ENERGY POVERTY AND THE IMPACT OF ENERGY SUBSIDIES: RECENT TRENDS IN ITALY[1]

Elisabetta Segre, Paola Tanda

Abstract. In 2008, Italy introduced a system of means-tested energy subsidies which are deducted directly from electricity and gas bills. Since 2021, the deduction has been automatic for households with an ISEE certificate on file, and additional financial resources have been allocated to help households cope with the rise in energy prices. This has significantly increased both the number of households benefiting from the measure and the amount of the bonus. This analysis aims to assess recent trends in the impact of energy subsidies on reducing the number of energy-poor households.
The ISTAT's household microsimulation model, which is based on the IT-SILC survey matched with administrative data, allows us to estimate energy poverty at household level using the Low Income High Costs approach. In addition, the model allows us to identify which households received the subsidies and to estimate the amount of bonus received by each household.
Our findings show that energy subsidies have been effective in offsetting the impact of rising energy prices for energy-poor households. However, enhancing the targeting mechanisms could improve the effectiveness of the bonuses in reducing energy poverty.

1. Introduction

Energy poverty—defined as the condition in which households are unable to secure adequate energy services at an affordable cost[2]— is driven by a confluence of factors including energy inefficient housing, volatile energy prices, reliance on fossil fuels, and structural socio-economic disadvantages. Its consequences are profound, affecting physical and mental health outcomes, social inclusion, and

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[1] The views and opinions expressed in this paper are those of the authors and do not necessarily reflect the official position of ISTAT.

[2] According to the Energy Efficiency Directive ((EU) 2023/1791) "energy poverty means a household's lack of access to essential energy services, where such services provide basic levels and decent standards of living and health, including adequate heating, hot water, cooling, lighting, and energy to power appliances, in the relevant national context, existing national social policy and other relevant national policies, caused by a combination of factors, including at least non-affordability, insufficient disposable income, high energy expenditure and poor energy efficiency of homes".

economic opportunities (Marmot Review Team 2011, Thomson *et al* 2017, European Commission and Cornelis, 2025).

At the European level, a suite of initiatives has been developed to tackle this issue like the Social Climate Fund and the Clean Energy for All Europeans legislative package and in its 2024 updated National Energy and Climate Plans (NECP), Italy acknowledges energy poverty as a major socio-political challenge. Several national initiatives have been implemented to mitigate the impact of rising energy costs on vulnerable populations: the strengthening of social energy bonuses; economic incentives to support the installation of solar PV systems for low-income families; and the promotion of Renewable Energy Communities (RECs); fiscal measures such as VAT reductions on energy bills and temporary removal of system charges.

In this paper, we focus our attention on energy subsidies (from here on social bonuses). This welfare measure have existed in Italy since 2008, providing discounts on electricity and gas bills for low-income households. The eligibility is based on the Equivalent Economic Situation Indicator (ISEE) and household composition. The ISEE certificate is issued by INPS (The National Institute for Social Security) upon demand. Since 2021, the system of social bonuses has been revised. First, the discount became automatic, households are no longer required to apply if ISEE data is already on file. Higher discounts for eligible households have been provided, partially funded by general tax revenues, and income thresholds have been raised several times.[3] Using ISTAT' microsimulation model (FaMiMod) we are able to identify beneficiaries of energy social bonuses.[4] This information combined with household characteristics like ISEE, size of the households, number of children, and climatic zone of residence, is used to assess the amount of the benefit a household is entitled to receive. [5]

Once beneficiaries and social bonuses are estimated at household level, we assess the impact of social bonuses on energy poverty.

