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INTEGRATING THE ECONOMIC, SOCIAL AND CLIMATE TRANSITION IN SICILY

POLICY BRIEFING
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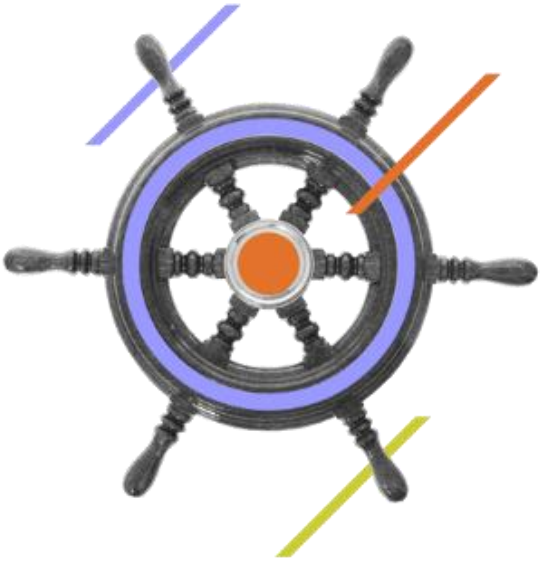

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EXECUTIVE SUMMARY

Addressing the climate crisis requires overcoming the current political and social fragmentation through **the design and implementation of inclusive and redistributive climate policies, capable of building broad public support** and ensuring that different social groups benefit from the opportunities these policies provide. In this regard, public action should adopt, as much as possible, **a people- and place-based approach**, taking into account the specific social, economic, territorial, and climatic conditions in which policies are implemented. This is essential to maximise their effectiveness not only in terms of emissions reductions, but also in terms of socioeconomic benefits.

In line with this objective, this study analyses **the impact of public incentives for energy efficiency in Sicily, examining whether they have had a redistributive effect and whether they have been aligned with the economic and energy needs of the population**.

We focus on Sicily due to its distinctive economic, social, and climatic context, which makes it a case study of particular interest that can be extended to other Mediterranean regions. Sicily is characterised by socioeconomic conditions that differ significantly from those of Central and Northern Italy, as well as by a building stock that offers substantial potential for improvement in terms of energy efficiency. These elements make the region especially relevant for analysing and designing public policies aimed at improving energy efficiency in the residential sector. At the same time, favourable climatic conditions can facilitate the implementation of certain interventions, reducing their costs compared to other contexts.

Specifically, given these socioeconomic and climatic differences, we argue that Sicily represents an appropriate case study for assessing the potential for electrification of residential heating. **We therefore complement the analysis of incentives with a study on the technical and economic feasibility of electrification**. Indeed, the island's climate, predominantly warm and dry across much of the territory, represents an advantage for the deployment of technologies such as heat pumps, helping to contain installation and operating costs and making the process of electrification relatively more affordable both at the regional level and for individual households compared to colder regions.

In addition to these two quantitative analyses, the study includes **a direct and in-depth exploration of the needs of the Sicilian population with respect to energy efficiency**. Through a questionnaire submitted to a representative sample of the population, we examine how incentives such as *Ecobonus* have been perceived, who has been able to benefit from them, and who has instead been excluded[1].

With regard to the first impact analysis, we find that at the national level **the use of energy efficiency incentives such as *Ecobonus* has been concentrated in high-income regions with colder climates, namely in Central and Northern Italy**. *Ecobonus* has therefore, properly, favoured areas with greater potential for reduction of energy consumption and higher heating costs. However, beyond being regressive in nature (as we will show later in the study), this measure has in practice excluded areas of the country where electrification would already be within reach, such as Sicily. In a national context in which energy taxation penalises electricity and there is simultaneously a need to reduce households' energy costs, it is crucial that policies are able to intervene where electrification of energy consumption is easier to achieve. More specifically, our results show that the allocation of *Ecobonus* funds

[1]The questionnaire was designed on the basis of the results of the impact analysis on incentives and was conducted prior to the analysis of electrification potential.

per capita, per building, and adjusted for regional GDP has been particularly pronounced in regions where **these instruments could exploit the highest potential for reducing energy consumption and costs** (high income levels and colder climates). By contrast, **in southern regions, incentives have been far less attractive for households, both due to lower heating needs and to more limited economic capacity**.

As a result, existing policies have failed to harness the greater electrification potential of these regions, highlighting the need for targeted policy measures tailored to these territories. This pattern is observed not only at the national level: even within Sicily, wealthier municipalities have been able to attract significantly more public funding than poorer ones. To sum up:

- Sicily received **50% less *Ecobonus* funding compared to the national average**.
- Energy savings achieved in Sicily accounted for only 2.3% of the national total in 2023 and 1.8% in 2024. Energy savings per euro invested were 55% lower than the national average and resulted in a **limited impact in terms of emissions reductions.**
- The allocation of FESR funds across Sicilian municipalities shows greater attention to the energy and social needs of the population, although there is a persistent tendency to favour wealthier municipalities. **These received around 50% of total funds, compared to only 10% allocated to the lowest-income municipalities**.

This gap is further exacerbated by the lack of policies tailored to the social and economic conditions of these regions. Indeed, survey results reveal that only 20% of respondents tried to access incentives such as *Ecobonus*, and only half of them were successful. **Among the most frequently reported barriers to accessing these incentives, high upfront costs and the lack of technical support emerge as the most significant.**

These results are consistent with the estimated electrification potential and help to interpret its territorial implications:

- **In warmer climate zones, we estimate that the electrification process is already highly cost-effective**. The adoption of technologies such as air-to-air heat pumps allows decarbonisation targets to be achieved while minimising required investment costs. **These areas (climate zones A, B, and C) are also the most densely populated in Sicily, making such interventions potentially relevant at scale**.
- By contrast, **in colder climate zones**, electrification requires a more **gradual** approach and a diversified technology portfolio. In particular, **air-to-water heat pumps become optimal solutions when combined with building retrofit interventions aimed at reducing thermal demand**.
- Finally, the electrification process in Sicily could be further facilitated by the expansion of renewable energy production, particularly solar and wind, two resources that are widely available across the region.

Overall, **the results suggest that uniform policies such as *Ecobonus* tend to favour wealthier and colder contexts, while an effective decarbonisation strategy requires differentiated measures that are consistent with the climatic, social, and economic characteristics of different areas**. This conclusion is reinforced by one of the key findings from our survey, which shows that **citizens are supportive of policies that prioritise the needs of lower-income and more vulnerable groups, while opposing those perceived as unfair and costly**.

In light of these findings, **we recommend maintaining *Ecobonus* in its current tax deduction form, given its effectiveness in high-income and colder areas (Northern Italy), where deep renovation interventions are often required**. We also argue that this incentive should evolve beyond the sole objective of energy efficiency and **explicitly incorporate decarbonisation goals through the electrification of energy consumption**, ensuring a simultaneous reduction in energy use and emissions.

In regions with a high prevalence of warm climate zones (mainly southern Italy and the Islands), lower heating needs reduce the effectiveness of *Ecobonus*. In these contexts, **policy interventions should instead leverage the higher electrification potential through incentive schemes that support households, especially low-income ones**:

- In the purchase of high-efficiency heat pumps for those in warm climate zones (A, B, and C);
- In house renovations combined with the replacement of traditional fossil-fuel heating systems with electric technologies (air-to-water heat pumps) in colder zones (D, E, F).

This approach can contribute to reducing energy consumption and, consequently, household energy bills, making these policies more attractive and socially supported. Currently, in Sicily, gas expenditures account for a significant share of the income of an average household, rising sharply in colder areas, **where 6–7% of annual income is spent on gas alone**. When electricity costs are also taken into account, in climate zones D and E total energy expenditures **amount to around 10%** of household income for an average family, exposing a large share of the population to conditions of energy poverty.

A systematic electrification process, starting from areas with the highest potential, can be achieved through a reform of the current fiscal system. Indeed, **ECCO shows that in Italy the tax regime penalises electricity more heavily than fossil fuels**[2]. As a result, **despite an average reduction in energy consumption of around 80% achieved through the adoption of heat pumps, the effective reduction in energy bills amounts to only 40%.** Correcting this imbalance by lowering electricity taxation would make electrification **economically attractive and ensure a substantial reduction in energy costs and household bills**. Integrating such a fiscal reform **with policies that promote the uptake of high-efficiency appliances** could represent a powerful lever for accelerating electrification and reducing emissions. Moreover, this approach would shorten investment payback periods, strengthen incentives for private investment, and **consequently reduce the need for public subsidies**, which could then be more effectively reallocated to address social needs and support vulnerable groups.

Compensatory measures such as the ***Bonus Sociale Gas* should be considered temporary instruments and accompanied by other incentives that actively promote electrification**. On its own, the bonus does not contribute either to emissions reductions or to improvements in building energy performance. As a consequence, the current decision by the Italian government to allocate a significant share of the Social Climate Fund resources to this measure appears difficult to justify.

Furthermore, the regressive nature of existing incentive schemes, which **automatically exclude individuals who are unable to bear the upfront costs of energy efficiency interventions**, **calls for the adoption of policies that are better calibrated to the needs of these groups.** For instance, in areas where building **retrofits** are necessary to improve the

[2] Source ECCO: Tassazione energetica e sussidi fossili

efficiency of heat pumps (in Sicily, climate zones D, E, and F), an incentive system aligned with the local economic context would facilitate access for households most in need. Examples of redistributive incentives that could ensure broader and more equitable access to resources include:

- Direct grants to low-income households, combined with purchase incentives or discounts to support the diffusion of high-efficiency technologies;
- low-interest loans;
- local revolving funds;
- fiscal reform aimed at reducing the tax burden on electricity and incentivising its uptake;
- simplification of administrative procedures and provision of technical assistance;
- ensuring transparent allocation of resources.

INTRODUCTION

Addressing the climate crisis in today's world means navigating a context marked by growing political and social fragmentation, where climate action is often relegated to polarised debates and public distrust towards institutions is rising. In such a context, **there is an urgent need to build new meaning and consensus around the ecological transition, making climate policies a concrete lever to improve people's everyday lives**. Without this, climate policies risk becoming a source of conflict rather than an opportunity for economic and social development.

ECCO's People-Based Transition project was created to bridge this divide, offering a methodological framework, the "Social Taxonomy", to propose **redistributive climate policies intrinsically connected with the needs of the people, the territories in which they live, and their everyday lives.** The Taxonomy aims to systematically highlight the differences between social groups within the Italian population and identify gaps and opportunities for redistributive, effective, inclusive and politically acceptable policies. **In this way, the transition is presented as an opportunity to renew the social and democratic contract between institutions and citizens.**

This policy brief applies the *People-Based Transition* approach to Sicily. Using a data-driven methodology combined with a survey to the local population, the study assesses whether **public incentives for energy efficiency interventions have been allocated efficiently, that is, targeted at situations of greatest need, and therefore fairly, by responding to the needs of low- and middle-income households**.

The analysis is structured into three main sections:

1. **A first quantitative assessment** of the impacts of public funding and its distribution in Sicily compared to the rest of Italy.
2. **An estimate of the technical and economic feasibility of the electrification of residential energy consumption**, and its potential social benefits.
3. Finally, **a survey-based exploration of citizens' direct experiences**, the barriers they face in accessing public funds, the socioeconomic factors shaping these obstacles, and public attitudes and preferences towards climate policies in the transport and residential sectors.

This qualitative perspective allows us to identify not only the critical issues in policy implementation, but also the social dynamics and preferences that should inform the design of more effective and inclusive interventions.

We show that public incentives have been unevenly distributed compared to other regions, **reflecting the lower effectiveness of these schemes in southern Italy**, due to milder climatic conditions and lower economic resources relative to other parts of the country. At the same time, precisely because of Sicily's climatic context, **the electrification of residential heating systems emerges as an optimal option for minimising investment costs, reducing energy bills, and simultaneously achieving decarbonisation objectives**.

Finally, based on our findings, we propose policies that take into account Sicily's social, economic, and climatic context, that not only promote electrification but are also inclusive and effective, supporting the energy transition while ensuring that public resources are spent equitably. These recommendations can help bridge existing gaps and accelerate the transition in Sicily and in other Mediterranean regions with similar social, territorial, and climatic conditions.

RESEARCH CONTEXT

Sicily is the largest island in the Mediterranean, with roughly 5 million inhabitants, and is a particularly central region in Italy. Its economy accounts for 5% of national GDP and is mainly driven by the services sector (78% of GDP), followed by industry, building and agriculture (respectively, 11%, 6% and 5% of GDP)[3]. Tourism is also particularly relevant for the island's economy.

Compared to the rest of Italy, particularly the centre and north, Sicily has one of the lowest regional GDPs per capita. Indeed, low industrialisation, reliance on agriculture and services and a high unemployment rate (14%) represent great barriers to the islands' economic growth[4]. The distribution of household income is particularly unequal both in comparison with the rest of Italy (**Figure 1**) and within the island itself (**Figure 2**), with low-income households concentrated in rural areas, while coastal cities tend to have higher income classes. Persistent structural vulnerabilities, inadequate infrastructure, the isolation of rural areas and governance gaps are all barriers to the adoption and effective implementation of climate policies[5].

In this study, **we examine these critical issues, with particular attention to the allocation of incentives such as *Ecobonus* for energy efficiency in the residential sector and their socioeconomic impacts**. In addition, we assess **the potential for electrifying residential energy consumption**, taking into account the island's different climate zones, an option that could significantly reduce households' gas expenditure.

Given this context, our work aims to answer the following research questions:

1. What are the socio-economic impacts of national public incentives schemes for energy efficiency on Sicilian middle and low-income households and municipalities?
2. Are public funds for energy efficiency allocated equitably and efficiently in Sicily? i.e., according to the income levels and energy needs of Sicilian municipalities?
3. To what extent have these incentives contributed to energy savings and emissions reductions?
4. What other measures and adjustments to current policies are necessary to address the specific needs of middle and low-income municipalities and households?
5. What is the technical and economic potential for electrification in Sicily? Why can electrification reduce household energy costs, and which policies could effectively support this process?

