of the HUG scheme will need to be introduced if Government wishes to continue towards achieving the aim of the scheme by 2030. This paper presents an estimate of the number of off-gas grid homes in England using alternatives fuels¹ as their main fuel for heating, the number of which would be eligible for upgrades through the HUG scheme, and how many years it would take to upgrade all these eligible homes through the HUG scheme. The appendix describes the source, assumptions, and calculations for the analysis presented in this paper.

¹ Alternative fuels for heating include heating oil, house coal, smokeless fuel, wood, propane, bulk LPG, community heating from boilers/CHP/waste heat and anthracite nuts. These fuels are an alternative to the use of gas and electricity for home heating systems.

Supporting off-gas grid homes in England using alternative fuels for heating through the Home Upgrade Scheme (HUG)

There are between 2.8 million and 3.2 million off-gas grid homes in England, representing around 12% to 13% of all homes in England. These homes do not have a physical connection to the mains gas network so do not receive gas from the National Grid. The Home Upgrade Grant (HUG) is designed to support lower-income owner-occupied or privately rented off-gas grid homes that have an energy efficiency rating of Band D to G. Between 860,000 and 1.1 million such homes in England are eligible for support to improve their energy efficiency rating through the HUG scheme.

Table 1: Number of off-gas grid homes in England and of these the number eligible for support from the HUG scheme

| | Lower-bound estimate | Mid-point estimate | Higher-bound estimate |
|--|----------------------|--------------------|-----------------------|
| Number of off-gas grid homes in England... | 2,800,000 | 3,000,000 | 3,200,000 |
| ...of which eligible for HUG | 860,000 | 960,000 | 1,070,000 |

Source: Author's analysis of Fuel Poverty Database 2019

Many off-gas grid homes in England are however connected to the National Grid through a physical connection to electricity and use this fuel for their heating system. There are also off-gas grid homes in England that either do have such a connection or use alternative fuels (to electricity) as their main fuel for heating. There are between 1.1 million and 1.4 million off-gas grid homes relying on alternative fuels as their main fuel for heating, of which between 380,000 and 530,000 can be supported to improve their energy efficiency rating by the HUG scheme.

Table 2: Number of off-gas grid homes relying on alternative fuels as their main fuel for heating in England and of these the number eligible for support from the HUG scheme

| | Lower-bound estimate | Mid-point estimate | Higher-bound estimate |
|--|----------------------|--------------------|-----------------------|
| Number of off-gas grid homes relying on alternative fuels as their main fuel for heating in England... | 1,200,000 | 1,300,000 | 1,500,000 |
| ...o/w eligible for HUG | 380,000 | 450,000 | 530,000 |

Source: Author's analysis of Fuel Poverty Database 2019

The first phase of the Home Upgrade Scheme (HUG) has been allocated £1.1 billion for delivery over a 15 month period. For £1 billion we estimate 65,000 off-gas grid homes could be upgraded to an energy efficiency rating of Band C.

At an annual rate of 65,000 homes, between half and three-fifths of eligible off-gas grid homes in England (520,000) could be upgraded through the HUG scheme by the end of 2030-31, with a further seven to eleven years required to upgrade the remaining number of eligible homes. If the HUG scheme was to focus on off-gas grid homes relying on alternative fuels as their main fuel – rather than electricity – for heating, then all these eligible homes in England could be upgraded by the end of 2031-32

Table 3: End of year by which all eligible off-gas grid homes in England can be upgraded to energy efficiency rating of Band C through the HUG scheme

| | Lower-bound estimate | Mid-point estimate | Higher-bound estimate |
|---|----------------------|--------------------|-----------------------|
| Eligible off-gas grid homes in England... | 2036-37 | 2037-38 | 2040-41 |
| ...of which relying on alternative fuels as their main fuel for heating | 2028-29 | 2029-30 | 2031-32 |

Source: Author's calculations using Fuel Poverty Database 2019 and English Housing Survey 2020-21 report

Discussion

There are between 2.8 million and 3.2 million off-gas grid homes in England, of which we estimate between 860,000 and 1.1 million will be eligible for support through the Home Upgrade Grant (HUG) scheme. We estimate that around 520,000 homes could be upgrading through the HUG scheme by the end of 2030-31 at a cost of £1 billion per year, with up to a further decade before the remaining eligible homes are upgraded. Furthermore, we estimate that if the HUG scheme focused on supporting off-gas grid homes in England relying on alternative fuels as their main fuel for heating, all such eligible homes could be upgraded by the end of 2031-32.

These figures are based on analysis that assumes the eligibility criteria for a HUG scheme extended beyond March 2025 would remain similar to the current scheme. Future versions of this scheme may vary the eligibility criteria, and furthermore, the cost of upgrading eligible off-gas grid homes in England may change over time.

