VINCENTIAN MESL RESEARCH CENTRE

The cost of adequately heating the home

Examining the variation in minimum household energy needs by level of dwelling efficiency and exploring an alternative approach to supporting households at risk of energy poverty

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Contents

Abstract

This Working Paper examines the cost of household energy over the recent period of high energy inflation using the Minimum Essential Standard of Living (MESL) data and demonstrates the impact of dwelling efficiency and method of purchase on these costs.

Energy poverty typically results from the interaction of three key factors, namely, the energy efficiency of a dwelling, the cost of household energy, and household income. To demonstrate the influence and interplay of these factors, this paper identifies the minimum energy need for four household types, calculating the variation in cost by level of dwelling efficiency and method of purchase. This paper examines the potential burden of energy poverty for the household types in social welfare and national minimum wage scenarios. The analysis presents these findings in the context of the overall MESL expenditure need and household income for each household type.

The value of current energy-related income supports, and other social welfare payments has been eroded over the current inflationary period. This paper highlights the fixed nature of Fuel Allowance and the Household Benefits Package and sets out the case for an alternative policy approach that is more responsive to households' minimum energy need by taking account of dwelling efficiency and any price volatility in the energy market.

Introduction

Over the past two years, there has been an exceptional surge in energy prices, increasing household energy costs to unprecedented levels. In the 2023 MESL, rising electricity and gas prices have pushed urban home energy costs up by an average of 67.8% higher than 2022. While a reduction in home heating oil prices combined with rising electricity prices have seen rural energy costs rise by 6.2% in the year to March 2023. Cumulatively, from March 2020 to March 2023, MESL household energy costs increased by 117.1% for urban based households and by 75.8% for rural based households (MESL, 2023). Urban heating costs (where the use of natural gas is assumed) have increased by an average of 92.7% in the MESL baskets, while rural heating costs (where the use of home heating oil is assumed) have decreased by an average of 12.8%.

The Government's recent Energy Poverty Action Plan defines energy poverty as:

> "… an inability to heat or power a home adequately"
> (Department of the Environment Climate and Communications, 2022a:6).

The Action Plan cites household energy needs costing more than 10% of net household income as a long-standing measurement of energy poverty in Ireland. In the 2023 MESL, an analysis of estimated household energy costs as a percentage of social welfare income for four household types, from 2020-2023, found that each household will have been pushed into energy poverty, with energy expenditure exceeding 10% of their net income to meet minimum energy needs. This paper aims to further investigate the impact of the acute rise in energy costs for each household type in the context of the MESL.

It is widely accepted that energy poverty typically results from three key factors, namely: the energy efficiency of the dwelling, the cost of energy and household income. To demonstrate the influence and interplay of these factors, this paper identifies the minimum energy need for four household types at different levels of efficiency and examines the burden of this energy need for the household types in multiple income scenarios. The four household types are as follows:

- Working age single adult
- Two parents with two children (pre-school & primary school ages)
- One parent with two children (primary school & secondary school ages)
- Older single adult

Using a subset of SEAI data on estimates of the energy needed for adequately heating dwelling types by level of efficiency and fuel type used, this paper offers estimates on the heating portion (space heating and hot water) of the minimum energy need for each of the household types. The electricity portion of the minimum energy need is based on existing MESL data. The pricing of the energy basket is based on the 2023 MESL pricing data, and so reflects the price levels of March 2023. The analysis presents these findings in the context of the overall MESL expenditure need and household income for each household type. The

household expenditure data and income calculations are from the 2023 update of the MESL data.

This paper focuses on urban household energy costs (gas is the standard fuel included in the urban MESL baskets). Because of the current price volatility of different fuel types, one rural scenario is examined, where it is assumed that home heating oil is used. This paper also details the differential in cost by the payment method used to access household energy, with regards to identifying the presence of the poverty premium in the Irish energy market.

Minimum Essential Standard of Living (MESL)

The Minimum Essential Standard of Living (MESL) consensual budget standards research identifies the cost of a socially acceptable minimum standard of living. The research collaborates with members of the public in deliberative focus groups to establish a social consensus on the minimum basket of goods and services people need to participate in the social and economic norms of Irish life, at a standard of living which people agree no one should be expected to live below. It represents the minimum required to meet physical, social, and psychological needs, and enable a life with dignity.

The research is iterative, working through multiple phases of deliberative focus groups, to establish a negotiated social consensus on what people regard as essential for households to have a minimum, but socially acceptable standard of living. In this way the MESL is a tangible measure, grounded in lived experience and derived from social consensus, of what is required for participation, dignity and avoiding poverty.

The MESL research operationalises the concepts which underpin the human right to an adequate standard of living, the Irish Government definition of poverty and social inclusion, and the key principle set out in the European Pillar of Social Rights that all have a right to an adequate minimum income which enables a life with dignity.

The MESL translates these concepts and ideals into a practical indicator by producing detailed household budgets comprised of the goods and services deemed necessary for an acceptable minimum standard of living for 90% of households in Ireland.[1] In practical terms, the MESL operationalises a direct measure of poverty, providing a unique benchmark of what is required to enable inclusion, participation, and a life with dignity. It also provides a vital evidence-based benchmark for assessing the adequacy of social welfare supports and minimum rates of pay.

[1] *The MESL data focuses on single-unit households, household compositions comprising either a one or two adult headed households, and up to four dependent children. The remaining 10% of households not included in the current MESL are other compositions, e.g., an older person and their adult child, a household of three plus adults (house sharing/flat mates), a young adult (18+) continuing to live in the family home, and households with more than four children.*

Defining and Measuring Energy Poverty

While 'energy poverty' and 'fuel poverty' are often used interchangeably, energy poverty has a broader meaning, capturing all home energy requirements including heating, lighting, and the use of appliances. Fuel poverty relates solely to the costs of heating a home, and further, the inability to keep a household adequately heated (Lawlor & Visser, 2022). Because this paper calculates a household's electricity and heating needs, the term 'energy poverty' is used.

The Irish Government's recent Energy Poverty Action Plan incorporates the principles of the previous Strategy to Combat Energy Poverty, recognising that energy poverty is "a symptom of inadequate resources to cover living costs rather than an energy only problem" and that "Adequate supplies of light, heat and power are fundamental to being able to participate in society and essential for social inclusion" (DECC, 2022a:5). These principles underpin the definition of energy poverty as:

> "…an inability to heat or power a home adequately" (Department of the Environment Climate and Communications, 2022a:6).

The Energy Poverty Action Plan recognises that energy poverty is influenced by the energy efficiency of a dwelling, as well as household income and the cost of energy (DECC, 2022a). A household's ability to meet its minimum energy need is determined by these three factors and their interaction with one another. In order to apply the definition set out in the Energy Poverty Action Plan, it is necessary to identify a household's minimum energy need, and subsequently the cost of this need relative to household income.

Several methods currently exist to measure energy poverty, although, it is important to note that each method has its limitations, with commentary on defining and measuring poverty frequently identifying such limitations and the challenges they present (Barrett, Farrell & Roantree, 2022; Lawlor & Visser, 2022).

Expenditure-based measures, including the one used most recently by the ESRI (Barrett, Farrell & Roantree, 2022), refer to the share of household income spent on household energy. When a household spends more than 10% of their disposable income on home energy services, they are defined as being in energy poverty (Boardman, 1991). Although, the 10% measure fails to capture the degree of energy poverty experienced by a household. A household may be marginally below the 10% threshold, and be 'at risk' of energy poverty, whilst another may be significantly above the 10% threshold, with energy costs presenting themselves as a much greater burden than the measure suggests.

Additionally, a household may spend more than 10% of their income on energy, but this may be more than is required to meet their minimum energy need. This holds true in cases where it is the occupier's preference to have the house excessively warm (Barrett, Farrell & Roantree, 2022). Alternatively, other households may have a greater energy need, for example, in cases where an occupant has specific health requirements, and must spend a significant share of income on energy to meet their minimum energy need. Despite being the

most frequently used measurement of energy poverty in Ireland, its limitations are clear, focusing solely on the share of income spent on energy, and failing to consider other central factors such as the severity of energy poverty experienced, as well as the condition of the home (DECC, 2022a). In 2015, the DECC collaborated with external consultants to carry out a bottom-up analysis of energy poverty in Ireland. The objective measure adopted captured the number of households in energy poverty, as well as the intensity of energy poverty. The analysis examined fuel expenditure as a proportion of household income, estimating the percentage of households whose energy costs exceeded three thresholds: 10%, 15%, and 20% (DECC, 2016). The results of the study are detailed on page 6.

The current paper will apply these three indicators of core (10%), severe (15%) and extreme (20%) energy poverty to determine the depths of energy poverty that each household type may potentially be vulnerable to. The thresholds are outlined in Table 1:

Table 1 Thresholds of energy poverty

10% Threshold	A household is considered to be experiencing '**core**' energy poverty when it spends more than 10% of its net income on household energy.
15% Threshold	A household is considered to be experiencing '**severe**' energy poverty when it spends more than 15% of its net income on household energy.
20% Threshold	A household is considered to be experiencing '**extreme**' energy poverty when it spends more than 20% of its net income on household energy.

Other approaches include self-reported measures of energy poverty, such as the energy deprivation items set out in the CSO's annual SILC report (see page 6). Capturing energy deprivation trends further adds to understandings of energy poverty by providing additional meaning to expenditure-based figures. It is likely that there are more people experiencing energy poverty than income-measures show such as those households that go without heating to make ends meet. They are not spending a large proportion (10% or more) of their income on household energy, rather, they are going without essential energy to meet other basic needs. While the measurement offers meaningful insight into people's lived experience within the home, the impact of dwelling efficiency is not considered.

It is clear that results can differ depending on how energy poverty is assessed, demonstrating the complexity of the concept itself, as well as its measurements. The recent Energy Poverty Action Plan accepts that a lack of data presents challenges in measuring the impact of dwelling efficiency on energy poverty. Moreover, it acknowledges the need for improved data collection and methodologies to identify the levels of energy poverty experienced, and to better target supports at households at risk of energy poverty (DECC, 2022a). To overcome these challenges, the Action Plan sets out a range of actions under the ESRI's new research

programme funded by the Government, to propose new metrics and methods to better measure energy poverty in Ireland (DECC, 2022a).

Current Context

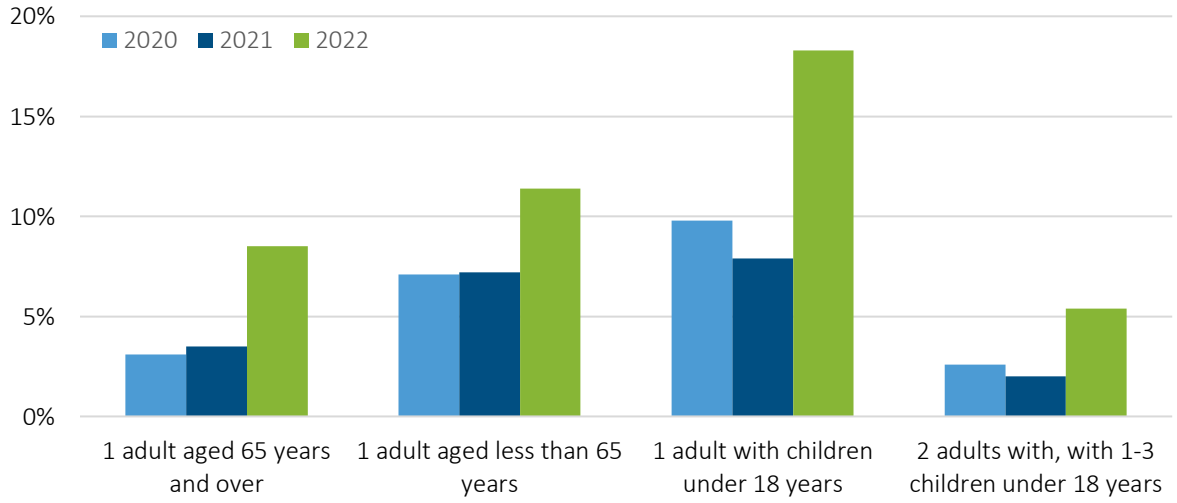
The 2015 DECC analysis of energy poverty in Ireland found that 28% of Irish households were in core energy poverty (10% threshold) 8% were in severe energy poverty (15% threshold) and 3% were in extreme energy poverty (20% threshold) (DECC, 2015). Findings also identified the prevalence of energy poverty in Ireland, examining various categories such as fuel poverty by tenure, or by main heating fuel. The analysis found that households living in oil heated dwellings had the highest prevalence of energy poverty.

More recent data on energy poverty reflects the impact of ongoing and exceptional increases in energy prices. ESRI findings based on expenditure indicators estimate that at least 29.4% of people are in energy poverty, with the research predicting that this estimate could now be up to 43.0% in 2023 (Barrett, Farrell & Roantree, 2022). Deprivation indicators provided by the annual SILC report shows an increase in the proportion of people experiencing energy deprivation (CSO, 2022c). Two of the eleven basic deprivation indicators in the SILC relate to energy poverty:

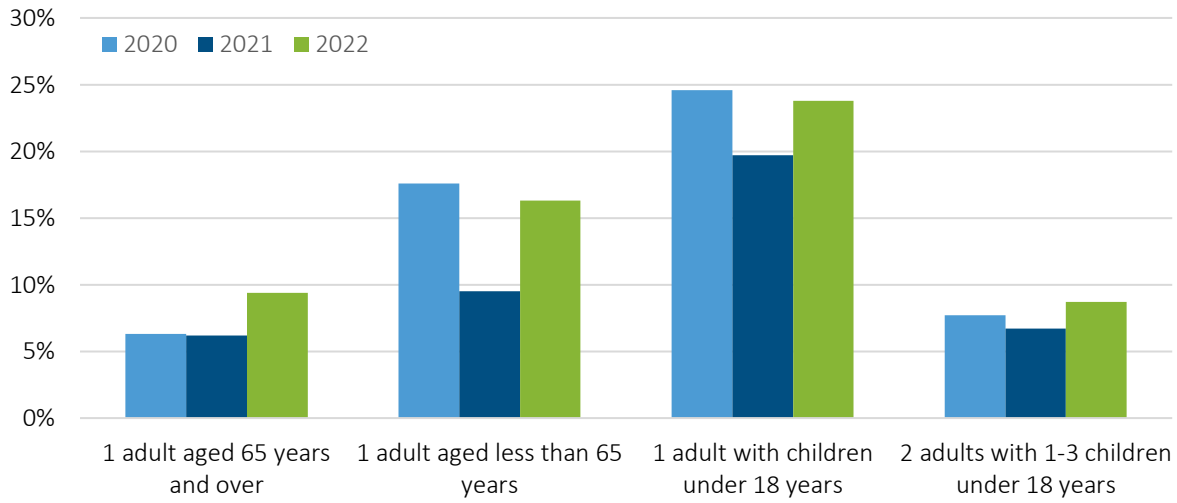
- 'Without heating at some stage in the last year'
- 'Unable to afford to keep the home adequately warm'

In 2022, 9.2% were 'without heating at some stage in the last year', compared to 7.1% in 2021. The SILC reported that the percentage of people 'unable to keep the home adequately warm' has more than doubled since 2020, rising from 3.3% to 7.2% (CS0, 2022c).

