



# How to improve energy efficiency policies to address energy poverty? Literature and stakeholder insights for private rented housing in Europe

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## **How to improve energy efficiency policies to address energy poverty? Literature and stakeholder insights for private rented housing in Europe**

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### **Abstract**

Households in the private rented sector (i.e., households renting properties at a market rate from a private landlord), and especially those of lower income, face far more energy poverty issues than the general population, meaning that they are often unable to afford socially and materially required levels of energy services. In this context, energy efficiency policies are of the outmost importance as they can improve households' living conditions and contribute to the alleviation of energy poverty. Nevertheless, when it comes to the private rented sector across Europe, implementing such policies is hindered by several barriers. Our article sheds light on structural factors that serve as barriers to, and solutions for, the implementation of energy efficiency policies in the private rented sector across Europe. Our approach is twofold: first, an in-depth desk research is performed to identify financial, social, political/regulatory, and technical barriers and solutions. Literature findings are then supplemented and validated by a European-wide survey, eliciting knowledge embedded in 64 relevant stakeholders and field experts. Our findings indicate that although financial barriers are always of the essence, a holistic assessment of barriers is required, as there is a lack of awareness about policies that could improve tenants' living conditions. They also provide possible solutions that governmental bodies at all levels and other organisations could implement to improve energy efficiency and tackle energy poverty. Overall, our work suggests key implications, which, if acted upon, could accelerate the deployment of energy efficiency policies in the private rented sector across Europe.

## 1. Introduction

Energy poverty is generally defined as the inability to afford socially and materially required levels of household energy services, which can affect health, social inclusion, environmental quality, mental well-being, and, productivity [1–3]. The condition is common in the European Union (EU) and the United Kingdom (UK) [4], particularly in the private rented sector (PRS) which accommodates 30% of the EU's and 27% of the UK's citizens. The PRS is generally understood to encompass households who rent properties at a market rate from a private landlord [5]. According to data obtained from the Energy Poverty Dashboard (EPD) [6], and without taking into account the latest increasing prices, households in the PRS across Europe struggle with energy-related issues to a considerably greater extent than the overall population with regard to energy poverty indicators, while privately rented homes are considered the least energy efficient on average across the various housing sectors [7–11].

In this context, energy efficiency at the EU level is considered an important policy area for enhancing the living conditions of households, alleviating energy poverty, and simultaneously meeting targets for climate change mitigation [12–15]. Despite these benefits, there are a variety of structural factors that function as “barriers” to implementing energy efficiency policies, particularly in the PRS. Whilst several partial assessments of these factors can be found in the scientific literature, studies so far have either focused on barriers across the entire housing sector, or are country-specific, and do not reflect on pan-European trends [16–20]. Furthermore, studies specifically targeting the PRS across Europe examine structural factors individually, do not provide an evaluation of barriers and solutions in an integrated manner, and do not allow for the multi-sectoral engagement of all stakeholders.

Our article addresses these gaps by providing a holistic evaluation of the structural factors (in terms of barriers and respective solutions) that affect the implementation of energy efficiency policies for the alleviation of energy poverty in the PRS across Europe. We ask the questions: “*What are the main barriers hindering the implementation of energy efficiency policies in the PRS across Europe?*” and “*What are the appropriate solutions, in terms of policy improvements, to address these barriers, for the alleviation of energy poverty?*” We apply a multi-method approach, first conducting an in-depth review of academic and grey literature to identify and categorise barriers to, and respective solutions for, the successful implementation of energy efficiency policies in the PRS across Europe. The review was followed by a European-wide survey to generate primary data on **i.** the importance of the identified categories of barriers, **ii.** how aware relevant stakeholders are of specific policy measures that could address the identified barriers, **iii.** possible solutions that governmental bodies at different scales can implement to alleviate the identified barriers, and **iv.** which vulnerable groups are mostly affected by energy poverty in the PRS across Europe.

Overall, the novel contribution of our work to the scientific and policy literature is threefold:

- We analyse structural factors that affect the implementation of energy efficiency policies specifically in the PRS across Europe, which is highly understudied among the housing sectors in Europe and has only been examined in specific country contexts, also considering the opinions of a large sample of relevant experts.
- We acknowledge that the structural factors, which function as barriers to, and solutions for, the successful implementation of energy efficiency policies for the alleviation of energy poverty in the PRS across Europe, encompass a wide range of financial, social, political/regulatory, and technical aspects. These aspects cannot be considered separately, and, thus, we apply a multi-method approach to evaluate them in a holistic way, aiming to bridge the gap in the current scientific literature.
- We provide insights on how relevant field experts consider that barriers to the implementation of energy efficiency policies in the PRS across Europe could be resolved.

## 2. Energy poverty and energy efficiency in the PRS across Europe

On average across the EU, privately renting a home consumes up to 35% of the disposable income of lower-income households (lower income here is defined as below 60% of the median disposable income) [21]. Moreover, these groups are disproportionately impacted by the steady increase of market-rate rents, which rose by 13% between 2010 and 2019 [8]. Legendre and Ricci [22] highlight that PRS tenants in France are more vulnerable to energy poverty due to the poor energy performance of rented dwellings. This is also the case in Spain, where, according to Aristondo and Onaindia [23], energy poverty is high in rented houses, while Meyer et al. [24] show that being a PRS tenant in Belgium increases households'

exposure to energy poverty due to the sector's inefficient building stock. Furthermore, in the UK private renters pay on average significantly more in rent than social renters, yet live in homes of worse quality and efficiency [25]. These cost differentials, in combination with the prevalence of low-income tenants in the poorest quality segments of the EU's and UK's housing stocks, make tenants in the PRS more vulnerable to energy poverty [26–28], yet this housing segment remains critically understudied and under-targeted by policies.

Scientific studies have also correlated high rates of energy poverty in the PRS across Europe with specific demographics of social groups, as, for example, lower-income citizens [29], or young adults and students, who, according to relevant data, often fall behind on their energy bills and reduce, or turn off their heating to keep costs down [30,31]. Finally, race and ethnicity have also been acknowledged as contributors to precarity and discrimination [32,33]. Therefore, dedicated actions that actively contribute to the alleviation of energy poverty in the PRS amongst vulnerable groups are of utmost importance, particularly considering the EU's vision to create an Energy Union whereby “*citizens take ownership of the energy transition, benefit from new technologies to reduce their bills, participate actively in the market, and vulnerable consumers are protected*” [34].

Existing literature identifies “split incentives” among landlords and tenants as one of the main barriers [35]; “split incentives”, or the “landlord-tenant dilemma”, captures a situation, where one party, the landlord, invests in energy efficiency, while the benefits produced are received by another, the tenant, who benefits from decreased utility costs and improved thermal comfort [36]. Moreover, studies in the scientific literature so far have also focused on analysing the financial barriers when implementing energy efficiency policies, as well as solutions to address them [37–41], while a smaller proportion of studies have investigated political/regulatory, social, and technical barriers [42–45].

Ambrose and McCarthy [46] have explored the behaviour of landlords and have developed the following typologies: **(i)** non-joiners, who make efforts to keep expenditures to a minimum and believe that energy efficiency increases rents, **(ii)** passive actors, who appreciate the need for warm and cheap houses, but are unable, or unwilling to invest in energy efficiency measures as they don't believe that they will be able to recoup costs through rent increases or capital value rises, **(iii)** active, who try to improve energy efficiency with low-cost solutions, and **(iv)** pro-active, who are very interested in the benefits of energy efficiency measures. On the other hand, tenants have little choice but to rely on landlords' willingness to implement energy efficiency measures [47]: in many cases, tenants can affect their heating costs only through behavioural changes as they lack control over the operation of their heating system, and more generally over their energy supply [48,49]. In addition, tenants can also be unwilling to invest in energy efficiency measures since they do not own the property [50,51], which can result in low motivation for action.

Implementing energy efficiency policies in the PRS across Europe is not just a question of technical capacity; it is related to wider financial, social, and political/ regulatory challenges, as even when implemented, energy efficiency refurbishment projects can create, or exacerbate existing injustices between landlords and tenants. Evidence from Germany shows that building energy regulations enforced by the government have resulted in their financial consequences to be handled in disputes between landlords and tenants. The resultant injustices are reflective of a wider distributional conflict around affordable housing and potential unjust outcomes of cost burdens of the implemented policies [52].