[3] *Eligibility criteria*

	ISEE threshold	
	Less than 4 children	*More than 4 children*
2021	ISEE < 8.265	ISEE < 20.000
2022	ISEE < 12.000	ISEE < 20.000
2023	ISEE < 15.000	ISEE < 30.000
2024	ISEE < 9.530	ISEE < 20.000

[4] For details on the FaMiMod model refer to https://www.istat.it/it/files//2015/10/rsu_2_2015.pdf

[5] Less than 1 out of 2 households applies for an ISEE certificate, in 2023 they were 10.4 million out 26 million households (INPS, ISEE Observatory). To identify households receiving the bonus, a take-up rate was applied to the measure, in order to align the estimates of the number of beneficiaries with administrative information on number of bonuses paid (ARERA 2021, 2022, 2023).

Microsimulation models developed by Public Institutions are usually static and short-run oriented (Colombino 2016) and FaMiMod is no exception. The non behavioral assumption might induce a bias in our estimates, since a change in the price of energy induces a change in the level of energy demand. Nevertheless we have reasons to believe that the size of the bias might be negligible. First of all, we focus our analysis on the impact on energy poverty of an automatic discount in the bill. Unlike social tariffs, this kind of measure has a low or null impact on the price signal (Faiella e Lavecchia 2014). Another aspect that should be taken into account is that in Italy a high share of the energy costs are not linked to energy prices (Faiella and Lavecchia 2021).

An additional reason for us to believe that the bias could be negligible comes from the literature on the effect of energy prices dynamic on energy demand (see Priesmann and Praktiknjo 2025 for a review). Estimations of the price elasticities are rather heterogenous and inconsistent. Nevertheless, there is a strong consensus on the fact that energy demand is rather inelastic to price change in the short run (Espey and Espey 2004, Faiella and Lavecchia 2021). Since behavioral response need time to materialize (Colombino 2016), a short-run oriented policy assessment like ours should produce rather accurate estimates.

To the best of our knowledge, there are few examples in literature of behavioral microsimulation models used to study energy poverty (Tovar Reaños and Lynch 2022, Colabella *et al.* 2023) and we did not find evidence of behavioral model used to assess the effect of welfare measures on energy poverty. The Italian Ministry of Economy and Finance has an on-going, not yet published, work where a non behavioral micro-simulation model is used to evaluate the effect of energy inflation on energy expenditure and energy poverty (De Sario *et al.* 2025).

2. Data and methods

The measurement of energy poverty ranges from simple expenditure-based thresholds to complex, multidimensional frameworks that incorporate income, energy needs, housing quality, and subjective experience (for a review see Thomson *et al* 2017a, Gouveia *et al* 2022, Faiella and Lavecchia 2014, Tovar Reaños and Lynch 2022). Energy poverty accounts for several driving factors, summarized by Bouzarovski and Petrova (2017) in seven categories: access, affordability, flexibility, energy efficiency, need and cultural practices. Thomson *et al* (2017) classifies methods of measurement in three groups: expenditure approaches, which provide a proxy of energy deprivation by comparing actual energy costs to a threshold (absolute or relative); consensual approaches, which accounts for self-reported subjective measures such as the ability to afford an adequate level of heating or cooling; direct measurements, which assess the adequacy of energy services (like heating, cooling, lightning), for example, by taking the internal temperature of the dwelling.

We rely on the expenditure approach to assess the prevalence of energy poverty in Italy. In particular, we estimate the headcount of energy poor households using a Low Income High Costs (LIHC) type of measure. The LIHC measure defines a household as fuel poor if its required energy costs are above the national median and if its income net of the energy expenditure would fall below the poverty line (UK Department of Energy and Climate Change, 2013). To assess required energy costs, energy needs are modelled accounting for household composition, dwelling characteristics, and regional climatic conditions. This approach emphasized the structural dimensions of energy poverty, highlighting how factors like housing quality and energy efficiency play a role alongside income constraints.[6]

The same type of approach is used by the Italian Observatory for Energy Poverty (OIPE) to produce a measure of energy poverty often reported in official documents as the NECP. To assess energy poverty OIPE uses data from the Household Budget Survey carried out by ISTAT. This data source provides the official measure of energy expenditure faced by households according to the COICOP classification.