Graph 1 Energy deprivation, 'unable to keep the home adequately warm' by household composition (%)



Graph 2 Energy deprivation, 'without heating at some stage in the last year' by household composition (%)



When examined by household composition, findings show that one parent households experience the highest rates of deprivation for the two energy-related indicators. In 2022, 18.3% of one parent households were 'unable to keep the home adequately warm', an 8.5 percentage point increase from 2020 (9.8%), and over double the rate experienced in 2021 (7.9%). Additionally, 23.8% of one parent households have gone 'without heating at some stage in the last year,' over double that of all individuals (9.2%) (CS0, 2022c). Graph 1 and Graph 2 illustrate energy deprivation by household composition.

Rising Home Energy Costs

Household energy costs have significantly increased over the recent period. In the 2023 MESL, urban households saw energy costs increase by an average of 67.8%, while rural household saw a 6.2% increase, compared to 12-months earlier. Cumulatively, from March 2020 to March 2023, the MESL Household Energy increased by 117.1% for urban households and by 75.8% for rural households (MESL, 2023). In the MESL baskets, urban heating costs (where the use of natural gas is assumed) have increased by an average of 92.7%, while rural heating costs (where the use of home heating oil is assumed) have decreased by an average of 12.8%. The MESL research has previously reported that home heating oil is more costly than the use of natural gas. However, the exceptional increase in gas prices, combined with a slight decrease in home heating oil, has reversed the situation, with the cost of the urban household energy basket now exceeding the rural.

In the 2023 MESL, an analysis of estimated household energy costs as a percentage of social welfare income for four household types, from 2020-2023, found that each household will have been pushed into energy poverty, with minimum energy expenditure exceeding the 10% core energy poverty threshold to meet essential energy needs.

There has been an exceptionally large increase in energy prices over the current inflationary period. Household energy costs were increasing over 2021, with price inflation accelerating

throughout 2022. The 12-month CPI rate for the average change in the price of home energy (electricity, gas, and other fuels) peaked at 72.8% in October 2022 (CSO, 2022b). The upward trend in inflation has eased somewhat since, with prices in March 2023 (the reference point for the 2023 MESL data used in this paper) an average of 32.6% higher than the 12 months prior.

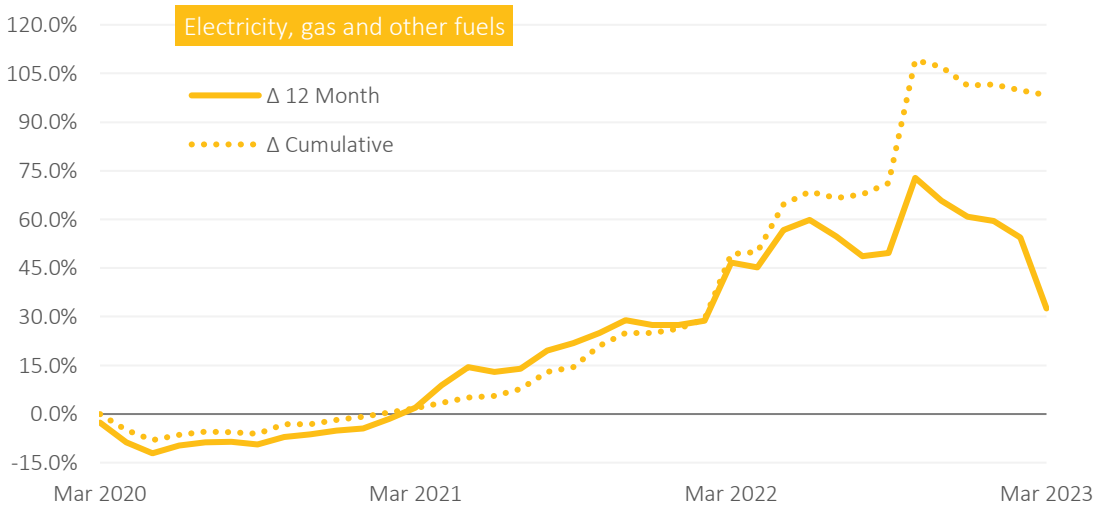
Rising oil prices were the largest factor in home energy inflation from 2021 to 2022, showing an average 12-month increase of 126.6% to March 2022. There has been a significant reduction in home heating oil prices since, with the CPI reporting a 29.1% decrease in the 12 months to March 2023. The SEAI quarterly comparison of fuel costs (April 2023) show similar findings of a reduction in home heating oil costs, with gas oil decreasing by 14.9%, and kerosene decreasing by 19.5% (SEAI, 2023a).[2]

However, Electricity and Gas have shown significant increases to March 2023, the 12-month CPI rate shows inflation in the following energy prices:

- Electricity: 62.7%
- Natural Gas: 92.1%

Graph 3 illustrates the 12-month CPI rate for the average change in the price of home energy fuels (electricity, gas and other fuels), from March 2020 to March 2023.

Graph 3 CPI – Electricity, gas and other fuels, 12-Month and Cumulative Change



The variation in inflation by fuel type highlights how the type of fuel used for home heating can have a significant impact on a household's vulnerability to energy poverty.

[2] *Based on typical discounted prices. SEAI prices include those from various suppliers that publish their prices online.*

Energy Related Social Supports

Fuel Allowance and the Household Benefits Package are the two main social welfare payments for supporting households with the cost of household energy. The Government has also committed to upgrading 500,000 homes to a B2 standard or cost optimal equivalent by 2030 under the National Retrofit Plan. These supports are described in further detail in the sections below.

Fuel Allowance

Fuel Allowance is a means-tested, seasonal payment made to vulnerable households on long-term social welfare who are unable to provide for their own heating needs. Usually, Fuel Allowance runs from late September to the end of April each year. To qualify for the payment, you must live alone or with dependents, be in receipt of a qualifying payment (unless you are aged 70 or over), such as the State Pension, Disability Allowance, One-Parent Family Payment, and satisfy a means test.

The rate of Fuel Allowance was last increased in Budget 2022 by €5, from €28 per week to €33 per week, currently granted for a 28-week season. Budget 2023 retained the core rate of €33 per week. It was also announced that all in receipt of the payment would receive an additional once-off lump sum of €400 in November 2022. Because this one-off lump sum payment was made in 2022, it is not included in the energy cost calculations presented in this paper.

In January 2023, an expansion of Fuel Allowance saw an increased income threshold for those aged 70 or over, with the income limit raised to €500 per week for single older persons, and €1,000 per week for couples. The requirement to be in receipt of a qualifying payment was also removed for those aged 70 and over. Fuel Allowance for those aged under 70 retains a lower income limit and is restricted to those in receipt of a long-term social welfare payment such as the One-Parent Family Payment or the State Pension. However, those in receipt of Jobseeker's Allowance will now qualify if they have been in receipt of social welfare for over 12 months – a reduction from the previous 15-month requirement.[3]

Household Benefits Package

The Household Benefits Package includes an electricity or gas allowance and is not means-tested. It is a targeted payment primarily for those aged 70 or over. Those between the ages of 66 and 70 may also be eligible for the package if they are in receipt of social welfare or satisfy a means test. In addition, the package is also available to some people aged under 66 years who are in receipt of specific social welfare payments, such as Disability Allowance. The Household Benefits Package provides €35 per month towards electricity or gas.

[3] *Due to the long-term requirement, Fuel Allowance is not included in the standard Jobseeker social welfare scenarios modelled in the MESL. This applies to the Two Parent, and the Working Age Single Adult household types examined in this paper.*

National Retrofit Plan

Improving the efficiency of energy poor homes has been identified as the most sustainable path out of energy poverty (DECC, 2022b). As part of the National Retrofit Plan, the Government has committed to an ambitious goal of upgrading 500,000 homes to a B2 BER standard or cost optimal equivalent by 2030. The plan anticipates that 120,000 retrofits will be achieved to a B2 standard by 2025 (SEAI, 2023b). According to SEAI progress reports on delivery against retrofit targets, 84,768 home upgrades were achieved in 2022, and 18,527 of these were to a BER B2 standard (SEAI, 2022c). This equates to approximately 15.4% of the 120,000 home upgrades to be achieved to a B2 standard by 2025, and 3.7% of the 2030 target (500,000). According to a more recent SEAI progress report, an additional 7,566 home upgrades had been carried out to a B2 level or higher by the end of quarter two of 2023 (SEAI, 2023b).

Increased funding towards grant supports offers free energy upgrades for local authority housing through the Local Authority Retrofit Programme, and for low-income homeowners through the SEAI's Fully Funded Energy Upgrades (previously known as the Better Energy Warmer Homes Scheme). In order to qualify for a free energy upgrade through the SEAI scheme, the applicant must be a homeowner, and be in receipt of a social welfare payment such as the Working Family Payment or the One-Parent Family Payment. Qualifying for the Fuel Allowance payment also brings eligibility for the Fully Funded Energy Upgrade Scheme.

There are households that could potentially be excluded from free energy upgrades, including those tenants in the private rented sector that are in receipt of the Housing Assistance Payment (HAP). This is particularly concerning as over 55% of dwellings in the private rented sector have a BER between D and G (DECC, 2016). A recent report by SVP also expressed concerns in relation to those households that are excluded from current retrofitting plans, leading to further inequalities in housing, financial and health outcomes (2023). Delays of up to two to three years in relation to the SEAI's free retrofitting scheme has also been reported (Friends of the Earth, 2023), leaving vulnerable household at risk of energy poverty with inadequate supplementary support to meet energy costs in the interim.

State Response to Increasing Home Energy Prices

In efforts to ease the financial pressure experienced by households due to rising living costs, the Government announced several tranches of one-off 'Cost of Living' payments and supports over the course of 2022 and 2023. Cost of Living measures were introduced in April 2022 to help households specifically with rising energy costs. The following tax and welfare changes were announced in April 2022:

- A €125 lump-sum Fuel Allowance payment (March 2022)
- A €200 Electricity Account Credit to all households in Ireland
- An additional €100 Fuel Allowance payment (May 2022)
- The VAT rate on gas and electricity cut from 13.5% to 9.0%
- The PSO (Public Service Obligation) levy reduced to €0

A set of further measures announced in Budget 2023 came into effect in the last quarter of 2022. This included a once-off lump sum payment of €400 to Fuel Allowance recipients in November 2022.

Electricity Cost Emergency Benefits

The second Electricity Cost Emergency Benefits Scheme was announced in Budget 2023. The scheme builds on the electricity credit delivered in quarter two of 2022. Under the scheme, each household receives €600 credit over three instalments of €200. The first electricity credit was made between November and December 2022, and consequently, is not included in the 2023 MESL energy cost calculations used in this paper. The second and third payment were made in the first half of 2023, and therefore, the value of these supports are included in the calculations presented in this paper.

Other Financial Measures

A range of other financial measures have been introduced, including:

- An extension of the 9.0% VAT rate on electricity and gas bills until the end of October (2023)
- The PSO levy set to a negative number of -€97.12.

Consumer Protection Measures

In addition to the state supports introduced to tackle ongoing rising energy prices, the Commission for Regulation of Utilities (CRU) announced enhanced consumer protection measures for electricity and gas customers for winter 2022/3, some of which included the following:

- Suppliers must automatically place all customers with a financial hardship meter on the cheapest tariff
- Arrears repayment levels on PAYG top-ups reduced from 25% to 10%
- An extended moratoria on energy disconnections for all households to the end of March 2023
- Priority vulnerable customers, that is, those that are registered as being critically reliant on electronic medical equipment, cannot be disconnected at any time for non-payment
- Vulnerable customers, that is, those that are registered as having a medical condition or are aged over 66, cannot be disconnected for the winter period. This was extended to cover a 6-month period until 31 March 2023
- Debt repayment periods extended to allow for a minimum of 24 months to repay any accumulated debt

(CRU, 2023).

Methodology

Calculating Minimum Energy Need

The space heating and hot water portion of the minimum household energy need offered in this paper uses the BER method DEAP calculations as supplied by the SEAI, while the electricity portion of the minimum household energy need is based on existing MESL data. This paper presents the average estimated weekly cost of the minimum energy required for a semi-detached house and an apartment for different household types located in urban areas (based on the use of natural gas), with one rural example (based on the use of home heating oil).[4]

The Domestic Energy Assessment Procedure (DEAP), the official BER method for calculating and rating the energy performance of dwellings, define requirements for heating and lighting in the home (SEAI, 2022a). The BER grades range from A-G, where A-rated homes are the most energy efficient, and G-rated homes are the least energy efficient.

This paper identifies the estimated cost of household energy at different levels of efficiency or BER bands. The following BER bands are included, and the C2 dwelling type applied as a standard in the MESL budget is used as a comparison or mid-point:

- E1-E2
- D1-D2
- C2-C3
- C2 (mid-point)
- B3-C1
- A1-B2

The least efficient BER bands, F and G, are not included in the core analysis. While F and G rated dwelling types cumulatively represent 10% of all housing stock (CSO, 2023b), their inefficiency results in exceptionally high costs for maintaining 'adequate warmth'. Examples of the potential costs are provided for the Older Single Adult. It should also be noted that the BER acts only as an indicator on the energy performance of a dwelling and energy consumption in the real-world will vary. This is explored in further detail in the sections below.

Heating

Recent recommendations from the World Health Organization (WHO) identify 18°C as the minimum internal temperature to protect the health of the general population during cold

[4] *The MESL budget for older people and for households with children is based on living in a standard sized family home of approximately 100m^2. For the working age single adult, it is based on a one bedroom dwelling of approximately 45m^2.*

seasons and recognises that a higher internal temperature may be necessary for vulnerable groups, including older people (WHO, 2018).

