



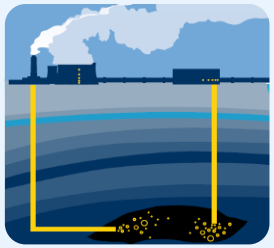



Bottom-up analysis of fuel poverty in Ireland

DCENR

Final report

20th November 2015

Element Energy Ltd

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Fuel poverty definitions

We use the 'objective' measure in this presentation

Fuel poverty measure	Method	Previous study in Ireland?	Reference
1. Actual expenditure	Compare fuel expenditure to household income	Yes	Scott et al (ESRI, 2008)
2. Subjective	Occupant self-reported methodology*	Yes	Scott et al (ESRI, 2008) DCENR (2009) Watson & Maitre (2015)
3. Objective	**Compare normative fuel expenditure** to household income**	**Not to our knowledge**	➢ **This study**

- In this project we use the **'objective'** measure of fuel poverty.
- The objective definition allows measurement of:
  - the '***extent***' of fuel poverty, i.e. how many households are in fuel poverty;
  - the '***severity***' of fuel poverty, i.e. how much of a household's income is required to be spent on fuel.
- In the objective definition, a threshold of percentage income required to spend on fuel is typically set; households above this threshold are said to be in fuel poverty.
- We will use three thresholds: **10%, 15%** and **20%**, and calculate the number of households in fuel poverty (the 'extent').
- We will also report on the 'severity' of fuel poverty.

*Reported difficulty in warming the home adequately and/or going without heating for some part of the year.

**i.e. that which would need to be spent to maintain certain standard internal conditions

Definitions

Required energy spend fraction: $100 \times \frac{modelled\ fuel\ expenditure}{income}$

At-risk group: Households whose *Required energy spend fraction* exceeds a defined threshold

Prevalence of fuel poverty: The percentage of households in a particular category (e.g. living in detached houses) whose *Required energy spend fraction* exceeds the defined threshold

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Irish households were disaggregated into groups by six core variables

Each group represents a combination of six 'core variables'

- The aim was to be able to identify likely segments of the population in which fuel poverty is prevalent.

Core variables	*Example group*
• Location	*Kildare*
• Dwelling type	*Terraced house*
• Main heating fuel	*Oil*
• BER rating	*D1-D2*
• Tenure	*Private rented sector*
• Employment type	*Self-employed*

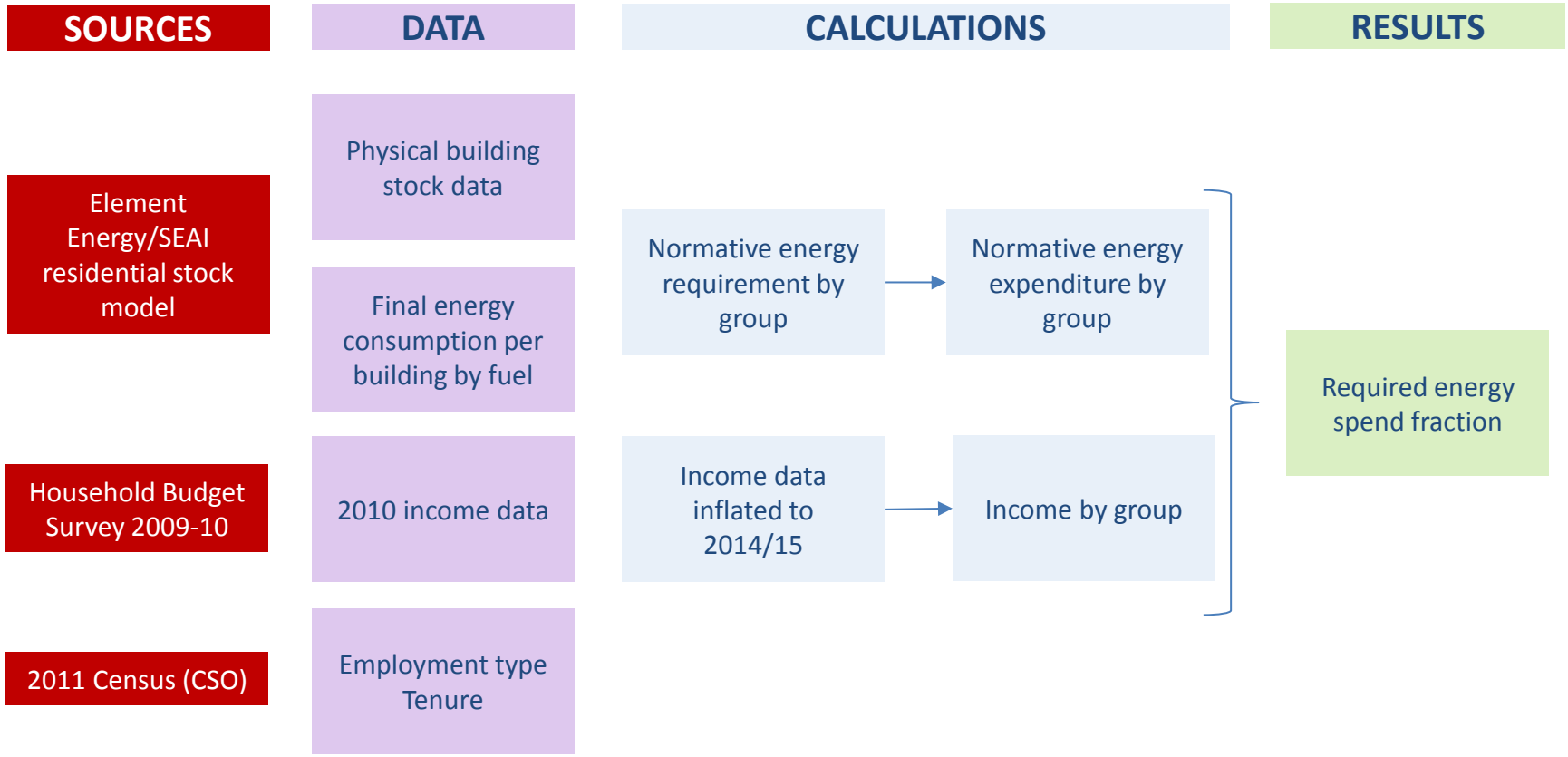
Output of analysis

Required energy spend fraction

- The results in this presentation are given in terms of the fuel poverty metric (% or number of households in fuel poverty) by one core variable at a time.
- The model used to derive these results could also be used to estimate prevalence of fuel poverty by two variables, for example tenure and employment.

High level representation of process

Data analysis and stock modelling were used to predict fuel poverty prevalence for each group