INCOME DISTRIBUTION, ENERGY NEEDS AND CO2 EMISSIONS

Italy is characterised by significant geographical inequality, with wealth and economic resources heavily concentrated in the northern and central areas. This geographical heterogeneity is particularly evident from income distribution. **Figure 1** displays the quintiles of income per number of households, i.e., *Household Income*, across Italian municipalities: the top quintiles are mostly spread in the north and centre of Italy, while the municipalities of the south and the islands are mostly composed of lower-income households[6].

[3] Source: Regione Sicilia Documento economico Finanziario regionale (2024)
[4] Source: Sole 24 Ore, Sicily, the economy grows but remains fragile
[5] Source: IPCC, AR6 WGIII: Chapter 13: National and sub-national policies and institutions
[6] Data Source: ISTAT Income

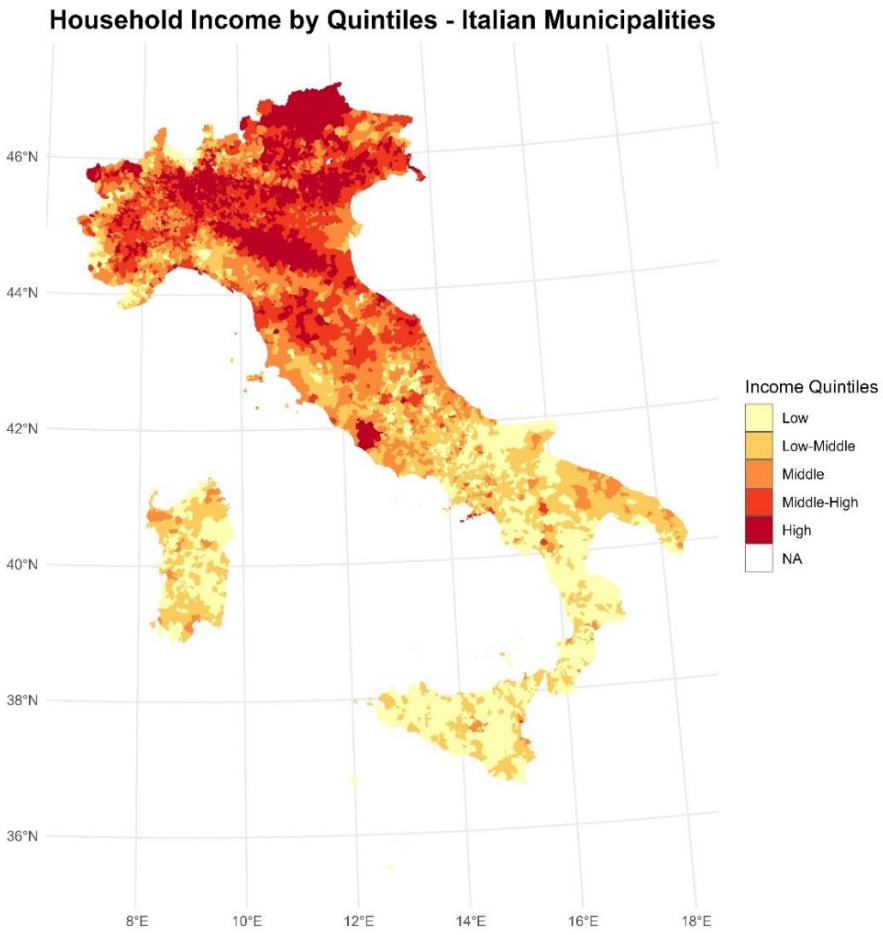

Figure 1 - *Income quintiles distribution of Italian Municipalities. The darker the colour, the higher the income class. ECCO's own elaboration based on ISTAT data.*

Moreover, according to the new report by the Italian National Statistical Agency (ISTAT), in 2024 households living in absolute poverty in Italy account for 8.4%, a share that increases significantly in the south, where it reaches 10% of total households. In the two main Italian islands (Sicily and Sardinia), the share rises to 11.2%[7].

There is also a significant share of Italian families – around 9%- living in **energy poverty** conditions, meaning that a great proportion of their income is devoted to energy spending, or that they cannot afford to properly heat their house. **In Sicily, the share of households in energy poverty rises to 14,4%,** among the highest in Italy after Puglia, Molise and Calabria[8].

Within the Sicilian region, the distribution of household income (**Figure 2**) again highlights a widespread heterogeneity, with low-income municipalities concentrated in the centre and southwest part of the island[9]. **However, relative to the national income distribution, even the high-income quintile in Sicily remains lower than the high-income quintile in the north.**

[7] Source: ISTAT. Link: Poverty in Italy 2024 and Poverty Tables 2024
[8] All data on energy poverty are sourced from OIPE (2024), the Italian Observatory on energy poverty.
[9] The quintiles are computed within the region, so a high-income municipality in Sicily is not directly comparable to a high-income municipality in other regions.

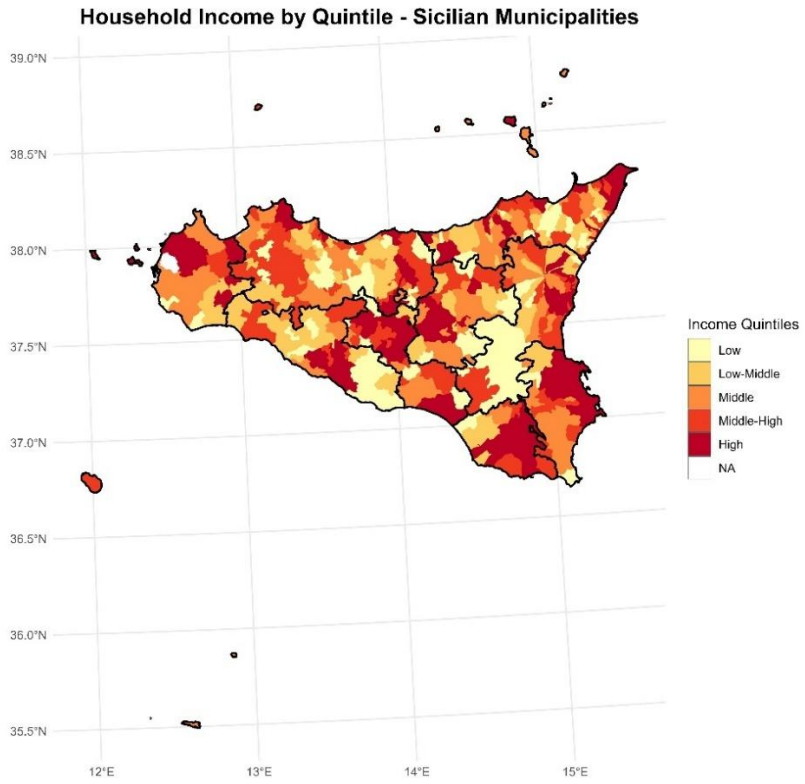

Figure 2 – *Per-capita Income quintiles distribution of Sicilian Municipalities. The darker the colour, the higher the income class. ECCO's own elaboration based on ISTAT data.*

Given the focus of the analysis, we also examine Sicily's **energy needs**. Data are obtained from the ACE model developed by the Politecnico di Milano[10], which estimates residential energy needs for different building typologies across the Italian territory. The estimates are based on heating degree days, defined as the annual sum of the positive difference between indoor and outdoor temperatures. Higher heating degree day values correspond to higher energy demand.

Building on these data, we present municipal-level energy needs for three housing categories: single-family dwellings, multi-family buildings with individual heating systems, and multi-family buildings with centralised heating systems.

Energy needs are expressed in **MWh/year** and normalised by the average floor area of the different housing typologies (in square metres), as estimated by the Politecnico di Milano using elaborations based on ISTAT data.

Figure 3 displays the **quintiles of energy needs** for each housing typology at the municipal level. In Sicily, the highest values are mainly concentrated in the island's **inland areas**, which correspond to colder and more mountainous climate zones, **namely zones D, E, and F**. Warmer climate zones (**A, B, and C**), mainly coastal areas, are instead characterised by lower energy needs.

Finally, regarding carbon emissions, in 2022, emissions per capita in Sicily were 6.58 tCO_2eq, slightly below the national average of 6.7. Sicily also has the lowest amount of CO_2 emissions per capita in the building sector compared to other regions (0.4 tCO_2eq pc against the

[10] Pozzi, M., Muliere, G., Fattori, F., & Motta, M. (2026). Per una EPBD sulla giusta strada verso la decarbonizzazione. *QUALENERGIA SCIENCE*, *2*, 61-70.

national average of 1,12 tCO_2eq pc). This is due to the particularly mild climate, which considerably lowers heating consumption.

However, the energy efficiency of Sicilian buildings remains low and significantly below the national average, with only 7% of buildings meeting high energy class[11]. Moreover, Sicily has one of the highest shares of illegal settlements, about 48% of the total number of buildings[12].

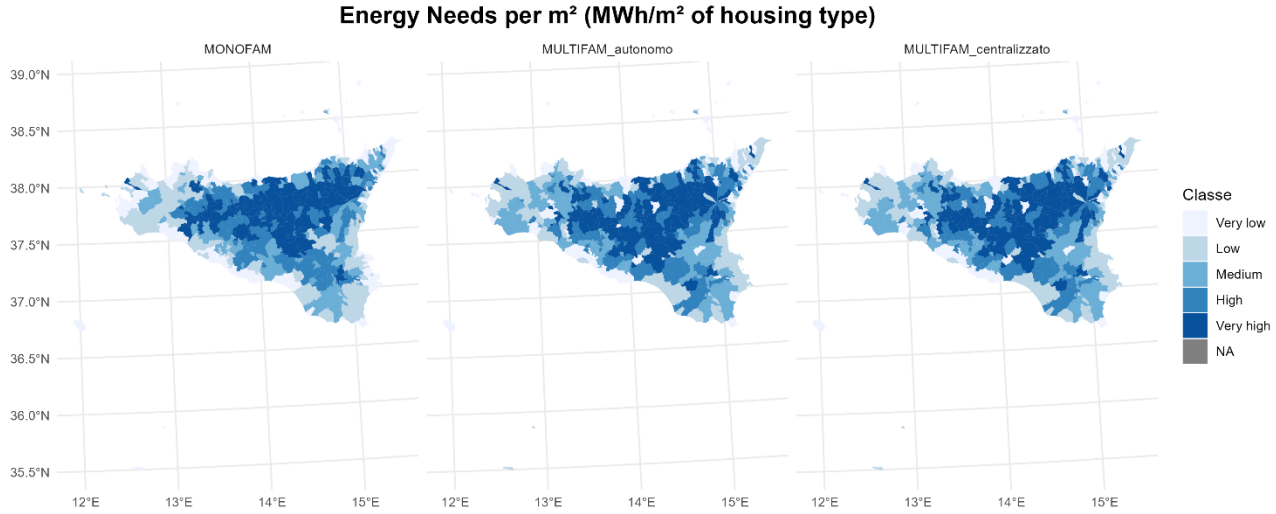

Figure 3 - *Energy Needs by Sicilian Municipalities for different types of buildings ("MONOFAM" stands for independent houses; "MULTIFAM autonomo" stands for houses in condominiums with their own heating systems; "MULTIFAM centralizzato" stands for houses in condominiums with centralised heating systems). The darker the colour, the higher the energy needs. ECCO's own elaboration based on data from Politecnico di Milano.*

[11] All data on emissions and energy class of buildings is sourced from CIRO – DATABASE
[12] Source: Cresme (Centro ricerche economiche sociologiche e di mercato nell'edilizia) e Istat "Rapporto Bes (benessere equo e sostenibile) 2024".

ENERGY EFFICIENCY INCENTIVE SCHEMES IN ITALY

The building sector is one of the most polluting sectors in Italy and therefore requires significant emissions reductions. According to ECCO's report on the NECP, it accounts for 20% of national energy-related GHG emissions and requires a 42% cut of emissions under the NECP compared to 2005.

Public incentives to promote energy efficiency renovations date back to 2007, when *Ecobonus* was initially established under Law 296/2006. Since then, *Ecobonus* has been periodically updated and modified.

Ecobonus is a tax-deduction incentive, meaning that it reduces taxable income following investment in energy efficiency interventions. As of 2025, it provides a 50% tax deduction for energy efficiency renovations on primary residences (for secondary homes, the deduction is reduced to 36%). This incentive is used by public entities, SMEs and private citizens for various energy efficiency interventions, including insulation, heating system upgrades and renewable energy installations. According to ENEA's report on energy public incentives, in 2023 *Ecobonus* induced a total of 1,700 GWh of energy savings, 82% of which came from residential buildings[13].

During the 2020 pandemic, the Italian Government launched Superbonus 110% via the Relaunch Decree ("Decreto Rilancio", Law 77/2020) as a measure to stimulate the economy. The incentive provided a 110% tax deduction for qualifying energy efficiency and seismic risk reduction interventions. Unlike *Ecobonus*, ***Superbonus* initially allowed the transfer of tax credits to contractors or financial institutions, enabling immediate access to funds**[14]. However, this led to an inflation in construction costs due to an increase in demand and fraudulent practices (such as requiring the transfer for inflated or non-existing projects), ultimately making the measure too costly for the state and resulting in the removal of this mechanism. The incentive was then adjusted to a tax-deduction regime like *Ecobonus*: the 110% deduction rate was applicable until 2023, decreasing to 90% in 2024, with further reductions anticipated in subsequent years. The incentive was officially removed in 2026.

As of September 2025, more than 500,000 residential buildings have been renovated under *Superbonus* (around 5.7% of occupied residential buildings[15]), for a total of €122 billion invested[16]. When it was first launched, the agency of the Italian National Recovery and Resilience Plan estimated that the programme would achieve around 191 Ktep/year of energy savings and reduce greenhouse gas emissions by about 667 KtonCo2/year[17].

Recent work by ECCO has analysed the structural problems associated with incentive schemes. Firstly, the Italian building stock is very old (68% of buildings are more than 45 years old) and characterised by high energy consumption. Its renovation would require €650 billion in investments between 2022 and 2050, far exceeding the resources currently provided by existing policies. Secondly, current incentives are inefficient in ensuring real energy savings and supporting long-term planning, often functioning as emergency tools – particularly Superbonus – rather than as structural and permanent instruments. Notably,

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[13] Source: ENEA (Natioanl Agency For New Tecnologies, Energy And Sustainable Development). Link: Rapporto Annuale detrazioni fiscali efficienza energetica | ENEA 2025

[14] Source: Italian-Superbonus-BRIEFING

[15] In Italy, there are 12 mln residential buildings (source: ENEA) of which approximately 70% (8,7 mln) is occupied (source: ISTAT Abitazioni). 500,000 buildings renovated under *Superbonus* correspond to 5,7% of the 8,7 mln occupied residential buildings.