The DEAP sets out required internal temperatures (during home heating periods) of 21°C in the living room and 18°C in the other occupied rooms. The DEAP bases its heating schedule on the requirements of a typical household, representing a total heating period of 56 hours per week or 8 hours per day during the heating season, which runs for 8 months from October to May (SEAI, 2022a). The 8 hour heating schedule is as follows:

- Weekdays: 07.00 to 09.00 and 17.00 to 23.00
- Weekends: 07.00 to 09.00 and 17.00 to 23.00

It is important to note that the BER method acts as an indicator on the energy performance of a dwelling, and its estimates on fuel consumption reflect only what is required for heating, based on a standard occupancy pattern of 8 hours per day and required indoor temperatures during heating periods, as set out in the DEAP. As such, it should be taken into account that real-life energy consumption will vary.

Using data from Report 1 of the SEAI's *National Heating Study* based on an archetype-based stock calibration and assumptions model (SEAI, 2022b), the current paper identifies minimum heating need for each household type based on the Building Energy Rating (BER). The methodology and assumptions applied in the SEAI study use data from the domestic BER database and CSO Census data for its residential archetypes. In this way, it is ensured that the total residential building stock is represented, rather than only those dwellings that have had a BER assessment. The study used the BER database to identify the following attributes for the different archetypes: building type, main heating fuel and BER. The CSO Census data was then used to determine the number of homes by dwelling type and main heating system.

The study derived estimated space heating and hot water demand using BER data, and then combined estimates of final energy use with the efficiency of the primary heating system. Because the BER is intended to act as an indicator on the energy performance of a dwelling, its estimates for fuel consumption in the home reflect only what is required for heating based on a standard occupancy pattern. For this reason, a calibration factor was applied to the heating demand, as the aim of the study was to provide an indication of real-life energy consumption.

Because the current paper aims to look at minimum energy needs, as opposed to actual energy consumption in the real world, the SEAI provided a subset of data with the uncalibrated figures for space heating and hot water use.

Heating Type

The MESL baskets are based on the use of gas or oil to heat the home, as the majority of households heat their homes by natural gas (32.7%) or heating oil (38.9%) (CSO, 2022a). However, it is important to note that dwelling types at the higher end of the efficiency scale may use electricity only, that is, heat pumps, to heat the home.

According to the SEAI's *Heating and Cooling in Ireland Today* supporting data (2022b), it is the minority of the Irish housing stock that have an A1-B2 BER grade (8.8%). Further, recent CSO Census data (2022a) reports that approximately 3.8% of the Irish housing stock have a heat pump installed in their home.

Because it is the minority of housing stock that currently have a heat pump, this paper does not include the use of heat pumps in its analysis. Although, it is important to note that there are a growing number of households using heat pumps. Additionally, CSO data (2023b) reports 99% of dwellings built between 2020 and 2023 and 96% of dwellings built between 2015 and 2019 are A-rated. Therefore, this may need to be revisited in future MESL work.

Adjusted Heating Schedule

Heating regimes elsewhere, including England and Scotland, have adjusted or enhanced heating schedules in their fuel poverty calculations. In Scotland, an enhanced heating regime of 16 hours per day is usually applied when at least one occupant has self-reported as having a physical or mental condition or illness that is expected to last longer than 6 months, or, when an occupant is an older person, aged 75 or over (Scottish Government, 2020). Similarly, in England, a 16-hour heating schedule is applied in situations where occupants are likely to be home during the day (Department for Business, Energy Industrial Strategy, 2022).

Cold indoor temperatures are linked to asthma, increased blood pressure and poor mental health (WHO, 2018). Additionally, cold and damp housing can result in both respiratory and cardiovascular illness, particularly amongst older people (WHO, 2018). As older people are more likely to need warmth due to health reasons (Age Action, 2022) and are more likely to be at home during the day, an enhanced heating schedule of 16 hours per day is applied to the older single adult household type included in this analysis. [5] For the other household types, a standard heating period of 8 hours per day, as set out in the DEAP, is applied.

Electricity

While a BER uses assumptions for usage of electricity, including lighting, ventilation and pumps, it excludes electricity used for purposes such as the operation of appliances, including fridges, dish washer, television, or activities such as cooking or laundry. The MESL research has established minimum electricity requirements, including the running costs of appliances and activities, as well as lighting, for different household types and compositions. As such, the electricity portion of the minimum household energy need offered in this paper uses MESL data on the electricity requirements of each household type examined.

[5] *It is important to note that an enhanced heating schedule was not applied in the energy costs calculations for the older single adult included in the 2023 MESL report. Therefore, the findings in this paper may differ from those presented in the 2023 MESL update.*

How household energy is purchased

This paper details the differential in cost by payment method used to purchase household energy. The price plans examined are based on the following:

- Bundling (getting electricity and gas from the same supplier)
- Paying by Direct Debit
- Pay-as-you-go (PAYG) electricity/gas

The energy cost calculations presented in this paper are based on the pricing undertaken for the 2023 MESL household energy baskets.

Typically, the MESL research identifies the price of energy per unit, the standing charge, the PSO levy and Carbon Tax for each household type. The pricing of the household energy basket is based on a review of available plans, or 'shopping around' for a low cost option, as multiple suppliers in the market offer discounted unit rates, contracts, and cashback for their plans. When repricing household energy, the most cost-effective option for each household type is identified and included in the MESL budget. It is important to note that the energy costs presented in the MESL research is based on the assumption that a household can afford the most cost-effective option available and is the "best case scenario." However, this can vary depending on how a household pays for their energy.

Pay-as-you-go (PAYG) electricity and/or gas is often more expensive than other payment options due to service charges and higher tariffs.[6] Because low-income households are often unable to access the most cost-effective deals in the energy market, the PAYG option may be the preferable option, as these plans can offer control over budgeting. This leads to an extra cost for low-income households in the energy market and is known as the poverty premium.

Findings

The estimated total cost of energy required is presented in the context of the MESL expenditure need and household income (MESL, 2023), in social welfare and national minimum wage scenarios, for each of the household types. The overall adequacy of household income in the two income scenarios are examined for each household type as minimum energy expenditure changes. The expenditure data and income calculations are based on the most recent MESL data (2023). [7] Moreover, the energy costs are based on the pricing undertaken for the 2023 MESL household energy baskets.

This section includes graphs that illustrate estimated weekly household energy costs as a proportion of household income, by dwelling efficiency and payment method, for each household type and income scenario. The bar in each graph illustrates the average weekly

[6] *It is important to note that this does not apply to financial hardship PAYG meters.*
[7] *Details of income calculations are provided in full in the appendix of this paper.*

cost of household energy, while the red line indicates the core energy poverty threshold (when a household spends more than 10% of its net income on household energy). The labels above the bars represent the total cost of energy as a percentage of net household income and are colour coded to reflect the three thresholds of energy poverty, i.e., core energy poverty (10% threshold), severe energy poverty (15% threshold) and extreme energy poverty (20% threshold). The household types, income scenarios and dwelling types are detailed below:

- Single Adult of Working Age
    1. Unemployed Jobseeker living in an apartment based in an urban area, with gas central heating
    2. Adult in Full-Time Employment living in an apartment based in an urban area, with gas central heating
- Two Parents with Two Children (Pre-School & Primary School Ages)
    3. A Stay-At-Home Parent and an Unemployed Jobseeker living in a semi-detached house based in an urban area, with gas central heating
    4. A Stay-At-Home Parent and an Adult in Full-Time Employment living in a semi-detached house based in an urban area, with gas central heating
- One Parent with Two Children (Primary School & Secondary School Ages)
    5. A Stay-At-Home Parent living in a semi-detached house based in an urban area, with gas central heating
    6. Adult in Full-Time Employment living in a semi-detached house based in an urban area, with gas central heating
- Older Single Adult
    7. An older adult living alone in receipt of the Contributory Pension and living in a semi-detached house based in an urban area, with gas central heating
    8. An older adult living alone in receipt of the Contributory Pension and living in a semi-detached house based in a rural area, with oil central heating

Working Age Single Adult

The working age single adult household type is based in an apartment located in an urban area with gas central heating. A social welfare scenario and employed scenario are examined for this household type. A standard heating schedule of 8 hours per day is applied, and the estimated cost of household energy is the same for both income scenarios. Due to the long-term requirement, Fuel Allowance is not included in the standard Jobseekers social welfare scenarios modelled in the MESL.

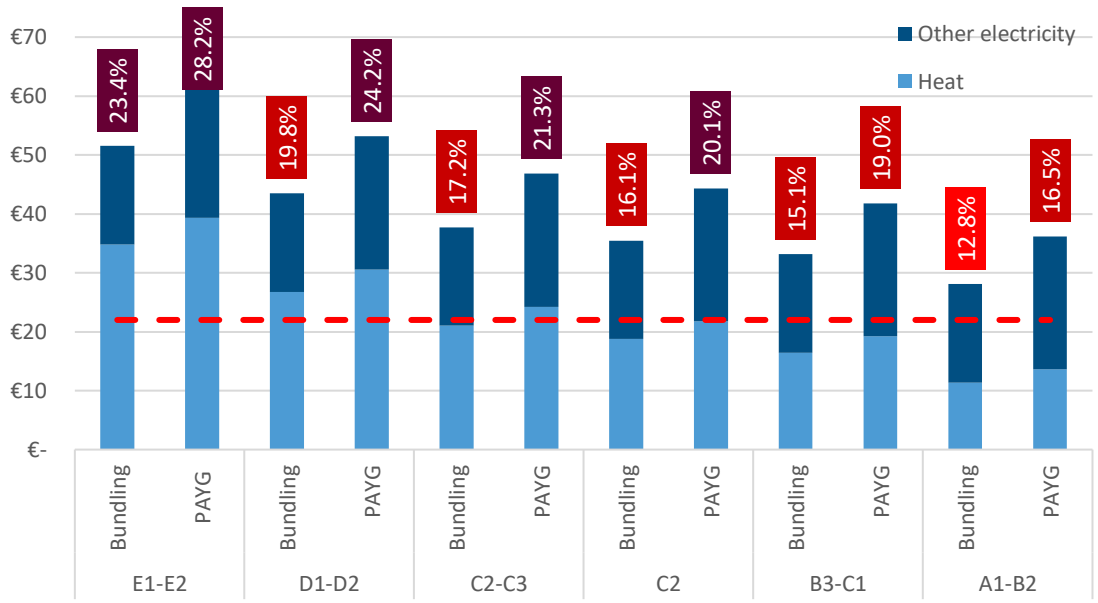
Table 2 Estimated weekly household energy costs for working age single adult *Bundling versus PAYG*

	E1-E2	D1-D2	C2-C3	C2	B3-C1	A1-B2
Bundling (€)	51.53	43.51	37.74	35.46	33.16	28.06
PAYG (€)	61.95	53.14	46.82	44.31	41.78	36.19
Differential (€)	10.42	9.63	9.07	8.85	8.63	8.13

Based on the scenarios and assumptions made in this paper, depending on dwelling efficiency, the estimated weekly energy costs for this household type could range from as little as €28.06 per week to as much as €51.53 per week when bundling. The estimated standard MESL weekly energy cost based on the C2 level of efficiency is €35.46. At a moderately more efficient level (B3-C1), energy costs decrease by approximately 6.5% or €2.30 per week. While being slightly less efficient (D1-D2) increases energy costs by approximately 22.7% or €8.05 per week. In comparison, when purchasing the same basket of energy needs by PAYG, the estimated weekly cost of energy could range from €36.19 per week to €61.95 per week. The estimated weekly cost of energy presented in Table 2 reflects the average weekly cost over the course of the year. The actual cost of energy over the course of the year will vary, reflecting a greater need for light and heat during winter months and reduced need during summer months.

1. Unemployed Jobseeker

Graph 4 MESL energy costs as a percentage of household income, per week
Income Scenario 1 (Unemployed Jobseeker) [8]



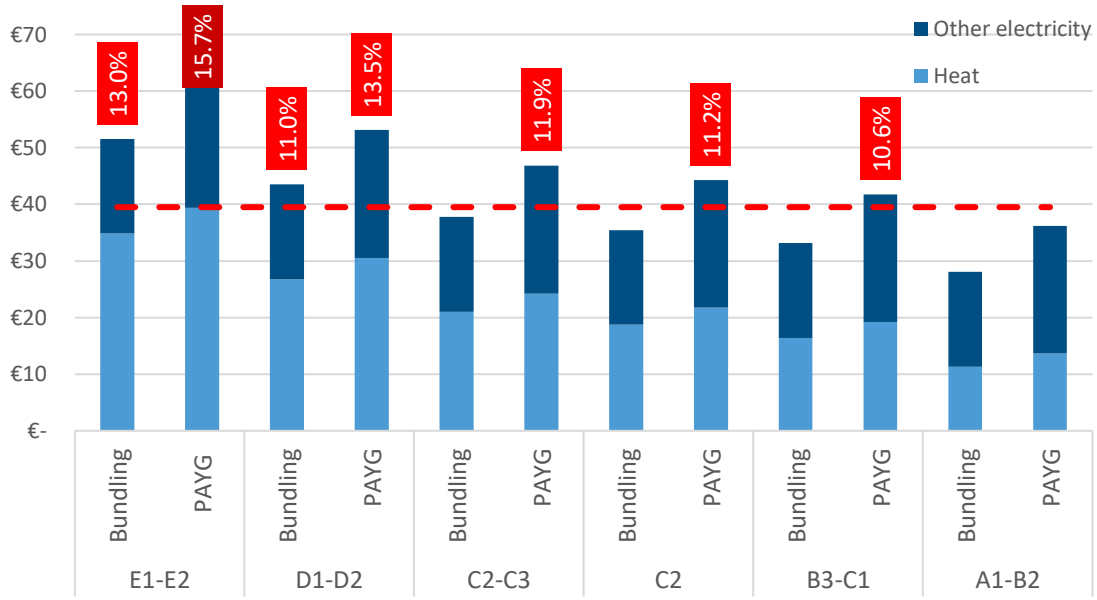
The first income scenario for this household type is based on the working age single adult being unemployed and in receipt of a Jobseekers payment. In this income scenario, when dependent on a Jobseekers Allowance, the average weekly household income is €220. Housing costs are based on the tenant contribution required when in receipt of Rent Supplement.

[8] *As stated on page 16, for each graph presented in this section, the red line indicates the core energy poverty threshold 10% core energy poverty threshold. The labels above the bars represent the total cost of energy as a percentage of net household income and are colour coded to reflect the three thresholds of energy poverty, i.e., core energy poverty (10% threshold), severe energy poverty (15% threshold) and extreme energy poverty (20% threshold).*

Graph 4 illustrates estimated weekly energy costs as a percentage of household income for the unemployed working age single adult household type, by BER and payment method. For this household type, varying degrees of energy poverty are indicated at each efficiency level. Even at the most efficient level (A1-B2), 12.8% of income is required to meet minimum energy needs, with the household type approaching the severe energy poverty threshold. This is in a situation where energy is purchased in a cost-effective way and the dwelling is highly energy efficient, indicating that social welfare income is inadequate to meet ongoing rising energy prices.