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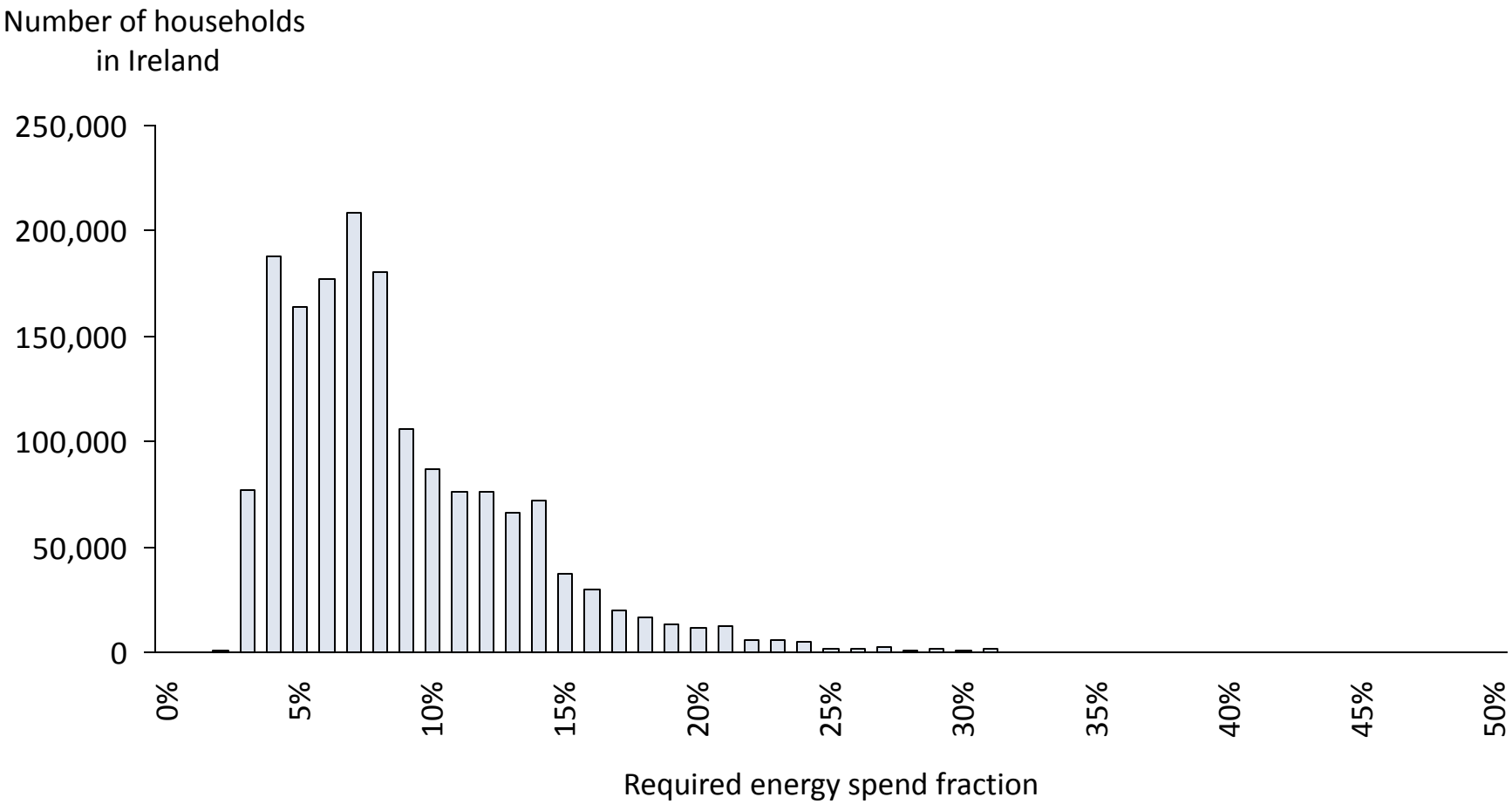
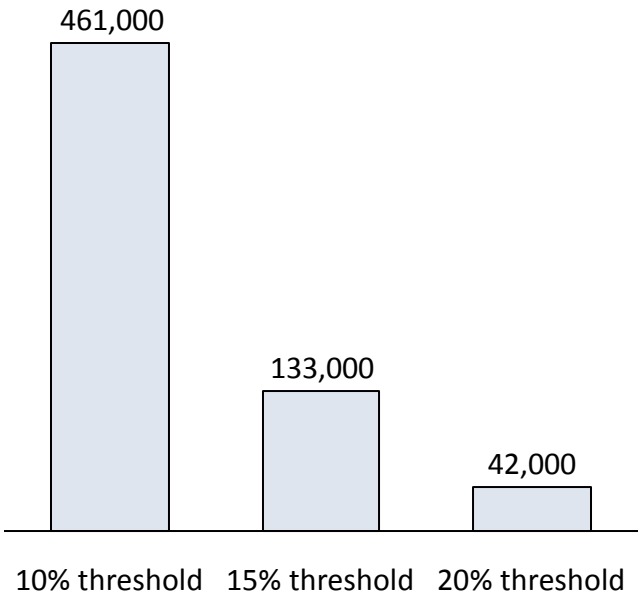
Overall results for Ireland

Distribution of Required energy spend fraction

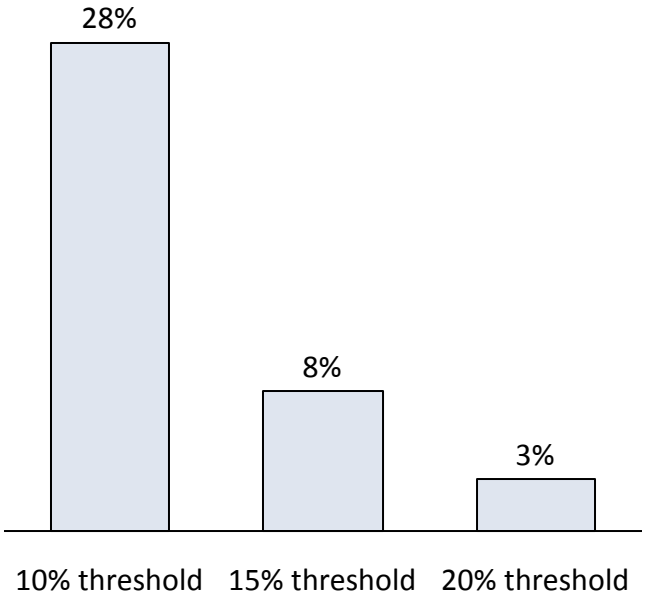


Overall results for Ireland: prevalence of fuel poverty using different thresholds