[16] Source: Superbonus ENEA

[17] Source: Strengthening the Ecobonus for energy efficiency - Italia Domani

Superbonus was very costly while contributing only marginally to emissions reductions. Moreover, both *Ecobonus* and *Superbonus* automatically exclude renters (20% of Italian families) from accessing funds, and do not consider fairness along the supply chain or the safety of workers[18].

All things considered, ECCO emphasises the need to link incentives to actual energy performance improvements, not just to costs, therefore enhancing efficiency in public spending**Errore. Il segnalibro non è definito.**. In this paper, we also underscore the need for a redistributive allocation of public resources, with particular attention to lower-income households and municipalities. Indeed, incentive schemes must ensure that all households, not only wealthy ones, can afford renovations. This calls for complementary tools like low-interest loans, revolving funds and targeted grants for vulnerable groups. All the required improvements to these schemes would align Italy's building stock with the EU EPBD Directive, which calls for predictable, long-term policies for building renovation[19]. We also believe that electrification has a great potential in regions with a milder climate, such as Sicily, which can easily substitute gas consumption with electricity. Therefore, we propose incentives for electrification via a fiscal reform that adjusts the current electricity taxation. This would guarantee a reduction in final energy consumption and in the costs of energy bills for households, with significant social benefits, resulting in a more appealing policy for southern regions than current incentive schemes.

THE ALLOCATION OF ECOBONUS FUNDS

As a first exploratory analysis, we study the allocation of *Ecobonus* Incentive across Italian regions. We gathered ENEA data on the amount of funds and the number of interventions in residential buildings for each region in 2023 and 2024[20].

Figure 4 shows, on the left side, the allocation of *Ecobonus* funds over the number of households in each region (EUR invested per family), while, on the right side, the share of funds relative to regional GDP. The normalised values of both indicators are divided into quintiles: the first quintile corresponds to a "Very Low" amount of funds per family/regional GDP, up to a "Very High" allocation per family/regional GDP. Similarly, **Figure 5** (in Annex I) displays the allocation over the total number of buildings (EUR invested per building).

As shown in the maps, the northern regions of Italy received a higher share of funds per capita, while the southern ones mostly fall within the bottom quintiles ("Very low" and "Low"). When we scale the funds by the economic capacity, proxied by regional GDP, a slightly more equitable picture emerges. Nevertheless, southern regions still appear to be mostly excluded from the scheme[21].

Compared to the national average, Sicily received 50% less *Ecobonus* funding per household (75% less in 2024), with similar gaps observed when funding is measured per

[18] Source: ECCO - PNIEC: Progress Report 2025

[19] Under the EPBD Directive, Italy was required to submit a draft of the National Building Renovation Plan to the European Commission by 31 December 2025; however, this deadline was not met, leading the Commission to launch an infringement procedure in March 2026. Source: Il Sole 24 ORE

[20] ENEA's 2025 data are still not available. For the sake of space, we only insert 2023 figures (2024 figures are very similar and provide no additional information).

[21] This apparent equity may be influenced by the particularly low GDP in some southern regions, which can artificially inflate the value of this indicator. The opposite stands for higher income regions such as Lazio or Trentino-Alto-Adige.

number of building. In terms of the share of funds relative to regional GDP, Sicily received 24% less (*60% less in 2024*) *Ecobonus* funding than the national average.

With regard to the second research question, **we find that the allocation of *Ecobonus* incentives in Sicily has been consistently lower than in other Italian regions when benchmarked against population size, number of buildings, and regional GDP.** It is not surprising that this energy efficiency mechanism has been primarily directed towards Northern Italy, where energy consumption levels are higher and intervention costs are greater. However, this approach has excluded areas such as Sicily, where a reform of energy taxation could unlock the resources needed to finance low-cost building energy efficiency policies while significantly reducing energy costs for the most vulnerable households.

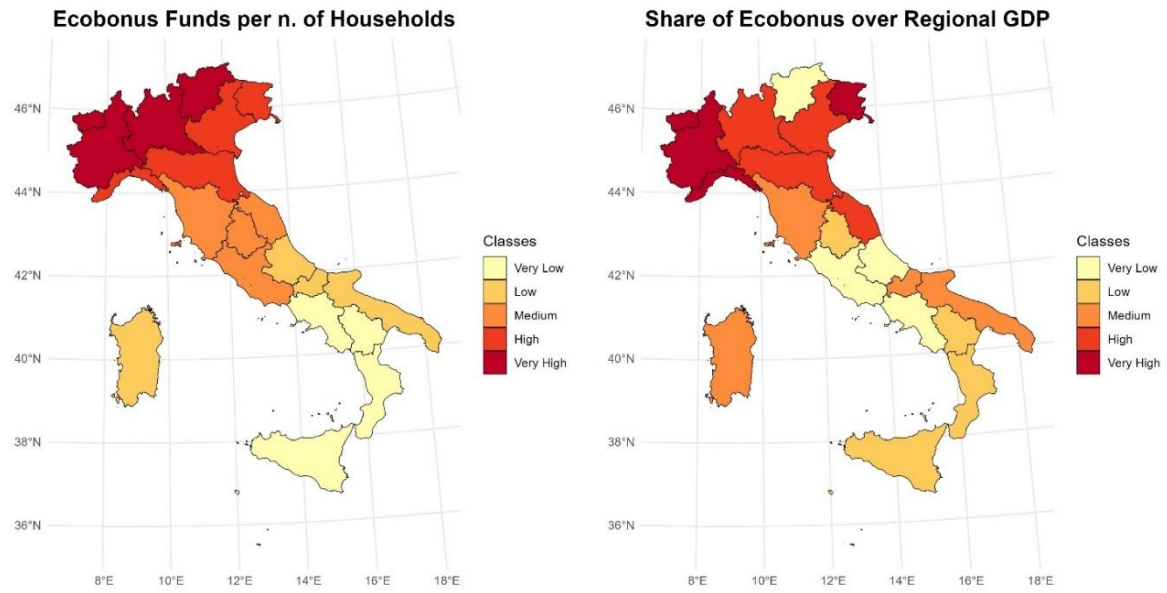


Figure 4 - *The amount (in EUR) of Ecobonus funds over the number of households (on the left) and over the regional GDP (on the right). The darker the colour, the higher the amount of funds per capita or per GDP. ECCO's own elaboration based on data by ENEA and ISTAT.*

Box 1: The case of the Superbonus

We also analyse the Superbonus allocation, showing in **Figure 6** the funds per capita (left side) and the funds over regional GDP (right side).
The allocation appears more evenly distributed across regions compared to the Ecobonus, with several southern regions, such as Basilicata, ranking among the highest recipients. However, **this pattern is difficult to interpret.** On the one hand, it may reflect the original design of Superbonus characterised by a direct access to credit, thereby removing a key barrier that particularly affects lower-income groups in a tax-deduction scheme such as the Ecobonus. On the other hand, it may also be influenced by the fraudulent activities associated with Superbonus mentioned earlier, which could have inflated the values.
Sicily received a lower allocation even under this scheme: **36% less Superbonus funds per number of households and 10% less funds over GDP compared to the national mean.**

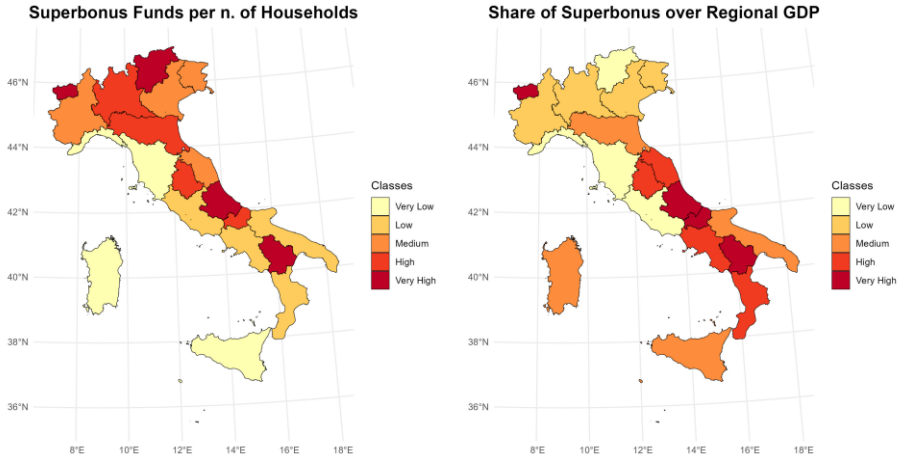


Figure 6 - *The amount (in EUR) of Superbonus funds over the number of households (on the left) and over the regional GDP (on the right). ECCO's own elaboration based on data by ENEA and ISTAT.*

ENERGY SAVINGS FROM ECOBONUS FUNDS

Regarding the efficiency of fund allocation, i.e., the energy savings achieved through the use of funds, we refer to ENEA's data on the 2023 and 2024 *Ecobonus* energy savings[22]. Similar data exist for *Superbonus*, but unlike *Ecobonus* they are not standardised, making their collection challenging and limiting comparability across regions. For this reason, we focus exclusively on *Ecobonus* estimates on energy savings.

The graph on the left in **Figure 7** illustrates the proportion of national energy savings attributed to each Italian region. In the case of Sicily, its energy savings account for 2.35% in 2023 and 1.8% in 2024 of the national total. The graph on the right shows the amount of energy savings per number of buildings (GWh per building). Here too, we notice a persistent disparity in regional outcomes, with northern regions benefitting the most in terms of savings compared to southern ones.

[22] Source: ENEA Rapporto Annuale sull'Efficienza Energetica 2025

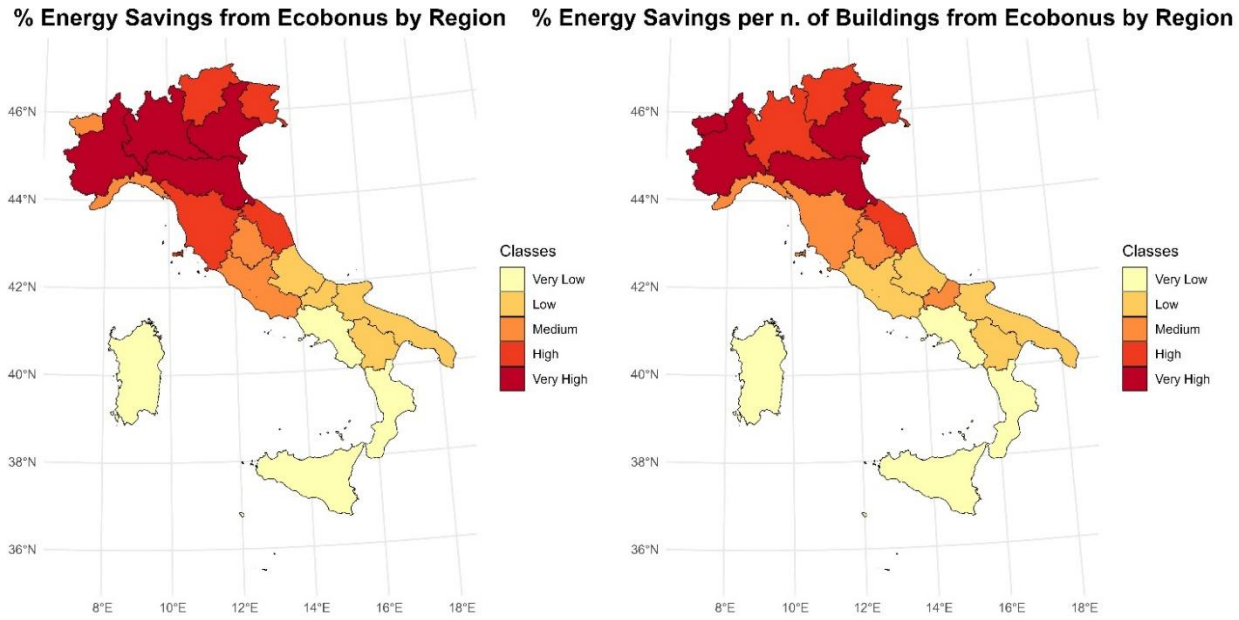


Figure 7 - *Graph on the left: share of energy savings from Ecobonus projects over the national total. Graph of the right: share of energy savings per number of buildings. ECCO's own elaboration based on ENEA and ISTAT data.*

To further illustrate this point, we computed an indicator that accounts for both the efficiency and equity of *Ecobonus* fund allocation. Specifically, we computed the share of energy savings (in GWh) over the invested funds (in million EUR) scaled by regional GDP per capita, thereby deriving energy efficiency per EUR of funds, corrected for the regional economy. The higher the indicator, the more the region has achieved energy savings per euro spent, considered its economic capacity. The results are displayed in **Figure 8**.

In Sicily, energy savings per euro spent, adjusted for regional GDP, are 55% lower (in both 2023 and 2024) than the national average, indicating that *Ecobonus* resources could have been more effectively invested to further reduce energy consumption and generate higher energy savings per euro spent, as observed in other regions.