Both these issues can be partially mitigated through setting out a longer-term commitment, both in terms of the eligibility criteria and the funding that will be available. A period of certainty provides opportunities to lock in the cost of upgrading eligible homes or hedging against significant price increases, and a sustained period of activity of this kind can lead to economies of scale and innovation that can either reduce the cost or increase the number of homes that can be upgraded for the same budget.

Methodology for estimating number of off-gas grid homes in England using alternative fuels for heating that are eligible for the Home Upgrade Grant (HUG)

This appendix presents the assumptions, calculations and datasets used to estimate the number of off-gas grid homes using alternative fuels as their main fuel for heating in England, the number of which would be eligible for upgrades through the Home Upgrade Grant (HUG) scheme, and how many years it would take to upgrade all these eligible homes through the HUG scheme.

The starting point for the analysis was the Fuel Poverty 2019 dataset. This dataset is derived from the 2019 English Housing Survey, which is a national survey created by the Department for Levelling Up, Housing and Communities (DLUHC), designed to build a picture of people’s housing circumstances and the condition of the housing stock in England. The fieldwork was carried out between April 2018 and March 2020, with April 2019 the midpoint and thereby the reference date for the database. At the time of the analysis, the Fuel Poverty 2019 database was the latest available version. The Fuel Poverty 2019 database is based on a sample of 11,974 households in England, which after applying the weighting factor equates to 23,661,751 households in England².

The first step was to estimate the number of homes in England that were not connected to the mains gas network. The Fuel Poverty 2019 dataset has a binary variable (Ongas) that flags whether a home has a connection or not to the mains gas, based on observations made by a surveyor combined with the types of fuels recorded for the space and water heating systems. Table A1 presents these figures.

Table A1: the number of off-gas grid homes in England

| Ongas - whether dwelling is on the gas grid | 95% lower-bound confidence interval | mid-point estimate | 95% higher-bound confidence interval |
|---|-------------------------------------|--------------------|--------------------------------------|
| No | 2,800,000 | 3,000,000 | 3,200,000 |
| Yes | 20,300,000 | 20,700,000 | 21,100,000 |
| Total | 23,100,000 | 23,700,000 | 24,300,000 |

Source: Age UK analysis of Fuel Poverty 2019 dataset; figures rounded to nearest hundred thousand

² The Office for National Statistics estimate there were 23,183,000 households in England in 2019 (with 95% confidence interval of between 23,082,000 and 23,284,000) and 23,487,000 households in 2021 (with 95% confidence interval of between 23,335,000 and 23,639,000).

Source: Office for National Statistics (ONS). 2022. *Households by household size, regions of England and GB constituent countries*. Table 10. [online]. Published 9th March 2022. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/datasets/householdsbyhouseholdsizeofenglandandukconstituentcountries>

The second step was to estimate how many of the homes in England that were not connected to the mains gas network used ‘alternative fuels’ as their main fuel for their main or primary space heating system. ‘Alternative’ fuels are fuels that are used as an alternative to gas from the mains network and electricity, and include heating oil, house coal, smokeless fuel, wood, propane, bulk LPG, community heating from boilers/CHP/waste heat and anthracite nuts. The Fuel Poverty 2019 dataset has a variable (Maintypefuel) that flags three types of fuels – gas, electricity and ‘other’ – used as the main fuel source for the main or primary space heating system. For the purposes of the analysis, we define off-gas grid homes in England relying on alternative fuels to heat their homes as off-gas grid homes that use ‘other’ fuels as the as the main fuel for their main or primary space heating system. Table A2 presents these figures.

Table A2: the number of off-gas grid homes in England relying on alternative fuels to heat their home

| Mainfueltype – main fuel type | 95% lower-bound confidence interval | mid-point estimate | 95% higher-bound confidence interval |
|-------------------------------|-------------------------------------|--------------------|--------------------------------------|
| Gas | 70,000 | 110,000 | 140,000 |
| Electricity | 1,500,000 | 1,600,000 | 1,800,000 |
| Other fuels | 1,100,000 | 1,200,000 | 1,400,000 |
| Total | 2,800,000 | 3,000,000 | 3,200,000 |

Source: Age UK analysis of Fuel Poverty 2019 dataset; figures rounded to nearest ten thousand (for gas row) and hundred thousand (for all other rows)

Table A2 shows that there are between 70,000 and 140,000 off-gas grid homes in England that are using gas for their main or primary space heating system. For the purposes of this analysis, we have included these homes in our definition of off-gas homes in England relying on alternative fuels as their main fuel for heating. The reason for this is that this source of fuel is not from the mains gas network and is therefore an alternative to gas and electricity from the National Grid, which is what we have meant by alternative fuels.