2. Full-Time Employment

Graph 5 MESL energy costs as a percentage of household income, per week
Income Scenario 2 (Full-Time Employment)



The second income scenario is based on the working age single adult being in full-time employment, working a 37.5-hour week and earning the National Minimum Wage. When in full-time employment, the estimated average weekly household income is €394.97 per week. In this situation, housing costs for the employed working age single adult is based on living in private rented accommodation and paying full market rent.

Graph 5 illustrates estimated weekly MESL energy costs as a percentage of household income for the employed working age single adult, by dwelling efficiency level and payment method. When purchasing energy in a cost-effective way, the occurrence of energy poverty lessens as dwelling efficiency improves. In this scenario, energy poverty is only indicated in the energy poor dwellings, that is, E1-E2 & D1-D2. In comparison, estimated energy expenditure is between 9.2% and 15.7% of this household type's net income when accessing a PAYG plan. This shows that a greater depth of energy poverty could potentially be experienced when a household purchases its energy by PAYG.

Two Parents with Two Children (pre-school & primary school ages)

The two parent with two children household type is based in a semi-detached house located in an urban area with gas central heating. Two income scenarios are examined for this household type. The first scenario is based on one adult being unemployed and the other a stay-at-home parent. Based on the assumptions made in this paper, Fuel Allowance is not included in the standard Jobseekers social welfare scenarios modelled in the MESL. In this case, this applies to the first income scenario for the two parent household type. The second scenario is based on one adult being in full-time employment and the other a stay-at-home parent. In this income scenario, the household type is in receipt of the Working Family Payment and therefore does not qualify for Fuel Allowance. Housing costs for both scenarios are based on social housing and paying a differential rent. A standard heating schedule of 8 hours per day is applied, and the estimated weekly cost of energy is the same in both scenarios.

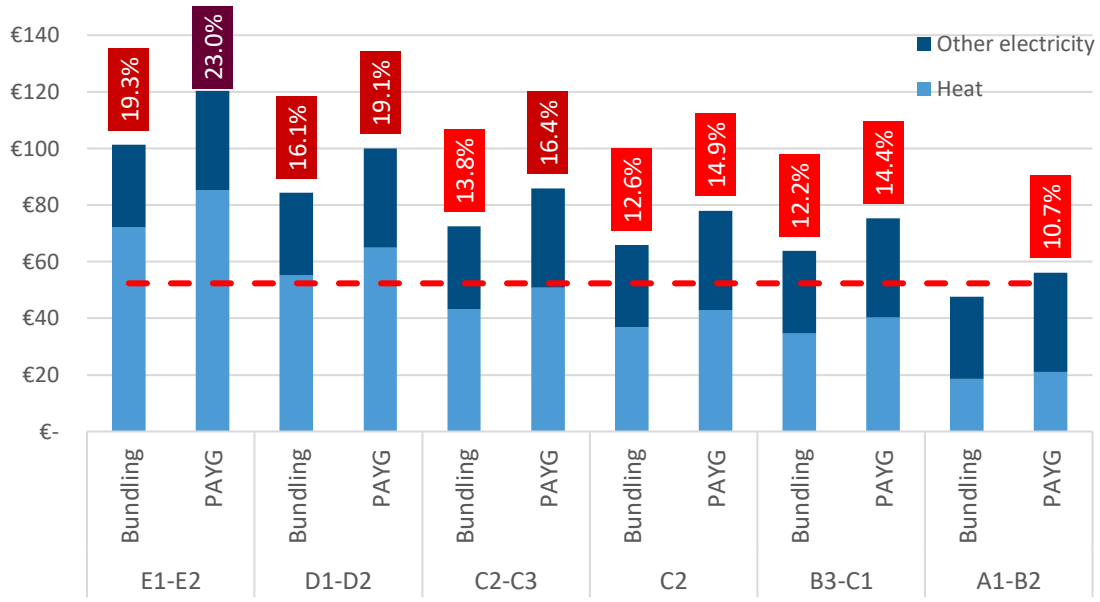
Table 3 Estimated weekly household energy costs for two parents with two children *Bundling versus PAYG*

	E1-E2	D1-D2	C2-C3	C2	B3-C1	A1-B2
Bundling (€)	101.27	84.28	72.43	65.91	63.73	47.70
PAYG (€)	120.35	99.99	85.79	77.98	75.36	56.15
Differential (€)	19.09	15.71	13.36	12.06	11.63	8.45

Depending on the condition of the dwelling, estimated weekly energy costs for this household type could range from €47.70 per week to as much as €101.27 per week. When accessing a cost-effective price plan, the estimated standard MESL energy cost at the C2 level of efficiency is €65.91 per week. At a moderately more efficient level (B3-C1), energy costs decrease by approximately 3.3%, or €2.18 per week. While being slightly less efficient (D1-D2) increases energy costs by approximately 27.9%, or €18.37 per week. When paying for the same basket of energy needs by PAYG, estimated energy costs could range from €56.15 to €120.35 per week. The estimated weekly cost of energy presented in Table 3 reflects the average weekly cost over the course of the year. The actual cost of energy over the course of the year will vary, reflecting a greater need for light and heat during winter months and reduced need during summer months.

3. One Unemployed Jobseeker & One Stay-At-Home Parent

Graph 6 MESL energy costs as a percentage of household income, per week
Income Scenario 1 (One Unemployed Jobseeker & One Stay-At-Home Parent)

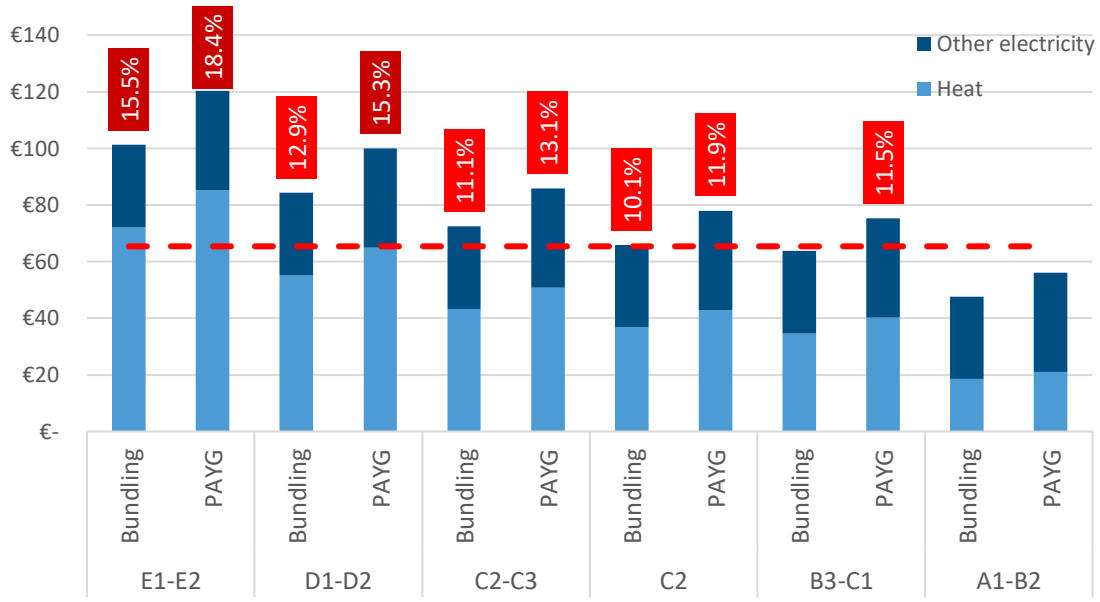


The first income scenario for the two parents with two children household type is based on one adult being a stay-at-home parent and the other an unemployed Jobseeker. In this scenario, the weekly household income is €523.46 when dependant on social welfare.

Energy poverty is indicated at almost every level of dwelling efficiency for this household type (see Graph 6). The only exception to energy poverty is when in a highly energy efficient dwelling (A1-B2) and bundling. Although, this case is only marginally below the core energy poverty threshold (9.1%). In comparison, estimated energy expenditure is between 10.7% and 23.0% of the two parent and two children household type's net income when the payment method is PAYG, demonstrating much greater depths of energy poverty.

4. One Full-Time Employment & One Stay-At-Home Parent

Graph 7 MESL energy costs as a percentage of household income, per week
Income Scenario 2 (One Full-Time Employment & One Stay-At-Home Parent)



The second income scenario for this household type is based on one parent being in full-time, minimum wage employment and the other a stay-at-home parent. In this scenario, the weekly household income from employment and secondary social welfare supports, including the Working Family Payment, Child Benefit and the Back to School Clothing and Footwear Allowance, is €654.14.

Graph 7 shows that this household type indicates energy poverty at most efficiency levels, with the exception of the more energy efficient dwellings, due to the high cost of energy. Greater depths of energy poverty are demonstrated when the method of purchasing household energy is PAYG, where estimated energy expenditure is between 8.6% and 18.4% of this household type's net income.

One Parent with Two Children (primary and secondary school ages)

The one parent with two children household type is based in a semi-detached house in an urban area with gas central heating. The first income scenario examined is based on the adult being a stay-at-home parent. The second income scenario is based on the adult being in full-time employment. Housing costs are based on social housing and paying a differential rent. A standard heating schedule of 8 hours per day is applied to both income scenarios. The estimated weekly cost of household energy is the same in both scenarios.

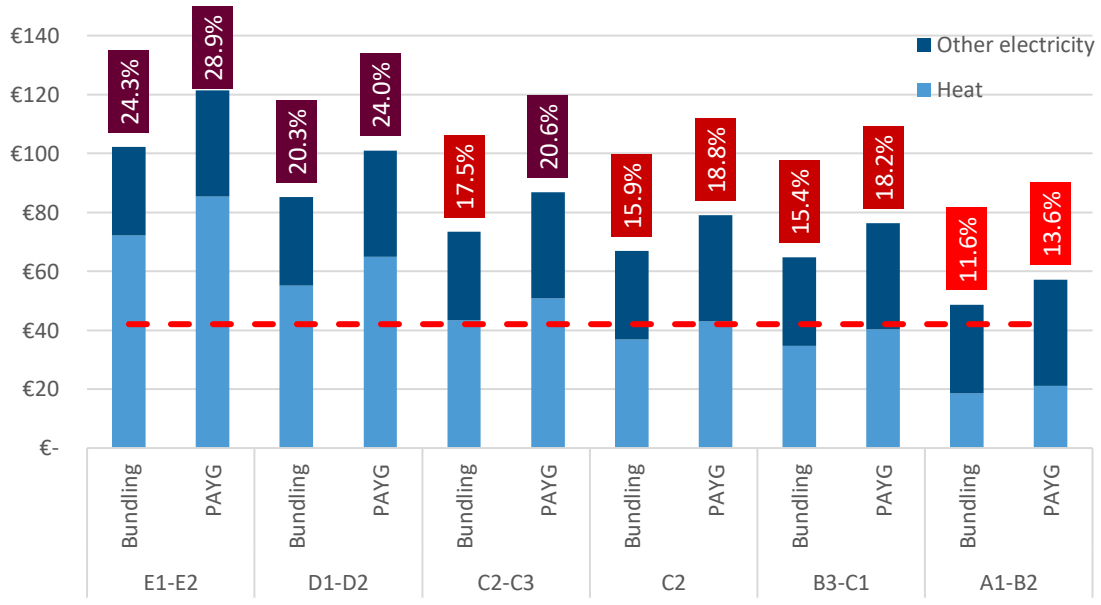
Table 4 Estimated weekly household energy costs for one parent with two children
Bundling versus PAYG

	E1-E2	D1-D2	C2-C3	C2	B3-C1	A1-B2
Bundling (€)	102.21	85.23	73.38	66.86	64.68	48.65
PAYG (€)	121.39	101.03	86.83	79.02	76.40	57.18
Differential (€)	19.17	15.80	13.45	12.15	11.72	8.54

Depending on dwelling efficiency, estimated weekly household energy costs could range from €48.65 to €102.21 per week. The estimated weekly household energy costs in the standard MESL basket at the C2 level of efficiency is approximately €66.86. At a moderately more efficient level (B3-C1), home energy costs decrease by an estimated 3.3%, or €2.18 per week. In a more energy poor dwelling (D1-D2), household energy costs increase by approximately 27.5%, or €18.37 per week. Alternatively, estimated weekly energy costs could range from €57.18 to €121.39 per week when the payment method is PAYG. The estimated weekly cost of energy presented in Table 4 reflects the average weekly cost over the course of the year. The actual cost of energy over the course of the year will vary, reflecting a greater need for light and heat during winter months and reduced need during summer months.

5. One Stay-At-Home Parent

Graph 8 MESL energy costs as a percentage of household income, per week
Income Scenario 1 (One Stay-At-Home Parent)

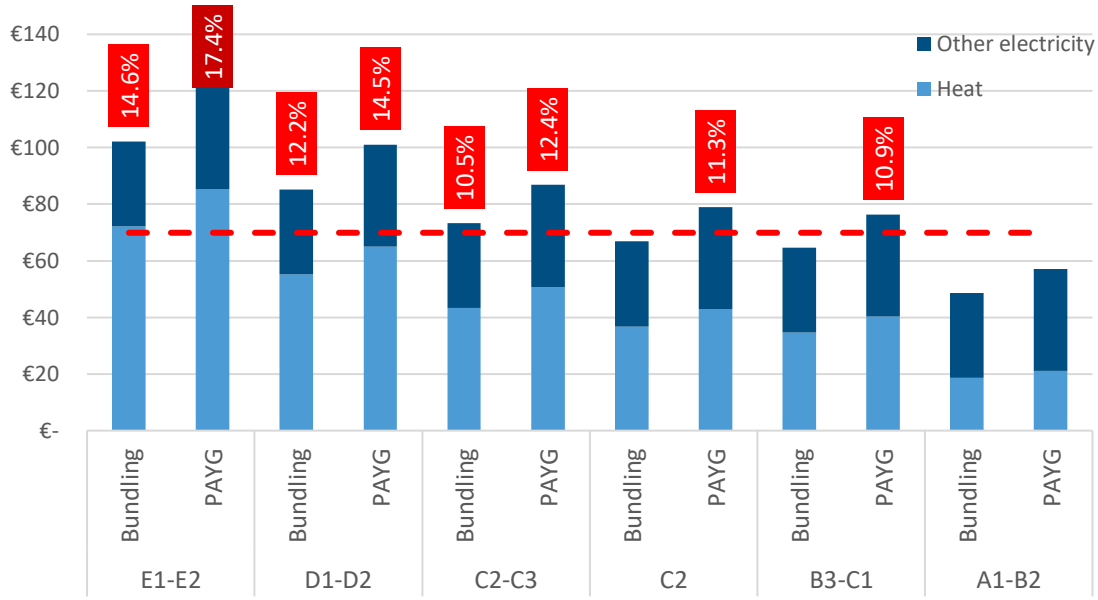


The first income scenario for the one parent with two children household type is based on one adult being a stay-at-home parent. When dependent on social welfare, primarily the One-Parent Family Payment, the weekly income for this household type is €420.48. Fuel Allowance is also counted in this household type's income.