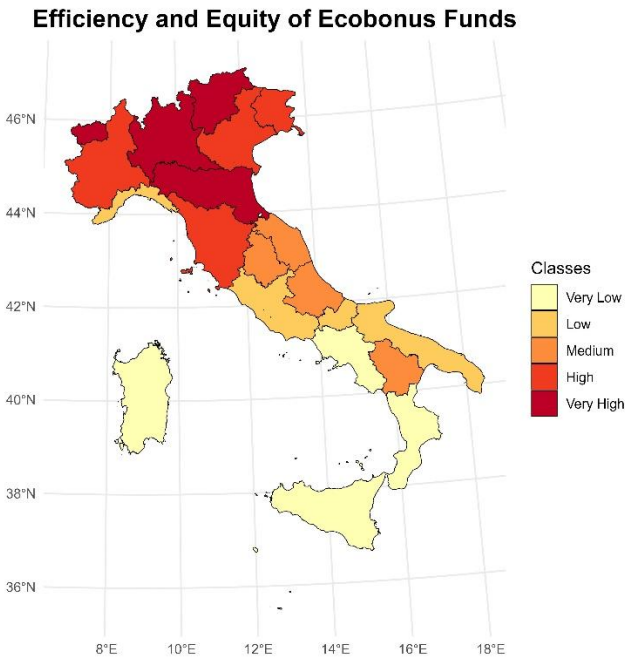


Figure 8 - *Share of energy savings over the amount invested from Ecobonus projects corrected by regional GDP per capita. The darker the colours, the higher the indicator (more efficiency and equity in funds allocation). ECCO's own elaboration based on ENEA, TERNA and ISTAT data.*

ECOBONUS AND CLIMATE OBJECTIVES

We now assess whether the energy savings achieved through *Ecobonus* are consistent with the national target set in the National Energy and Climate Plan (NECP) and the emissions reduction objectives under the NECP and the Fit for 55 Package.

According to ENEA estimates, *Ecobonus* generated a total of 115 GWh of energy savings in Sicily in 2022 and 2023 (respectively, 75.3 and 39.9), with €554 million of funds invested.

Under the NECP, energy efficiency incentives in Italy are expected to achieve a total of 32.5 Mtep of energy savings by 2030, to align with the EU objective of 55% emissions reduction. By 2023, this value corresponds to 4,16 Mtep[23].

Considering that Sicily represents 5.1% of the Italian energy mix, as an approximation, we can say that energy efficiency incentives should provide energy savings of: 1.65 Mtep in Sicily by 2030, and of 0.2 Mtep in 2023.

Given that 115.2 GWh corresponds to 0.01 Mtep, between 2022 and 2023 ***Ecobonus* funds in Sicily covered 5% of the 2023 regional target and 0.6% of the 2030 regional target.**

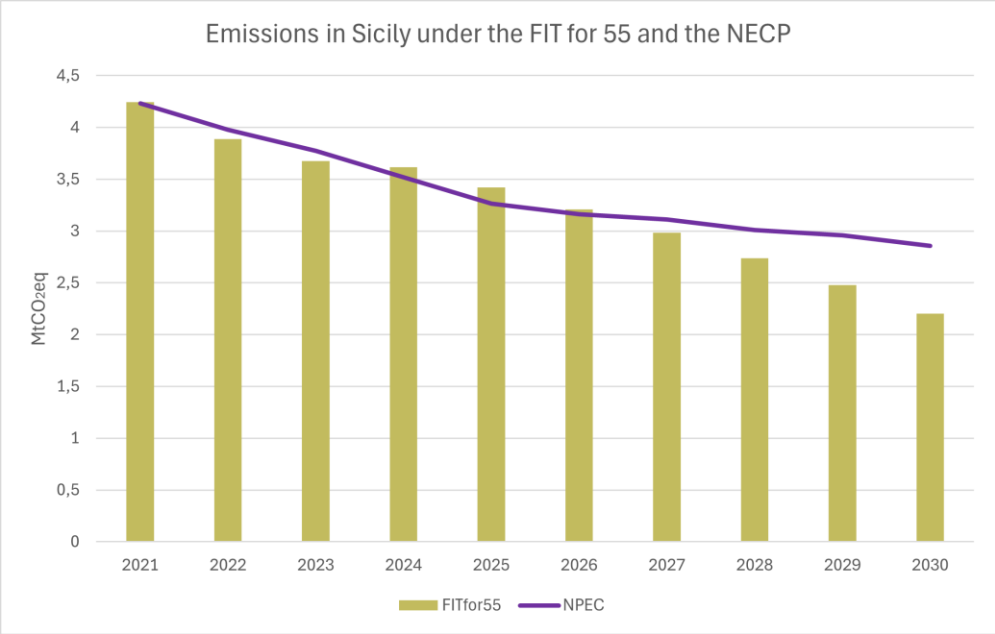
We also compute the avoided emissions attributable to Ecobonus. Assuming that 1 MWh of electricity produces 0.4tCO_2[24], it follows that:

- In Italy, *Ecobonus* avoided 1.5 MtCO_2eq by 2023.
- In Sicily, 0.05 MtCO_2eq.

We compare these values with ECCO's own scenario on emissions reductions under the Fit for 55 package and under the Italian NECP in the building sector[25]. Graph 1 below shows the

[23] Source: Monitoring Platform of the Italian National NECP. Link: Monitoraggio
[24] We refer to the European guidelines that provides the conversion rate from MWh to tCO_2 for each European country. In Italy, it is 0.483tCO_2/MWh (source: Covenant of Mayors for Climate and Energy)
[25] Source: PNIEC - ECCO

two scenarios adapted for the case of Sicily, highlighting the lower level of ambition of the NECP compared to the Fit for 55 package.



Graph 1 - *The emissions trajectory in Sicily under the Fit for 55 and the NECP scenarios. ECCO's own elaboration.*

In Sicily, emissions avoided thanks to *Ecobonus* accounted for 1.3% of emissions from the building sector in 2023, under both scenarios considered. By 2030, avoided emissions represent 2.1% of building-sector emissions under the Fit for 55 scenario and 1.6% under the PNIEC scenario, still a limited share of the reductions required.

While acknowledging the limitations of these estimates and considering that energy savings associated with *Superbonus* are not included, we conclude that *Ecobonus* has made only a limited contribution to achieving Sicily's 2030 climate objectives in terms of both emissions reductions and energy savings.

A FOCUS ON FESR FUNDS

Among the instruments of the European Union's cohesion policy, the European Regional Development Fund (*Fondo Europeo di Sviluppo Regionale* – FESR hereafter) was designed to reduce regional inequalities and support the structural development of less developed EU regions. It promotes industrial reconversion, particularly for SMEs, supports innovation and digital development, new infrastructure and the transition to a low-carbon economy (synthesised in the five strategic objectives: "smarter Europe", a "greener and low-carbon Europe", a "more connected Europe", a "more social Europe" and "Europe closer to citizens")[26].

In this work, we focus on the 2014-2020 and 2021-2027 programming periods, with a particular focus on Sicily. At national level, the FESR21-27 resources amount to **€75 billion**[27], of which Sicily receives a total allocation of **€5.86 billion[28].** As of June 2025, the allocated funds in Sicily amount to €660 million across over 270 projects. The share of resources dedicated to energy efficiency in public buildings ("Azione 2.1.1") amounts to 10.7 million for the Sicilian Region[29].

For the purpose of this brief, we analyse the data on the municipalities that accessed the FESR funds relative to the 2014-2020 programming period on energy efficiency, available from the Sicilian Region's website[30]. A total of 107 (out of 391) municipalities applied for and received funding, covering **190 projects and €230 million.**

Municipalities in the bottom 20th percentile of the income per capita distribution received approximately €23 million (10% of the total funds), while those in the top 20th percentile obtained €116 million (50% of total funds). **These figures indicate a marked imbalance in fund allocation, seemingly favouring higher-income municipalities.** This pattern is also evident in **Figure 9**, which shows that, aside from a few exceptions, most beneficiary municipalities fall within the middle, upper-middle and high-income categories.

[26] Source: Il Fondo europeo di sviluppo regionale (FESR) | Parlamento Europeo
[27] Source: Official website of the National Cohesion Agency. Link: Agenzia per la coesione territoriale
[28] Source: Official website of Regione Sicilia. Link: Regione Siciliana and Fondi Ue spesa 2021-27
[29] Source: Public Notice from Regione Sicilia. Link: Pubic Notice
[30] Source: Catalogo - Open Data Regione Siciliana

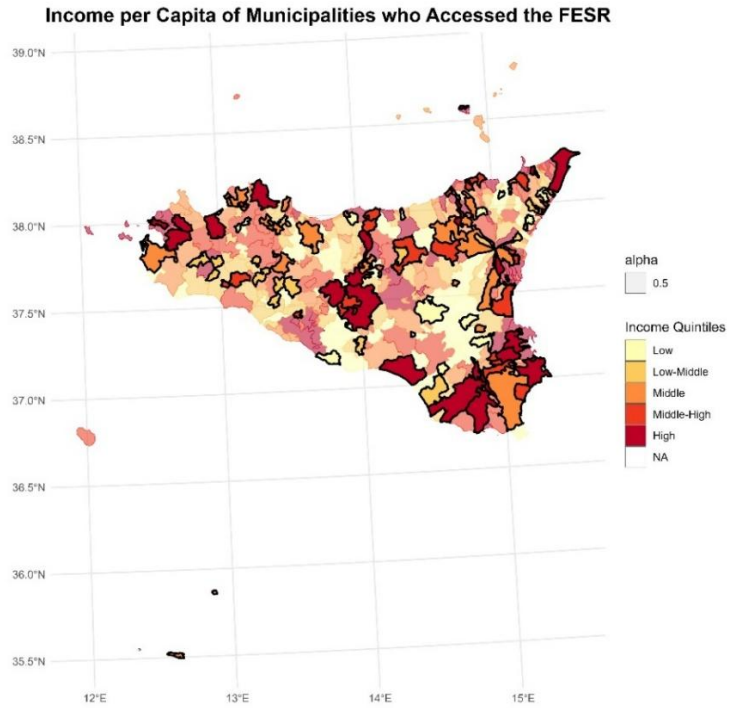


Figure 9 *– This figure highlights the municipalities that accessed the FESR funds. The colours represent the quintiles of the income per capita. ECCO's own elaboration based on ISTAT and Regione Sicilia Data.*

However, when population size and both energy and economic conditions are considered, the picture becomes slightly more equitable. When the amount of FESR funds is scaled by the number of households (**Figure 10** in Annexes), the municipalities that received the highest funds per capita are mainly concentrated in the central-northern area of the island.

In **Figure 11**, we present the value of an indicator accounting for: the amount of FESR funds per family, economic capacity (income per capita) and energy needs (more information on the indicator in Annex I). **This indicator allows us to measure the significance of the funds relative to local wealth and energy needs. Notably, the higher the indicator, the more the funds are allocated in areas with high energy needs and low income. In other words, high indicator values suggest a higher amount of the funds in areas with low income and high energy needs.** Figure 11 shows the different classes of the indicator (from *Very Low Impact* to *Very High Impact*) for the municipalities that accessed the FESR funds. It results that *some* municipalities with high energy needs and low income were still able to access funds *proportionate* to their needs, particularly those in the central area of the island.

In light of the research questions, Sicily emerges as one of the regions that has benefited the least from *Ecobonus* incentive, when accounting for population size, number of buildings, and regional economic capacity. This outcome can be explained by the **regressive nature** of the incentive schemes, which tend to favour higher-income regions, as well as by their **lower effectiveness in southern regions.**

However, when examining the distribution of similar public funds within Sicily, a more nuanced picture emerges**. In particular, although higher-income municipalities have received the largest share of resources, the allocation process of FESR funds has, in some cases, taken into account the energy and economic needs of local territories. This suggests that, to some extent, policies financed through European funds have been able to introduce a degree of differentiation, operating within the space left open by *Ecobonus*.** As a result, even less populous and lower-income areas have been able to access support that is more closely aligned with their specific needs.

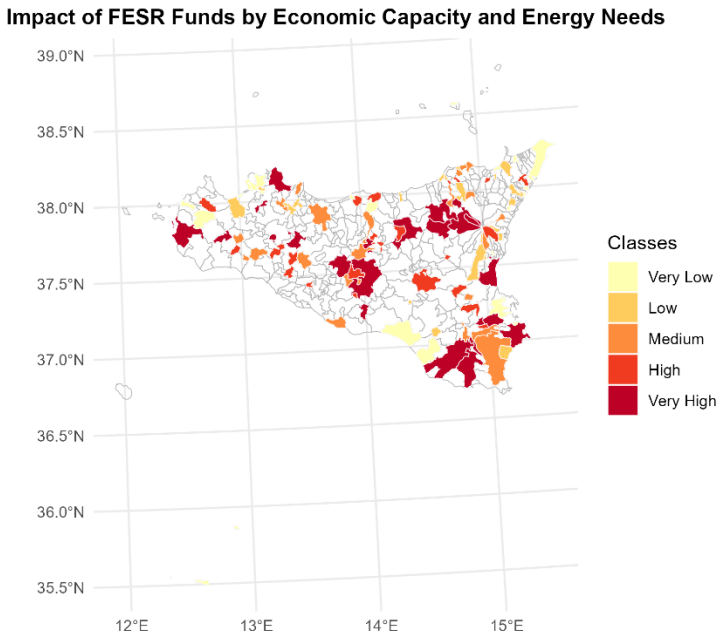


Figure 11 - *The amount of FESR funds (in EUR) per households corrected by the economic capacity (income per capita) and energy needs. ECCO's own elaboration based on ISTAT and Regione Sicilia Data.*

ELECTRIFICATION OF RESIDENTIAL ENERGY CONSUMPTION: ESTIMATING TECHNICAL AND ECONOMIC FEASIBILITY

In regions with mild winters, characterised by lower energy demand for heating, electric heating technologies, namely heat pumps, operate more efficiently than in colder climates[31]. Indeed, heat pump efficiency increases as the temperature difference between indoor and outdoor environments decreases, allowing higher levels of useful heat to be produced per unit of electricity consumed. In particular, according to European standards EN 14285 and a study by the Joint Research Centre[32], heat pumps installed in southern European countries typically achieve seasonal efficiencies that are 20-40% higher than those observed in Northern Europe. **This makes warm-climate regions such as Sicily particularly well suited for a transition away from fossil fuel-based heating systems through the electrification of residential heating, with lower associated investment costs**.

Beyond its technical feasibility, the electrification of residential energy consumption has significant **economic potential for households**. First, shifting thermal consumption away from fossil fuels, namely natural gas, towards a single energy vector, electricity, allows households to disconnect from the gas grid and eliminate one of the two energy bills, thereby avoiding fixed gas tariff costs. Second, the higher efficiency of heat pumps, particularly in mild climates, leads to a reduction in overall energy consumption, translating into lower energy expenditure for households.

