



Actions to Mitigate Energy Poverty in the Private Rented Sector

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ENPOR PARTNERS



The Institute for European Energy and Climate Policy (IEECP) is a non-for-profit, independent research organisation based in the Netherlands.



The Centre for Renewable Energy Sources & Saving (CRES) is a public entity supervised by the Ministry of Environment and Energy and is based in Greece.



Climate Alliance (CA) is a non-for-profit association based in Germany.



The Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) is a National Agency based in Italy.



The University of Manchester (UoM) is a higher education institution based in the United Kingdom.



Tartu Regiooni Energiaagentuur
Tartu Regional Energy Agency

The Tartu Regional Energy Agency (TREA) is an energy agency based in Estonia.



UPRC is primarily represented by the Technoeconomics of Energy Systems laboratory (TEESlab). TEESlab is a research unit within the university, based in Greece.



The University of Applied Sciences Utrecht (HU) is a higher education and research institution based in the Netherlands.



The Society for Sustainable Development Design (DOOR) is a civil society organization based in Croatia.



Wuppertal Institute for Climate, Environment and Energy (WI) is a German research institute and think tank for sustainable development based in Germany.



The Österreichische Energieagentur or Austrian Energy Agency (AEA) is a non-profit scientific association based in Austria.



The International Union of Property Owners (UIPI) is a pan-European non-profit association based in Belgium.

TESTIMONIALS

“ The participation of the Austrian Energy Agency and specifically of the experts from the ENPOR team provided the policy makers in the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology in-depth analysis on the situation of energy poor households in Austria and possible support measures to mitigate the additional burden these households currently face. ”

- Mag. Gerd Jung, MBA, Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology

“ I confirm that ENPOR project, through the established REACT groups, provided valuable insights leading to the improvement of the Action Plan for the alleviation of energy poverty in Greece, as well as, to the redesign of two policy measures (energy renovation programme and the Energy Efficiency Obligation Scheme), in order to combat energy poverty in the rented sector. ”

- Vasiliki Sita, Department of Energy policies and energy efficiency, Ministry of Environment and Energy, Greece

“ We are actively addressing energy poverty with a door-to-door approach. [...] In recent months, around 600 students have received customized energy boxes and advice. Additionally, visits were made to residences with energy boxes and counsel. ”

- City of Utrecht, Netherlands

“ The most significant health risks are related to uninsulated buildings, which are often too cold in winter, and in such cases, tenants are twice as likely to report poor health, caused by cold, moisture, drafts, mold, etc. Energy renovation eliminates these risk factors and improves the health condition of the population, and thus also affects the reduction of sick leave and the costs of the public health system. ”

- Ministry of Spatial Planning, Construction and State Property, Croatia



1 EXECUTIVE SUMMARY

Between 2020 and 2023, ENPOR has studied and acted to reduce energy poverty within the Private Rented Sector across seven European nations: Austria, Croatia, Estonia, Italy, Germany, Greece, and the Netherlands. This work was necessary as energy poverty – *which arises when one cannot cover their energy expenditure due to a combination of high energy costs, low incomes, inefficient housing, and varied regional climates* – is a growing issue in the private rented sector (PRS), seeing as roughly 30% of the EU's citizens live in rental properties, often characterized by lower energy efficiency. Within the project, 10 policies in 7 Member States were altered to consider and better accommodate the basic energy requirements of those experiencing energy poverty within the PRS.

At the heart of ENPOR's methodology was the formation of REgional ACTION (REACT) groups, which have been instrumental in fostering collaborative policy development and comprehensive stakeholder engagement across several communities and landscapes. These groups collaborated to ensure that the developed policies resonated with the diverse needs and experiences within the different countries' rented sectors. In addition, the project conducted an exhaustive analysis of 114 existing policies to identify gaps in energy justice and formulate targeted recommendations to rectify this issue.

Innovations like the Energy Poverty Dashboard and the Split Incentive Quantification Tool, a tool to study the 'split incentives' problem to balance costs and benefits between landlords and tenants, emerged from ENPOR, offering new perspectives in understanding and tackling energy poverty in the PRS. Following the co-creation of the 10 policies, several key policy recommendations arose, including the prioritization of inclusive and tenant-focused measures, the enhancement of energy efficiency standards in the PRS, especially for the least energy-efficient buildings. Moreover, the policies advocate for tenant protections against unfair evictions post-renovation and encourage shared responsibilities in energy efficiency improvements.

ENPOR's impacts are numerous, but most importantly, the project has heightened awareness and understanding of energy poverty in the PRS among policymakers and stakeholders, while its practical policy recommendations have influenced legislative and programmatic shifts in EU Member States. Furthermore, the project sets a new standard in stakeholder collaboration and policy co-creation, laying a foundation for future energy poverty initiatives.

2 INTRODUCTION

The Private Rented Sector is a critical arena for tackling energy poverty, directly affecting the well-being and sustainability of our communities.