In this income scenario, some level of energy poverty is indicated at each level of efficiency (see Graph 8). Living in an energy poor dwelling leaves this household type in a position of extreme energy poverty. When the dwelling is upgraded to a C2-C3 rating, it is in a position of severe energy poverty, or extreme energy poverty when the method of payment is PAYG. Even in a highly energy efficient dwelling (A1-B2) and with Fuel Allowance counted in weekly income, the household type is in a position of core energy poverty, indicating that social welfare income has not kept pace with rising energy costs.

6. One Full-Time Employment

Graph 9 MESL energy costs as a percentage of household income, per week
Income Scenario 2 (One Full-Time Employment)



The second income scenario is based on one adult earning a single salary from minimum wage employment, and other social welfare supports including the One-Parent Family Payment, the Working Family Payment, Child Benefit, and Fuel Allowance. In this scenario, the weekly household income is €699.07.

Graph 9 shows a greater prevalence, as well as a greater intensity, of energy poverty demonstrated at the lower end of the efficiency scale. While the higher end of the efficiency scale shows no incidences of energy poverty when purchasing energy in a cost-effective way. When accessing energy by PAYG, this household type indicates energy poverty at every level of efficiency, with the exception of the highly energy efficient home (A1-B2). This is in a situation where Fuel Allowance is counted as part of the one parent household type's weekly income.

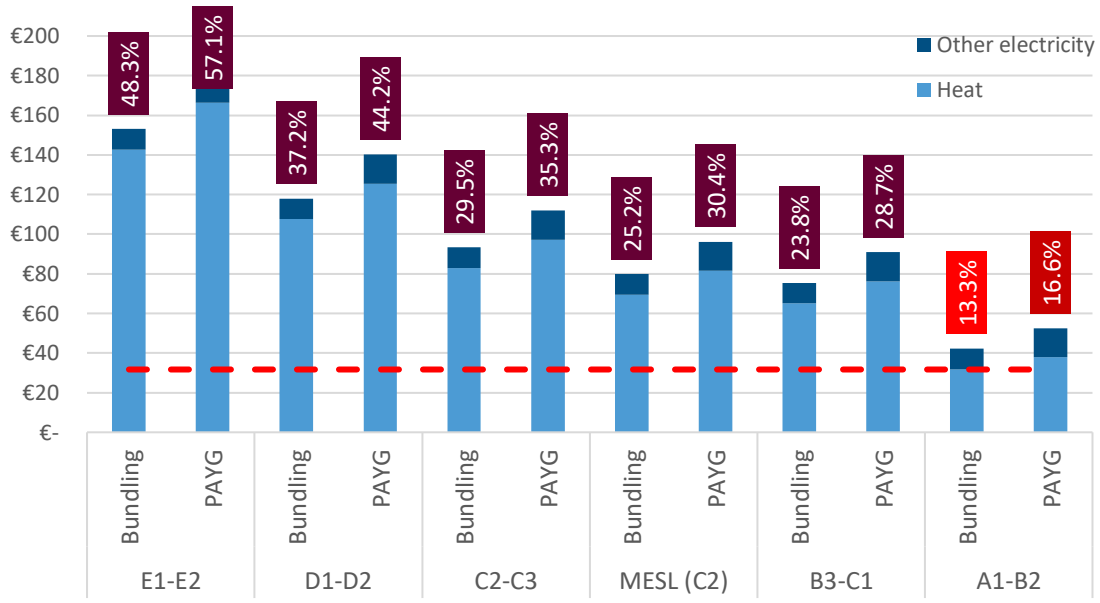
Older Single Adult

For the older single adult household type, the analysis looks solely at income from the Contributory Pension. For this household type, the analysis identifies the difference between

urban (based on the use of natural gas) and rural (based on the use of home heating oil) household energy costs. Housing costs are based on living in social housing and paying a differential rent. As stated on page 14, an enhanced heating schedule of 16 hours per day is applied based on the assumption that the older single adult household type is likely to be at home during the day.

7. Urban Scenario

Graph 10 MESL energy costs as a percentage of household income, per week
Urban Scenario (Older Single Adult, Contributory Pension)



The first scenario for the older single adult household type is based in an urban area with gas central heating. The weekly income from the Contributory Pension and other secondary social welfare supports, including Fuel Allowance, is €316.94. This household type is also eligible for a €35 electricity or gas allowance as part of the Household Benefits Package. In this case, the estimates presented in Table 5 include the effect of the electricity allowance on overall weekly energy costs for this household type.

Table 5 Estimated weekly household energy costs for urban older single adult
Bundling versus PAYG

	E1-E2	D1-D2	C2-C3	C2	B3-C1	A1-B2
Bundling (€)	153.07	117.92	93.39	79.89	75.38	42.19
PAYG (€)	180.95	140.24	111.83	96.21	90.98	52.54
Differential (€)	27.88	22.32	18.44	16.31	15.60	10.35

Depending on dwelling efficiency, estimated weekly household energy costs could range from €42.19 to as much as €153.07 per week. At a moderately more efficient level than the C2 rating used in the standard MESL basket (B3-C1) household energy costs decrease by approximately 5.6% or €4.51 per week. At a slightly less efficient level (D1-D2), household energy costs increase by approximately 47.6%, or €38.03 per week. In comparison, when the

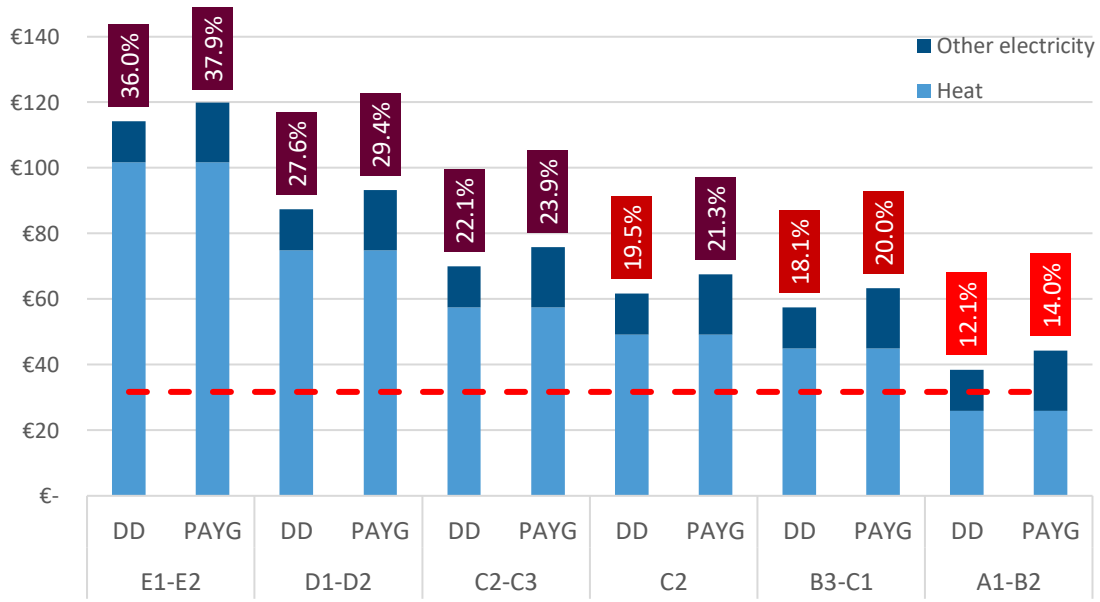
payment method is PAYG, household energy costs could range from between €52.54 to €180.95 per week. The estimated weekly cost of energy presented in Table 5 reflects the average weekly cost over the course of the year. The actual cost of energy over the course of the year will vary, reflecting a greater need for light and heat during winter months and reduced need during summer months.

Given that a disproportionate number of older persons occupy dwellings with a low BER (CSO, 2016; Age Action, 2022), it is worth noting that the cost of household energy for this household type, with an enhanced heating schedule, could be significantly higher when residing in an F or G-rated dwelling. Residing in an F-rated dwelling could increase weekly household energy costs by approximately 21.6%, or €33.01, to €186.08 when compared to the E1-E2 dwelling type. When residing in a highly inefficient dwelling (G), estimated weekly energy costs could be as much as €230.79. In a situation where the purchase method is PAYG, estimated weekly energy costs could be up to €219.18 in an F-rated home and €270.95 in a G-rated home.

Graph 10 demonstrates the varying degrees of energy poverty across efficiency levels for this household type. It is likely that older person household types are particularly vulnerable to energy poverty due to higher heating needs. Extreme energy poverty is indicated at each efficiency level, with the exception of the highly energy efficient home (A1-B2), where the household is in a position of core energy poverty when bundling, and severe energy poverty when on PAYG.

8. Rural Scenario

Graph 11 MESL energy costs as a percentage of household income, per week
Rural Scenario (Older Single Adult, Contributory Pension)



The second scenario for the older single adult household type is based in a rural area with oil central heating, where oil is purchased in a cost-effective way.[9] The income from the Contributory Pension and other secondary social welfare supports, including Fuel Allowance, is €316.94 per week. Because this household type also qualifies for the Household Benefits Package, the estimates presented in Table 6 include the effect of the electricity allowance on overall weekly energy costs.

Table 6 Estimated weekly energy costs for rural older single adult *Direct Debit versus PAYG*

	E1-E2	D1-D2	C2-C3	C2	B3-C1	A1-B2
Direct Debit (€)	114.16	87.43	69.95	61.68	57.43	38.45
PAYG (€)	119.98	93.24	75.77	67.50	63.24	44.27
Differential (€)	5.82	5.82	5.82	5.82	5.82	5.82

Depending on dwelling efficiency, estimated weekly household energy costs could range from between €38.45 and €114.16 per week. When upgraded to a more efficient level than the standard C2 level of efficiency used in the MESL (B3-C1) estimated household energy costs decrease by approximately 6.9% or €4.25 per week. At a slightly less efficient level (D1-D2), estimated household energy costs increase by approximately 41.7% or €25.75 per week. In comparison, when the payment method used to purchase electricity is PAYG, while oil is purchased in a cost-effective way, estimated total energy costs could range from between €44.27 and €119.98 per week. The estimated weekly cost of energy presented in Table 6 reflects the average weekly cost over the course of the year. The actual cost of energy over the course of the year will vary, reflecting a greater need for light and heat during winter months and reduced need during summer months.

As stated on page 25, given that older persons occupy Ireland's least efficient housing stock, it is worthwhile examining how costly energy could potentially be for this household type if residing in F or G-rated homes. Residing in an F-rated dwelling could increase weekly rural household energy costs by approximately €25.16 (22.0%), up to €139.32, when compared to the E1-E2 dwelling type. When residing in a highly inefficient dwelling (G), estimated weekly energy costs could be as much as €175.57. In a situation where the purchase method is PAYG, estimated weekly energy costs could be up to €145.14 in an F-rated home and €181.38 in a G-rated home.

Graph 11 shows varying degrees of energy poverty demonstrated at each level of efficiency, with the severity of energy poverty lessening as the household type moves up the efficiency scale. Although, even in a highly energy efficiency home (A1-B2), alongside the effect of both Fuel Allowance and the Household Benefits Package, the household type is in a position of core energy poverty.

[9] *The standard rural MESL budget for Older People is based on a C2 energy rating and home heating oil, with the household requiring approximately 1,260 litres per annum. Because this paper has an enhanced heating regime for the older single adult, at the C2 level of efficiency, approximately 2,521 litres per annum are required.*

Discussion

Table 7 Minimum energy expenditure as percentage of net household income

Household	Scenario		E1-E2	D1-D2	C2-C3	C2 (MESL)	B3-C1	A1-B2
SA	SW	PAYG	28.2%	24.2%	21.3%	20.1%	19.0%	16.5%
TP	SW	PAYG	23.0%	19.1%	16.4%	14.9%	14.4%	10.7%
OP	SW	PAYG	28.9%	24.0%	20.6%	18.8%	18.2%	13.6%
SA Older	U	PAYG	57.1%	44.2%	35.3%	30.4%	28.7%	16.6%
SA Older	R	PAYG	37.9%	29.4%	23.9%	21.3%	20.0%	14.0%
SA	SW	Bundle	23.4%	19.8%	17.2%	16.1%	15.1%	12.8%
TP	SW	Bundle	19.3%	16.1%	13.8%	12.6%	12.2%	9.1%
OP	SW	Bundle	24.3%	20.3%	17.5%	15.9%	15.4%	11.6%
SA Older	U	Bundle	48.3%	37.2%	29.5%	25.2%	23.8%	13.3%
SA Older	R	DD	36.0%	27.6%	22.1%	19.5%	18.1%	12.1%
SA	NMW	PAYG	15.7%	13.5%	11.9%	11.2%	10.6%	9.2%
TP	NMW	PAYG	18.4%	15.3%	13.1%	11.9%	11.5%	8.6%
OP	NMW	PAYG	17.4%	14.5%	12.4%	11.3%	10.9%	8.2%
SA	NMW	Bundle	13.0%	11.0%	9.6%	9.0%	8.4%	7.1%
TP	NMW	Bundle	15.5%	12.9%	11.1%	10.1%	9.7%	7.3%
OP	NMW	Bundle	14.6%	12.2%	10.5%	9.6%	9.3%	7.0%

EP Level	Threshold	Cases
No EP		**13**
Core EP	**10%**	**31**
Severe EP	**15%**	**24**
Extreme EP	**20%**	**28**

Table 7 presents the minimum energy expenditure need as a percentage of net household income by household type, income scenario, payment method and dwelling efficiency level.