Moreover, the economic and social benefits of electrification are further strengthened when **this process is accompanied by policies aimed at reducing electricity prices, as well as by incentives and public support** for the purchase of the relevant technologies. In this context, Italy's current taxation system penalises electricity relative to gas, thereby limiting the potential benefits of electrification. As shown by ECCO, **although the electrification of heating systems through heat pumps can reduce energy consumption by up to 80%, the resulting savings on energy bills amount to only around 40%**, as a significant share of efficiency gains is absorbed by the high level of taxes and system charges applied to electricity in Italy.

Low-income households, in particular, would benefit from a fiscal reform that corrects the current incentives favouring gas and addresses the existing imbalance between gas and electricity charges. By reducing electricity prices, such a reform would also lower the risk of energy poverty, which is particularly widespread in Sicily. In this context, **electrification represents not only a pathway towards decarbonisation, but also an opportunity to deliver tangible socioeconomic benefits, especially in regions where climatic conditions enhance its effectiveness**.

ENERGY POVERTY AND ENERGY NEEDS: THE COST OF GAS IN SICILY

In Sicily, heating energy demand is higher in the colder and more inland areas, as shown in **Figure 3.** These areas correspond to climate zones D, E and F and tend to be low-income inland areas (**Figure 2**), where around 14.5% of the island's population resides. The remaining areas (climate zones A, B, and C) are instead characterised by a warm climate and therefore exhibit lower heating needs and consumption levels.

[31] Sources: Joint Research Centre e IEA
[32] Sources: SCOP e JRC - Clean Energy Technology Observatory

The colder zones are also the most exposed to the risk of energy poverty. **Figure 12 highlights municipalities characterised by high energy demand and low income[33], differentiated by climate zone**. Unsurprisingly, most of these critical areas are concentrated in central Sicily and fall within the colder and intermediate climate zones: zone D (purple) and zones E/F (blue). Although zone C is characterised by a significantly warmer climate, it also includes some critical areas. Based on our estimates, **approximately 11.5% of the Sicilian population lives in the highlighted areas and is therefore at risk of energy poverty**, compared to about 7% across the Italian territory as a whole. These contexts call for timely policy interventions aimed at reducing households' energy costs while simultaneously ensuring adequate indoor energy comfort.

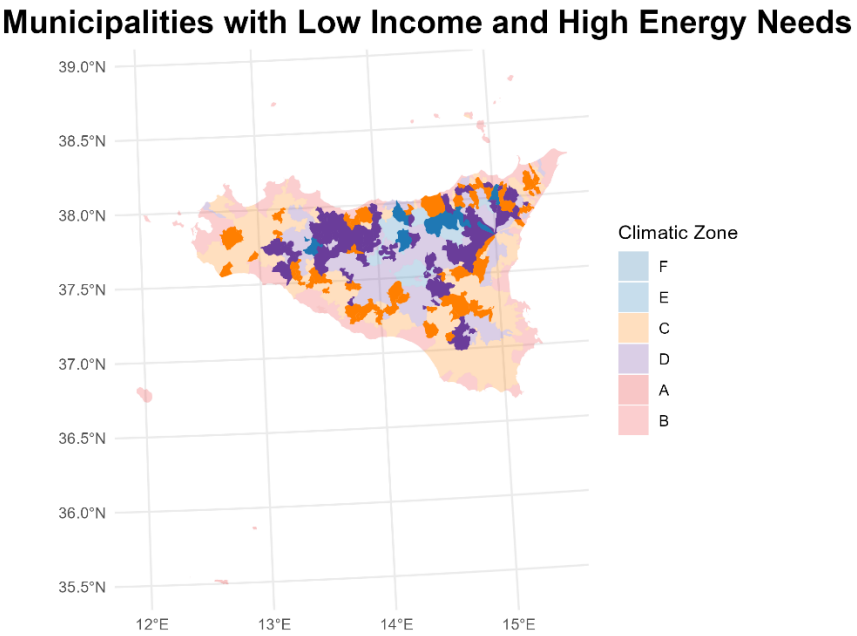


Figure 12 - *Municipalities shown in darker colours fall within the bottom two quintiles of the income distribution and the top two quintiles of the energy demand distribution, representing areas more exposed to the risk of energy poverty. Different colours indicate climate zones. ECCO's own elaboration based on ACE model data and ISTAT data.*

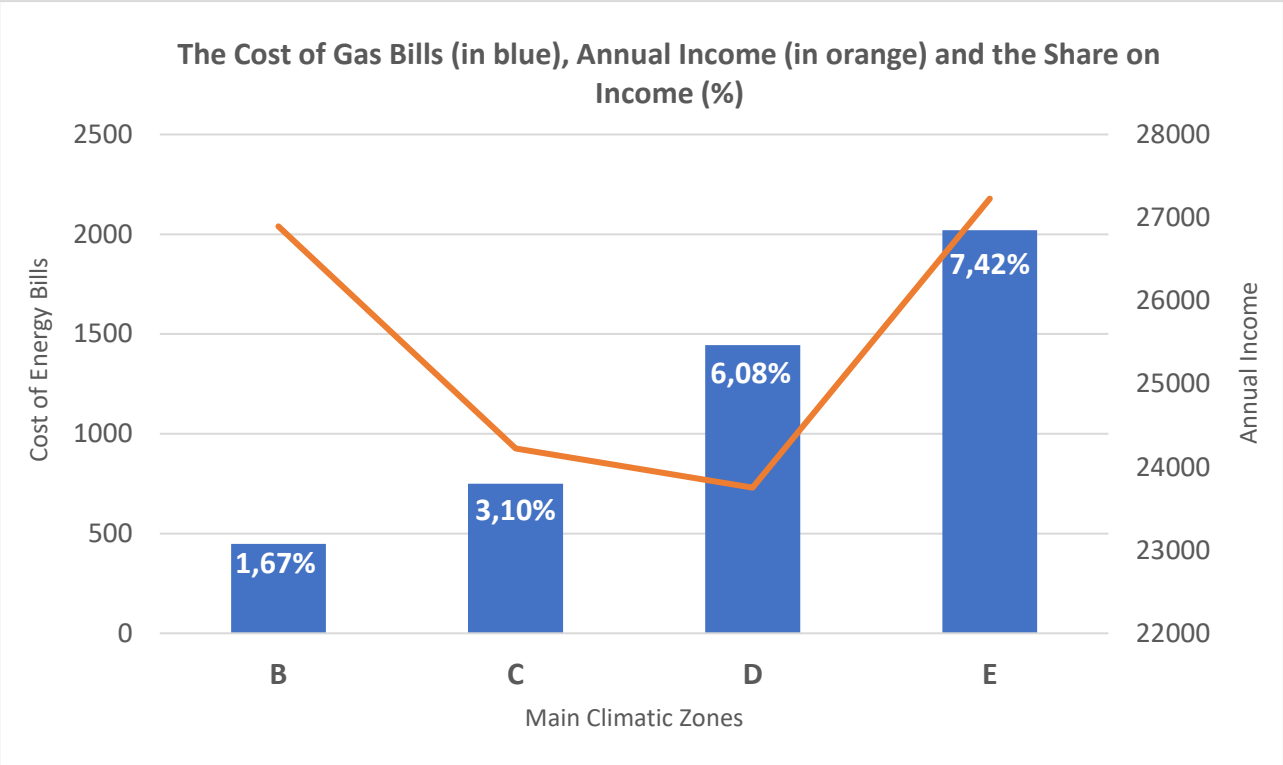
These critical areas, especially in climate zones D and E, are also those where we estimate the highest energy bill costs for an average household with more than two members. **Graph 2** shows annual gas expenditure[34] for an average Sicilian household in each climate zone (zone A is included in B, and zone F in E), overlaid with average annual income. We observe that the zones **where gas expenditure represents the largest share of household income correspond to colder climates and, therefore, higher energy needs**, reaching 6% and 7% respectively in zones D and E.

In terms of unit energy costs, an average Sicilian household spends around 19.6 c€/kWh in climate zone B, compared to 14.0 c€/kWh in climate zone E for gas consumption.

These results highlight the potential economic benefits for households associated with replacing gas-based heating with electric heating systems:

[33] Municipalities with high energy demand (in MWh/m²), i.e. top two quintiles of the energy demand distribution, and low income, i.e. bottom two quintiles of the annual income distribution (in EUR).
[34] The estimates are based on the economic conditions defined by ARERA as of March 2026, assuming a wholesale gas price of €0.50/Smc, to which fixed annual commercialisation costs of €130 are added.

- **In warmer climate zones**, because heat pumps achieve higher efficiency thanks to higher outdoor temperatures. These zones, it should be noted, are also the most densely populated.
- **In colder climate zones**, because gas accounts for a significant share of household expenditure: even if electricity alone may not always be the most efficient solution, hybrid systems or building retrofits aimed at improving energy performance can ensure energy savings and substantial cost reductions for households.



Graph 2 - *Estimated annual energy bill costs for an average Sicilian household (with more than two household members), broken down by climate zone of residence, with indication of average annual income (orange line) and the share of energy bills in household income (expressed as a percentage). ECCO's own estimation based on data from the Politecnico di Milano, ISTAT, and ARERA.*

ENERGY TAXATION AND SYSTEM CHARGES AS A BARRIER TO ELECTRIFICATION

In Italy, fiscal and parafiscal charges, when compared on an equal energy-content basis, are higher for electricity than for fossil energy carriers across all sectors, residential, transport and industrial. Taxes and system charges therefore significantly limit the potential economic savings that should result from the lower energy consumption of electric technologies. This, in turn, increases investment payback periods and acts as a barrier to the electrification process.

In the residential sector, electricity consumption is subject to fiscal and parafiscal charges that are around four times higher than those applied to gas consumption. At the national level in 2024, these charges are estimated at 9.4 c€/kWh for electricity, compared to 2.0 c€/kWh for gas.

The excise duty on electricity amounts on average to 2.27 c€/kWh, nearly double that applied to gas for residential use, which is estimated at 1.41 c€/kWh on average in 2024 (excise duty on residential gas vary depending on consumption levels: they are lower for consumption

below 120 m³/year and between 480 and 1,560 m³/year, higher for consumption between 120 and 480 m³/year, and reach their highest level for consumption above 1,560 m³/year).

Electricity consumption benefits from a significant exemption from the excise duty for monthly consumption up to 150 kWh/month (the first 1,800 kWh of annual consumption) in the case of contracts with a contracted capacity up to 3 kW. The resulting loss of revenue is recovered through a higher excise duty on consumption exceeding this threshold[35]. This design is the last legacy of progressive tariffs that implicitly associated low consumption levels with lower-income households, and it can be considered a measure supportive of energy efficiency. **However, today this association is questionable**, both because low consumption is not necessarily a reliable proxy for low income, and because it acts as a brake on electrification, which, in turn, represents the most energy-efficient option from a system-wide perspective. Moreover, the exemption on the first 1,800 kWh applies only to contracts below 3 kW, thereby introducing a barrier to electrification in the residential sector, which typically requires higher contracted capacity to enable a shift away from natural gas for space heating and cooking.

VAT is applied as a percentage of the economic value of the consumed energy carrier, including excise duty and all other cost components reflected in electricity and gas bills. Specifically, VAT is set at 10% on electricity and accounts for around 16.4% of the final gas bill[36] (based on average consumption levels). The lower VAT rate applied to electricity is effectively offset by a larger tax base compared to gas, resulting in a VAT cost per kWh that is around three times higher for electricity than for gas. Even when considering VAT applied to the full value of each energy carrier, including commodity costs, transport, supply, and fiscal and parafiscal components, the overall VAT burden remains higher on electricity than on gas.

Beyond taxation, electricity tariffs also reflect significant costs associated with **system and environmental charges**, including (i) general system charges (*oneri generali di sistema*) and (ii) the EU Emissions Trading System (ETS), which covers the electricity generation phase. These charges are nearly 50 times higher for electricity than for residential gas use.

The A_{SOS} component differs depending on whether the electricity contract is classified as resident or non-resident (primary versus secondary residence). In addition to the variable component, non-resident users are also subject to a fixed charge amounting to nearly €90 per year in 2024. This differentiation is based on property status and does not reflect underlying electricity service costs, although it follows a redistributive logic that may nonetheless be considered socially justifiable.

Graph 3 highlights the current breakdown of per-kWh tariff components for residential users at different consumption levels, comparing electricity and natural gas. In the cases analysed, the overall weight of taxation and levies on electricity ranges between **6.5 and 8.01 c€/kWh**, compared to **1.9 c€/kWh** for natural gas.