Number of households in fuel poverty



Percentage of households in fuel poverty

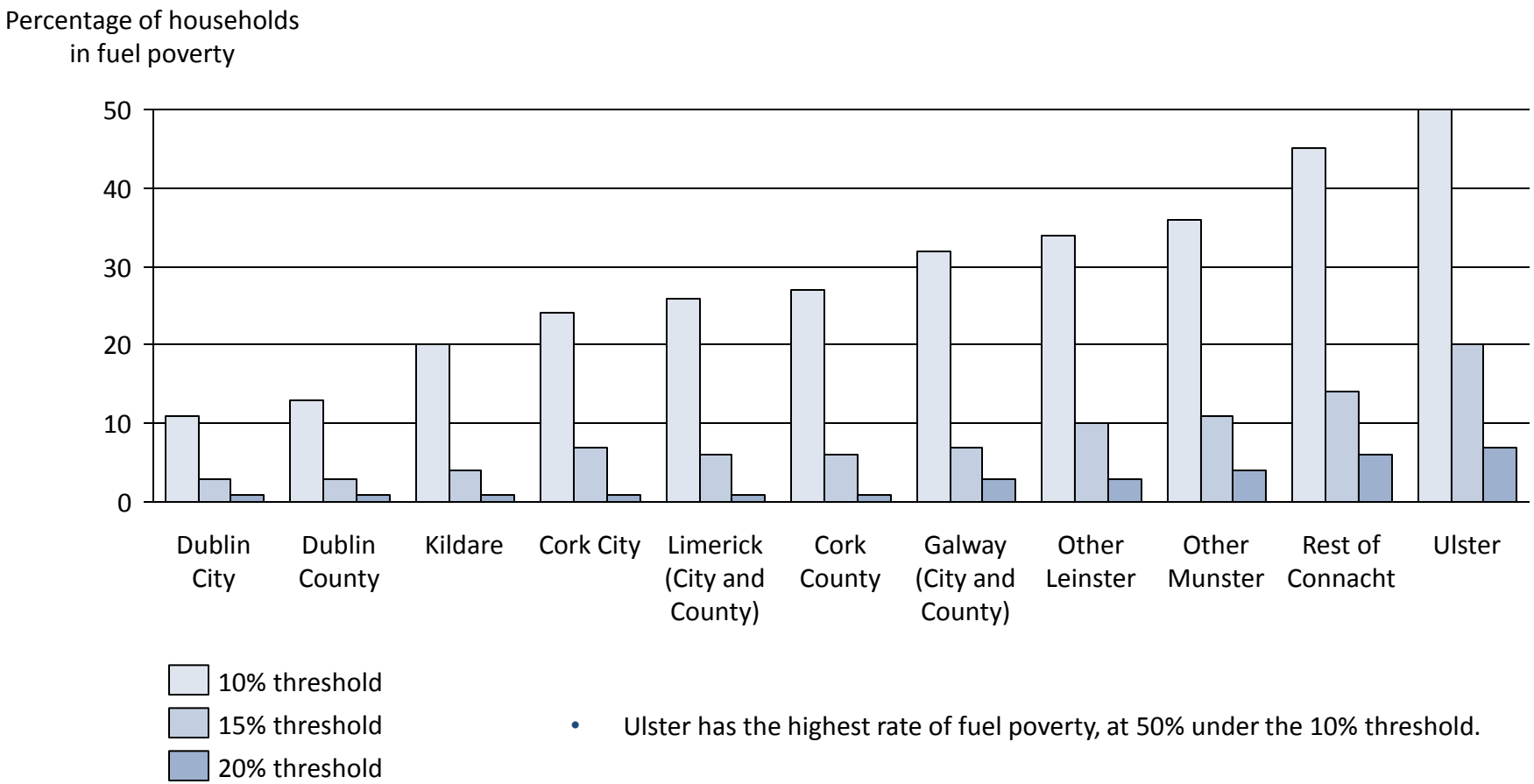


Metric	Threshold		
	10%	15%	20%
Number of households in fuel poverty	461,000	133,000	42,000
% households in fuel poverty	28%	8%	3%

- Using the 10% threshold, more than one-fourth of Irish households are in fuel poverty.
- The next slides show how this number varies with the six core variables introduced earlier.

Fuel poverty by location

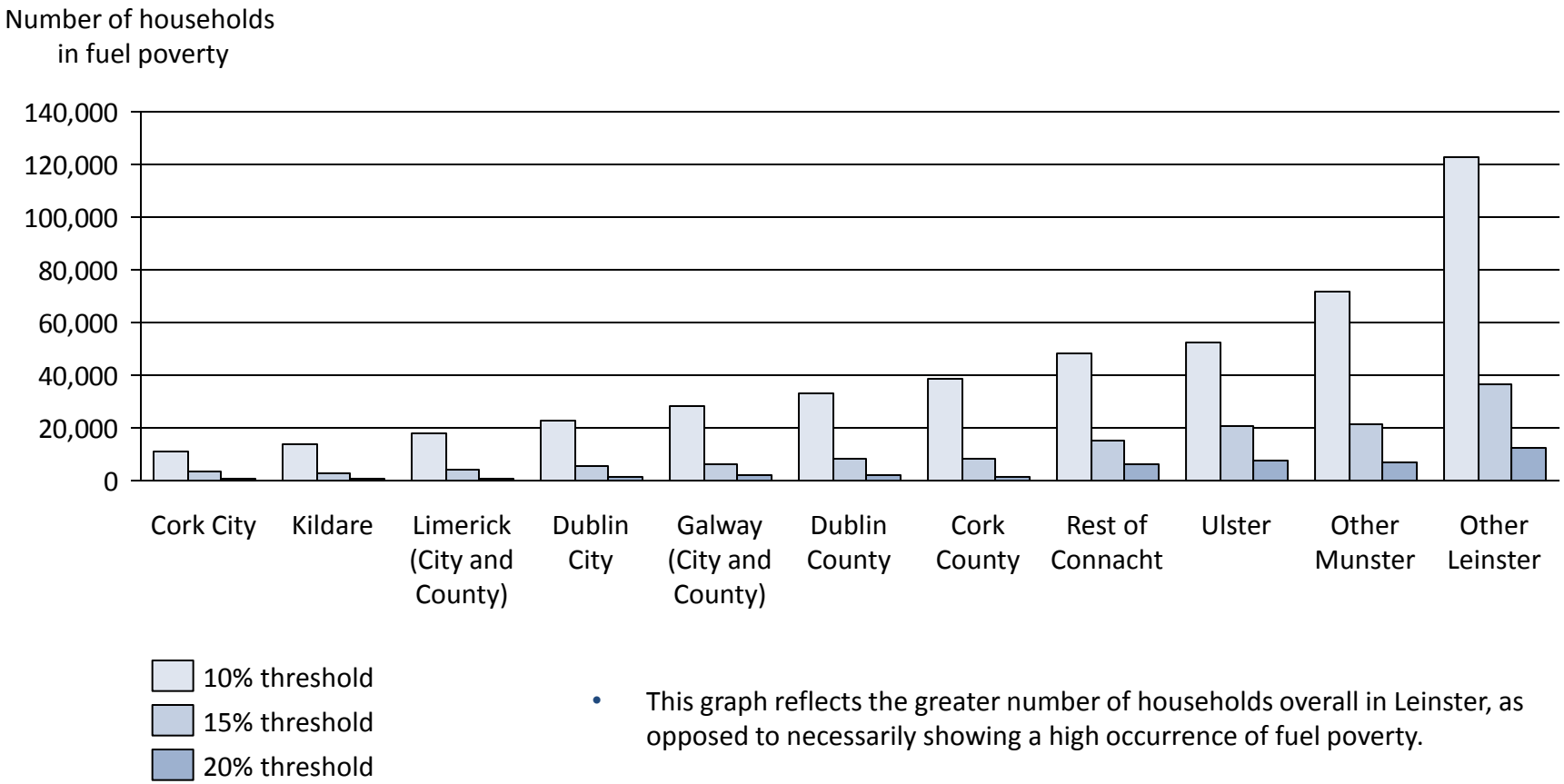
Percentage of households in each location in fuel poverty



- Ulster has the highest rate of fuel poverty, at 50% under the 10% threshold.