In total, 96 cases were examined. Estimated energy costs exceed the 10% threshold in 83 of the 96 cases. Of the 83 cases of energy poverty, 31 are core energy poverty (10% threshold), 24 are severe energy poverty (15% threshold) and 28 are extreme energy poverty (20% threshold). Of the 13 cases not in energy poverty, the estimated minimum expenditure need for seven is over 9.0% of net income, leaving these households at risk of entering energy poverty if energy prices continue to rise.

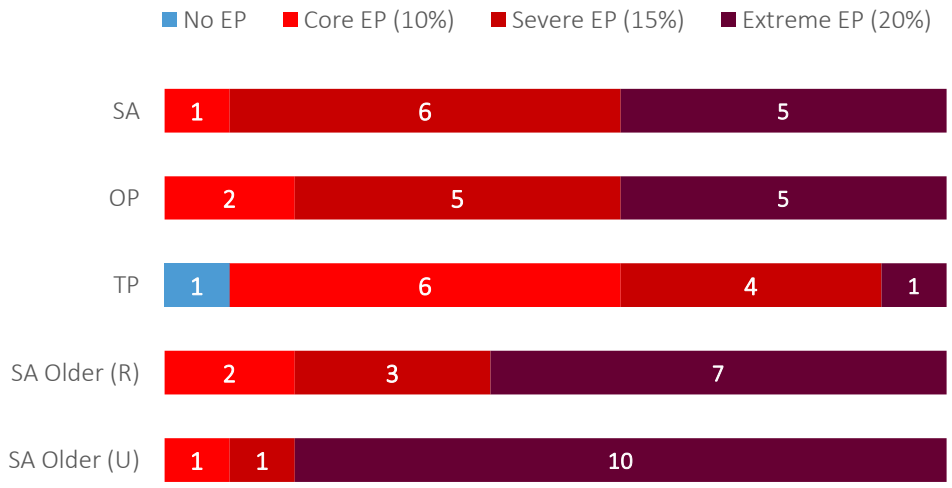
Key Findings

In total, 96 cases are examined. 83 of the 96 cases demonstrate some level of energy poverty. Of the 83 cases of energy poverty:

- 31 are in core energy poverty (energy expenditure need is more than 10% of net household income)
- 24 are in severe energy poverty (energy expenditure need is more than 15% of net household income)
- 28 are in extreme energy poverty (energy expenditure need is more than 20% of net household income)
    - 17 of these are in the case of the older single adult household type with an enhanced heating schedule
- In seven of the 13 cases not in energy poverty, the minimum energy expenditure need is over 9.0% of net household income, leaving the household at risk of entering energy poverty if energy prices continue to rise
- Social welfare dependent scenarios demonstrate the greatest prevalence and severity of energy poverty:
    - 59 of the 60 social welfare dependant scenarios demonstrate some level of energy poverty where at least 10% of net household income is spent on household energy
    - Almost half (28) of the social welfare cases demonstrate extreme energy poverty, where energy expenditure need is greater than 20% of net household income
- Energy poverty is more prevalent and a greater burden when purchasing minimum energy needs by pay-as-you-go
- As dwelling efficiency improves, energy costs are reduced, and in turn, the degree of energy poverty lessens. However, given the exceptional increase in energy prices, the minimum expenditure energy need is still so great that energy poverty persists in a number of these cases.

Social Welfare Scenarios

Graph 12 Number of energy poverty cases in social welfare scenarios



60 cases of social welfare dependent scenarios are examined: 12 in the case of the working age single adult household type, 24 in the case of households with children, and 24 in the case of the older single adult household type. In total, 59 of the 60 cases demonstrate some level of energy poverty. While the two parent household type does not indicate energy poverty when residing in a highly energy efficient dwelling (A1-B2) and purchasing energy in a cost-effective way, the minimum energy need is 9.1% of household income, leaving the household marginally below the core energy poverty threshold.

Almost half of the cases (28) in the social welfare scenarios examined demonstrate extreme energy poverty. There is also a higher prevalence of extreme energy poverty when purchasing household energy by PAYG. For example, 11 cases of extreme energy poverty are indicated when purchasing energy in a cost-effective way, and 17 cases of extreme energy poverty are indicated when the payment method is PAYG.

Based on the assumptions made in this paper, in the social welfare dependent income scenario, the one parent household type is eligible for Fuel Allowance. The older single adult household type is eligible for both Fuel Allowance and the Household Benefits Package. Because of the long-term requirement, Fuel Allowance is not included in the standard Jobseekers social welfare scenarios modelled in the MESL. In this paper, this applies to the unemployed working age single adult and the two parents with two children household type. All energy-related supports, including the two electricity credits provided in the first half of 2023, are included in the analysis where applicable.

One Parent with Two Children

For the one parent with two children household type in the social welfare dependent income scenario, extreme energy poverty is indicated when living in an energy poor dwelling with an efficiency rating of E1-E2 or D1-D2. While energy poverty remains when upgraded to the C2

level of efficiency, the improvement in efficiency reduces the intensity of energy poverty to a level where energy expenditure is between 10% and 20% of net household income, eliminating any cases of extreme energy poverty for this household type. When residing in a highly energy efficient dwelling type (A1-B2), this household type demonstrates core energy poverty. This is in a situation where Fuel Allowance is counted in weekly household income.

Two Parents with Two Children

In this income scenario, depending on the payment method used to purchase energy, the two parents with two children household type demonstrates severe to extreme energy poverty when residing in the least energy efficient dwelling types with a BER of D1-D2 or E1-E2. While energy poverty persists when upgraded to dwelling types at the mid-point of the efficiency scale (C2), the improvement in efficiency reduces the severity of energy poverty to a level where energy expenditure need is between 10% and 15% of net household income, removing any cases of severe or extreme energy poverty for the two parents with two children household type. There is no energy poverty indicated in the highly energy efficient dwelling type (A1-B2) when accessing a cost-effective price plan. Although, energy expenditure need is 9.0% of net income, leaving the household marginally below the core energy poverty threshold. In comparison, core energy poverty is indicated by the two parent household type when the payment method is PAYG and residing in the highly energy efficient dwelling (A1-B2).

Older Single Adult

The older single adult household type in receipt of the Contributory Pension and other social welfare supports has persistent energy poverty across all levels of efficiency in both the urban and rural scenario. This is in a situation where Fuel Allowance is counted in weekly household income and the household type is in receipt of the Household Benefits Package.

For the older single adult household type, an urban and rural scenario are examined. On average, the estimated household energy costs for heating by gas are 28.8% higher than energy costs for heating by oil, demonstrating a greater degree of energy poverty in the urban scenario for this household type, and supporting the MESL finding (2023) that the cost of gas now exceeds the cost of oil. This is in a situation where household energy is purchased in a cost-effective way. On average, estimated household energy costs for the urban scenario are approximately 42.3% higher than the rural scenario when the payment method is PAYG.[10]

When living in an energy poor home, estimated energy expenditure is far in excess of the 20% threshold in the urban and rural scenario, indicating very extreme energy poverty. In total, there are 17 cases of very extreme energy poverty for the older single adult household type. This accounts for over half of total extreme energy poverty cases (28) demonstrated in this paper.

[10] *PAYG in the rural scenario applies only to electricity costs.*

When residing in the E1-E2 dwelling type in an urban area, estimated energy costs are almost half (48.3%) of the older single adult's household income. In comparison, when the payment method is PAYG, estimated energy expenditure is up to approximately 57.1% of the household type's net income. While estimated energy costs reduce as dwelling efficiency improves, this household type continues in extreme energy poverty, with the exception of the highly energy efficient dwelling (A1-B2), where the household demonstrates core energy poverty when bundling and severe energy poverty when the payment method of PAYG.

In the case of the rural scenario, approximately 36.0% of net income is required to meet the older single adult household type's minimum energy need when residing in the least efficient dwelling type (E1-E2). When upgraded to a C2 rating and above and purchasing energy in a cost-effective way, the severity of energy poverty is reduced to a level where estimated energy expenditure need is between 10% and 20% of household income, removing any cases of extreme energy poverty. The severity of energy poverty is greater when purchasing electricity by PAYG, where estimated energy expenditure need is larger than the 20% threshold, indicating extreme energy poverty when residing in less energy efficient dwellings. When residing in an energy efficient dwelling, the depths of energy poverty are reduced to a level where between 10% and 20% of net household income is required to meet minimum energy need, when the payment method for electricity is PAYG.

In 2016, the CSO's *Domestic Building Energy Ratings from a Social Perspective* reported that 29% of people residing in a dwelling with a D rating were over the age of 75, while 19% of the same age group were in an E rated dwelling. Age Action (2022) estimates that 60% of all homes at the lower end of the efficiency scale (E-G rating) are occupied by older persons. Given the disproportionate number of older people living in Ireland's least energy efficient homes, it is likely that this household type is extremely vulnerable to increasing energy prices and therefore energy poverty.

Working Age Single Adult

For this income scenario, the working age single adult household type has persistent energy poverty across all levels of dwelling efficiency. When residing in an energy poor dwelling (E1-E2), the estimated minimum energy expenditure need is greater than 20% of the household's net income, indicating extreme energy poverty. Moving upwards on the dwelling efficiency scale reduces depths of energy poverty, although, the estimated energy expenditure need in most cases exceeds the severe energy poverty threshold, leaving one case of core energy poverty when in the highly energy efficient dwelling (A1-B2). In the case of the PAYG scenario, severe to extreme energy poverty is indicated at each level of efficiency. Even in a highly energy efficient dwelling (A1-B2), this household type indicates severe energy poverty when purchasing energy by PAYG.

Income Adequacy

In all of the social welfare dependent scenarios examined, the household types do not have an income that adequately meets a Minimum Essential Standard of Living. Of the 60 social

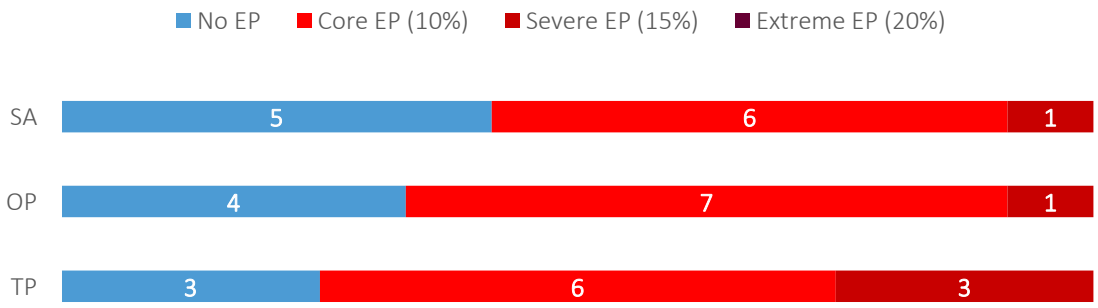
welfare dependent scenarios examined, 51 are in a position of deep income inadequacy, where social welfare supports provide for less than 90% of MESL expenditure need. While 9 are in a position where social welfare supports provide at least 90% of MESL need but are inadequate to fully meet minimum living costs. The findings show that as the energy efficiency of a dwelling type improves, estimated energy costs reduce, and the severity of energy poverty lessens. Consequently, the depths of income inadequacy also lessens. Appendix Table 13 presents levels of income adequacy and inadequacy for each household type, income scenario, payment method and dwelling efficiency level examined, by assessing net household income against total MESL costs.

When residing in the least energy efficient dwelling type (E1-E2), the potential income shortfall ranges from €78.47 to €159.51 per week when energy is purchased in a cost-effective way. Potential weekly income shortfall for household types is much greater when accessing a PAYG plan for the same basket of essential energy needs, ranging from approximately €93.19 to €168.96 per week. Even when residing in the most energy efficient dwelling (A1-B2), where estimated energy costs are substantially lower, each of the household types examined do not have an adequate income when in a social welfare dependent scenario, leaving a potential weekly income shortfall ranging from €18.22 to €96.22 when bundling, and €28.57 to €104.76 when on a PAYG plan.

Social welfare income is inadequate for each of the household types examined, meaning they will not be able to afford the cost of what is required to enable a Minimum Essential Standard of Living. In other words, household types will be forced to go without items deemed essential to meet their basic needs and to participate in the norms of Irish life.

Employed Scenarios

Graph 13 Number of energy poverty cases in employed scenarios



In total, 36 cases of full-time National Minimum Wage employment are examined: 12 in the case of the working age single adult household type and 24 in the case of household types with children. For the two household types with children, relevant social welfare supports such as the Working Family Payment, the One-Parent Family Payment and Child Benefit are included in household income. The one parent household type in an employed scenario is eligible for the Fuel Allowance payment. As stated on page 29, households in receipt of the

Working Family Payment, or in this case the employed scenario for the two parents with two children household type, do not qualify for any energy-related income support. The effect of the two electricity credits provided to all households in the first half of 2023 are included in energy cost calculations.

24 of the 36 employed scenarios examined demonstrate some degree of energy poverty. Of the 24 cases of energy poverty, 19 of these are core energy poverty, while five are severe energy poverty. In the employed scenarios, there are no incidences of extreme energy poverty. Energy poverty is more prevalent in situations where the payment method is PAYG. Additionally, in this situation, the severity of energy poverty is greater. For example, four of the five severe energy poverty cases are indicated in the PAYG scenario.

Two Parents with Two Children

In total, this household type demonstrates energy poverty in nine of the twelve cases examined. When residing in the least energy efficient dwelling (E1-E2), the household type is in severe energy poverty. At the next level of dwelling efficiency (D1-D2), the severity of energy poverty is lessened. The estimated minimum energy expenditure is below the 15% threshold and therefore, an improvement in dwelling efficiency reduces energy costs, leaving the household type in a position of core energy poverty. Although, in a situation where the payment method is PAYG, approximately 15.3% of net income is required to meet minimum energy needs at the D1-D2 level of efficiency, leaving the household in a position of severe energy poverty and demonstrating the additional costs incurred when accessing a PAYG plan.

Energy poverty continues as the household moves up the efficiency scale in some cases. When residing in the more energy efficient dwellings, this household type does not indicate energy poverty when the method of payment is bundling. Although, in a situation where energy is purchased by PAYG, approximately 11.5% of income is required to meet energy needs at the B3-C1 level of efficiency, indicating core energy poverty. This household type does not demonstrate energy poverty when residing in the highly energy efficient dwelling (A1-B2) and accessing a bundling or PAYG plan.

One Parent with Two Children

In this income scenario, the one parent household type demonstrates energy poverty in eight of the twelve cases examined. Core energy poverty is most prevalent at the lower end of the efficiency scale. There is one case of severe energy poverty indicated in the least energy efficient dwelling type (E1-E2). This is in a situation where the payment method is PAYG.