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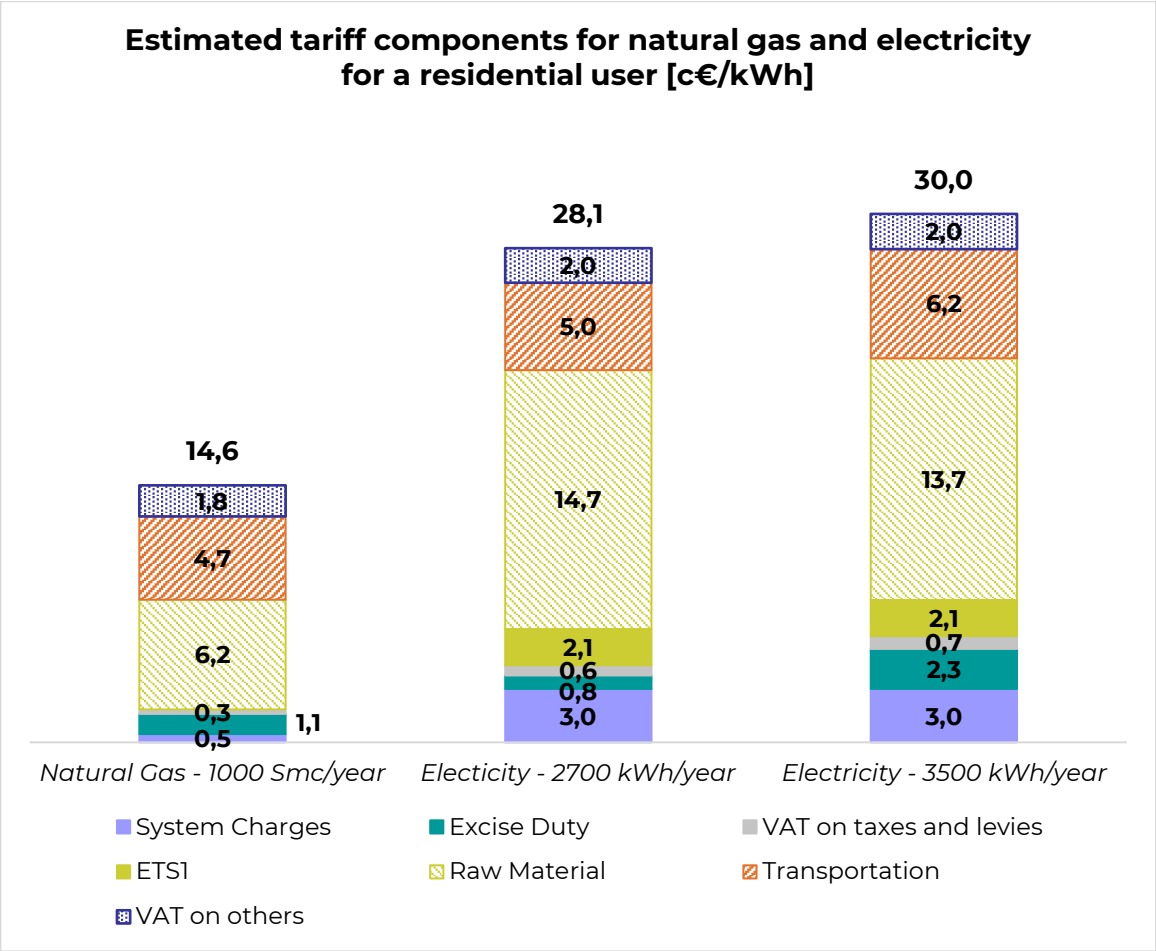
[35] This exemption (Article 52 of Legislative Decree No. 504 of 26 October 1995) turns into a progressive increase above the baseline rate of 2.27 c€/kWh for consumption exceeding 220 kWh/month. For exempt users, the estimated excise duty amounts to 0.76 c€/kWh, partially reducing the fiscal burden on electricity. However, when system charges are taken into account, the overall levy on electricity remains almost three times higher than that applied to natural gas. Although this relief was historically justifiable on social and energy efficiency grounds, it is harder to reconcile with a transition pathway in which electric technologies, entailing a shift of thermal uses and mobility towards electricity and a consequent increase in contracted capacity, are capable of delivering both economic and energy savings for households. The current excise duty system applied to residential electricity therefore constitutes an additional fiscal burden for households seeking to undertake the energy transition.

[36] For “civil uses” (Usi Civili), the VAT rate is set at 10% for annual gas consumption up to 480 Smc/year and at 22% for consumption exceeding this threshold.



Graph 3 - *Estimated tariffs components (in euro cents for kWh) for natural gas and electricity of an average user in the residential sectors. The components for electricity differ depending on the contracted capacity (kWh/year). ECCO's own estimations.*

When focusing exclusively on taxes (excise duty and the VAT applied to them), system charges, and environmental costs (ETS), the tariff imbalance becomes evident. A residential electricity user consuming 2,700 kWh/year with a contracted capacity of 3 kW benefits from an excise duty exemption on the first 1,800 kWh per year, resulting in an excise duty component of 0.76 c€/kWh (Case 1: 2,700 kWh/year).

When the user fully electrifies energy consumption, exits natural gas, and, out of necessity, increases contracted capacity above 3 kW, the exemption is entirely lost and the excise duty rises to 2.27 c€/kWh (Case 2: 3,500 kWh/year). This is precisely the comparison that is relevant when discussing electrification: **natural gas is taxed at 1.9 c€/kWh, while electricity is taxed at 8.1 c€/kWh.**

This cost structure clearly shows how fiscal and parafiscal charges act as a barrier to electrification, preventing consumers from fully benefiting from the higher efficiency of electric technologies. **In general terms, greater energy efficiency translates into lower energy consumption and, in principle, into lower energy bills, but under the current tariff structure this benefit is only partially realised.**

This barrier is particularly significant in southern Italy, as a result of a fiscal architecture rooted in an outdated energy paradigm. The issue must be understood as the combined effect of historical gas-related tax concessions and the heavier fiscal burden placed on electricity. The former stem from the legacy of gas network expansion policies (*metanizzazione*), which introduced VAT discounts, specifically a 10% VAT rate applied to the first 480 Smc of gas

consumption, to promote development in the south. While this strategy once served to ensure access to energy, it has now effectively become an **implicit subsidy for fossil fuels**. Conversely, the excise duty relief on electricity, limited to contracts with a contracted capacity below 3 kW, acts as a barrier to electrification, as it excludes consumers who adopt efficient technologies requiring higher contracted capacity.

Maintaining favourable taxation for gas while imposing a higher fiscal burden on electricity moves policy in the opposite direction of decarbonisation objectives and generates economic inefficiency. On the one hand, consumers are discouraged from adopting technologies such as heat pumps; on the other, the state faces a policy contradiction, as it allocates substantial resources to incentivise the energy transition while simultaneously maintaining a tax structure that rewards continued reliance on gas.

To make incentives for electrification more effective and efficient, it is necessary to **remove the structural barriers that currently make electricity less competitive than fossil fuels**. This requires a profound reform of the fiscal and parafiscal framework, in order to unlock the potential of southern Italy and finally transform the pricing system from a constraint into a driver of development.

THE TECHNICAL FEASIBILITY OF ELECTRIFICATION

Following the socio-economic considerations on electrification, we proceed with an assessment of its technical feasibility.

Our analysis is based on data from the ACE model developed by the Politecnico di Milano[37]. The model estimates the evolution of residential energy demand met by different technologies over the period 2021–2050, subject to two constraints:

1. Full decarbonisation by 2050[38]
2. Minimisation of aggregated costs[39]

The model produces these estimates for the entire Italian territory, which is divided into sub-provincial areas based on heating degree days.

To identify the technologies that most effectively meet residential energy needs under the imposed constraints, we proceed as follows:

First, the estimated energy need supplied by each technology in each sub-provincial area is **aggregated by climate zone**. This aggregation allows us to capture systematic differences in heating needs and technological performance driven by climatic factors, while preserving spatial heterogeneity.

Second, for each climate zone, **we analyse the temporal evolution of the energy need met by each technology over the model horizon**. In particular, we compute the **percentage change in energy demand between 2021 and 2050 for each technology**. This indicator allows us to assess whether a given technology becomes more or less relevant over time within each zone, independently of short-term fluctuations.

Based on this indicator, technologies are classified into three mutually exclusive groups:

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[37] Pozzi, M., Muliere, G., Fattori, F., & Motta, M. (2026). Per una EPBD sulla giusta strada verso la decarbonizzazione. *QUALENERGIA SCIENCE*, *2*, 61-70.
[38] With an intermediate goals of -43% by 2030 with respect to 2005
[39] Fixed and variable costs, and investment costs

1. **Dominant technologies:** exhibit a positive percentage change that is above the median of the energy need distribution across all technologies in the sample. Such technologies grow over time and account for a relatively large share of final energy need, indicating structural dominance in the optimal solution.
2. **Emerging technologies:** show a positive percentage change that is below the median. They grow over time but play a limited role in absolute terms, suggesting a complementary or transitional function.
3. **Phasing-out technologies:** these display a negative percentage change, indicating a systematic decline in their contribution to meeting energy demand over the horizon.

As a robustness check, we replicate the classification using an alternative indicator of technological dynamics[40]. The two approaches lead to consistent classifications.

The analysis reveals clear, climate-dependent patterns in the optimal composition of the technology mix. Across all climate zones, **traditional biomass-based technologies (fireplaces, pellet stoves, and wood stoves) exhibit a relatively rapid phase-out**, exiting the market around 2030 (or around 2035 in the coldest areas).

Results for the remaining technologies are summarised in **Figure 13**, which illustrates the increase (in orange) and decrease (in blue) in energy demand between 2021 and 2050 across climate zones, with different levels of intensity: the darker the colour, the faster the entry or exit of a given technology.

In warm climate zones (A, B, and C), the dominant technology is the electric air-to-air heat pump. This result indicates that full electrification of residential heating in these areas represents the **most efficient and least costly strategy under the decarbonisation constraint**. By contrast, **all other fossil fuel-based solutions are progressively phased out,** highlighting that the potential for electrification in these zones is already fully mature. The combination of relatively mild winters and the high efficiency of heat pumps make this technology structurally optimal.

In milder and colder climate zones (D, E, and F), the model identifies **deep building renovation combined with the replacement** of traditional fossil-fuel-based heating systems with electric technologies (**air-to-water heat pumps**) as the dominant solution. This outcome reflects a trade-off between electrification and system flexibility in areas characterised by higher heating demand and colder climatic conditions.

In zones D and E, **air-to-water heat pumps become optimal solutions when paired with reductions in buildings' thermal demand**. Retrofit interventions allow energy consumption to be significantly reduced and thus represent a crucial step for electrification, particularly in a region characterised by a very old and inefficient building stock. In these zones, **gas boilers show a slower phase-out, remaining relevant until nearly 2040**. This indicates a more gradual substitution process and a more diversified optimal technology mix, where **electrification is accompanied by transitional solutions and multiple technologies coexist in order to minimise costs** while still achieving full decarbonisation. However, this gradual substitution, given the current cost structure, risks being incompatible with the

[40] We estimate the trend over time (slope) of the energy needs by each technology. The technologies are then classified as "Dominant", "Emerging" and "Phasing-out" following the same criteria as for the percentage change, substituting it with the slope as reference variable.

European EPBD Directive, which foresees the complete phase-out of fossil-fuel boilers by 2040.

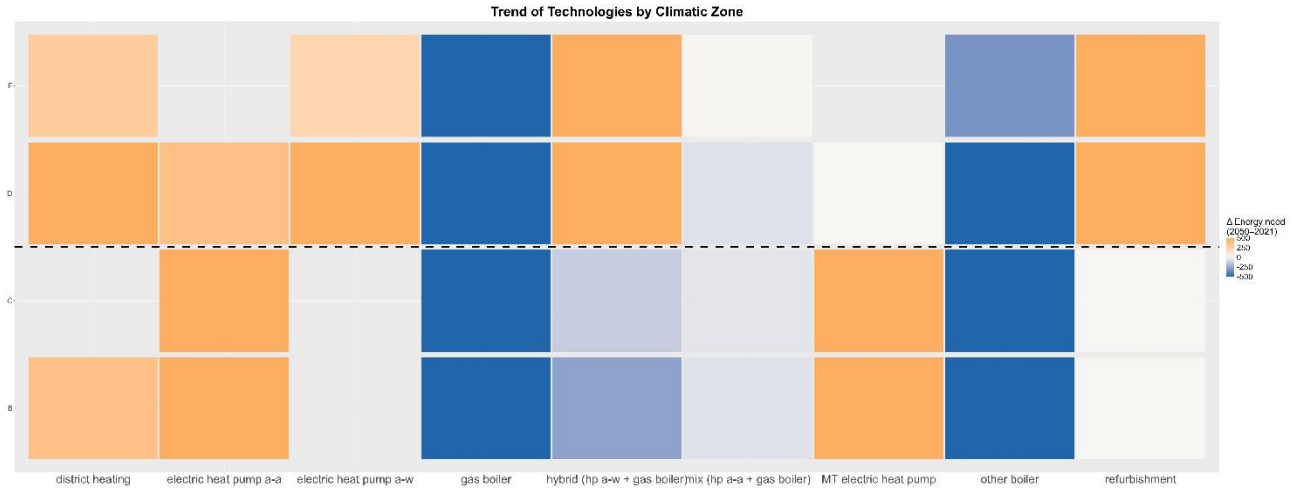

Figure 13 - *Change in energy needs (2050–2021) for the main heating technologies by climate zone. Colours indicate the direction and magnitude of change, highlighting growing technologies (orange) and phasing-out technologies (blue) across different areas. ECCO's own elaboration based on ACE model data.*

ENERGY EFFICIENCY: CITIZENS' NEEDS

Building on our impact analysis, we delve further into the subject to better understand the reasons behind the unequal allocation of public incentives and to propose more inclusive and effective climate policies. To do so, we study Sicilian citizens' views on current energy efficiency incentive schemes, the barriers they encounter in accessing them and their priorities for future climate policy measures.

Drawing on a comprehensive survey designed by ECCO and carried out by YouGov in October 2025, this section presents key findings regarding the perceptions, attitudes, behaviours and barriers faced by a representative sample of the Sicilian population (625 adults) in relation to energy efficiency and sustainable mobility policies. It identifies key priorities for energy efficiency policies and explores support for emissions reductions, alongside differences among income and social groups.

The findings provide policymakers with valuable guidance for designing effective, equitable and supported interventions in the region that can accelerate the transition toward decarbonization while addressing social and economic disparities. A crucial first step is **to restore the population's trust in politics**, which, as our survey reveals, is currently at its lowest. Indeed, more than half of respondents feel that they distanced themselves from politicians and that the level of trust for political institutions is very low, especially in their ability to address the needs of Italian families. **Confidence in the national government and local authorities is low**, whereas the European Union is viewed somewhat more favourably, with 28% of respondents expressing trust compared to just 20% for other institutions. Interestingly, higher-income households tend to have a more positive outlook towards the national government on average.

This pattern persists when considering political trust in the context of energy efficiency. When asked about these specific areas, respondents again identified the European Union as the most trusted institution, with around 28% expressing this preference, while national and local authorities received only 16–20%. Notably, individuals aged 35 to 44 display a higher-than-average preference for the European Union (35%) and for municipal authorities (25%, compared to the regional average of 16%).

Despite prevailing scepticism towards political actors, **support for progressive policy measures is robust among Sicilians**. Nearly 70% of respondents indicate that they are supportive or very supportive of political programmes which prioritise incentives based on income levels and target vulnerable households, both for mobility and energy efficiency initiatives, alongside a clear strategy to reduce emissions in Sicily. **This consensus holds regardless of political orientation, underscoring a shared commitment to environmental progress and social equity across the island.**

HOUSING AND ENERGY EFFICIENCY

Most Sicilian households (73%) live in an owned apartment, with 2–3 people on average. The owners are typically adults above 55 years old and higher-income individuals, while young people (18-34 years old) and lower income groups tend to live in a rented house.