Fuel poverty by location

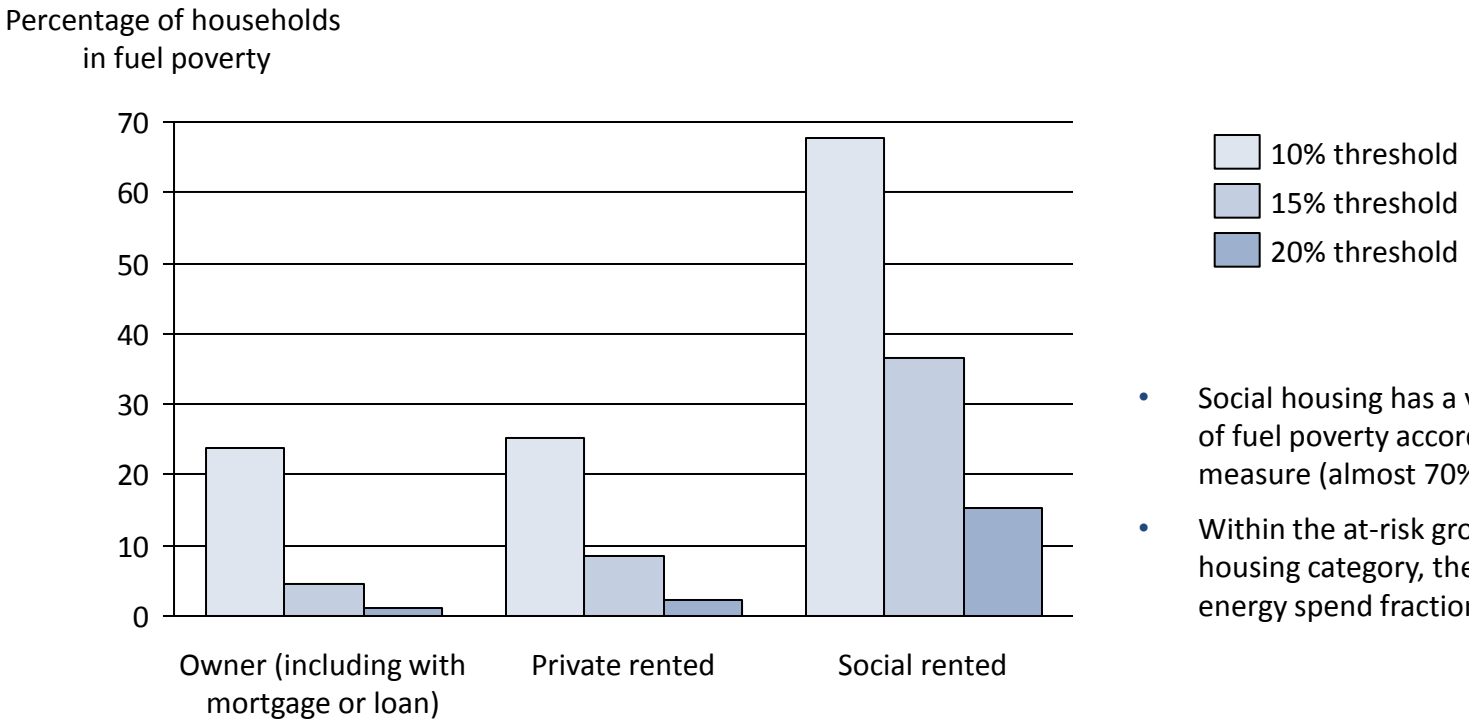
Number of households in fuel poverty



- This graph reflects the greater number of households overall in Leinster, as opposed to necessarily showing a high occurrence of fuel poverty.

Fuel poverty by tenure

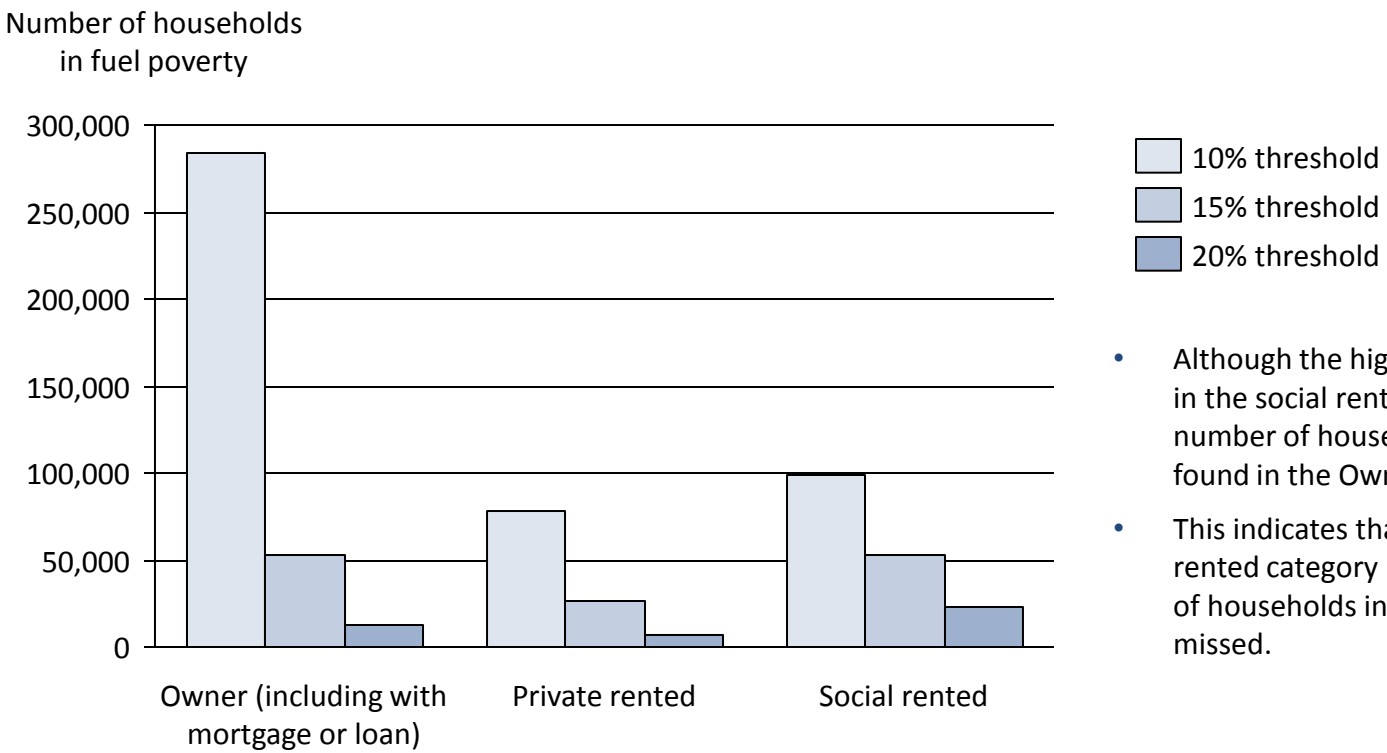
Percentage of households of each tenure in fuel poverty



- Social housing has a very high prevalence of fuel poverty according to the objective measure (almost 70%).
- Within the at-risk group in the social housing category, the average Required energy spend fraction is 17%.

Fuel poverty by tenure

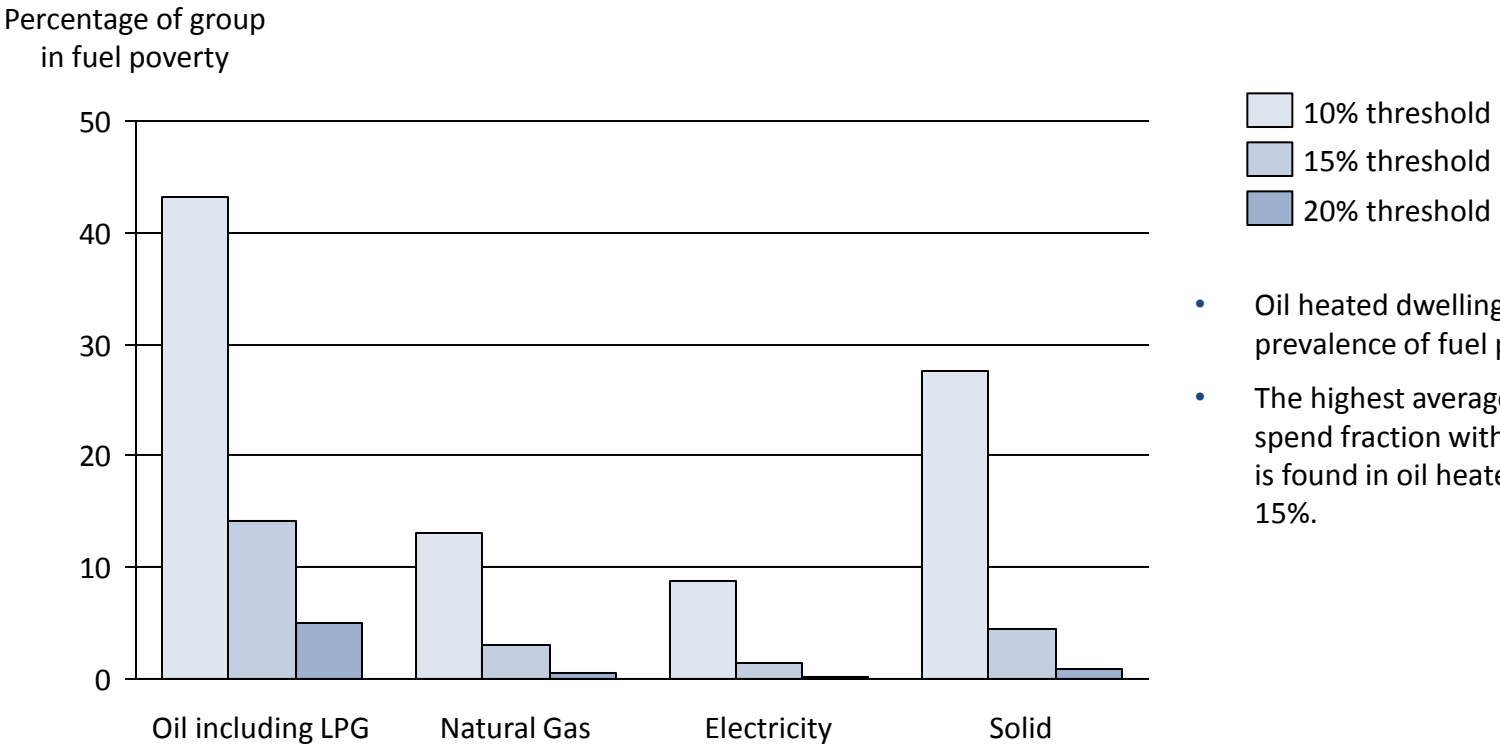
Number of households in fuel poverty



- Although the highest prevalence is found in the social rented category, the highest number of households in fuel poverty is found in the Owner category.
- This indicates that if only the social rented category is targeted, the majority of households in fuel poverty would be missed.