Nevertheless, in order to keep our analysis within the data environment of the micro-simulation model FaMiMod and thereby being able to carry out a policy evaluation analysis, we use an alternative data source. FaMiMod runs using the survey data collected by ISTAT in order to provide Eurostat with the set of Eu-Silc variables, matched with administrative data. The dataset contains detailed information on several housing expenditures including energy costs faced by the household[7]. This allows us to apply the LIHC approach, defining a household as energy poor when its energy expenditure exceeds the national median expenditure and its income, net of energy costs, falls below the “At risk of poverty line” (defined as 60% of the national median equivalized disposable income). According to Faiella and Lavecchia (2014), we added to this first group also At risk of poverty households reporting a null energy expenditure. As Faiella and Lavecchia, we are not able to estimate the household energy needs, as would be required by the LIHC method developed in the UK, due to lack of information on the energy efficiency of the

[6] In 2025, the UK Government introduced a revised framework - Low Income Low Energy Efficiency (LILEE) - that further refined the measurement of energy poverty. According to the LILEE metric, a household is considered energy poor if it has a low income (defined as below the poverty threshold after accounting for housing costs) and lives in a home with an energy efficiency rating of band D or below. This metric shifts the focus more explicitly toward energy efficiency, aligning energy poverty policy with broader environmental and decarbonization goals.

[7] Information on housing expenditures is collected in order to provide Eurostat with the Eu-Silc variable “Housing cost overburden rate”. Energy expenditure driven from this source are overall coherent with official estimates coming from HBS.

dwelling. The headcount ratio of energy poverty (H), given the income (Y_i) and the energy expenditure (EE_i) of household, is obtained as follows:

$$H = \frac{1}{n}\sum_{i=1}^{n} E_i \tag{1}$$

where

$$E_i \begin{cases} 1 \text{ if } EE_i > \text{median } (EE) \text{ and } Y_i - EE_i < 0.6 \text{ median } (Y) \\ 1 \text{ if } EE_i = 0 \text{ and } Y_i < 0.6 \text{ median } (Y) \\ 0 \text{ otherwise} \end{cases} \tag{2}$$

In our work EE_i is evaluated according to two scenarios. In the first one, we use energy expenditure as collected by the survey that is the actual cost faced by households. This cost is net of the energy bonuses received by a recipient household as a discount on the bills and allow us to estimate energy poverty after the subsidies (H_a) by applying equation (1) and (2).

In the second scenario, we calculate the cost a recipient household would have faced if it had not received the subsidy. We do that by adding the amount of the bonus to the actual energy cost and thereby obtaining the energy poverty headcount before the subsidies (H_b).[8]

Being our model a static non-behavioral one, the level of energy expenditure is held constant throughout the two scenarios, i.e. we assume that the policy does not affect the level of demand (see paragraph 2 for a discussion).

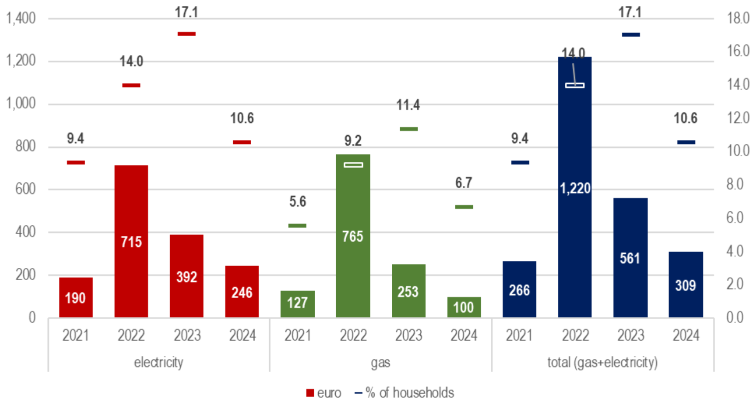
Although our estimates share the same theoretical approach as those performed by Faiella and Lavecchia and by the Italian Observatory on Energy poverty (OIPE), results should not be compared. Along with the fact that we use different data sources, the lack of comparability is due to important differences in equation (2). First of all, we compare EE_i with the median level of EE, while Faiella and Lavecchia and OIPE compare it with two times the average EE. Another difference relies on the fact that in the second condition of equation (2) we use data on disposable household income (Y_i) and the Eurostat' At risk of poverty threshold, whereas Faiella and Lavecchia and OIPE use data on the overall level of household expenditure (E_i) and their threshold is the average per-capita consumption expenditure equivalized by the number of household components.