When asked about the energy class of their house, 32% of participants could not answer. Among those who could answer, it resulted that higher income individuals (annual income>35 000 EUR) tend to live in high energy efficiency houses (class A or B). Moreover,

almost half of low-income individuals (annual income <15 000 EUR) reported experiencing difficulties in paying their bills at least once in the past year.

The general landscape regarding economic incentives for energy efficiency in Sicily reveals a high level of awareness of national schemes such as *Ecobonus* and *Superbonus*, with almost 90% of respondents being familiar with them. These measures are generally viewed positively for their potential to raise property values, enhance living standards and encourage the adoption of green technologies. **However, despite widespread knowledge and favourable opinions, actual participation remains limited: only one in five respondents has applied for these subsidies, and just 12% have successfully accessed them.** Most Sicilians – about 70% – identify substantial obstacles in using these incentives, the most significant being the **lack of upfront financial resources required to participate.** Other commonly cited barriers include perceived complex bureaucratic procedures, strict deadlines, unclear application processes, eligibility constraints and insufficient technical support.

When examining the situation across different social classes, clear disparities emerge. Higher-income households exhibit both greater awareness and a more enthusiastic attitude towards the incentives, appreciating the improvements these schemes bring to property value and quality of life. They also feel that these measures contribute to improving the conditions of higher and middle-income households, as well as of house owners in urban and rural areas. In contrast, younger people, individuals with lower educational attainment, and low-income households are less informed about the incentives and less likely to access them. **Younger people tend to favour these measures less and have faced significant exclusion when attempting to access the available funds.**

Furthermore, there is widespread agreement that renters and low-income groups have not gained significant benefits from these schemes, which are perceived to favour homeowners – especially those in higher and middle-income brackets.

Reflecting on these disparities, more than half of Sicilian respondents believe that low-income households should be prioritised for access to energy efficiency funds, followed by middle-income groups. There is consensus that renters and higher-income households should be the lowest priority for future allocations.

Among those who did benefit from incentives (roughly 10% of respondents), the funds were most used for replacing fixtures (35%), purchasing more efficient appliances (35%), installing external insulation (31%) and acquiring electric heat pumps (25%). Most of these beneficiaries reported reduced utility costs and improved home comfort as a result of their investments.

There is broad consensus that environmental and climate policies should be prioritised, with 73% of respondents supporting this, particularly among middle-income households. Policies promoting energy efficiency are also highly valued (62%), mainly by middle-high and higher-income groups. However, active engagement remains limited: **only one-third of Sicilians would be willing to actively support these measures or pay more for green energy.** Among those, half belong to middle- and higher-income households. Importantly, support – especially from middle-income groups – is conditional on **protecting low-income families**, which respondents believe should receive the highest priority in environmental policies. Conversely, higher-income households consider cost containment for citizens as a critical factor in policy design.

The key findings reveal significant disparities in housing situations, awareness and access to energy efficiency incentives among Sicilian households, with important policy implications.

Home ownership and high energy efficiency living are concentrated among older and higher-income individuals, while younger and lower-income groups are more likely to rent and face greater difficulties in paying bills. Although awareness of national incentives like *Ecobonus* and *Superbonus* is generally high, it is significantly lower among younger, less-educated and lower-income groups. **Actual uptake of incentives remains limited, particularly due to financial and technical barriers**. **Policy measures should therefore focus on reducing entry barriers for low and middle-income households and reducing costs for citizens, as this would gain strong public support across different social classes. Moreover, enhancing technical support, increasing outreach to less-informed groups and addressing initial financial constraints are crucial for improving both the effectiveness and the equity of energy efficiency incentives in Sicily.** All these policy measures are presented in more detail in the concluding section.

	Low-Income (< €15,000)	**Middle-Income (€15,000–€34,999)**	**Higher-Income (> €35,000)**
Housing situation	Mostly renters Younger individuals	Mostly owners Mixed age	Owners typically adults 55+ Energy Class A/B
Difficulty paying bills	~50% experienced difficulties	Less frequent	Rare
Awareness of incentives	Low (together with young)	High awareness	Very high awareness
Perception of incentives	Positive but limited benefit for renters	Positive	Very positive
Actual uptake of incentives	Across all groups: Uptake is very low (only 10% of respondents): Young people were those mostly excluded		
Barriers to access	Lack of initial funds	Technical challenges Perceived complexity	Technical challenges Perceived complexity
Priorities of incentives	Low-income families	Low-income families Rural residentials	Middle-income families
No priorities	Renters and Higher-income households		
Priorities of environmental policies	Low-income families	Low-income families (Support for climate policies)	Cost containment for citizens (Support for climate policies)

Table 1 - *Summary of survey results across classes of income. Only statistically significant results are reported. The survey was conducted by YouGov on a representative sample of 600 residents in Sicily. ECCO was responsible for the writing of the survey.*

POLICY RECOMMENDATIONS

The analyses presented in this study show that, in the fields of electrification and energy efficiency, **the criteria for allocating public resources can be revised and better targeted in line with the economic, social, and climatic needs of different territories, in order to maximise their effectiveness**. In particular, our findings indicate that public support for climate policies increases when such policies are **perceived as fair and capable of accounting for the conditions of economic and climatic vulnerability affecting specific social groups**.

In this context, the introduction of ETS2, scheduled for 2028, together with the associated Social Climate Fund (SCF), represents a **significant policy opportunity**. According to ECCO estimates, these instruments could generate substantial financial resources, **ranging between €16 and €44 billion from ETS2 revenues and around €5,5 billion from SCF allocations**. These resources provide an opportunity to move beyond short-term compensatory measures and to redirect public action towards **structural policies** that are targeted to people's needs and to the territorial contexts where their potential impact can be most effectively realised.

In view of a territorial differentiation of policies, **existing incentives such as *Ecobonus* show higher potential and effectiveness in higher-income regions characterised by colder or moderately cold climates, such as Central and Northern Italy**. In these contexts, such instruments can contribute to improving the energy performance of the building stock. However, it is crucial that these schemes evolve to **explicitly link energy efficiency objectives to emissions reductions and energy savings**, supported by transparent monitoring and verification systems. Within this framework, strengthening implementation capacity at the local level also plays a crucial role. For example, the introduction of criteria based on minimum improvements in energy performance or on emissions-reduction thresholds could help steer the allocation of resources towards a more targeted and effective use of incentives.

Schemes such as *Ecobonus*, which primarily operate through ex post tax deductions, reduce beneficiaries' tax liabilities only after the investment has been carried out. This design **limits their effectiveness in contexts characterised by lower income levels, where the need to cover upfront costs constitutes a significant barrier to accessing incentives**, as is often the case in southern Italy. As a result, such instruments may potentially become of **regressive** nature. The findings of our survey in Sicily confirm this issue: low-income households and younger individuals are more likely to be excluded from access to these incentives, highlighting the need for dedicated schemes tailored to their specific needs.

In its initial phase (2020), *Superbonus* allowed the transfer of tax credits to companies or financial institutions, enabling immediate access to funds. However, this mechanism led to numerous cases of fraud and abuse (including the attribution of credits for non-existent or overstated interventions), as well as to rising costs in the construction sector and a sharp increase in demand. These dynamics further strained public finances and made the measure excessively costly for the State. As of March 2024, both credit transfers and invoice discounts were abolished. As shown **in Figure 6**, the original design of *Superbonus* enabled a more balanced and equitable distribution of resources compared to *Ecobonus*. While these results should be interpreted with caution, **they suggest that direct transfer mechanisms can help overcome access barriers for low-income groups**, provided they are accompanied by adequate safeguards to prevent fraudulent behaviour.

In light of this evidence, while recognising the positive role of *Ecobonus* in contexts where it is most effective, there is a clear need to **complement it** with alternative instruments in territories where economic and social barriers limit its impact. In particular, for southern regions, measures that directly support groups most exposed to the risk of exclusion are especially relevant. These include **non-repayable grants for low-income households (first and second income quintiles), point-of-sale discounts for the purchase of relevant technologies, and subsidised loans for middle-income groups**.

Moreover, we recommend the implementation of energy policies that are aligned not only with the socioeconomic context, but also with **climatic conditions**. Indeed, the lower energy needs of warm-climate regions make the replacement of gas with electric systems particularly advantageous.

In Sicily, we show **that in climate zones A, B, and C, air-to-air heat pumps already represent the optimal technological and economic choice**. These zones, which host around 85% of the island's population[41], can be targeted **through direct support policies for low-income households to purchase air-to-air heat pumps, alongside incentive schemes for middle-income households**. In these areas, funding gas-based or hybrid technologies would be inefficient and should be excluded from future renovation measures, with incentives instead directed exclusively towards high-efficiency electric technologies.

In the remaining areas of the island, electrification of energy consumption still represents an optimal pathway when combined with hybrid and transitional technologies. In particular, **air-to-water heat pumps become optimal solutions when paired with building retrofit interventions aimed at improving energy performance**. In these contexts, public incentives targeted at lower-income households can effectively support the transition.

Policies that incentivise electrification can reduce households' final energy consumption costs and, consequently, lower energy bills, making these measures more attractive and more likely to gain public support, while at the same time offering a high decarbonisation potential. However, **such policies can only be effectively implemented if accompanied by a reform of the fiscal system**. In particular, reducing the tax burden on electricity represents a highly effective policy tool both to promote electrification and to strengthen energy efficiency interventions. As demonstrated by ECCO[42], **the current Italian tax system places a disproportionately high burden on electricity compared to fossil fuels, limiting bill savings and discouraging the adoption of efficient technologies such as heat pumps**. Correcting this imbalance would make electrification economically attractive. Moreover, integrating fiscal reform with policies that promote the uptake of high-efficiency appliances can act as a key lever to accelerate electrification and reduce emissions.

The electrification of residential energy consumption can be **accompanied by the development of renewable energy sources at both the regional and national levels**. In line with ECCO's decarbonisation scenario for the Italian power system, **a high penetration of renewables is compatible with a significant increase in electricity demand driven by the electrification of final energy uses**. In this context, regions such as Sicily, characterised by abundant solar and wind resources, display particularly favourable conditions for supporting electrification through local renewable energy production.

Within this framework, the use of compensatory measures such as the *Bonus Sociale Gas* should remain a temporary instrument to mitigate the impact of rising energy prices, for

[41] 52.5 % in A+B; and 32.7% in C

[42] Source: Tassazione energetica e sussidi fossili

instance under ETS2, on vulnerable households. This policy neither incentivises electrification nor contributes to decarbonisation objectives. For this reason, it is difficult to justify the allocation of €1.375 billion announced by MASE under the Italian Social Climate Plan for the extension of the *Bonus Sociale Gas Plus*, an amount that ECCO estimates to be disproportionately high in light of the expected increase in CO_2 prices under ETS2, estimated at between approximately €45 and €100 per tonne of CO_2[43].

Finally, we propose additional measures such as the establishment of **local revolving funds**, a potentially effective instrument for providing low-interest loans to households and SMEs, condominiums, and municipalities, while also ensuring long-term incentives for energy efficiency interventions. Revolving funds, by reinvesting loan repayments into new projects, create a financing mechanism that is sustainable over time.

All these measures should be implemented in parallel with policies aimed at strengthening **transparency in resource allocation**, funded projects, and beneficiaries. Throughout the analysis, we found that publicly available data on *Ecobonus* and *Superbonus* funds are not always sufficiently granular to identify beneficiaries and expenditure at the level of individual projects, as data are often aggregated at the regional level. The creation of municipality-level dashboards covering the entire Italian territory, containing data on individual interventions, information on beneficiaries, and regularly updated estimates of energy savings and emissions reductions achieved by each incentive scheme, would make it possible to monitor both the equity and effectiveness of resource allocation. **This would, in turn, allow funds to be reallocated if they fail to reach the most vulnerable low-income households and municipalities, and to adjust the level of resources devoted to different types of incentives.**

[43] Source: ECCO-Verso una transizione sostenibile: Il Piano Sociale Clima

CONCLUDING REMARKS

In this study, we examined the effectiveness and redistributive nature of the energy efficiency incentives currently in place in Italy. We focused on the case of Sicily, complementing the initial analysis with an assessment of the technical and economic potential for electrification in the region. Based on our findings, we propose adjustments to existing climate policies to ensure that public resources are used both efficiently and in a redistributive manner.

First, we identified significant geographical inequalities in the allocation of public funds for energy efficiency. Sicily has received a substantially lower share of energy efficiency funding compared to other Italian regions: *Ecobonus* funds per household were 50% lower than the national average. More generally, southern Italy and the Islands have received fewer resources than Northern and Central Italy. **While this disparity can be partly explained by higher heating energy demand in Northern regions, Sicily's energy efficiency needs remain largely unmet**, particularly in a region characterised by an ageing and inefficient building stock. Moreover, the efficiency of fund utilisation (energy savings per euro invested) has been significantly lower in Sicily, around 55% below the national average. This is reflected in the limited contribution of *Ecobonus*-related energy savings to emissions reduction targets, accounting for only around 5% of the reduction achieved by 2023 and 0.6% of the 2030 target.

Inequalities also emerge in the allocation of European FESR funds within the region. Although less pronounced than in the case of *Ecobonus*, wealthier municipalities have received a disproportionate share of resources, capturing around 50% of total funds, compared to 10% allocated to lower-income municipalities.

These results must be interpreted in light of Sicily's specific context. The region is characterised by high levels of energy poverty, an inefficient building stock, and a more fragile socioeconomic environment compared to Central and Northern Italy, **underscoring the need for energy efficiency policies that are specifically tailored to address these structural challenges**.

The inefficiency of instruments such as *Ecobonus* in Sicily is largely due to their fiscal structure, **which is perceived as a barrier, particularly because of the high upfront costs required and the complexity of access procedures**. Survey evidence shows that **only a small share of people in Sicily have been able to access *Ecobonus* funds**, and that low-income households have been largely excluded from this measure.