The European Union Horizon 2020 funded ENPOR project “Actions to Mitigate Energy Poverty in the Private Rented Sector” aimed to make energy poverty in the **private rented sector (PRS)** visible and quantifiable. Energy poverty is defined as a condition in which a person is unable to secure materially and socially necessitated energy services in their home, encompassing security of supply, affordability and access [1], [2]. As defined in the latest European Commission Recommendations on Energy Poverty published in October 2023, energy poverty is a situation in which households are unable to access essential energy services and products, thus affecting health, living standards and the levels of heating, cooling, and lighting of homes. It occurs when a high percentage of consumers’ income is spent on energy bills, when the energy efficiency of buildings and household appliances are low or when a household's energy consumption is reduced to a degree that negatively impacts health and wellbeing. Energy poverty is thus a

complex and multidimensional phenomenon driven by high energy expenditure (in proportion to the household budget) aggravated by high energy and fuel prices and their volatility, low levels of income, low energy efficiency of buildings and appliances, geographic and climate factors, household characteristics, family composition, health, and specific household energy and transportation needs and practices [3], [4]. To address this issue, ENPOR supported the design and implementation of tailored energy efficiency policies in seven European countries (Austria, Croatia, Estonia, Italy, Germany, Greece, and the Netherlands) through participatory activities and the empowerment of relevant stakeholders.

In this context, ENPOR conducted an in-depth multidisciplinary investigation into the state of art in energy poverty challenges associated with the PRS across Europe. As such, a detailed analysis of 114 policies and measures tackling energy poverty in the PRS took place, which

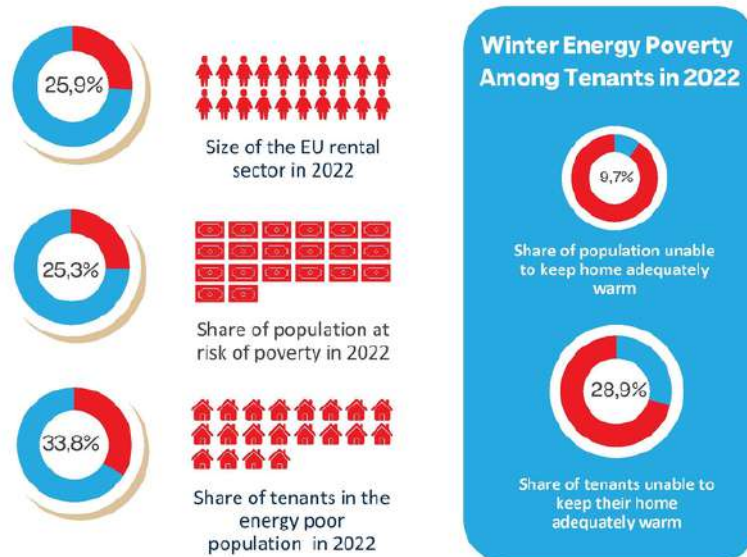


Figure 1. A summary of energy poverty in the PRS.

[1] S. Bouzarovski and S. Petrova, “A global perspective on domestic energy deprivation: Overcoming the energy poverty–fuel poverty binary,” *Energy Res. Soc. Sci.*, vol. 10, pp. 31–40, 2015, doi: 10.1016/j.erss.2015.06.007.

[2] S. Bouzarovski, H. Thomson, and M. Cornelis, “Confronting energy poverty in Europe: A research and policy agenda,” *Energies*, vol. 14, no. 4, pp. 1–19, 2021, doi: 10.3390/en14040858.

[3] European Commission (EC), “Commission Recommendation on energy poverty,” no. October. 2023.

[4] G. E. Halkos and E. C. Gkampoura, “Evaluating the effect of economic crisis on energy poverty in Europe,” *Renew. Sustain. Energy Rev.*, vol. 144, no. September 2020, p. 110981, 2021, doi: 10.1016/j.rser.2021.110981.



demonstrated an overall absence of specialised PRS energy support: therefore, a crucial contribution of ENPOR has also been driving initiatives for change. The project relied on the formation of **Regional ACTION (REACT)** groups for the purpose of bottom-up collaborative policy development and targeted in-country actions across the seven European countries.

These efforts have culminated in tangible policy recommendations designed to empower tenants and landlords, alleviate energy poverty, and influence the broader European policy landscape. Through the adaptation of targeted policies and measures to alleviate energy poverty in the PRS, centered on training and information as well as financial support programmes and Energy Efficiency Obligation Schemes, ENPOR revealed the importance of and need for high impact and long-term strategies in this sector. The Energy Poverty Dashboard (EPD) was created to provide a custom-built, comprehensive online platform featuring the geographic distribution of energy inequalities, alongside a new indicator to observe shares of energy poverty in the PRS. Additionally, the project included the carrying out of activities to quantify and the creation of a Split Incentives Calculation Tool to address the split incentive issue [5], while developing co-created policy frameworks applicable to regional and national contexts via close and repeated stakeholder engagement processes. The resulting policies, such as a **policy in Greece** which included targeted references regarding the split incentive problem into the Action Plan for the Confrontation of the Energy Poverty, are crucial in addressing the unique challenges faced by energy-poor tenants and landlords in the PRS, emphasizing the significance of specific energy efficiency improvements and the reinforcement of tenant protections to ensure sustainable and accessible energy solutions.