Fuel poverty by main heating fuel

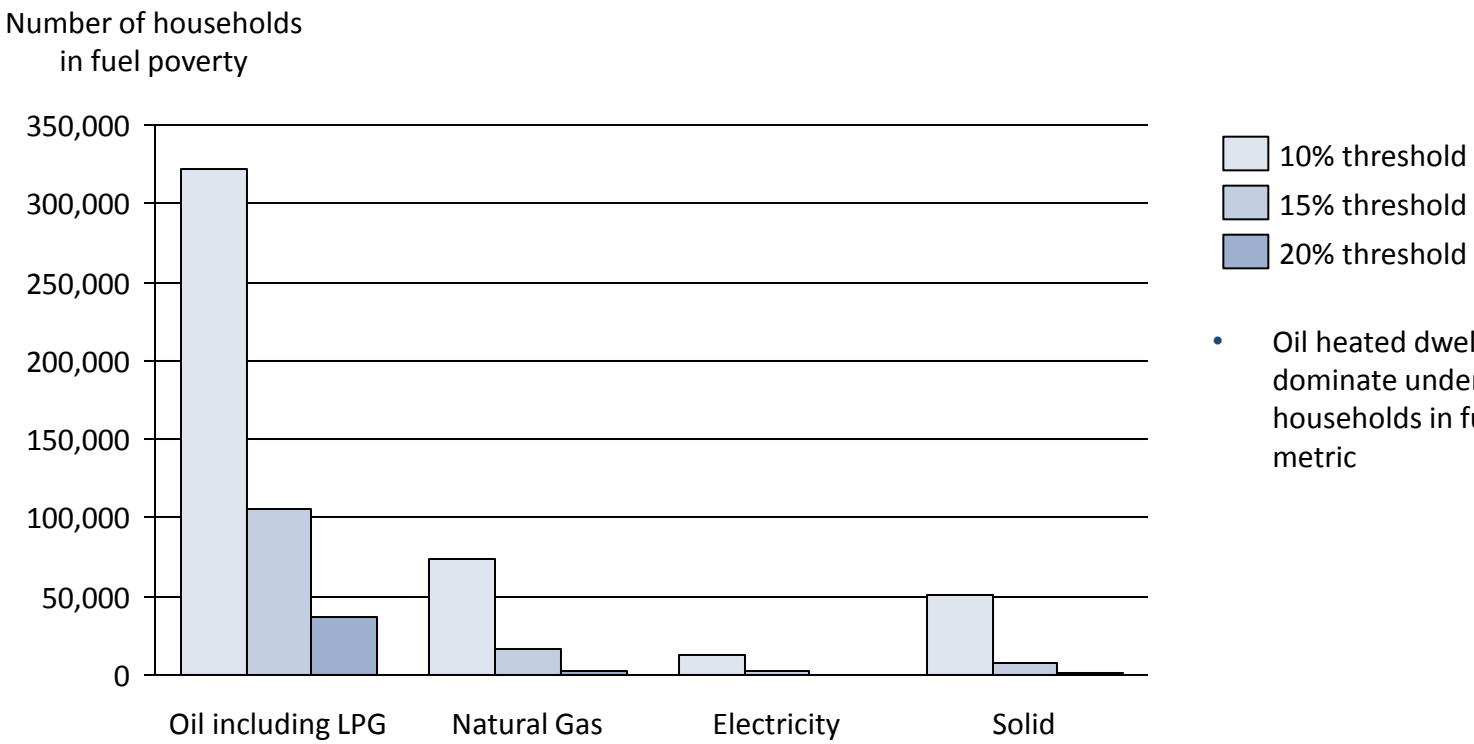
Percentage of households using each fuel type in fuel poverty



- Oil heated dwellings have the highest prevalence of fuel poverty.
- The highest average Required energy spend fraction within the at-risk group is found in oil heated dwellings, at 15%.

Fuel poverty by main heating fuel

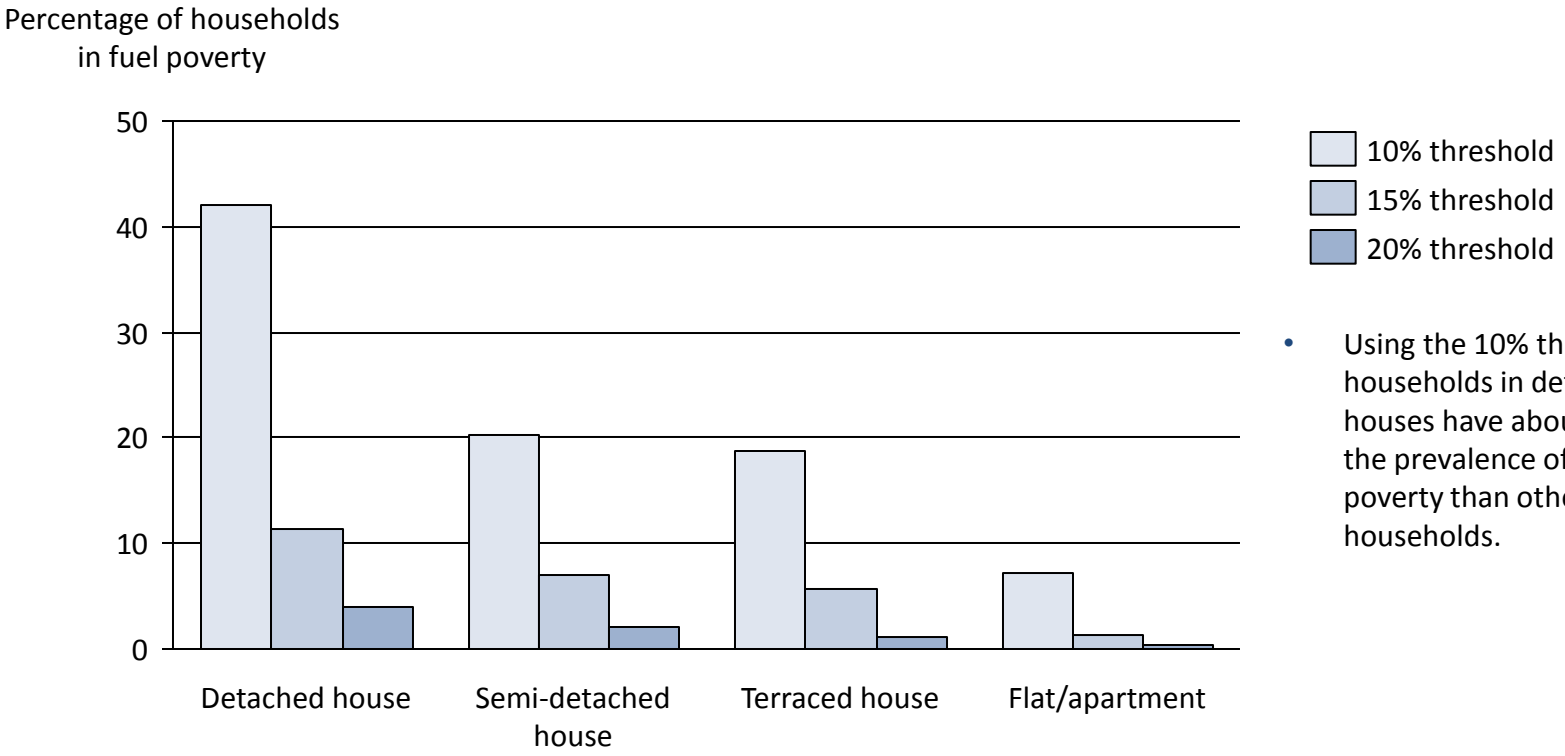
Number of households in fuel poverty



- Oil heated dwellings also dominate under the 'number of households in fuel poverty' metric