Considered this background, we argue that in Sicily policies that incentivise electrification, **by clearly identifying the most appropriate interventions and taking into account the region's geographic, climatic, and social characteristics, could deliver greater benefits for the population**.
In certain areas of the island, favourable climatic conditions not only reduce energy demand ex ante, but also significantly increase the efficiency of heat pumps, thereby enabling substantial cost reductions for households. Based on our assessment of the technical and economic feasibility of residential electrification**, air-to-air heat pumps already emerge as the optimal solution in the warmer climate zones (A, B, and C), where around 85% of the population (approximately 4 million people) resides**.
In colder zones, in addition to hybrid systems, where gas is gradually replaced by electricity, **building retrofit** represents another key intervention to enhance the effectiveness of **air-to-water heat pumps**.

Our policy recommendations build on one of the key findings from our survey: while there is widespread awareness of climate change and a general willingness to support climate policies, **this support declines significantly when measures are perceived as unfair or costly**. This awareness is accompanied by broad consensus that **low-income households and vulnerable groups should be prioritised** by policymakers in the design and implementation of such policies.

Our main policy recommendations include the introduction of stronger incentives for electrification **in regions where replacing gas can occur more rapidly and translate into a consequent reduction in household energy bills**. These incentives should be designed with a **redistributive structure**, prioritising access for low-income households. In warm climate zones, the most efficient measure consists in replacing gas-based heating systems with air-to-air heat pumps; in this case, incentives should directly support the purchase of this technology. In colder zones, our findings suggest that incentives should instead cover the purchase of hybrid gas–electric systems or support building renovation interventions.

Such an approach could attract broader public support compared to current incentive schemes, which express most of their potential in higher-income and colder areas (particularly in Northern Italy).

Incentives for electrification should be complemented by a **fiscal reform aimed at reducing the level of taxation on electricity**. We also propose a reallocation of energy efficiency funds in favour of low-income households and municipalities, **integrating tax-deduction-based incentives with a mix of instruments such as direct grants, upfront discounts at the time of investment, and low-interest loans**.

We further recommend the establishment of local revolving funds and the linkage of incentives to clearly defined decarbonisation objectives, expressed in terms of measurable energy savings and emissions reductions, supported by robust monitoring systems. Technical assistance and strengthened public awareness are additional key components, alongside greater transparency in resource allocation and action on structural and fiscal barriers, such as reducing electricity taxation, to maximise the overall effectiveness of these incentive schemes.

ANNEX I: METHODOLOGY

ENERGY NEEDS INDEX

We approximate energy needs by computing an index that considers both the year of the buildings' construction and energy consumption.

Available data from TERNA provides the energy consumption in GWh by province *p* in January 2023, EC_p (we use January as reference month because it has the highest energy consumption compared to others). Instead, ISTAT provides data on the total number of buildings by municipality *i* and the number of buildings constructed in different periods (e.g., before 1918, 1919-1945, 1946-1960, and so on) by province *p*.

We construct the **energy needs index** in different steps:

1. We firstly attribute the weights to the buildings' periods of construction, following the assumption that the older the building, the higher its contribution to energy needs, hence the higher its weight. The value of the weights goes from 0 to 1 and is available for period *T*, w^T
2. Then, we multiply the number of buildings in province *p* constructed in period *T* with the corresponding weight: $B_p^T * w^T$
3. Finally, we compute the final Energy Need Index as equally weighted sum of the year of construction index and the energy consumption:

$$EnergyNeed_p = 0.5 * B_p^T w^T + 0.5 * EC_p$$

EFFICIENCY AND EQUITY INDICATOR

The indicator accounts for:

1. **Financial support** per family, i.e., the amount of FESR fund in EUR per number of households in the municipality *i* : $FESR_family_i = {Total\ FESR\ funds_i}/{n.\ families_i}$
2. **Economic capacity**: i.e., income per capita of the municipality *i*, y_pc_i
3. **Energy needs**: a normalised energy need index, which accounts for energy consumption and building age (older buildings have higher weights).

The overall indicator, for each municipality *i,* is derived as:

$$Indicator_i = \frac{FESR_family_i}{y_pc_i} * Energy\ Need\ Index_i$$

GRAPHS

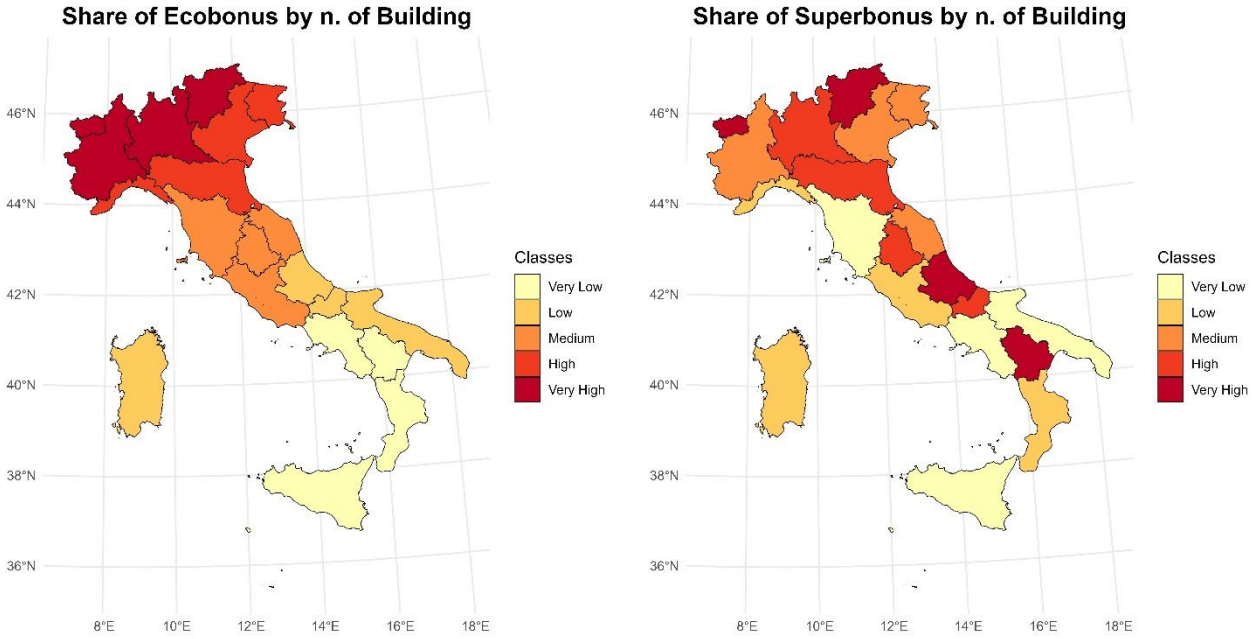

Figure 5 - *The amount (in EUR) of Ecobonus and Superbonus funds over the number of buildings in Italian regions. The darker the colour, the higher the amount of funds per building. ECCO's own elaboration.*

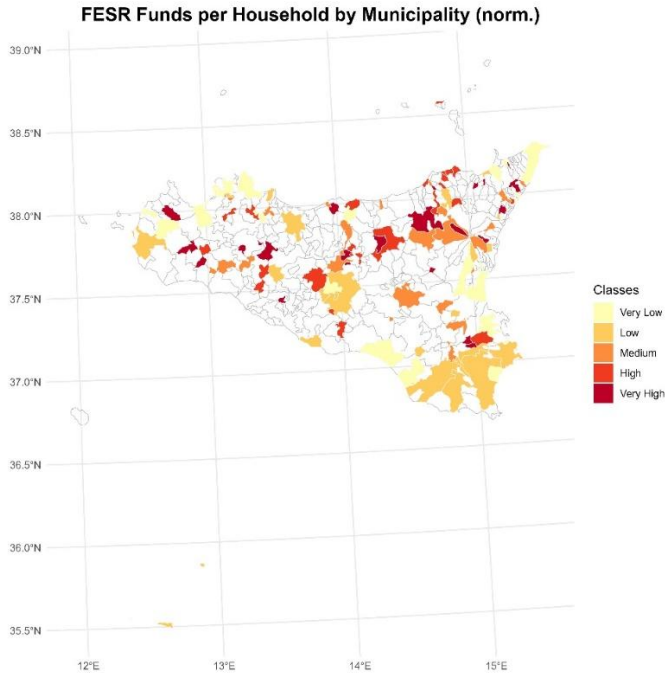

Figure 10 - *The amount (in EUR) of FESR funds on energy efficiency projects invested in Sicilian municipalities, per number of households. ECCO's own elaboration based on ISTAT and Regione Sicilia Data.*

ANNEX II: A FOCUS ON MOBILITY AND TRANSPORT

Due to data limitations, we could not implement a similar impact analysis on public incentives on private mobility. However, we decided to dedicate a specific focus to this topic in our survey.

More than half of Sicilians own only a single vehicle, mostly petrol or diesel models. Notably, in Palermo, the proportion of hybrid cars is significantly higher (18%) than the regional average of 9%. Electric vehicles, instead, represent a non-significant share. Private cars constitute the preferred mode of transport, used by 64% of the population, while walking is the next most popular choice at 39%. As might be expected, younger individuals are the principal users of public transport (28% rely on it), compared to just one in five Sicilians overall.

Widespread dissatisfaction with public transport appears to be a major factor behind its low usage. Only a small fraction of respondents rates the quality of public transport, especially trains and buses, as good or very good. Moreover, insufficient frequency, poor reliability and limited network coverage are considered the main obstacles. Overall, 88% of respondents have experienced at least one barrier to using public transport and 76% identify efficiency as a problem.

When examining specific groups, Palermo's residents are particularly discontented with bus services, though they tend to view the tram system more favourably. 83% of them cite overall efficiency as a problem, and many also highlight the poor quality of the travel experience as a significant deterrent. In Messina, public opinion regarding buses and trains is notably more positive than the regional average, with 47% and 32% of respondents respectively rating these services as good or very good, in contrast to the regional average of 22% and 20%.

Higher-income individuals are especially discouraged by the lack of network coverage, with 96% reporting having encountered at least one barrier to using public transport. Among this group, 89% consider overall service efficiency to be an issue. Young adults are the most affected by slow travel times, which acts as a major obstacle for them. They also cite the quality of the travel experience itself as a notable deterrent.

Regarding light mobility options such as walking and cycling, the principal obstacles identified are safety concerns and inadequate infrastructure. Most respondents indicate poor road safety or unsafe pedestrian paths, along with suboptimal road condition, insufficient sidewalks and bike lanes, and insufficient lighting at night. Notably, young adults and individuals from higher-income classes cite safety concerns as the main deterrent, while those in the middle-income group are more likely to point to inadequate infrastructure.

The challenges associated with the usage of electric cars reveal significant differences across social classes. The high purchase price is the most frequently mentioned obstacle (55% of respondents). However, younger people consider the economic issue to be less significant and instead highlight the shortage of charging stations as a major concern. Meanwhile, **households with middle incomes feel that the financial incentives have been inadequate for them to purchase an electric vehicle.**

In relation to mobility public incentives, just one in ten respondents reported having applied for a mobility subsidy, of which only half were granted one (30 out of 625 people surveyed). Similarly to the case of energy efficiency incentives, young people applied for the mobility incentives but were less successful in accessing them compared to other groups. Although the small number of recipients limits the statistical significance, among those who

did benefit, 33% requested discounted fares for local public transport, while 30% sought support for purchasing electric vehicles.

When exploring public perceptions of transport policies and priorities for the coming years, several clear trends emerge. Respondents agree that substantial upgrades to road, pedestrian and cycling infrastructure are urgently needed, with 73% viewing these improvements as the most pressing mobility priorities for the next five years. Strengthening public transport is also seen as essential by 70% of respondents. Additionally, 28% specifically advocate for reduced fares and incentives to encourage greater use of public transport.

In contrast, incentives for electric car adoption receive relatively less support, with only 20% considering them a top priority. However, when asked how to best facilitate a gradual transition away from petrol and diesel vehicles, the most popular solutions are economic incentives (supported by 59% of respondents) and affordable public transport options (56%). The idea of expanding the network of cycling paths is particularly backed by young adults and middle-income people. On the other hand, restrictive measures such as bans on petrol and diesel cars or the introduction of fossil fuel taxes are the least favoured, except among young people, who particularly support the second one.

Looking at different social groups, higher-income respondents and adults over 55 are especially in favour of infrastructure improvements and incentives for electric vehicles. Those in the middle-income bracket are more likely to support discounted or tax-deductible train tickets. Notably, except for higher-income groups, most respondents believe that policies should prioritise support for low-income and vulnerable individuals: older people are especially supportive of helping the vulnerable, while younger people prioritise assistance for students.

The main findings reveal that private cars remain the dominant mode of transport in Sicily, with limited uptake of hybrid and electric vehicles. Public transport is underused, largely due to widespread dissatisfaction with service quality, reliability and coverage. Higher-income groups and young adults encounter barriers such as poor network coverage and slow travel times. Safety concerns and inadequate infrastructure hinder walking and cycling, especially among younger and higher-income respondents. Financial incentives for electric vehicles are perceived as insufficient, and only a minority have accessed mobility subsidies. There is strong public support for improvements to infrastructure and public transport, while incentives for electric cars receive less emphasis. Most respondents believe policies should prioritise support for low-income and vulnerable groups.

Overall, income is a less relevant factor in shaping attitudes toward mobility, whereas factors such as city of residence and age groups are more relevant. Unlike energy efficiency, **there is broader agreement across social classes on mobility-related issues.**

Social group	Main obstacles to PT use	Main barriers to electric cars	Policy priorities and support
All respondents	Insufficient frequency Poor reliability Limited network coverage.	High purchase price Lack of charging stations	Infrastructure upgrades (roads, pedestrian, cycling); Strengthen PT; Reduced fares/incentives for PT; Low-income and vulnerable households. (Low priority for EV incentives)
Across all groups: **1) Very low uptake of mobility subsidies** (5%) – Young people among those mostly excluded. **2) Very low perceived quality of Public Transport** – Particularly in Palermo and small towns			
Higher-income individuals	Scarce PT network coverage.	—	Infrastructure upgrades; EV incentives; Strengthen PT; Middle-income households (Lower support for vulnerable groups.)
Middle-income individuals	—	Insufficient public incentives	Tax-deductible train tickets Cycling infrastructures
Young (18-34) and Young Adults (35-44)	Slow speeds/time (35-44) Bad travel experience (18-34)	Lack of charging stations (18-34). Applied for incentives but couldn't access them.	18-34: Expanding cycling paths; More supportive of fossil fuel taxes; Priority for students.

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