Academia and the current policy context in several European countries seek to provide solutions to the afore-mentioned existing challenges. Ástmarsson et al. [53] recommend a package of legislative changes in Denmark, such as mandatory savings, financial incentives (e.g., subsidies to landlords with financial limitations, etc.), and improved dissemination of information about these measures. “Grants for Social Insulation Projects in Rental Buildings” in Belgium provides grants for insulation measures in low-income households in the PRS; before the grants are facilitated, a project promoter conducts discussions between landlords and tenants [54]. The “Support for energy efficiency improvements in specific residential areas” scheme in Sweden aims to overcome challenges by offering financial support to landlords for improving energy efficiency of their property, with a portion being allocated to a rent reduction for tenants [55]. The “Nyth Nest Scheme” in Wales provides eligible households with a package of energy efficiency improvements, obliging landlords not to raise the rent for the period of twelve months after their implementation [56]. Finally, Fuerst et al. [36] recommend that the provision of a link between rents and energy efficiency measures is a key recommendation to enhance the implementation of energy efficiency policies in the PRS across Europe. Nevertheless, outside of these highlighted examples, very few policies consider or address the particularities of the PRS across Europe when it comes to the implementation of energy efficiency measures, highlighting the need of further

research on what prevents, or on what could encourage, landlords and tenants to implement such interventions [57].

### 3. Methods

In this article, we investigate the structural factors that affect energy efficiency policies for the alleviation of energy poverty in the PRS across Europe, by analysing both implementation barriers and respective solutions in a holistic manner, also aiming to achieve a greater generalisability of our findings [58]. To do so, we apply a multi-method approach based on extensive desk research and an online survey to collect data from a large sample of field experts, as visualised in **Fig. 1**. All activities were implemented from January to June 2021 in the context of the European Commission (EC)-funded Horizon 2020 project “ENPOR<sup>1</sup>”.

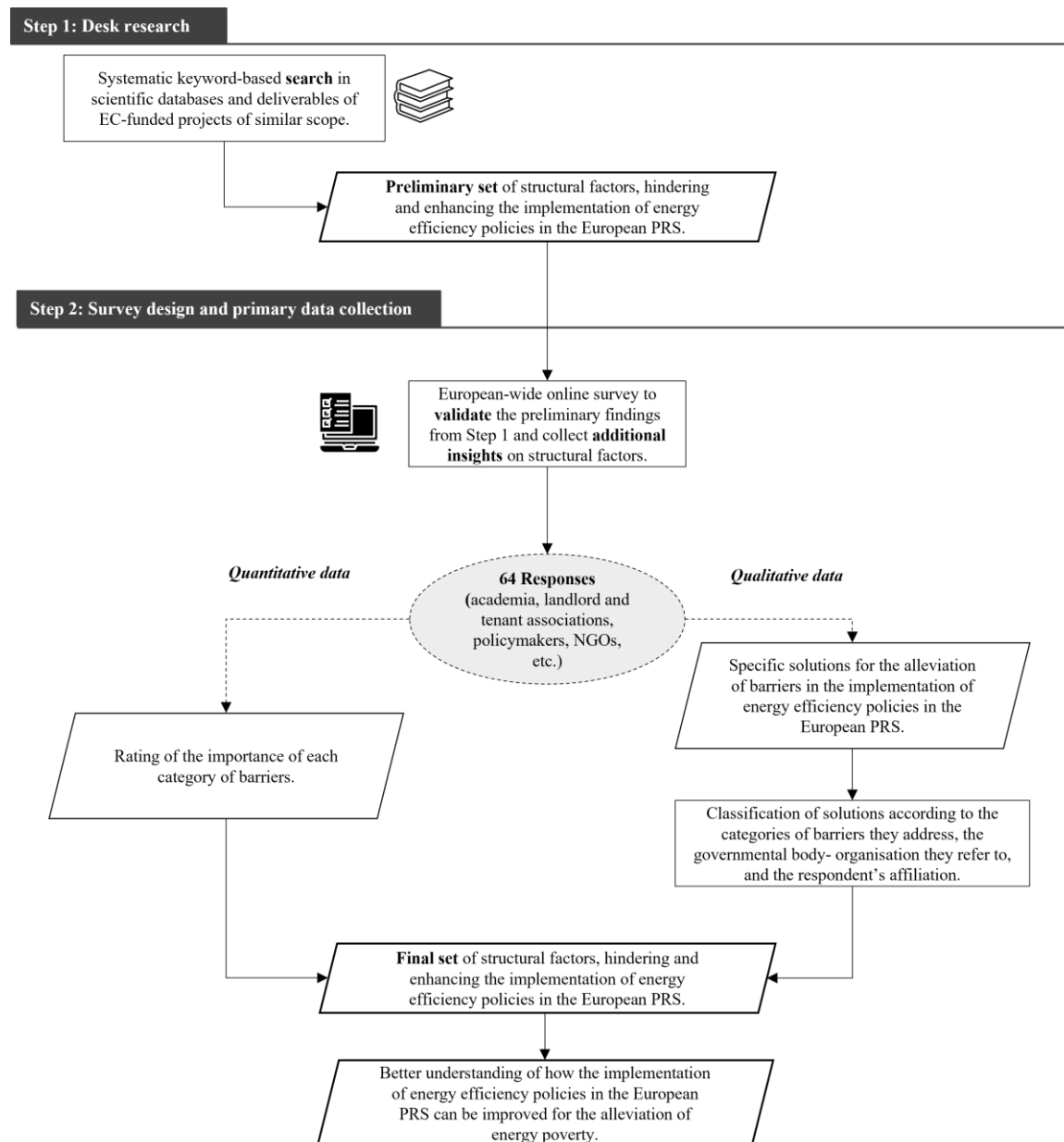


Fig. 1. Overview of the multi-method approach applied in the context of this study.

<sup>1</sup> <https://www.enpor.eu>

### 3.1. Step 1: Desk research

We conducted an extensive review of relevant scientific and grey literature to identify a preliminary set of key categories of barriers, hindering the implementation of energy efficiency policies in the PRS across Europe, and solutions that could address them, also reflecting on possible causalities. In the case of scientific literature, we conducted a keyword-based search of energy peer-reviewed journal articles in the “Science Direct” and “Google Scholar” databases, using relevant search keywords, e.g., “energy poverty”, “energy vulnerability”, “energy efficiency”, “policies”, “barriers”, “solutions”, “Private Rented Sector”, “PRS”, “United Kingdom”, “UK”, “Europe”, “European Union”, “EU”, etc., separately, or in different keyword combinations. Search results were constrained to the period 2011-2021. In the case of grey literature, the search process was centred around relevant technical reports and position papers to supplement existing scientific knowledge. For this case, search results were also constrained to the period 2011-2021. We also made use of research knowledge found in previous deliverables from the “ENPOR” project as well as deliverables from other recent EC-funded projects of similar scope, as the Horizon 2020 projects “ComAct<sup>2</sup>”, “EnergyMEASURES<sup>3</sup>”, “EmpowerMed<sup>4</sup>”, “POWERPOOR<sup>5</sup>”, “SocialWatt<sup>6</sup>”, etc. The preliminary set of the structural factors as determined by this research allowed us to create the survey questionnaire that was used in the next step.

### 3.2. Step 2: Survey design and primary data collection

Between April to June 2021, we conducted an online survey of relevant stakeholders across Europe to validate our preliminary findings and obtain broader insights on the deduced structural factors. The survey was titled “Structural Barriers to Investment in Energy Efficiency Policies in the Private Rented Sector” and divided into three sections; the first section aimed to recognise the importance of each category of barriers identified during our desk research, while the second section aimed to collect primary data on potential policy improvements (i.e., solutions), that could address the identified barriers, and their importance. Finally, the objective of the third section was to identify the most vulnerable groups in the PRS across Europe.

We designed the survey in the “EUSurvey<sup>7</sup>” platform as a semi-quantitative questionnaire, which built on the preliminary findings of our desk research. The survey questionnaire contained mandatory and optional questions as well as independent questions and questions that were built on previous responses. Depending on the structural factors to be addressed, we applied a variety of question formats, from single and multiple choice (respondents chose between multiple given answers, e.g., select the most relevant or correct statement, etc.) to Likert-like scales (respondents had to rank the importance of the different factors, e.g., from “not at all important” to “extremely important”) and free-text boxes. All responses were either quantitative (e.g., rating of importance of barriers identified, etc.), or qualitative (e.g., free-text questions regarding necessary improvements of the regulatory framework at the EU, national, regional, or local level, etc.), and have been anonymised.

The survey population was based on a non-probability sample, sent via multiple channels to clusters of potentially interested stakeholders working across the spectrum of energy efficiency and energy poverty in Europe. Stakeholders represented each part of the “quadruple helix”, which considers the collaboration of four main actors (industry, government, academia, and civil society) as a necessity for inclusive and successful energy planning [59]. Special focus was given to engage with representatives of landlord and tenant associations (e.g., the National Residential Landlords Association (UK), National Union of Real Estate Owners (France), The Tenants’ Voice (UK), The National Confederation of Housing (France), the German Tenants’ Association, etc.). The questionnaire and anonymised aggregated data are openly available [60].