When accessing a cost-effective price plan, this household type does not demonstrate energy poverty when residing in dwelling types at the C2 level of efficiency and above. However, in two of the three cases where energy poverty is not indicated, the estimated minimum energy expenditure need is over 9.0% of net household income. In this situation, the household is dangerously close to entering energy poverty if energy prices continue to rise.

The severity of energy poverty is much greater in the PAYG scenario, where there is only one incidence where the household does not indicate energy poverty, compared to three when the payment method is bundling.

Working Age Single Adult

In this income scenario, the working age single adult household type demonstrates energy poverty in seven of the twelve cases examined. When residing in an energy poor dwelling (E1-E2 & D1-D2) this household type demonstrates core energy poverty when the payment method is bundling. There are no incidences of energy poverty indicated as the household moves up the dwelling efficiency scale. However, at the mid-point of the efficiency scale (C2), there is a minimum energy expenditure need of approximately 9.0% of net household income, leaving the household marginally close to energy poverty if inflation in energy prices continue.

For the PAYG scenario, there is a higher prevalence of energy poverty. Five of the seven cases of energy poverty demonstrated by the employed working age single adult household type are in situations where electricity and gas are purchased by PAYG. Additionally, a greater share of income is required at each level of efficiency in order to meet the household's estimated minimum energy needs. In this situation, core or severe energy poverty is demonstrated at each efficiency level, with the exception of the highly energy efficient dwelling (A1-B2). Although, the household type is approaching the core energy poverty threshold, with estimated minimum expenditure need at approximately 9.2% of net household income when residing in the A1-B2 dwelling type.

Income Adequacy

In the employed scenarios, income adequacy varies by household type and dwelling efficiency level. Of the 36 employed scenarios, 12 demonstrate deep income inadequacy, while 3 are in a position where net income, including relevant secondary social welfare supports, provide at least 90% of MESL need but are inadequate to fully meet minimum living costs. There are 21 cases in the employed scenarios that demonstrate income adequacy with net household income meeting total MESL expenditure need. When the efficiency of the dwelling type improves, the estimated cost of energy reduces, and the depth of income inadequacy lessens. While income may be adequate in a number of cases (21), the household type may still be vulnerable due to energy poverty due to high energy costs and the share of income required to meet estimated minimum energy needs (see Appendix Table 13).

When residing in the least energy efficient dwelling (E1-E2), the potential weekly income shortfall is €177.99 for the working age single adult household type and €8.65 for the one parent with two children household type. Alternatively, in the PAYG scenario, the potential weekly income shortfall is €188.41 for the working age single adult household type and €27.82 for the one parent household type.

Deep income inadequacy persists for the employed working age single adult household type at all levels of dwelling efficiency, while the one parent household type demonstrates income

adequacy as dwelling efficiency improves and energy costs are reduced. The situation differs for the two parent household type, where income adequacy is demonstrated at each level of dwelling efficiency. Although, because of high energy costs, this household type still indicates energy poverty when residing in less efficient dwelling types, despite having an adequate income.

Fuel Allowance and Household Benefits Package

As discussed on page 9, Fuel Allowance and the Household Benefits Package are the two primary social welfare payments for supporting households with home energy costs. The value of the support has not been maintained, as the flat-rate payments have not kept pace with rising energy costs. The rate of payment for the two supports has reduced significantly in recent years due to extreme volatility in energy prices.

Originally, the Household Benefits Package offered a set quantity of electricity or gas units irrespective of any changes in the unit price of energy. In this way, the value of the payment rose in line with energy price increases. In 2013, this changed to a cash amount of €35 credit per month. The flat-rate payment has not increased since 2013, and therefore, has reduced significantly in value, demonstrating the static nature of the payment.

Adjustments have been made to the weekly rate of Fuel Allowance. In Budget 2023, the core weekly rate of Fuel Allowance was retained (€33) for a 28-week season. In addition, a one-off lump sum payment was made to recipients of Fuel Allowance in the final quarter of 2022, increasing the annual value of the payment.

The base rate of Fuel Allowance has devalued due to significant price increases in the energy market. If the Fuel Allowance payment is measured directly against household energy costs in 2020, the payment would have met approximately 45.1% of the urban one parent household type's minimum energy needs when residing in a C2 dwelling type, as used in the standard MESL. In 2023, this reduces to 26.6% of energy costs, an 18.5 percentage point decrease from 2020. When residing in a slightly less efficient dwelling, (D1-D2), Fuel Allowance would have met 37.1% of this household type's home energy costs in 2020. In 2023, this reduces to 20.8%, a 16.2 percentage point decrease from 2020.

This situation is based on the household accessing the most cost-effective price plan in the energy market, so it is expected that energy costs would be significantly higher when on a PAYG plan, as demonstrated by the findings presented in this paper. Not only does this highlight that Fuel Allowance has failed to progress at the same rate as rising energy costs, but it also reflects the fixed nature of the payment, as it does not consider the energy efficiency of the dwelling in question.

Pay-as-you-go Premium

The findings of the current paper show that the estimated cost of energy when accessing energy by PAYG is significantly higher than that of a bundling/direct debit contract, because of higher tariffs, additional service charges and higher standing charges. The findings show

that the low-income household cases examined in this paper would pay more for energy when the payment method is PAYG, leading to a greater occurrence, as well as greater depths, of energy poverty amongst PAYG cases.

The last two years have seen multiple energy providers set up 'Hardship Funds,' by which they offer discretionary support to customers in financial difficulty (SVP, 2023). Recent consumer protection measures introduced by the CRU mandates energy providers to move all customers with a hardship PAYG meter onto the cheapest tariff available from the provider. Hardship meters are offered to consumers experiencing financial difficulty to pay back arrears. Customers that choose to pay for their energy by PAYG often do so as a lifestyle choice and the payment method may offer some control over budgeting. Although, there are also customers living in rental accommodation, where PAYG meters are often pre-installed. In these cases, the customer generally has no choice but to pay for their energy by PAYG.

In the UK, the Government recently announced that the extra charges associated with prepayment meters will be abolished, removing the "prepayment premium" in the energy market (Atkins, 2023).[11] This means that customers with a prepayment meter will be paying the same as direct debit customers for their energy.

Despite the cost of energy being considerably lower when availing of discounts for paying by direct debit and bundling, these deals are often not a realistic or accessible option for low-income households. PAYG customers are disproportionately on low-incomes and vulnerable to energy poverty (Corfe & Keohane, 2018; Davies & Trend, 2020). If the additional costs associated with PAYG energy were removed and vulnerable households were placed on a lower tariff, household energy costs for the MESL urban household types examined in this paper could be reduced, on average, by approximately 20%.

Alternative Policy Measures

Given the variation of energy needs across different household types, the current price volatility of different fuel types, and the complexity of the energy market itself, there is a need to re-examine whether the fixed nature of Fuel Allowance and the Household Benefits Package remain fit for purpose. The findings of the current paper show that the static nature of the flat-rate payments does not adapt to fluctuations in energy prices or price variations between fuel types, and subsequently, the price being paid by households themselves.

Several EU member states have introduced alternative policy measures, many in the form of social energy tariffs, to support vulnerable households to meet their energy bills (Baptista & Marlier, 2020). Generally, these reduced tariffs provide a reduction in overall bills and are within defined ceilings of consumption for qualifying households. In Spain, there is a social discount rate for electricity, and the proportion of discount a household is eligible for is

[11] *OFGEM will review approaches to permanently bring the premium associated with prepay meters to an end, ready for implementation by April 2024.*

based on consumer category, defined by household income. There is a consumption limit on the amount of energy entitled to a discount, meaning the consumer must pay the standard price per unit if its energy usage exceeds the defined threshold (Cabrero & Gallego, 2020). Similarly, in Belgium, the social tariff mechanism is progressive, so that the unit prices rises when there is a higher level of consumption reached. This diminishes the intended impact of the tariff, as it is typically low-income households that live in energy poor dwellings, and thus have increased energy needs (Lancker, 2020).

Other alternative approaches include systems that 'guarantee' access to essential energy at a low cost. In the UK, the New Economics Foundation proposes a 'National Energy Guarantee,' a scheme that would reduce the price paid by households to help households meet their energy needs (Chapman & Kumar, 2023). The scheme offers a range of allowances, primarily designed to protect households' minimum energy needs by pricing them at a low cost, while other 'premium tariffs' are targeted towards wealthier households with a higher level of consumption and aims to act as an incentive to retrofit the home.

In Ireland, Age Action are proposing an Energy Guarantee for older persons as a long-term solution to increasing energy prices. The proposed Energy Guarantee would ensure that older adult household types can afford a minimum quantity of energy. The policy brief states that the system would grant a higher level of support to those households on lower incomes and with lower BER grades (Age Action, 2022).

An alternative measure that reflects the energy needs of households, including household income, dwelling efficiency, fuel source and household type, would support vulnerable households manage their expenditure and meet their minimum energy need. Such a mechanism would provide a safety net to low-income households by making any fluctuations or increases in energy prices more manageable. The impact of the described approach is applied in the context of an Energy Guarantee type scheme similar to that of Age Actions and the New Economics Foundation and is described further below.

Energy Guarantee

The overarching aim of the proposed Energy Guarantee is to ensure that the level of support helps the household in question to meet its minimum energy need, as currently indicated by the BER method DEAP estimates. It is broadly accepted that there is a lack of data regarding the energy efficiency or BER of Ireland's housing stock (Friends of the Earth, 2023). For example, the 2022 Census counted 2,124,590 permanent dwellings in Ireland (CSO, 2022a). Over the period of 2009-2023, approximately 1,343,199 dwellings received a domestic BER certificate (CSO, 2023b). However, there is currently no way of estimating the energy efficiency or BER of homes without a certificate.

As stated on page 10, the Fully Funded Energy Upgrades scheme (formerly known as the Better Energy Warmer Homes Scheme) provides free energy efficiency upgrades to eligible applicants. In order to be considered eligible for the scheme, the household must be in receipt of a qualifying social welfare payment, including the One-Parent Family Payment, the

Working Family Payment, or significantly, Fuel Allowance. At the beginning of the application process, the applicants dwelling is checked for a BER. If the applicant does not have a BER for their dwelling, the SEAI will carry out a free BER assessment on the dwelling, at no cost to the applicant (SEAI, 2021).

Because the proposed Energy Guarantee is primarily linked to dwelling efficiency, there is potential for it to work alongside the SEAI's Fully Funded Energy Upgrades, as the scheme provides the means for vulnerable household types in need of support with energy costs, to obtain a free BER assessment. The proposed approach could therefore provide a greater level of support when the applicant awaits an energy upgrade through the SEAI scheme. Further, there is potential for the proposed Energy Guarantee to taper once an energy upgrade is achieved through the scheme.

A BER certificate is currently compulsory for dwellings available for rent. This is important, as it means that vulnerable household types such as HAP tenants in the private rental sector will not be excluded from the proposed approach. The question of eligibility for the model is detailed on page 42.

The proposed Energy Guarantee is modelled below in the case of the one parent household type and the older single adult, when based in an urban area with gas central heating.

Modelling an Alternative Approach

An Energy Guarantee, targeted at households in need of support with energy costs, would protect vulnerable households from any increases in energy prices. The aim of the proposed approach is to guarantee that a minimum quantity of energy can be secured through a credit. Illustrated through the hypothetical scenarios explored below, the proposed system guarantees that 60% of the minimum energy need, relating solely to the cost of the energy units required, indicated by the BER method DEAP estimates for heating and MESL data on electricity requirements, is met. The modelled approach determines the value of the credit based on net household income, household type, dwelling efficiency or BER band, and fuel source. In the hypothetical scenarios explored, the modelled approach replaces Fuel Allowance and the electricity or gas allowance under the Household Benefits Package. It should be noted that the energy cost estimates presented in this section include the effect of the two electricity credits provided in 2023.

One Parent with Two Children

This hypothetical scenario is based on the one parent household type living in an urban area with gas central heating and purchasing energy in a cost-effective way. The social welfare income scenario differs slightly from previously in this paper. The current rate of Fuel Allowance has been removed from weekly household income, so that the impact of the proposed approach can be measured directly against household energy costs. This leaves weekly household income from social welfare supports at an estimated €402.71.

As stated previously in this paper, depending on dwelling efficiency, estimated household energy costs range from between €48.65 and €102.21 per week for the urban one parent household type. Core to extreme energy poverty is indicated across the efficiency scale, where core energy poverty is demonstrated in the highly energy efficient dwelling (A1-B2), and extreme energy poverty is demonstrated at the lower end of the efficiency scale. The one parent with two children household type demonstrates deep income inadequacy at each level of dwelling efficiency.

In this hypothetical scenario, the paid value of the proposed support varies based on the efficiency rating of the dwelling type. The proposed support meets 60% of the one parent household type's minimum energy needs in terms of units required to adequately power and heat the home, at each dwelling efficiency level. In this way, the amount met by the mechanism is proportionate to the scale of energy need. The impact of the described approached is demonstrated in the table below:

Table 8 Impact of proposed Energy Guarantee for the one parent household type

	E1-E2	D1-D2	C2-C3	C2	B3-C1	A1-B2
Net Income (€)	402.71	402.71	402.71	402.71	402.71	402.71
Energy Expenditure (€)	102.21	85.23	73.38	66.86	64.68	48.65
Cost of Energy Units (€)	97.00	81.10	70.01	63.92	61.88	46.87
% met by Energy Guarantee	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Value of Energy Guarantee (€)	58.20	48.66	42.01	38.35	37.13	28.12
Household Energy – Value	44.02	36.57	31.37	28.51	27.56	20.53
Energy as % of income	10.9%	9.1%	7.8%	7.1%	6.8%	5.1%

In this hypothetical scenario, the estimated weekly cost of energy is significantly reduced, as well as occurrences of energy poverty. Depending on dwelling efficiency, the value of the credit meets between an estimated €28.12 and €58.20 of energy need in terms of unit costs. Table 8 shows that there is only one case of core energy poverty indicated when residing in the least energy efficient dwelling (E1-E2). As dwelling efficiency improves, the share of estimated income allocated to household energy costs is reduced significantly.

While the proposed support provides a greater level of credit to the household type when residing in less efficient dwellings, it is important that it also responds to the issue of low income. If the support were to ensure that energy expenditure was no more than 9.5% of net household income, its value could be adjusted so that the household is not paying a large portion of their income on essential energy. This way, the proposed support would be better targeted to those household's most in need, e.g., low-income households and households residing in energy inefficient dwellings.