The third step was to estimate how many off-gas grid homes relying on alternative fuels as their main fuel for heating in England would be eligible for support through the Home Upgrade Grant (HUG). There is no variable in the Fuel Poverty 2019 dataset that flags whether a home is eligible for the HUG scheme. We therefore needed to identify such

homes from the variables available. The HUG scheme sets out guidance to Local Authorities on the eligibility criteria, which states homes should be:

- off the mains gas grid (off-gas grid)
- owner occupied or privately rented
- have an EPC rating of between D and G
- have an annual gross household income of less than £31,000 (before housing costs and excluding income from DLA, PIP and AA)
- likely to be living in fuel poverty

Furthermore, homes within Lower Layer Super Output Area (LSOA) ranked in income deciles 1 to 3 in the Index of Multiple Deprivation are eligible for the HUG scheme without the need to verify their annual gross household income is below £31,000. Local Authorities also have some discretion on homes suitable for the HUG scheme as long as they broadly meet the eligibility criteria.

The Fuel Poverty 2019 dataset has variables for off-gas grid (Ongas), housing tenure (tenure4x), EPC rating (FPEERband) and living in fuel poverty (fpLILEEflg). The income variable in the dataset reflects after-tax household income, inclusive of all benefits (fpfullinc) and is therefore not the same as that set out in the guidance but the best approximation available. Based on these variables - except for the fuel poverty variable because all homes with an EPC rating of D to G are also defined to be in fuel poverty in the dataset under the LILEE definition of fuel poverty - we identify homes that would be eligible for the HUG scheme. Table A3 presents the number of off-grid homes, and of these the number relying on alternative fuels as their main fuel for heating, by whether they would be eligible for the HUG scheme.

Table A3: the number of off-gas grid homes in England, and the number of these relying on alternative fuels to heat their home, that are eligible for the HUG scheme

| Homes eligible for the HUG scheme | 95% lower-bound confidence interval | mid-point estimate | 95% higher-bound confidence interval |
|--|-------------------------------------|--------------------|--------------------------------------|
| Off-gas grid homes | 860,000 | 960,000 | 1,070,000 |
| Off-gas grid homes relying on alternative fuels as their main fuel for heating | 380,000 | 450,000 | 530,000 |

Source: Age UK analysis of Fuel Poverty 2019 dataset; figures rounded to nearest ten thousand

The fourth step was to estimate how many homes could be upgraded per year through the HUG scheme. The first phase of the Home Upgrade Scheme (HUG) has been allocated £1.1 billion for delivery over a 15 month period, and taking this as guidance, we assumed £1 billion spend through the HUG scheme over 12 months.

The English Housing Survey 2021 report found that in 2020, on average, it cost £12,363 to improve homes to an energy efficiency rating of Band C, with the cost averaging £15,000 or more for 9.1% of homes in England³. Assuming it would cost on average £15,000 to upgrade homes through the HUG scheme, we estimate 65,000 homes could be upgraded for £1 billion⁴. If the average cost of upgrading these homes was £20,000 then 50,000 homes could be upgraded for £1 billion⁵.

The fifth and final step was to estimate how many years it would take to upgrade all eligible homes through the HUG scheme. Assuming 65,000 homes on average can be upgraded per year to energy efficiency rating of Band C through the HUG scheme, Table A4 shows the number of years it would take to achieve this. Table A5 shows the number of years assuming on average annual rate of 50,000 homes can be upgraded through the HUG scheme.

³ Department for Levelling Up, Housing and Communities. 7 July 2022. *English Housing Survey, 2020 to 2021: private rented sector. Chapter 4: annex tables. Table AT_4_8.* [online] Available at <https://www.gov.uk/government/statistics/english-housing-survey-2020-to-2021-private-rented-sector>

⁴ £1 billion divided by £15,000 = 65,000

⁵ £1 billion divided by £25,000 = 50,000

Table A4: End of year by which all eligible off-gas homes in England can be upgraded to energy efficiency rating of C through the HUG scheme, assuming 65,000 homes per year

| | lower-bound estimate | mid-point estimate | higher-bound estimate |
|---|----------------------|--------------------|-----------------------|
| Eligible off-gas grid homes in England... | 2036-37 | 2037-38 | 2040-41 |
| ...of which relying on alternative fuels as their main fuel for heating | 2028-29 | 2029-30 | 2031-32 |

Source: Author's calculations using Fuel Poverty Database 2019 and English Housing Survey 2020-21 report

Table A5: End of year by which all eligible off-gas homes in England can be upgraded to energy efficiency rating of C through the HUG scheme, assuming 50,000 homes per year

| | lower-bound estimate | mid-point estimate | higher-bound estimate |
|---|----------------------|--------------------|-----------------------|
| Eligible off-gas grid homes in England... | 2040-41 | 2042-43 | 2044-45 |
| ...of which relying on alternative fuels as their main fuel for heating | 2030-31 | 2031-32 | 2033-34 |

Source: Author's calculations using Fuel Poverty Database 2019 and English Housing Survey 2020-21 report