We analysed survey results in two steps: first, we compiled and compared quantitative responses; and second, we complemented results based on stakeholders’ direct quotes (qualitative results). One interesting observation about the qualitative results of our survey is that 58% of the respondents answered the questions in the free-text boxes. This provided us with high-grade qualitative data from relevant stakeholders and field experts on solutions that governmental bodies at all levels, as well as other organisations such as tenant-landlord associations, or NGOs, could promote in order to alleviate barriers in the implementation of energy efficiency policies in the PRS across Europe. These solutions

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<sup>2</sup> <https://comact-project.eu/>

<sup>3</sup> <https://energymeasures.eu/>

<sup>4</sup> <https://www.empowermed.eu/>

<sup>5</sup> <https://powerpoor.eu/>

<sup>6</sup> <https://socialwatt.eu/>

<sup>7</sup> <https://ec.europa.eu/eusurvey>

are classified according to the categories of barriers they address, the governmental body/organisation they refer to, and the respondents' affiliation.

#### 4. Results

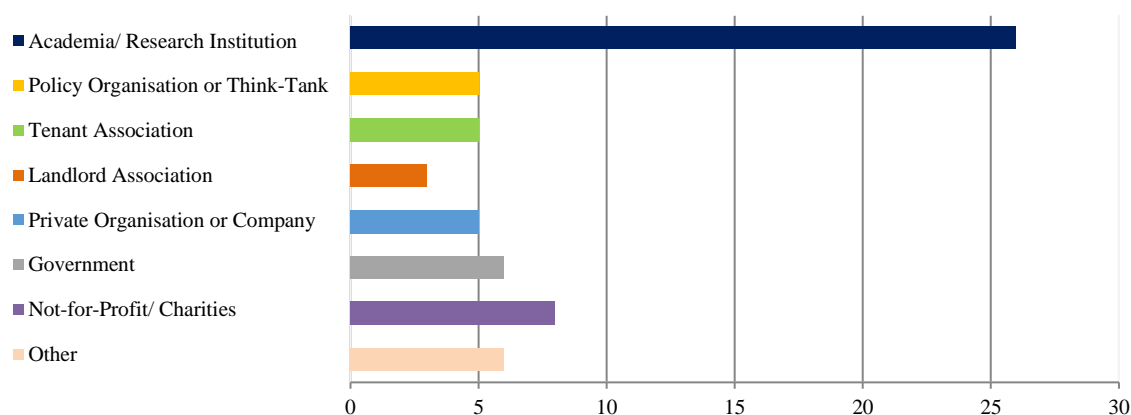
Our desk research led to the identification of several barriers, which we then classified in four key categories based on insights from existing literature in the field [46,61]. **Table 1** presents these categories along with the individual barriers each category consists of.

**Table 1**

Four key categories of barriers hindering the implementation of energy efficiency policies for the alleviation of energy poverty in the PRS across Europe according to literature.

Categories	Barriers	Sources
<b>Financial</b>	- Split-incentives/ lack of direct financial incentive to landlords.	[40,45,62–64]
	- High upfront costs/ lack of funding schemes.	
	- Return on investment.	
	- Increased rent (often exceeding the overall energy savings).	
	- Energy efficiency does not increase the value of the property.	
<b>Social</b>	- Broader social vulnerability in the sector (e.g., unemployment, single parents, ethnic minorities, etc.).	[65–68]
	- Tenants' and landlords' mistrust in governmental policies.	
	- Stigmatisation and time-consuming, complex processes.	
	- Small scale, low-income landlords.	
<b>Political/Regulatory</b>	- Political invisibility/ lack of data on energy poverty amongst tenants in the PRS.	[57,69,70]
	- Lack of energy labelling and mandatory efficiency schemes.	
<b>Technical</b>	- Lack of information.	[43,71–74]
	- Lack of technological knowledge for implementing effective solutions.	
	- Energy usage behaviour/rebound effect.	

These preliminary findings structured the survey questionnaire, which supplemented our analysis. In total, we collected 64 completed responses. **Fig. 2** presents the overall sample size of the survey participants according to their affiliation. The highest participation is from the field of research and academia (26 respondents), while 8 are from not-for-profit organisations/charities, and 6 from governmental bodies, of which 4 are working at the national and 2 at the regional level. Furthermore, 6 respondents are working in other sectors (2 in energy agencies, 1 in real-estate, and 3 unspecified). They are followed by stakeholders working on policy organisations or think-tanks, private organisations or companies, and tenant associations each of which accounts for a total of 5 respondents. Finally, 3 respondents are representatives of landlord associations. Their classification along with the tenets of the “quadruple helix” model is presented in **Table A.1** of the **Appendix**.



**Fig. 2** The sample size of the survey participants according to their affiliation.

Survey participants were asked to rate the importance of the four key categories of barriers as identified from our desk research. A Likert-like scale was used, with “1” assigned to “Not at all important” and “5” assigned to “Very important” (Fig. 3). Results show that financial barriers were regarded to be the most significant, with 71.9% of the respondents rating this category as the most important one. Social barriers were viewed by the respondents as the second most important category, with 67.2% of them rating this category as “More than quite important” (“4” on the Likert-like scale). Political/Regulatory barriers are rated third; 62.5% of the survey participants rated this category as “More than quite important”. Finally, technical barriers were overall rated as of the lowest importance of our surveyed barriers, with only 9.4% of the respondents rating them as “Very important” and most of the respondents rating them as “Less than quite important”, or “Quite important” (“2” or “3” on the Likert-like scale).

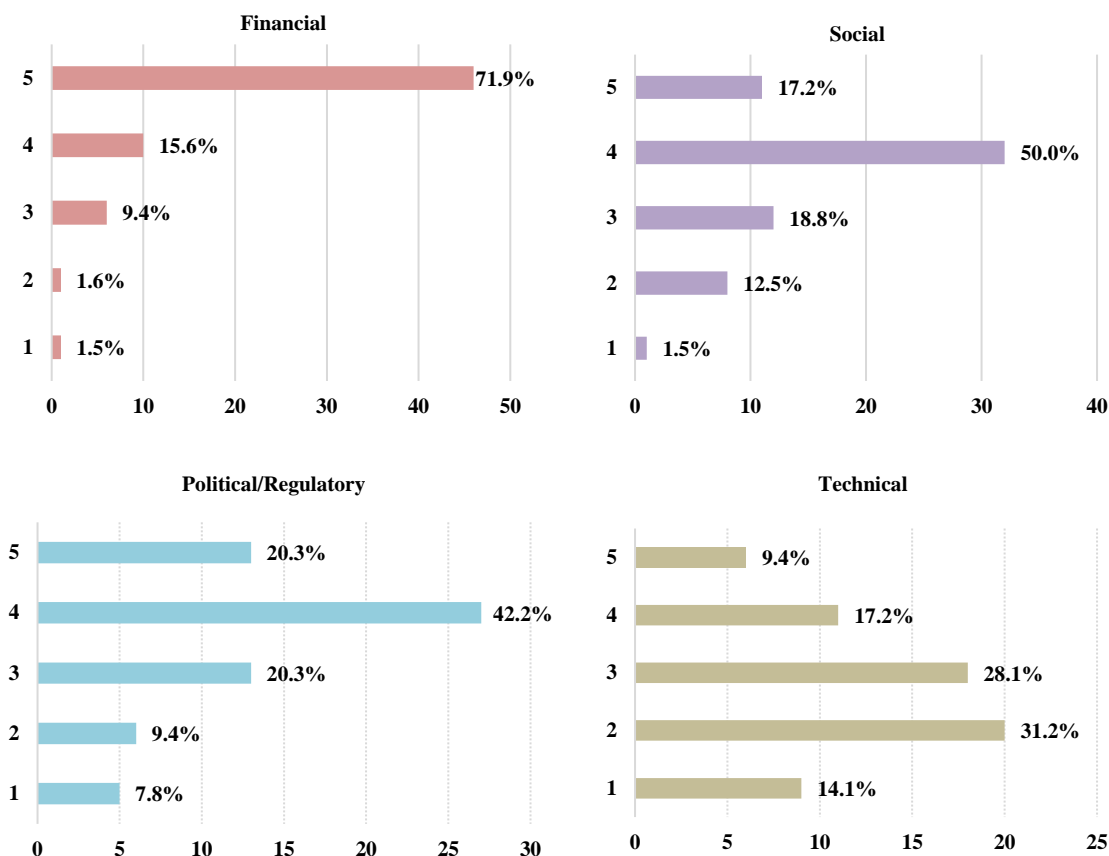


Fig. 3. Importance rating of the four key categories of barriers hindering the implementation of energy efficiency policies for the alleviation of energy poverty in the PRS across Europe according to the survey participants. Survey responses in total figures (n=64).