Fuel poverty by dwelling type

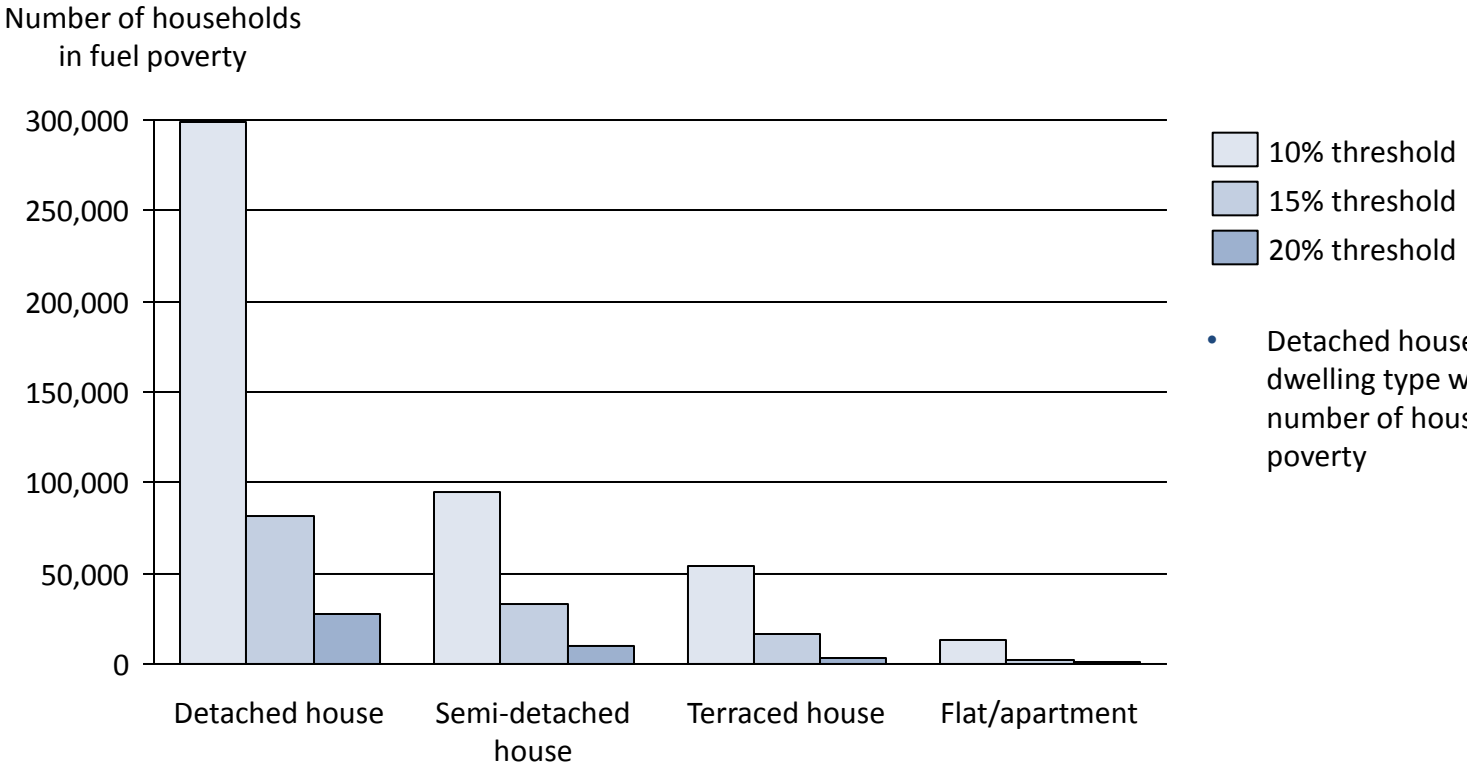
Percentage of households from each dwelling type in fuel poverty



- Using the 10% threshold, households in detached houses have about twice the prevalence of fuel poverty than other households.

Fuel poverty by dwelling type

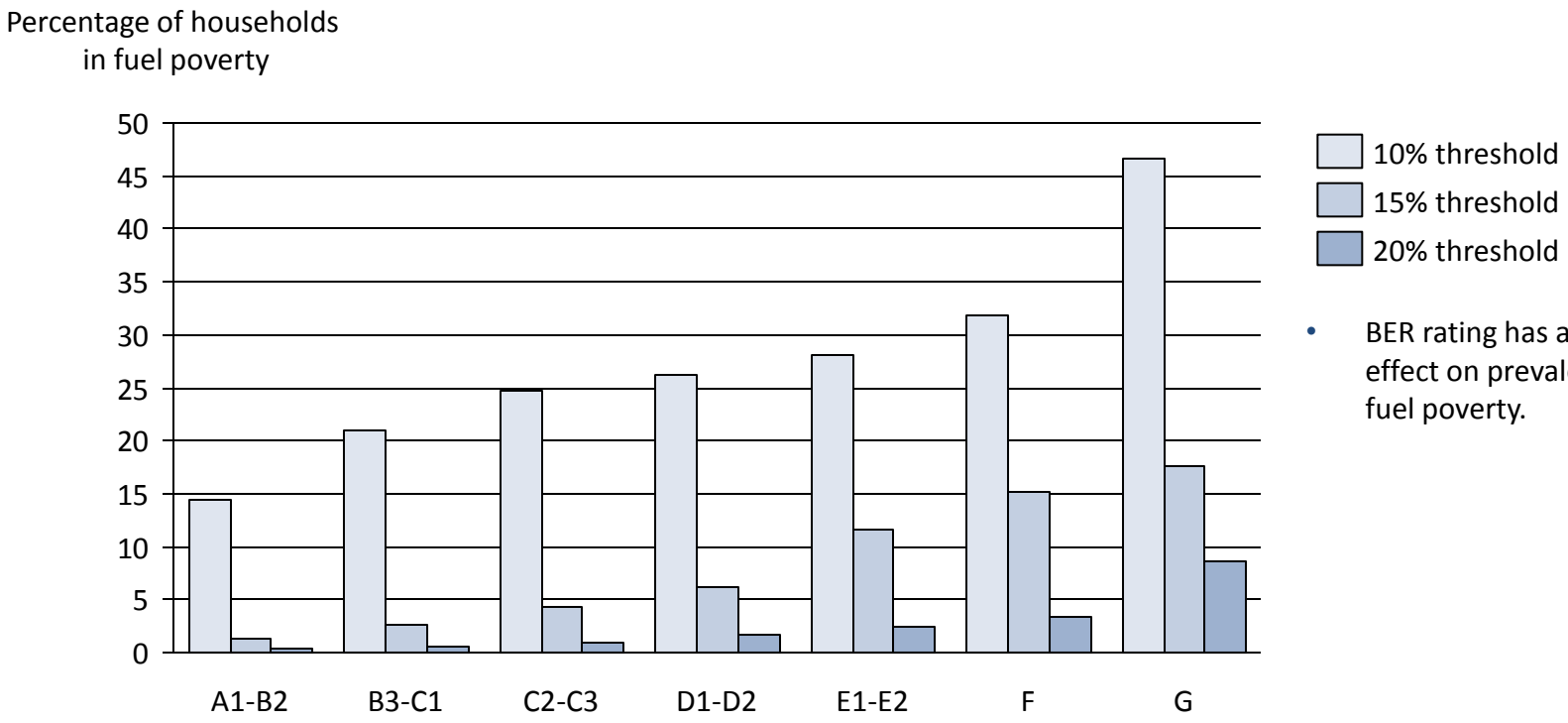
Number of households in fuel poverty



- Detached houses are also the dwelling type with the highest number of households in fuel poverty