[8] Households living in buildings with central heating system need to file a demand to obtain gas bonuses. Hence, for these households only, the information on the actual gas expenditure collected in the survey is not net of the value of the bonus. The two scenarios are computed accordingly.

3. Energy subsidies in Italy: recipients and amount

In 2021, almost 1 out of 10 households received a discount on the electricity bill of €190 on average, and 60% of these households received also a cut in the gas bill of €127(Figure 1). The average total amount of energy bonuses is estimated at €266. As mentioned above, the system became more generous to help household face the increase in energy prices and, in 2022 the average total amount peaked to €1,220, reaching 14.0% of the total resident households. This share kept growing in 2023, reaching its highest level (17.1%) thanks to the extension of the ISEE threshold to €15,000. In 2024, the ISEE threshold has been set back to 9.530 euro, resulting in a significant reduction in the proportion of eligible recipient households.

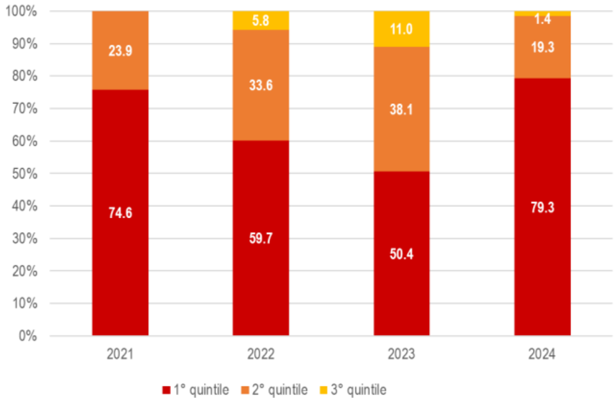
Figure 1 – *Household-based energy subsidies by type – Years 2021-2024 (euro and share of households).*



Source: Estimates based on Istat' microsimulation model FaMiMod.

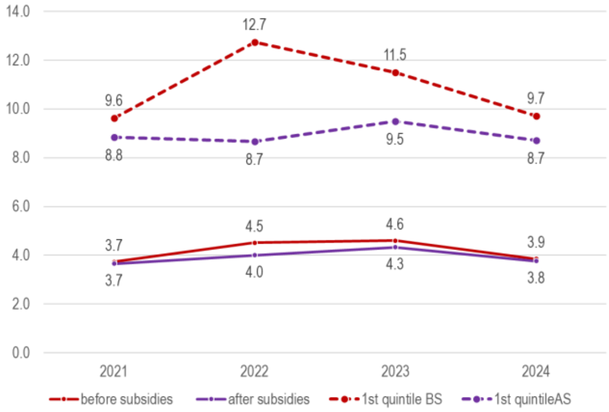
Energy subsidies target the poorest households. Over the 2021-2024 period, approximately 94% of beneficiary households belonged to the bottom two income quintiles, receiving more than 93% of the total subsidy expenditure (Figure 2). Starting from 2022, thanks to the increase in the ISEE threshold, among the beneficiaries we find a small share of households belonging to the central quintile (5.8% in 2022, 11.0% in 2023). This share decreased substantially in 2024, when the ISEE threshold has been set back to €9.530.

Figure 2 – *Household-based energy subsidies by disposable income quintile - Years 2021-2024 (composition).*



Source: Estimates based on the Istat'household microsimulation model (FaMiMod).