Fig. 4 presents the mean value of the Likert-like scale responses measuring the importance of each category. We see that differences tend to be at the assessed level of importance of the barrier; in particular, financial, social, and political/regulatory barriers were rated as at least “Quite important” (above “3” on the Likert-like scale), while technical barriers were almost rated as “Quite important” (almost “3” on the Likert-like scale). In addition, when it comes to the affiliation of the respondents, financial barriers were classified as the most important among all the different groups, apart from the representatives from policy organisations/think tanks, who indicated political/regulatory barriers as the most important category (Fig. 5).



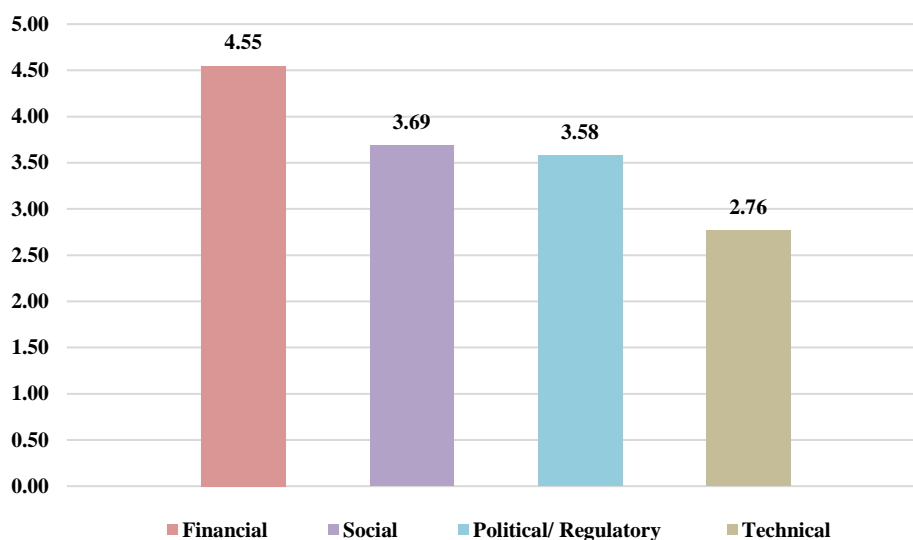


Fig. 4. Mean value of the Likert-like scale responses measuring the importance of each category of barriers.

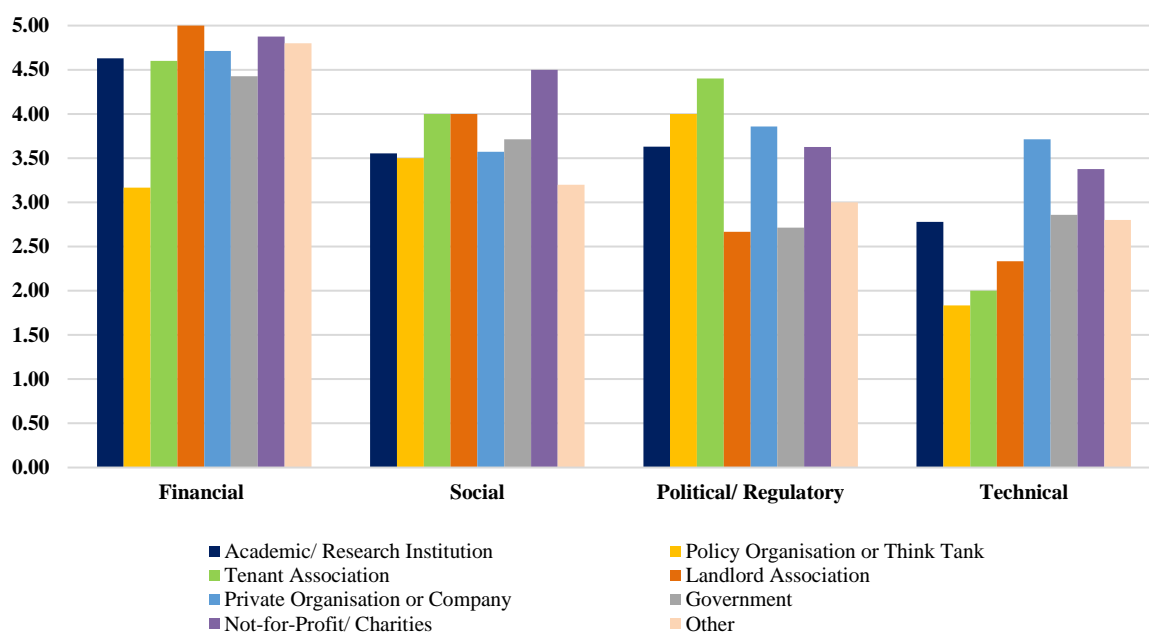
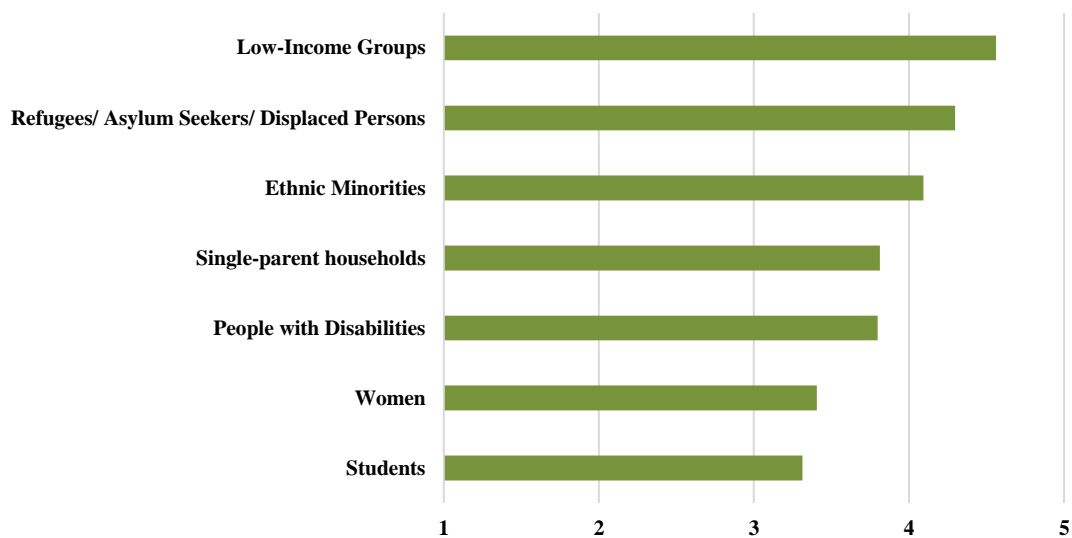


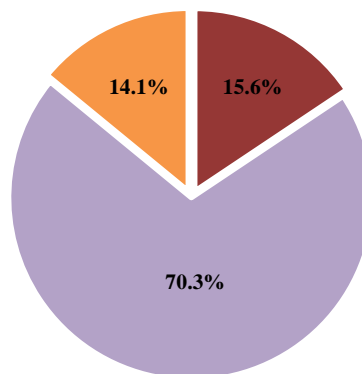
Fig. 5. Mean value of the Likert-like scale responses measuring the importance of each category of barriers according to the affiliation of survey respondents.

Our survey pointed out social barriers as the second most important category of barriers. Survey participants were asked to rank specific vulnerable groups of tenants, as derived from the scientific literature [22,75,76], according to their exposure to energy poverty (with “1” being “Not affected at all” and “5” being “Extremely affected”). The mean rating for each group (Fig. 6) was above “3” (“Affected”), which shows that stakeholders in the field consider each one of the tenant groups as potentially vulnerable to energy poverty. Low-income tenant groups were rated as the most affected by energy poverty, followed by refugees/asylum seekers/displaced persons and ethnic minorities, which are also more likely to be in a lower-income group compared to the average population [77]. Finally, in the free-text boxes, a significant number of respondents also suggested “Elderly people” as an additional tenant group that should not be omitted.



**Fig. 6.** Mean rating value of the affectedness of different tenant groups by energy poverty in the PRS across Europe, according to stakeholders' perspectives.