Fuel poverty by BER rating

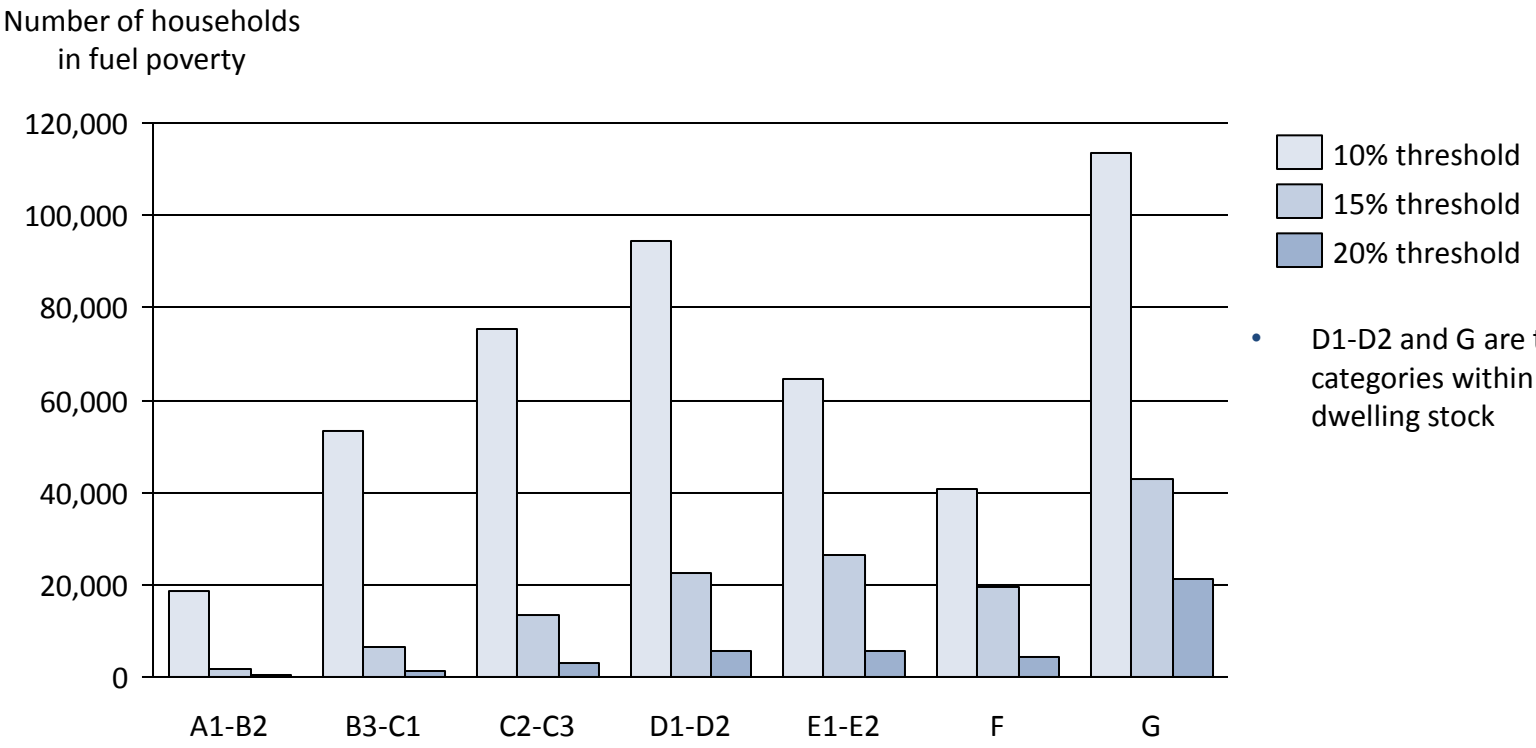
Percentage of households from dwellings of each BER category in fuel poverty



- BER rating has a strong effect on prevalence of fuel poverty.