Figure 3 *Equivalent energy expenditure as a share of equivalent disposable income before and after energy subsidies – Years 2021-2024 (% of total household expenditure).*



Source: Estimates based on Istat' microsimulation model FaMiMod.

Energy subsidies helped offset the impact of rising energy prices on poor households. Figure 3 shows that, without the subsidies, the average share of equivalent energy expenditure over the first quintile household equivalent disposable income would have grown in 2022 up to 12.7%. Thanks to the generous bonus system in place that year, the share decreased to 8.7%, slightly lower than the share observed in 2021 (8.8%).

4. The impact of energy subsidies on energy poverty

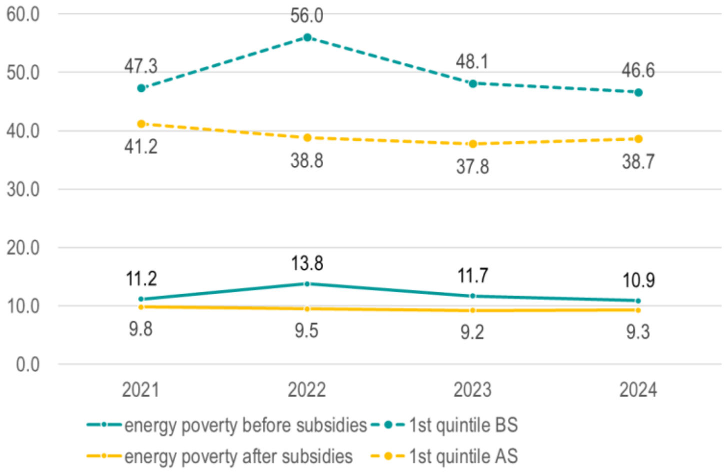
As explained in paragraph 2, to assess the impact of social bonuses between 2021 and 2024, we identify households in energy poverty according to two scenarios: one with bonuses (H_a) and one without (H_b). The latter was constructed by adding the estimated value of the bonuses to actual household expenditure. This provides an estimate of the energy expenditure the households would have incurred in the absence of such measures.

Simulation results show that in 2021, 11.2% of households in Italy were in energy poverty before social bonuses were paid (Figure 4). This percentage fell to 9.8% after the bonuses were received, a decrease of 0.4 percentage points. The impact of the bonus energy poverty reached a peak in 2022. With the rise in energy prices, the share of households in energy poverty before subsidies H_b increased to 13.8%. Yet, the amount of the bonuses was so high in 2022, that the resulting incidence of households in energy poverty after subsidies, 9.5%, is lower than the one observed in 2021. In 2023, 11.7% of households experienced energy poverty before subsidies. This figure decline to 9.2% afterwards (-2.5%). In 2024, social bonuses helped reduce energy poverty by 1.6 percentage points (from 10.9 to 9.3%).[9]

Households in the first quintile of the income distribution are more likely to be energy poor. In 2022 energy poverty before energy subsidies reached a peak of 56.0% among the poorest households, moving from the 47.3% observed in 2021. Again, energy subsidies helped off-setting the impact of the peak in energy prices. Without the social bonus measure, energy poverty would have increased by 8.7 p.p. Instead, once social bonuses are accounted for, the share of families experiencing energy poverty is lower in 2022 than in 2021 by 6 p.p. (41.2 vs 38.8%).

[9] The time series of energy poverty after social bonuses estimated in this work differs from the one provided by OIPE (OIPE, 2024). In particular, we observe a rather steady trend while OIPE's estimates show a sharp increase between 2022 and 2023 (from 7.7 to 9.0). Nevertheless, estimates are not comparable, refer to paragraph 2 for details.