Moreover, the survey investigated respondents' knowledge of specific EU-level policies aimed at improving energy efficiency in the PRS across Europe. As presented in **Fig. 7**, only 14.1% of the survey participants considered themselves as “very aware”, while the majority (70.3%) described themselves as “fairly aware”, meaning that, while they are aware of policies in place, they are incapable of naming them or providing specific information on them. On the other hand, 15.6% of the participants responded that they had never heard of such policies. The relevant EU-level policies in place according to the respondents that considered themselves as “very aware”, along with a short description, are presented in **Table 2**.



- a. Not Aware - I have never heard of EU-level policies to address issues faced by PRS tenants to improve the energy efficiency of dwellings.
- b. Fairly Aware - I know there are EU-level policies to address issues faced by PRS tenants to improve the energy efficiency of dwellings, but would not know them in detail/ do not know specific information.
- c. Very Aware - I can provide examples of EU-level policies to address issues faced by PRS tenants to improve the energy efficiency of dwellings.

**Fig. 7.** Survey respondents' knowledge on specific EU-level policies aimed at improving energy efficiency in the PRS across Europe.

**Table 2**

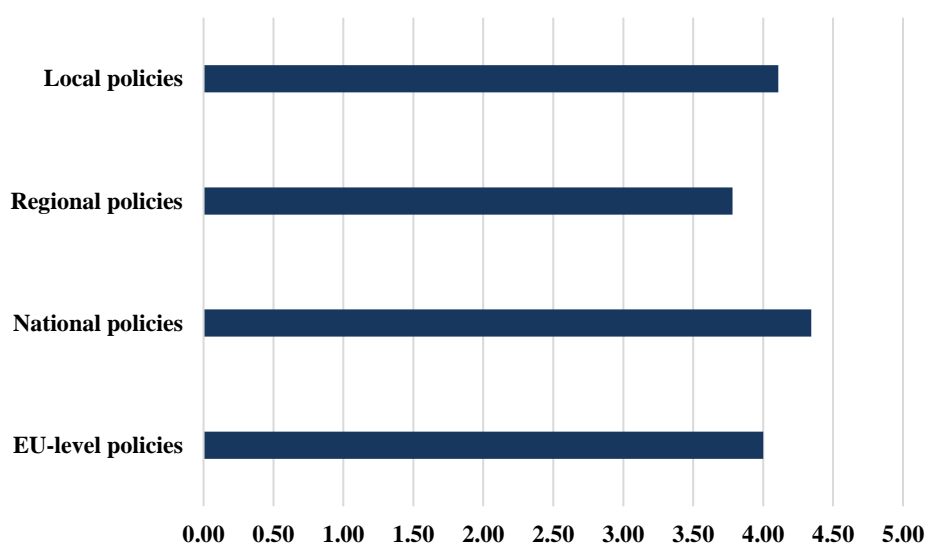
Relevant policies mentioned by survey participants that considered themselves as “very aware” of EU-level energy efficiency policies to address issues faced by PRS tenants.

Policy Name	Short description
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Eco-design	This Directive sets a framework for establishing EU eco-design rules for energy-related items, to ensure that such products can freely move within the EU market [78].
Effort Sharing Regulation	This Regulation sets obligatory climate targets in the Member States regarding the emission of the sectors of buildings, road transport, waste, agriculture, and small industries [78].
Energy Efficiency Directive (EED)	This Directive lays down a framework of measures to promote energy efficiency within the EU in order to ensure the achievement of its 2030 energy efficiency targets [79].
Energy Performance of Buildings Directive (EPBD)	This Directive encourages the improvement of energy efficiency across the EU's building sector [80].
Renewable Energy Directive (RED)	This Directive promotes energy from renewable sources. It sets a binding EU target for the overall share of renewable energy in the EU's gross final consumption by 2030 [81].
Renovation Wave	This Strategy aims to at least double the annual rate of energy renovations in the residential and non-residential building stock by 2030, fostering deep renovations [82].

Stakeholders and field experts were also asked to provide commentary on the specific actions that governmental bodies at all levels, and other organisations, could facilitate to alleviate the identified barriers in the implementation of energy efficiency policies in the PRS and design policies more inclusive and considerate of energy poverty. These inputs are discussed in the next section based on the category of barriers they address, along with inputs that encompass a wider range of categories of barriers providing integrated solutions.

On a Likert-like scale of 1 (“Not at all important”) to 5 (“Very important”) respondents were asked to rank the importance of different scales of governance for implementing energy efficiency policies in the context of alleviating energy poverty (**Fig. 8**). Policies at the national level were classified as the most important, followed by policies at the local level, indicating the necessity of contextualised and context-specific solutions to address the particularities of PRS in each country.



**Fig. 8.** Mean rating values of the importance of different governance levels at implementing energy efficiency policies for the alleviation of energy poverty in the PRS across Europe.

## 5. Discussion

### 5.1. Barriers and solutions

#### 5.1.1 Financial

A pan-European survey conducted by the International Union of Property Owners from January to March 2021 shows that 77% of landlords (out of 10,000 respondents) believe that investing in energy efficiency is extremely helpful and that 31% of the landlords who do not renovate but wish to, do not have the funds required [62]. This finding was validated by our survey results, as across the board, financial barriers were consistently rated the most important category of barriers to implementing energy efficiency policies in the PRS across Europe. As indicated by **Table 1**, split incentives and lack of direct

financial incentives for landlords, high upfront costs, and lack of funding schemes are some of the most common financial barriers hindering the successful implementation of energy efficiency policies in the PRS across Europe. Other important barriers found across the literature concern investment returns of energy efficiency improvements and uncertainties regarding the increase of properties' value. For tenants, an increasing concern is that energy efficiency improvements could result in systematic "renovictions", i.e., evictions as a result of escalating rents caused by energy efficiency renovations that add value to the property [63]. On the other hand, there is not yet enough evidence that the marketability of renovated dwellings increases. This is mainly attributed to ambiguity around how energy efficiency improvements affect the value of real estate properties and the lack of research on the specific economic benefits for landlords, e.g., how energy efficiency improvements impact selling prices or rental incomes, etc. This, thus, discourages landlords to implement energy efficiency measures [40,45].

Scientific literature suggests that grants, subsidies, and tax reliefs (i.e., income tax, property tax, or Value Added Tax reductions) have been the most appealing incentives for landlords to renovate [62]. This is also validated by our survey results with respondents providing specific suggestions on potential financial incentives that could be used to overcome financial barriers at all different governance levels, i.e., EU, national, regional, local. One respondent representing a tenant association referred to "*the provision of subsidies at the EU level along with the demand of a minimal pace on energy efficiency improvements*", whilst another respondent working on academia/research recommended that "*national governments need to specifically address financial schemes to the PRS*".

The key role of local governments was also brought up by another respondent from not-for-profit companies/charities, who claimed that "*governments can be proactive at the local level by leasing properties from landlords that may not have the resources for repair*", while a stakeholder from academia/research suggested that local governments can "*assess opportunities and potential negative impacts at the project level, promoting tailored financing solutions, by avoiding, renovictions*". Furthermore, a stakeholder from the same field recommended the establishment of local tax deductions as an incentive to the implementation of energy efficiency measures. The landlord-tenant dilemma could also be balanced through targeted energy efficiency financial service methods, such as the "on-bill finance" method, which gets capital to fund energy efficiency improvements in buildings and makes repayments through energy bills [64]. Another useful financial service is the Property Assessed Clean Energy (PACE) financing, which finances energy efficiency renovations through specific bonds offered by municipal governments to investors. The loans are repaid over the assigned term (typically 15 or 20 years) via an annual assessment on the property's tax bill. The tax assessment is not placed on the property owner but on the property, allowing its transferability and helping to overcome split incentives [83].

Finally, two survey participants specifying their affiliation as "other" stated that "*national governments can and should carry out reforms and actively encourage private finance solutions, such as on-bill finance*", and that "*national/local banks could create specialised services for the PRS across Europe in collaboration with Energy Service Companies- mandated from the government- to provide innovative financing solutions*".

### 5.1.2 Social

The presence of vulnerable and low-income social groups in the PRS across Europe can affect the implementation of energy efficiency policies. According to a comparative study of several countries (including Austria, France, Germany, Italy, Spain, the Netherlands, Belgium, Sweden, and the UK), households with non-native members, or students, are more likely to be occupants of rental properties, which also live in overcrowded and substandard households [65]. Low-income households, people with disabilities, as well as, single-parent households are some other social groups that live in the PRS and are "at risk" of energy poverty [66].