As dwelling efficiency improves and household energy costs decrease, there is potential for the support to taper. For the purpose of demonstrating the impact of the tapering of the proposed support, a limit is applied, where energy costs are reduced, but only so much that they are between 6.0% and 9.5% of net household income. In a situation where the support

reduces energy costs to a point where the share of net income allocated to energy expenditure is lower than 6.0%, the paid value of the support is adjusted or reduced.

The refinements described above are demonstrated in Table 9:

Table 9 Impact of proposed Energy Guarantee with refinements for the one parent household type

	E1-E2	D1-D2	C2-C3	C2	B3-C1	A1-B2
Net Income (€)	402.71	402.71	402.71	402.71	402.71	402.71
Energy Expenditure (€)	102.21	85.23	73.38	66.86	64.68	48.65
Cost of Energy Units (€)	97.00	81.10	70.01	63.92	61.88	46.87
% met by Energy Guarantee	65.9%	60.0%	60.0%	60.0%	60.0%	52.2%
Value of Energy Guarantee (€)	63.96	48.66	42.01	38.35	37.13	24.49
Household Energy – Value	38.26	36.57	31.37	28.51	27.56	24.16
Energy as % of income	9.5%	9.1%	7.8%	7.1%	6.8%	6.0%

Table 9 shows that when the proposed model is refined, it eliminates all cases of energy poverty by ensuring that at least 60% of the household type's minimum energy needs in relation to unit costs are met, and energy expenditure is no more than 9.5% of net household income. Additionally, when energy efficiency improves and costs are reduced, the support tapers. In the case of the one parent household type when dependent on social welfare income, the support tapers when residing in a highly energy efficient dwelling (A1-B2), so that energy expenditure is no lower than 6.0% of net household income, and an estimated 52.2% of the household type's energy needs are met in terms of units.

Table 10 One parent household type, proposed approach & impact on income adequacy

	E1-E2	D1-D2	C2-C3	C2	B3-C1	A1-B2
Total MESL	506.31	504.62	499.43	496.57	495.61	492.22
Net Income	402.71	402.71	402.71	402.71	402.71	402.71
Income - MESL	-103.60	-101.91	-96.72	-93.86	-92.90	-89.51

In this hypothetical scenario, deep income inadequacy persists for the one parent household type when dependent on social welfare income. While the reduction in household energy costs lessens the depths of income inadequacy somewhat, the gap between social welfare income and MESL expenditure need remains broad.

Older Single Adult

This hypothetical scenario is based on the older single adult household type living in an urban area with gas central heating and purchasing energy in a cost-effective way. For this scenario, Fuel Allowance is removed from weekly household income. This leaves estimated weekly household income at €299.17 when in receipt of the Contributory Pension and other social

welfare supports. The effect of the electricity allowance, under the Household Benefits Package, on energy costs is also removed.

As stated on page 24, the weekly cost of energy varies based on dwelling efficiency, ranging from €42.19 when residing in the highly efficient dwelling type (A1-B2), and €153.07 when residing in the least efficient dwelling type (E1-E2) for the urban older single adult household type. This household type demonstrates persistent levels of energy poverty across the efficiency scale, where very extreme energy poverty is indicated at the lower end of the efficiency scale (E1-E2), and core energy poverty is indicated at the higher end of the efficiency scale (A1-B2). This household type also demonstrates income inadequacy at each level of dwelling efficiency.

In this hypothetical scenario, depending on the share of household income required to meet energy expenditure, the proposed Energy Guarantee meets at least 60% of the older single adult household type's energy need relating to unit costs, through a credit. The value of the credit varies based on dwelling efficiency. The impact of the modelled approach is demonstrated in Table 11:

Table 11 Impact of proposed Energy Guarantee for the older single adult household type

	E1-E2	D1-D2	C2-C3	C2	B3-C1	A1-B2
Net Income (€)	299.17	299.17	299.17	299.17	299.17	299.17
Energy Expenditure (€)	161.15	126.00	101.46	87.97	83.46	50.27
Cost of Energy Units (€)	154.47	121.50	98.49	85.83	81.60	50.47
% met by Energy Guarantee	85.9%	80.3%	74.2%	69.4%	67.4%	60.0%
Value of Energy Guarantee (€)	132.73	97.57	73.04	59.55	55.04	30.28
Household Energy - Value	28.42	28.42	28.42	28.42	28.42	19.99
Energy as % of income	9.5%	9.5%	9.5%	9.5%	9.5%	6.7%

In this hypothetical scenario, the level of the proposed support ranges from 60% to 85.9%, depending on dwelling efficiency, demonstrating that the older person household type requires a greater level of support due to additional heating needs. Under this modelled Energy Guarantee, the same principle would apply to other vulnerable household types with additional heating or electricity needs, such as those in receipt of Disability Allowance, that also qualify for the Household Benefits Package.

Table 12 Older single adult household type, proposed approach & impact on income adequacy

	E1-E2	D1-D2	C2-C2	C2	B3-C1	A1-B2
Total MESL	321.39	321.39	321.39	321.39	321.39	318.00
Net Income	299.17	299.17	299.17	299.17	299.17	299.17
Income Shortfall	-22.22	-22.22	-22.22	-22.22	-22.22	-18.83

Because of the level of support provided through the credit in the case of the older single adult household type, the proposed model greatly improves levels of income adequacy, eliminating all cases of deep income inadequacy.

Limitations

It is important to note that the estimates presented in this paper are subject to limitations. One such limitation is that the space heating and hot water portion of the minimum household energy need offered in this paper uses the BER method DEAP calculations as supplied by the SEAI, while the electricity portion of the minimum household energy need is based on existing MESL data. The MESL estimates do not capture all electricity requirements of all household types. Additionally, while the minimum household energy need estimates offered in the current paper provide insight as to what a household should need to adequately heat and power their home, real-life energy consumption will vary. As such, these factors should be considered when interpreting the estimates offered in this paper.

While the proposed model, by design, relies on an expenditure-based method to eliminate all occurrences of energy poverty by ensuring that at least 60% of energy needs are met where required, and are no more than 9.5% of net household income, it does not provide additional support where income inadequacy persists. Therefore, this model does not consider where a household may choose to go without essential items such as food or adequate warmth, as would typically be indicated through self-reported or subjective measures such as the SILC.

It should be noted that the proportion of energy needs met through the proposed support, alongside the limits set regarding the share of income allocated to energy need, are not definitive, and could be refined further if necessary.

Eligibility for the proposed Energy Guarantee model would need to be given careful consideration. There are household types that are currently not eligible for energy-related income supports. Current targeting of Fuel Allowance and the Household Benefits Package is restrictive, leaving vulnerable households without the support they need to meet minimum energy costs. Eligibility criteria for Fuel Allowance excludes some households that have low-incomes and are at risk of energy poverty. For example, there is also a long-term requirement of 12-months for people in receipt of Jobseekers Allowance, excluding those that are recently unemployed. The question of whether all households on social welfare payments, including those in low paid employment, and those in receipt of the Working Family Payment, would be considered eligible for the proposed approach needs to be investigated further. As demonstrated by the findings in this paper, these household types are vulnerable to energy poverty and are at risk of being unable to access essential energy, particularly when dependent on social welfare income, and require support to help meet household energy costs.

While current eligibility for Fuel Allowance for Jobseekers is accompanied with a long-term requirement, it would be beneficial to review this condition when considering the proposed model. Given the built-in tapering of the modelled support, there is also potential for those

engaged in low-paid employment, such as a single adult household type with no dependent children, to be considered eligible for the proposed Energy Guarantee. The impact of the proposed Energy Guarantee on employed working age single adult household type's needs to be explored further in future research.

While it is clear that further research is required to explore alternative policy measures to protect vulnerable households against high energy costs, a support that guarantees a low cost for household's minimum energy need would couple well with current national retrofit plans, as such an approach would become less costly as the energy efficiency of dwellings are improved. Moreover, the proposed approach would support qualifying households in the private rented sector, such as HAP tenants, which are not eligible for, or are currently excluded from, free retrofit plans.

Conclusion

The findings of this Working Paper have demonstrated the impact of dwelling efficiency and the payment method used for household energy on a low-income household's vulnerability to energy poverty.

In total, 96 cases were examined, and energy poverty was demonstrated in 83 of the 96 cases. Of the 83 cases in energy poverty, 31 are in core energy poverty (energy expenditure need is more than 10% of net household income), 24 are in severe energy poverty (energy expenditure need is more than 15% of net household income), and 28 are in extreme energy poverty (energy expenditure need is more than 20% of net household income). For seven of the 13 cases that did not indicate energy poverty, the minimum energy need is over 9.0% of net household income, leaving these households at risk of entering energy poverty in the face of ongoing price inflation. Energy poverty is more prevalent and severe in the social welfare dependent scenarios, with 59 of the 60 scenarios demonstrating some level of energy poverty. Moreover, for social welfare dependent scenarios, income is inadequate for each of the household types to afford what is required to enable a Minimum Essential Standard of Living. Due to the level of inadequacy shown in the findings, it is inevitable that vulnerable households are choosing to go without essential items, such as food or adequate warmth in the home, and are therefore living below a socially acceptable minimum level.

It is evident that low-income households pay more for their energy when purchasing energy by PAYG, demonstrating the presence of the poverty premium in the energy market. Eliminating the additional costs associated with all PAYG plans and placing low-income households on the lowest tariff in the market would significantly reduce depths of energy poverty.

The findings of this paper show that improving dwelling efficiency is essential, as it significantly reduces the minimum energy need and consequently energy costs. However, in the context of inadequate income, improving energy efficiency alone will not enable a low-income household to meet its minimum energy need. The findings show that all social

welfare dependent households, with the exception of one, demonstrate energy poverty even when a high level of efficiency is reached (A1-B2). Each of these households continue to face inadequate incomes, showing that income supports are inadequate to meet both energy need and overall expenditure need. Therefore, it is vital that policy addresses both dwelling efficiency and income adequacy in its approach to tackling energy poverty.

This paper has highlighted the inadequacy of energy-related income supports for low-income and social welfare dependent households at a time of energy price crisis. The fixed nature of Fuel Allowance and the Household Benefits Package fail to consider the complex variation of energy needs across different household types.

There is a question regarding whether Fuel Allowance and the Household Benefits Package remain fit-for-purpose. It is clear that the fixed nature of the payments are not responsive when prices are volatile in the energy market. This paper has explored the potential impact of introducing a support mechanism based on a household's minimum energy need in the form of an Energy Guarantee. Further research is required to explore alternative policy measures such as an Energy Guarantee to support vulnerable households to meet minimum energy needs.

Appendix

Income Calculations

Social Welfare Scenarios

Housing costs for the unemployed working age single adult is based on private rented accommodation and receipt of Rent Supplement. Housing costs for households with children and older single adult household types are based on social housing and paying a differential rent.

The social welfare income scenarios assume full entitlement to payments relevant to the household scenario:

- Single Adult
  - JS Personal Rate
  - Rent Supplement
- Two Parents
  - JS Personal Rate + Qualified Adult + Qualified Child
  - Child Benefit
  - Back to School Clothing & Footwear Allowance
- One Parent
  - One-Parent Family Payment/JS Transition + Qualified Child
  - Child Benefit
  - Back to School Clothing & Footwear Allowance
  - Fuel Allowance
- Older Single Adult
  - Contributory Pension + Living Alone Increase
  - Fuel Allowance
  - Telephone Support Allowance
  - Household Benefits Package

Employed Scenarios

Housing costs for the employed working age single adult are based on 90% of average Dublin rent for a one-bedroom dwelling. Housing costs for households with children and the older single adults are based on social housing and paying a differential rent.

The working age single adult household type is based on the adult being in full-time employment (37.5 hours).

The two parent household type is based on one adult being in full-time employment (37.5 hours) and one adult being a stay-at-home parent.

The one parent household type is based on the adult being in full-time employment (37.5 hours).

Income is net household income, after tax (PAYE, PRSI & USC), and social welfare supports e.g., Child Benefit. Means tested social welfare supports for households with children, e.g., Working Family Payment, One-Parent Family Payment, are included as applicable.

Income Adequacy

Table 13 Heatmap summary of income adequacy findings

Household	Scenario		E1-E2	D1-D2	C2-C3	C2 (MESL)	B3-C1	A1-B2
SA	SW	PAYG	-€ 93.19	-€ 84.39	-€ 78.06	-€ 75.55	-€ 73.03	-€ 67.44
TP	SW	PAYG	-€ 97.55	-€ 77.20	-€ 62.99	-€ 55.18	-€ 52.57	-€ 33.35
OP	SW	PAYG	-€ 168.96	-€ 148.61	-€ 134.40	-€ 126.59	-€ 123.98	-€ 104.76
SA Older	U	PAYG	-€ 156.98	-€ 116.27	-€ 87.86	-€ 72.24	-€ 67.01	-€ 28.57
SA Older	R	PAYG	-€ 165.33	-€ 138.60	-€ 121.12	-€ 112.85	-€ 108.60	-€ 89.62
SA	SW	Bundle	-€ 82.78	-€ 74.76	-€ 68.99	-€ 66.70	-€ 64.40	-€ 59.31
TP	SW	Bundle	-€ 78.47	-€ 61.49	-€ 49.63	-€ 43.12	-€ 40.94	-€ 24.90
OP	SW	Bundle	-€ 149.79	-€ 132.81	-€ 120.95	-€ 114.44	-€ 112.26	-€ 96.22
SA Older	U	Bundle	-€ 129.10	-€ 93.95	-€ 69.42	-€ 55.93	-€ 51.41	-€ 18.22
SA Older	R	DD	-€ 159.51	-€ 132.78	-€ 115.30	-€ 107.03	-€ 102.78	-€ 83.80
SA	NMW	PAYG	-€ 188.41	-€ 179.60	-€ 173.28	-€ 170.77	-€ 168.24	-€ 162.65
TP	NMW	PAYG	€ 10.05	€ 30.41	€ 44.61	€ 52.42	€ 55.04	€ 74.26
OP	NMW	PAYG	-€ 27.82	-€ 7.47	€ 6.74	€ 14.55	€ 17.16	€ 36.38
SA	NMW	Bundle	-€ 177.99	-€ 169.97	-€ 164.20	-€ 161.92	-€ 159.62	-€ 154.52
TP	NMW	Bundle	€ 29.14	€ 46.12	€ 57.97	€ 64.49	€ 66.67	€ 82.70
OP	NMW	Bundle	-€ 8.65	€ 8.33	€ 20.18	€ 26.70	€ 28.88	€ 44.92

	Cases
Adequate	21
Inadequate ≥90% and <100%	12
Deeply Inadequate <90%	63

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