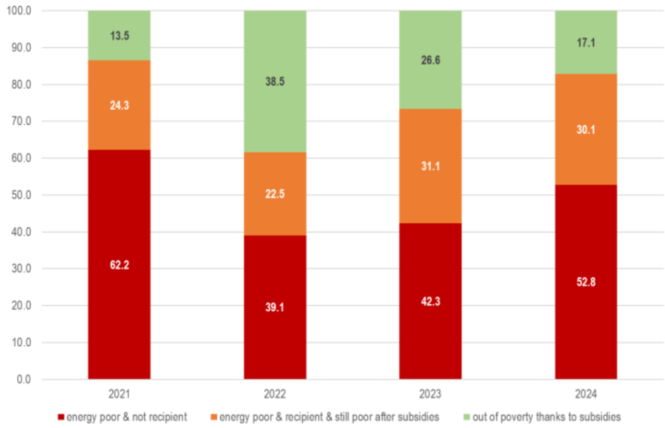
Figure 4 *Energy poverty before and after energy subsidies - Years 2021-2024 (% of households).*



Source: Estimates based on Istat' microsimulation model FaMiMod.

Focusing on households below the energy poverty threshold in 2021, 62.2% did not receive the bonuses, 24.3% received bonuses while remaining in energy poverty, and 13.5% escaped poverty thanks to the subsidies (Fig. 5). Target efficiency improved in 2022, when energy poor households not reached by the social bonus decreased to 39.1% and 38.5% of beneficiary households escaped energy poverty.

Figure 5 *Target efficiency of energy subsidies - Years 2021-2024 (composition).*



Source: Estimates based on Istat' microsimulation model FaMiMod.

In 2023, when the number of beneficiary households increased and the amount granted became less generous, we observe a rise in the share of households receiving the social bonus and yet remaining energy poor (31.1%). In 2024, more than one energy poor household out of 2 is not among the beneficiaries, and we observe the highest share of households receiving the bonus yet remaining poor.

An energy-poor family may not be eligible for the subsidy because it does not have a valid ISEE certificate, or an electricity account registered in the name of a family member (for example, the family's electricity account is registered in the name of the homeowner), or has an ISEE higher than the threshold to be eligible for the bonus.

The model allows studying subsidy effectiveness by breakdown variables such as household size, geographical and climate area. These more detailed analysis are a priority for future research.

5. Conclusions

Between 2021 and 2024, Italy’s reform of the social energy bonuses helped significantly containing the rise in energy poverty, particularly during the surge in energy prices in 2022. Using a Low Income High Costs (LIHC) approach and ISTAT's FaMiMod microsimulation model, we examined the effectiveness of these subsidies in reducing energy poverty.

The results confirm the role of subsidies in mitigating the impact of energy price shocks and their long-term effects on energy poverty. Without social bonuses, the proportion of households experiencing energy poverty would have increased significantly in 2022. However, the same year saw a proportion of energy-poor households after subsidies that was lower than that observed in 2021, which more than offset the impact of rising energy prices. A fairly large mitigating effect was also observed in 2023.

Overall, the social energy bonus system has been effective in mitigating the impact of rising energy costs on household welfare. In terms of targeting efficiency the largest proportion of households lifted out of energy poverty thanks to the bonuses is observed in 2022. Enhancing the targeting mechanisms could improve the system's effectiveness in reducing energy poverty.

Appendix

The ISTAT’s Microsimulation Model: FaMiMod is based on administrative data from the Ministry of Finance, matched to ISTAT survey data from EU-SILC.

Although the model is static, it is regularly updated to the most recent year by: 1) projecting monetary variables forward using either National Accounts or MeMo-It forecasts; 2) reweighting the survey sample based on the most recent populations breakdown by age, sex, and employment status (i.e. employed, dependent, self-employed or unemployed), and 3) updating the model's legislative framework to ensure the baseline accurately reflects current legislation. Once updated, the model can simulate the effects of new policies by comparing income level and income distribution under different scenarios (baseline vs reform or alternative scenario). For more details see https://www.istat.it/it/files//2015/10/rsu_2_2015.pdf.

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Elisabetta SEGRE, Istat, elisabetta.segre@istat.it
Paola TANDA, Istat, paola.tanda@istat.it