When aiming to target such groups, mistrust, which depends on the context and the actors involved, can work as a barrier to the implementation of energy efficiency policies. Feelings of stigmatisation and shame can also play a role, as neighbours or building managers who are aware of the financial assistance, that these groups get, may stigmatise them. Moreover, if the process is perceived as time-consuming, and/or complex, vulnerable groups can be more reluctant to apply [67]. To what concerns landlords, the PRS across Europe mainly consists of small-scale landlords, which often results in a lack of professionalism, inadequate knowledge regarding energy efficiency issues, and inability to apply for grants or subsidies due to lack of confidence. In addition, landlords' possible mistrust of policy and legislation as well as the presence of a proportion of low-income landlords can also work as barriers to the implementation of energy efficiency policies [68].

Expansion of advice services through greater outreach to affected persons, closer integration of social association advice centres, job centres, and municipal authorities, as well as training relevant employees on how to deal with energy efficiency and energy poverty concerns, are considered beneficial for addressing social barriers [68]. A stakeholder working in the field of governance responded that “*energy efficiency policy should be accompanied by general awareness raising of tenants’ rights, due to the fact that many tenants fear that their tenancy agreement will be negatively affected if they raise energy efficiency issues to their landlords*”. According to survey participants, local governments and NGOs have the most significant impact on addressing social barriers. One respondent from “other” affiliation stated that “*local governments are best placed to reach out, protect, and raise awareness of vulnerable groups*”, while a tenant association representative suggested that “*local governments can organise a joint local approach and stimulate cooperatives of all inhabitants (owners and tenants alike)*”. Furthermore, a respondent from the field of academia and research stated that “*NGOs can warn the authorities when energy efficiency delivery in the PRS results in negative distributional impacts, or misses energy vulnerable population*”, while an employee of a private organisation/company claimed that “*it is very important to raise awareness, collaborate with local NGOs and organisations that represent all the different stakeholder groups of the value chain*”. Promoting such tailor-made social policies at the local level obtains secured and long-term funding, closely connecting social solutions with financial and political ones. This is why several respondents requested increased social service resources, mainly at the EU and national levels.

### 5.1.3 Political/Regulatory

Although PRS across Europe is considered as the least efficient housing sector, only a very small number of measures address the political and regulatory context of energy efficiency with regard to energy poverty, while public participation and policy engagement is quite low, meaning that tenants and landlords are not brought together to examine and address the needs of both sides [57]. Moreover, the lack of officially established frameworks to address the specificities of the PRS, as well as the difficulty to formulate them is likely to have led representatives from policy organisations/think tanks to rate political/regulatory barriers as the most important category of barriers, contrary to all the other stakeholder groups which considered the financial ones as the most important.

An interesting observation from the responses presented in **Table 2** is that even the “very aware” field experts are facing challenges in providing proper examples of EU-level policies to address issues faced by PRS tenants to improve the energy efficiency of dwellings. Their inputs are limited to EU-level strategies/directives, and regulations, which do not consider thoroughly the particularities of the PRS across Europe and encompass more general directions regarding the increase of energy efficiency and the alleviation of energy poverty in Europe.

These findings validate that awareness on the political and regulatory aspects of energy efficiency policies for the alleviation of energy poverty in the PRS across Europe is inadequate, even among individuals working in the relevant fields, that there are not enough policies, and finally, that information concerning these policies is not adequately stated, or even accessible.

In addition to the policy gap, the political invisibility of the most vulnerable tenants remains an issue, which means that in the PRS across Europe, there is a major challenge to identify and quantify energy vulnerable households. Current efforts on the proper identification of energy vulnerable households in the PRS across Europe include bias in the selection, misrecognition, and inaccurate targeting. These issues lead to the exclusion of energy vulnerable households from policy support schemes [69].

The establishment and the function of observatories at the local, national and/or the European and their collaboration with the respective authorities to raise awareness on energy poverty and vulnerable groups, as in the case of the EU Energy Poverty observatory<sup>8</sup> and the “Covenant of Mayors<sup>9</sup>” initiative [84], can combat political invisibility and lack of data [85]. In this context, survey respondents reflected on the need to address political invisibility and impose better political regulation, especially at the EU level. Some respondents also suggested that “*all Member States should adopt clear action plans with intermediate milestones to improve the least efficient dwellings, develop EU-wide regulations for monitoring and evaluating the impact of energy poverty*”, while other respondents highlighted that “*Member States should adopt a definition of energy poverty as well as a method for identifying households at risk of it*”. The need of “*national and comparative analyses of national measures across Europe and the design of a common approach with the most efficient and effective solutions*” was also

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<sup>8</sup> [https://energy-poverty.ec.europa.eu/index\\_en](https://energy-poverty.ec.europa.eu/index_en)

<sup>9</sup> <https://www.eumayors.eu/en/>

highlighted by a private organisation's/company's employee. On the local level, government representatives suggested specific urban planning techniques such as identifying priority neighbourhoods and developing local action plans.

Furthermore, recent developments in the EU regulation emphasise the need to reduce energy use and improve energy efficiency in the building sector [86]. "Minimum energy performance standards", with the use of Energy Performance Certificates (EPCs), is one of the main regulatory measures used to overcome barriers in the implementation of energy efficiency policies in the PRS across the EU [87]. Similar is the case in the UK, where "Minimum Energy Efficiency Standards" specify the EPC minimum criteria for a dwelling so that it can be rented [88,89]. A stakeholder from the field of governance highlighted that *"it could be indicated that renting a home must be connected with a minimum energy classification that ensures the comfort of those who live in it"*. Nevertheless, EPCs are facing diverse criticism regarding their reliability [90,91]. In particular, a respondent from the field of academia and research suggested that *"the prohibition of renting inefficient dwellings should be accompanied by clear deadlines, financial incentives, and ensuring the EPCs' reliability, by reinforcing training, qualifications, and controls of the assessors allowed to deliver them"*, while a respondent from a landlord association opposed to Minimum Energy Performance Standards, claiming that European policies should follow *"[...]less mandatory minimum energy performance requirements and more incentives to landlords and tenants"*.

Special attention was also given from several respondents on how the policy context could empower the agency of tenants. Indicatively a respondent from the field of academia stated that *"local authorities should be enabled to inspect properties in order to give power to tenants to request energy-performance improvements, especially when it comes to low energy-performance properties"*, whilst another coming from the same field highlighted the importance of *"national regulations to allow for "do-it-yourself" works done by the tenants when these works improve the energy performance of the dwelling"*. The latter means that, in case the landlord opposes to tenants' suggested interventions, and an assessor confirms that the dwelling is "substandard", then the regulation should allow tenants to do the necessary interventions themselves to improve the energy performance of their dwellings. Finally, a respondent representing a tenant association recommended the *"mandatory creation of a group of tenants for each building and groups of buildings at the neighbourhood scale for better negotiations with landlords and authorities, to define better public subventions, high-quality energy efficiency renovation projects, as well as to avoid the danger of evictions"*.

#### 5.1.4 Technical

Technical barriers are categorised as the least important category of barriers according to our survey. Nevertheless, as indicated by the current literature, lack of information, technical support and advice are some factors that contribute to landlords' hesitancy to invest in energy efficiency projects. Their hesitancy is further enhanced by issues connected with the energy-saving estimations and a lack of trust in their accuracy [71]. The adoption of innovative and more efficient designs is also discouraged by a lack of knowledge and capacity. Increasing awareness of innovative technologies to learn how to use them and to determine whether they are profitable can be costly and time-demanding for individuals, serving as another technical barrier to the implementation of energy efficiency improvements [43].

This is also supplemented by the fact that landlords do not benefit directly from such improvements, so they might be less likely to devote time to learning all the aspects that follow them, while tenants, who directly benefit from such improvements, do not have the authority to proceed with the necessary investment decisions. Moreover, most energy users have a traditional mindset, focusing on upfront investment costs, rather than ongoing operational costs and money saved over time. Furthermore, in many cases, consumers' mistrust of innovation professionals, or their belief that energy efficiency increases a project's prices and length might have a significant impact on the decision to renovate or not [72,73].

In addition, even if energy-saving measures are put in place in a tailored way including all the particularities of the PRS across Europe, this will not necessarily lead to reducing energy costs, or consumption, due to rebound effects. Rebound effects efficiency paradox, in which an obtained result is to some extent opposite to what was intended [74], leading to a discrepancy between theoretically projected savings and actual savings, which can also discourage the implementation of energy efficiency measures [92].

Increasing awareness and knowledge on the technological aspects of energy savings and energy efficiency retrofits could be one way to overcome technical barriers. According to our survey, NGOs,

associations, and private companies can play a major role in this by using their technical expertise to better support the implementation of energy efficiency measures. Another very important type of support that was highlighted by survey respondents is “*capacity building, training activities, and information campaigns*”, so that both tenants and landlords are capable of making well-informed decisions about the adoption of energy efficiency measures.