Fuel poverty by BER rating

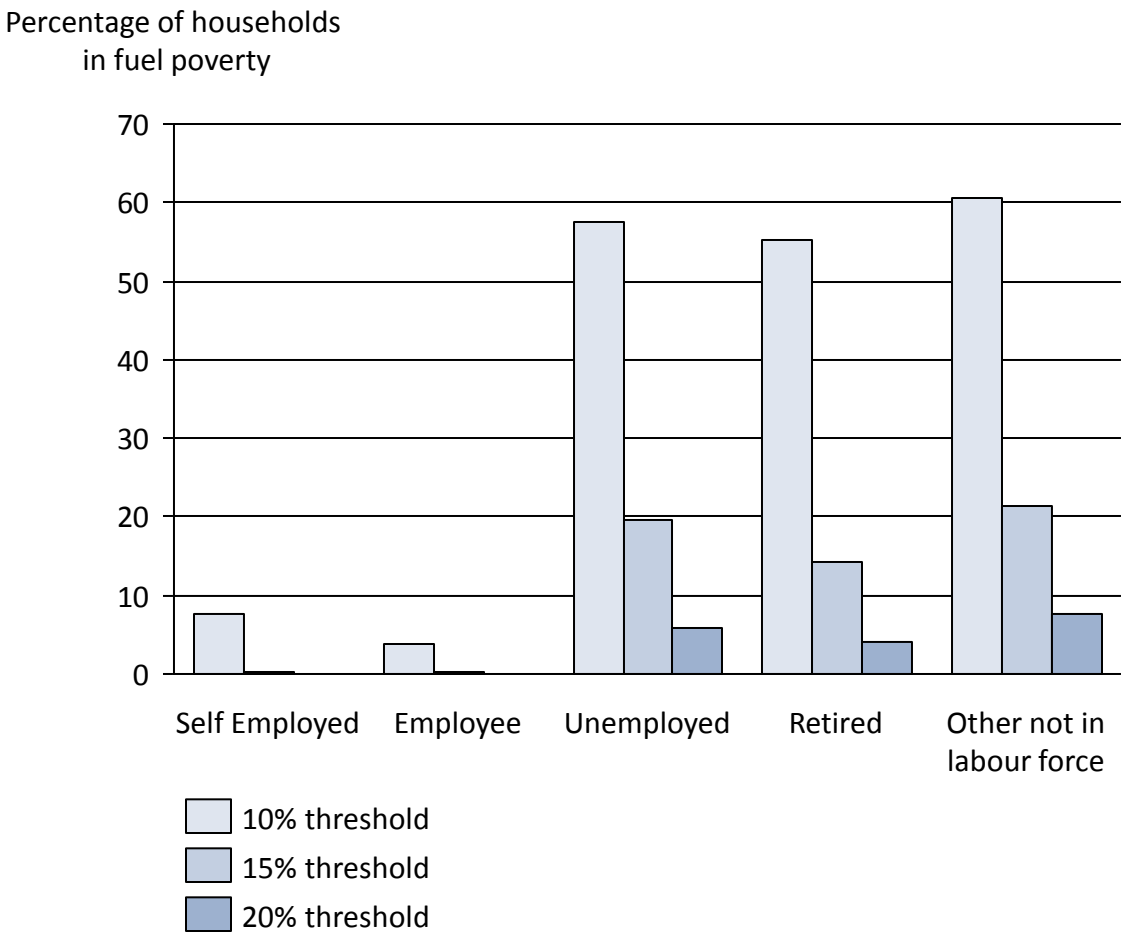
Number of households in fuel poverty



- D1-D2 and G are the largest categories within the dwelling stock

Fuel poverty by employment type

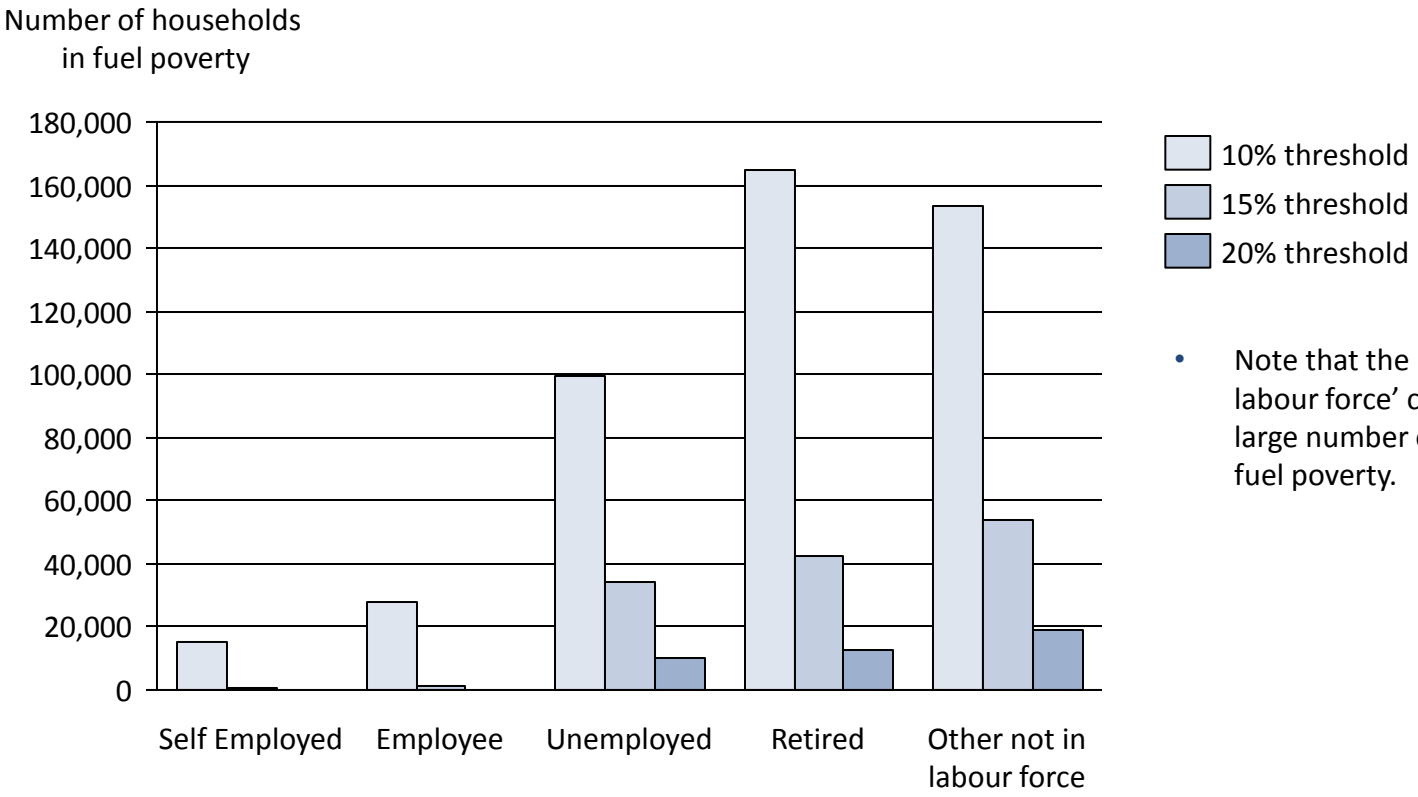
Percentage of households of each employment type in fuel poverty



- Unemployed and retired households have a high prevalence of fuel poverty.
- However, the largest category in percentage terms is 'Other not in labour force' employment type.
- This refers to the sum of households where the reference person is:
  - Looking after someone at home
  - A student/pupil
  - Unable to work due to permanent sickness/disability
  - Looking for first regular job
  - Aged 15 or under, or absent on census night
- The Household Budget Survey reports that this 'Other' category has the lowest average income of all the categories, which is why its extent of fuel poverty is high.

Fuel poverty by employment type

Number of households of each employment type in fuel poverty



- Note that the 'Other not in labour force' category also has a large number of households in fuel poverty.

Highest numbers in terms of prevalence of fuel poverty (using the 10% threshold)

The social rented sector was where the highest prevalence of fuel poverty was found

Categories of variables with a high prevalence of fuel poverty under the 10% threshold:

- Social rented (68%)
- ‘Other not in labour force’ (61%), unemployed (57%) and retired (55%)
- Located in Ulster (50%)
- G-rated dwellings (47%)
- Oil heated dwellings (43%)
- Detached houses (42%)

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Refinements possible to improve analysis

Higher resolution income data would improve the accuracy of the analysis

- Currently, the income data is as follows:
  - Income by tenure
  - Income by location
  - Income by employment type
- We do not currently have data for the individual combinations of income by tenure *and* location *and* employment type. The income of these individual combinations was estimated by applying distributions for tenure, location and employment subsequently.
- Obtaining access to the microdata from the 2009-10 Household Budget Survey would enable data to directly be used for these individual combinations.
- Secondly, it would be beneficial to obtain data on income by dwelling type, BER rating and main heating fuel (the three of the six core variables for which we do not currently have income data).
- This would allow us to observe, for example, the extent to which detached houses are occupied by either more wealthy households or poorer ones. Currently, indirect correlations are captured by variables such as employment status, which are not 100% correlated to income.
- Finally, a distribution of incomes could be used instead of the average per group. Currently, all of the households within one group are either in fuel poverty or not; in reality, their differing incomes would spread them out over both sides of the boundary.

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Appendix 1: Variables used from each data source

Data source	Variable
BER register	BER rating by dwelling type
	BER rating by main heating fuel
	BER rating by location
Household budget survey 2009-2010 (inflated to 2014/15)	Income by tenure
	Income by employment type
	Income by region
2011 Census (CSO)	Number of households by location
	Number of households by dwelling type
	Number of households by main heating fuel
	Number of households by employment type
	Number of households by tenure
	Income by county
Element Energy/SEAI residential building stock model	Final energy demand of dwelling archetypes, by fuel type

Appendix 2: Fuel price data used

Note: The year 2015 was used for all of the analysis in this report; subsequent years given for info.

€/kWh	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Electricity (heating)	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.14
Electricity (non-heating)	0.28	0.29	0.29	0.30	0.30	0.30	0.31	0.31	0.32	0.32	0.33	0.33	0.34	0.35	0.35	0.36
Oil (including LPG)	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13
Natural gas	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Solid fuel	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06

Appendix 3: Comparison of results to other fuel poverty definitions

Fuel poverty measure	Method	Result	Reference
1. Actual expenditure	Compare fuel expenditure to household income	19.4% of households in fuel poverty in 2008	Scott et al (ESRI, 2008)
2. Subjective	Occupant self-reported difficulty to a) keep the home adequately warm and/or b) self-reported going without heating for some part of the year	8.1% of households reporting a) or b) 2006 7.3% of households reporting b) in 2009 21.2% of households reporting a) or b) or arrears in 2011	Scott et al (ESRI, 2008) DCENR (2009) Watson & Maitre (2015)
3. Objective	Compare normative fuel expenditure (i.e. that which would need to be spent to maintain certain standard internal conditions) to household income	30% of households in fuel poverty	