Furthermore, many respondents considered that governmental bodies should promote the creation of one-stop-shops (OSS). OSS are facilities that bring all policy interventions together in a single body, working with stakeholders to give all necessary skills and knowledge for home-energy renovations [93]. OSS could provide comprehensive guidance and continuous technical support to landlords and tenants during the lifetime of energy efficiency projects. Another important factor highlighted by a respondent from the field of policy organisations/think tanks is the training of experts on energy poverty, while a tenant association representative highlighted the importance of “*ensuring that the advice provided is trustworthy*”. To this end, neutral parties like public authorities and landlord/tenant associations could provide lists of trusted professionals, and improve the lack of transparency in the market [94]. The involvement of independent energy efficiency experts to coordinate and facilitate the process can support the implementation of energy efficiency policies [19]. These services could also support the efforts of addressing rebound effects by promoting sustainable energy consumption for the best utilisation of energy efficiency measures.

## 5.2. A multi-dimensional perspective of solutions

Our work builds on the rationale that implementing energy efficiency policies to alleviate energy poverty in the PRS across Europe is a holistic and multi-dimensional problem affecting different economic sectors; thus, interdisciplinary approaches are of great importance [95]. To this end, we provide insights on how different stakeholder groups consider that governmental bodies and other organisations, such as NGOs, could improve the implementation of energy efficiency policies. Detailed stakeholder insights on potential solutions that highlight the need for a multi-dimensional perspective are provided in **Table A.2** (EU governmental bodies), **Table A.3** (national governmental bodies), **Table A.4** (regional governmental bodies), **Table A.5** (local governmental bodies), and **Table A.6** (other organisations such as NGOs) in the **Appendix**.

Indicatively, a respondent from the field of policy organisations/think tanks claims that EU governmental bodies should “*oblige landlords to renovate, to support the EU’s efforts to reach the 2050 goals, taking into account that tenants do not have to bear all costs*”, referring to the need for actions that target both political/regulatory and financial barriers. The need for governmental bodies to encompass a wider range of categories of barriers is also highlighted by an academic, who states that governments should “*offer tax reduction on the renting revenues if landlords commit to renting their dwellings with a rent lower than the market, along with the requirement that their dwellings meet a minimum energy-performance level. Additional tax reductions could be granted if the dwelling is rented in vulnerable groups*”. In this way, financial, political/regulatory, and social aspects of the issue are considered, also highlighting the importance of interconnecting energy and social policies for the most effective alleviation of barriers.

A similar approach is also proposed by a stakeholder from the field of non-for-profit organisations/charities, who suggests that “*when national governments design energy efficiency financing tools, a detailed mapping of the residency models should be foreseen to support a better allocation of funds based on the real and proven needs of each residency model*”, connecting financial incentives with the political/regulatory context. Finally, a respondent working on a city network (specified as “other”) recommends that “*local governments can assess opportunities and potential negative impacts at project-level and promote tailored financing solutions (e.g., to avoid so-called renovations, etc.), especially when it comes to vulnerable households*”, giving prominence to a multi-dimensional perspective on the alleviation of financial, political/regulatory, and social barriers.

## 6. Conclusions and policy implications

In this article, we provide a comprehensive and holistic analysis of structural factors towards the successful implementation of energy efficiency policies for the alleviation of energy poverty in the PRS across Europe. To do so, we coupled existing knowledge in the scientific and grey literature with an online survey to collect semi-quantitative data from a larger sample of relevant stakeholders and field experts. In addition, qualitative survey data allowed us to capture knowledge embedded in stakeholders on the specific solutions that decision-makers at different governance levels could apply to overcome existing barriers.

Our findings showed that financial barriers were rated as the most critical by all the different stakeholder groups, except by policymakers. This highlights the importance of providing financial incentives and subsidies that consider the needs of both landlords and tenants. On the other hand, policymakers that participated in the survey highlighted that the existing barriers are not only an issue of lack of funding and rated political/regulatory barriers as the most important ones, since existing energy efficiency policies fail to capture the particularities of the PRS across Europe. This is also aligned with our survey's outcome on policy awareness, which was found to be low to fair. The latter underlines that the PRS across Europe is understudied, particularly among lower-income and vulnerable groups. This implies that, in addition to designing proper financial policies, policymakers with an interest in promoting energy efficiency policies in the residential sector, should focus on the identification of energy vulnerable households, as well as dissemination and information campaigns. Furthermore, the survey indicated that a wide range of vulnerable groups, such as low-income groups, displaced persons, or ethnic minorities, are also significantly exposed to energy poverty, highlighting the importance of the implementation of energy efficiency policies in the PRS across Europe. Policymakers should also focus on collecting relevant socioeconomic data and establishing personalised, transparent, and inclusive policies that take into account the particularities of different vulnerable groups.

In addition, we argue that EU-level strategies can play a significant role in the promotion of energy efficiency policies in the PRS across Europe. Governmental bodies can develop a coherent methodology applicable to the European level, by funding, monitoring, and sharing knowledge and best practices on energy efficiency and energy poverty among Member States, also providing them with the flexibility to adapt to national peculiarities and markets. The current EU legislation is committed to delivering energy efficiency and addressing energy poverty towards a fair energy transition. Indicatively, the EED, and its proposed recast, is one of the cornerstones of the existing EU legislation that allows for the delivery of energy efficiency policies in vulnerable households to mitigate energy poverty. Nevertheless, prioritisation of vulnerable households depends on criteria that most Member States have not fully established yet. Our findings should be considered especially in view of the latter.

Furthermore, survey participants consider policymaking at the national level more important when implementing energy efficiency policies in the PRS across Europe. They suggest that national government planning can take advantage of the current EU legislation and funding policies, establish specific obligations to landlords, consider their financial constraints, enhance tenants' agencies, and promote a detailed mapping of the sector when designing energy efficiency financing tools. They can also decentralise governance, since regional and local authorities can better investigate the most effective mechanisms for the implementation of energy efficiency policies, identify energy vulnerable households, mediate between landlords and tenants, assess opportunities and negative impacts at the project scale, and monitor the effects of energy renovations. Therefore, they can improve the development of regional and local action plans with financial, social, and technical solutions, tailored to the specific issues their communities face.

Our results also imply that, although financial constraints work as the most hindering factor to implementing energy efficiency policies in the PRS across Europe, correcting for financial constraints alone may not be sufficient for improving energy performance and tackling energy poverty. Our multi-dimensional perspective and the solutions provided by the survey respondents indicate that, although the notion of "barriers" is a practical method to identify structural factors that hinder the implementation of energy efficiency policies, it leads to piecemeal approaches. Barriers and solutions cannot be viewed in isolation as they cover financial, social, political/regulatory, and technical issues. This is where the conceptual notion of "barriers" reaches its limits as an explanatory tool for better understanding deep challenges regarding energy efficiency, housing quality, and energy poverty. In addition, previous research regarding the implementation of energy efficiency policies has mainly been guided by perspectives focused on new technologies and cost savings, mainly limiting the issue in the frame of energy policy, and, thus, failing to address it as a policy issue with further interconnections, as for example with social sciences [96]. Exploiting insights from complementing social sciences is likely to give more social relevance and scientific validity to policymaking.

Moreover, we acknowledge some limitations of our study in terms of the generalisability of our findings regarding barriers and respective solutions, as we were not capable of investigating the different PRS contexts across Europe in further depth. Nevertheless, the barriers and the solutions analysed in our study are relevant to all the European countries, regardless of their relative importance. This is also demonstrated by our survey's population since we received responses from stakeholders in more than 15 European countries. In addition, while all survey respondents are highly experts in the fields of energy



efficiency and energy poverty, as also indicated by their capability to provide high-grade qualitative data for the improvement of the design and implementation of energy efficiency policies, we also acknowledge that specific stakeholder groups remained fairly underrepresented; this was expected considering the high fragmentation of the PRS and the consequential difficulty to engage with stakeholders from specific groups, as for example, representatives of landlord and tenant associations. However, representatives from civil society were equally represented overall (25% of the respondents) (Table A.1). Another survey limitation is that respondents from Eastern Europe (2.9% of the respondents), in which large shares of the population suffer from energy poverty [97], also remained relatively underrepresented. This is counterbalanced, though, by the fact that responses from Southern Europe, which is also another region with high energy poverty levels, are relatively high (47.1% of the respondents) [98].

Finally, although our study is supported by the scientific literature and has received positive comments regarding its novelty and significance by fellow researchers and policymakers during a range of international conference and workshop presentations, further research is required to enhance our survey findings by collecting more quantitative data and engaging with all the interested parties affected by the phenomenon of energy poverty. To this end, by highlighting general trends that are common across Europe, we call for further research on the size of the phenomenon of energy poverty in the PRS across Europe and how Member States deal with it. Further research should focus on data collection on: (i). how many energy vulnerable households across Europe live in multi-, or single-family homes, and what are the implications regarding the implementation of energy efficiency policies in each situation, and (ii). whether any of the individual Recovery and Resilience Plans, or Long-Term Renovation Strategies, at the Member State level, include specific measures for the alleviation of energy poverty in the PRS. These insights could support scientists, decision-makers, relevant stakeholders, and field experts, in developing analytical tools to drive deep systemic change in the PRS across Europe.

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## Appendix

**Table A.1**

Classification of survey respondents based on the tenets of the “quadruple helix” model.

Actor	Affiliation of the survey respondents	Number of responses
Industry	Private organisation/Company, Others (energy agency, Real Estate)	8
Government	Governance, Policy organisation/Think-Tank	11
Academia	Academia/Research institution	26
Civil society	Not-for-Profit/Charities, Landlord Association, Tenant Association	16
-	Other (not specified)	3

**Table A.2**

Policy improvements/actions that EU governmental bodies can implement according to survey participants, and respective categories of barriers they alleviate.

Categories of barriers addressed	Solutions	Affiliation of survey respondent
Financial Social Political/Regulatory	“Develop a coherent methodology applicable on a European level to define levels of energy poverty and the level of financial assistance at each level of poverty.”	Landlord association
Financial Political/Regulatory	“Set overall objectives on energy efficiency/renewables but avoid going into detailed regulation (e.g., need of flexibility to adapt to local peculiarities, specific markets, etc.), along with further support of renovations through the provision of funds.”	Private organisation/Company

<b>Financial Political/Regulatory</b>	<i>“Provide legal regulation (oblige landlords to renovate, otherwise we will never reach the 2050 goals, however, make sure that tenants do not have to bear all costs).”</i>	Policy organisation/Think tank
<b>Financial Social Political/Regulatory</b>	<i>“Monitoring and sharing of knowledge and best practice on energy poverty among MS, funding schemes, strong regulation, surveys among the MS, special awareness programs for consumers, focus on energy poverty with specific solutions to compact the reason behind the problem, support to vulnerable consumers with affordable funding solutions.”</i>	Private organisation/Company Not-for-Profit/Charities
<b>Financial Social Political/Regulatory</b>	<i>“Further guidance to MS by setting targets, providing funding for the alleviation of, and further research on, energy poverty in the PRS across Europe.”</i>	Academia/Research institution

**Table A.3**

Policy improvements/actions that national governmental bodies can implement according to survey participants, and respective categories of barriers they alleviate.

<b>Categories of barriers addressed</b>	<b>Solutions</b>	<b>Affiliation of survey respondent</b>
<b>Financial Political/Regulatory</b>	<i>“Provide subsidies and demand a minimal pace on improvements of energy efficiency.”</i>	Tenant association
<b>Financial Political/Regulatory</b>	<i>“Better and more focused usage of the current EU legislation, and funding policies directly targeting energy vulnerability in the PRS across Europe, also providing better guidance to their subordinates.”</i>	Academia/Research institution
<b>Financial Political/Regulatory</b>	<i>“Provide subsidies and demand a minimal pace on improvements of energy efficiency, improve tenant rights on decisions in regard to improving energy efficiency.”</i>	Tenant association
<b>Financial Political/Regulatory</b>	<i>“Establish obligations for PRS landlords to comply with minimum energy efficiency requirements in the housing they own and rent out. Address high rental prices by intervening in PRS markets, giving powers to local/regional authorities in charge of urban areas, where prices have rapidly increased in recent years. Channel and distribute EU funding, coupled with national resources for retrofitting in PRS. Set consistent, ambitious national energy efficiency policies, or strategies, which adequately consider energy efficiency in the PRS across Europe, energy poverty and climate change.”</i>	Academia/Research institution
<b>Financial Political/Regulatory</b>	<i>“When designing energy efficiency financing tools, a detailed mapping of the residency models should be foreseen. This can support a better allocation of funds based on the real and proven needs of each residency model.”</i>	Not-for-profit/Charities
<b>Financial Political/Regulatory</b>	<i>“Adopt a progressive approach to forbid renting inefficient dwellings, with a clear deadline and financial incentives that decrease over time, or with financial incentives under the conditions to strongly limit the increase in the rent over the next 10 years. In case renovations are done without public aid, a regulation should limit the increase in rents after works so that it does not exceed savings in energy bills.”</i>	Academia/Research institution
<b>Financial Social Political/Regulatory Technical</b>	<i>“More funding schemes, special awareness programmes for consumers, focus on energy poverty with specific solutions to compact the reason behind the problem, support to vulnerable consumers with affordable funding solutions.”</i>	Private organisation/Company Not-for-Profit/Charities
	<i>“More information and data on the benefits of energy efficiency policies.”</i>	Other

**Table A.4**

Policy improvements/actions that regional governmental bodies can implement according to survey participants, and respective categories of barriers they alleviate.

<b>Categories of barriers addressed</b>	<b>Solutions</b>	<b>Affiliation of survey respondent</b>
<b>Social Political/Regulatory Technical</b>	<i>“Regional authorities could investigate the most effective mechanisms to get landlords to upgrade their properties, lead on demonstration projects, coordinate large retrofit projects, and provide support to access funding.”</i>	Not-for-Profit/Charities

<b>Financial Political/Regulatory</b>	<i>“Depending on state composition: assist the delivery of EU/national funds and the implementation of national policies/strategies. Attract EU funding for dedicated regional programmes, or supplement EU/national funding with own resources from regional budgets.”</i>	Academia/Research institution
<b>Financial Political/Regulatory</b>	<i>“If sufficient power was decentralised at the regional level, this level could provide support services for local energy efficiency/renovation programmes, provide financing, catalyse the defragmentation of the energy renovation market (on the supply and demand sides), set up guarantee funds to de-risk private finance, etc.”</i>	Other

**Table A.5**

Policy improvements/actions that local governmental bodies can implement according to survey participants, and respective categories of barriers they alleviate.

Categories of barriers addressed	Solutions	Affiliation of survey respondent
<b>Financial Political/Regulatory</b>	<i>“Establishing local tax deduction, along with flexible local building regulation, in order to implement energy efficiency measures.”</i>	Academia/Research institution
<b>Financial Political/Regulatory</b>	<i>“Influence rental prices in the PRS through municipally-owned, or managed social housing.”</i>	Academia/Research institution
<b>Financial Political/Regulatory</b>	<i>“Observe changes in rental prices following retrofitting at street, or neighbourhood scales, which can be seen as signs of “low-carbon gentrification, or renovation.”</i>	Academia/Research institution
<b>Financial Social Political/Regulatory</b>	<i>“Local governments can assess opportunities and potential negative impacts at project-level, and promote tailored financing solutions (e.g., to avoid so-called renovations, etc.), especially when it comes to vulnerable households.”</i>	Other
<b>Financial Social Political/Regulatory</b>	<i>“Social services of municipalities have a good knowledge of the households facing difficulties with paying their rent, energy bills, etc. And increasingly, municipalities have a good knowledge of the energy performance of the building stock in their area. They can, therefore, adapt information and support schemes according to the issues faced by owners and tenants.”</i>	Academia/Research institution
<b>Financial Social Political/Regulatory</b>	<i>“Advisors from municipalities can be mediators between tenants and owners when landlords face difficulties to get their dwelling meet minimum standards or would like to do works.”</i>	Academia/Research institution
<b>Social Political/Regulatory</b>	<i>“Set local renovation plans to support renovation by identifying and accompanying persons at risk of energy poverty at this level.”</i>	Private organisation/Company

**Table A.6**

Policy actions that organisations like NGOs can implement according to survey participants, and respective categories of barriers they alleviate.

Categories of barriers addressed	Solutions	Affiliation of survey respondent
<b>Social Political/Regulatory</b>	<i>“NGOs can provide essential support to low-income and vulnerable households. They can also help to identify buildings that are substandard, and where owners abuse vulnerable households that cannot look for other housing opportunities.”</i>	Academia/Research institution
<b>Social Political/Regulatory Technical</b>	<i>“NGOs may help energy vulnerable groups to have their voice heard in front of public authorities or mediate with landlords and other non-state actors involved in PRS retrofitting actions (e.g., construction firms, etc.).”</i>	Academia/Research institution

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