[5] Split incentives arise when the benefits of an investment, particularly in energy efficiency upgrades or renovations, do not align with the party bearing the costs. Within the PRS, investments for energy efficiency upgrades are expected to be carried out by landlords (as the owners of any rented property), while the financial benefits are traditionally reaped by their tenants, who receive lower energy bills following an energy renovation. The lack of immediate financial benefit for landlords therefore discourages them from making investments into their rented properties, leaving their tenants in poor building conditions.

3 INSIGHTS ON ENERGY POVERTY IN THE PRS

Energy poverty is widespread in the EU, with around 1 in 10 people unable to adequately heat their homes, while the issue becomes particularly pronounced in the PRS, which accommodates 30% of the EU's citizens [6]. The PRS is broadly defined as a classification of housing whereby a landlord, who is not a local authority, some type of housing association or registered social landlord, leases a property to a tenant, for more than six months. According to data from the EPD [7], households in the European PRS struggle with energy-related costs to a considerably greater extent than the overall population, while privately rented homes are considered the least energy efficient on average across the various housing sectors [8]–[12].

Therefore, living in the PRS can be one of the factors contributing to vulnerability to energy poverty, as exposure to energy poverty can be linked to renting conditions, such as tenancy insecurity and the low quality of housing. Considering this and utilising the concept of multiple vulnerabilities [13], ENPOR formulated a tentative identification of some of the most vulnerable groups in the European PRS (Table 1). This classification is based on three axes of vulnerability including socio-demographic, involving factors such as income, ethnicity, gender, housing, involving the regulation and structure of the housing stock in particular, and energy, concerning the efficiency and type of energy supply.

Table 1. An overview of vulnerable groups in the PRS across Europe, based on existing literature on the topic. Rows indicate the primary axis of vulnerability, columns indicate the secondary axis of vulnerability.

Primary axis of vulnerability	Secondary Axis of Vulnerability		
	Socio-demographic	Housing	Energy supply
Socio-demographic		<ul style="list-style-type: none"> • Single parent tenants • Ethnic minority tenants • Tenants with unemployed or older family members • Tenants with small children • Elderly tenants 	Tenants suffering from other vulnerabilities beyond the home (e.g., high transport costs)
Housing	Households in short-term lets		<ul style="list-style-type: none"> • Tenants in unaffordable and inflexible energy pricing arrangements (e.g., all utility payments wrapped in one) • Tenants that live in areas with high energy costs from available suppliers
Energy supply	Tenants living in energy inefficient homes	Tenants in homes with an expensive energy supply (e.g., electric only)	

[6] S. Bouzarovski and S. Tirado Herrero, "The energy divide: Integrating energy transitions, regional inequalities and poverty trends in the European Union," *Eur. Urban Reg. Stud.*, vol. 24, no. 1, pp. 69–86, 2017, doi: 10.1177/0969776415596449.

[7] "Energy Poverty Dashboard." <https://www.energypoverty.info/>

[8] M. Lang, R. Lane, K. Zhao, and R. Raven, "Energy efficiency in the private rental sector in Victoria, Australia: When and why do small-scale private landlords retrofit?," *Energy Res. Soc. Sci.*, vol. 88, no. February, p. 102533, 2022, doi: 10.1016/j.erss.2022.102533.

[9] Eurostat, "Housing in Europe – STATISTICS VISUALISED 2020 edition," 2020.

[10] DECC, "English Housing Survey," *Communities*, pp. 1–73, 2021.

[11] A. R. Ambrose, "Improving energy efficiency in private rented housing: Why don't landlords act?," *Indoor Built Environ.*, vol. 24, no. 7, pp. 913–924, 2015, doi: 10.1177/1420326X15598821.

[12] I. Burfurd, L. Gangadharan, and V. Nemes, "Stars and standards: Energy efficiency in rental markets," *J. Environ. Econ. Manage.*, vol. 64, no. 2, pp. 153–168, 2012, doi: 10.1016/j.jeem.2012.05.002.

[13] N. Simcock, K. Jenkins, ... G. M.-C. for R., and undefined 2020, "Vulnerability to fuel and transport poverty," *Creds.Ac.Uk*, no. May, pp. 1–5, 2020, [Online]. Available: <https://www.creds.ac.uk/wp-content/uploads/FAIR-vulnerability-briefing.pdf>.

The policies for alleviating energy poverty in the EU are not sufficiently directed at low-income groups, and even more to low-income or vulnerable PRS tenants, as they do not often bring together landlords and tenants to address split incentive issues [5] when it comes to financing energy upgrades of buildings. Most policies involve technical and financial measures to alleviate energy poverty, while there are only a few advice measures regarding behavioural change and energy saving in the household. An even more limited number of measures address the regulatory and political context of energy poverty in the PRS, while the public participation and policy engagement dimensions are inadequately represented in all of these measures. To better understand the policy context, ENPOR analyses them across basic tenets of energy justice related to energy poverty (distributional, spatial, recognitional, and procedural justice).

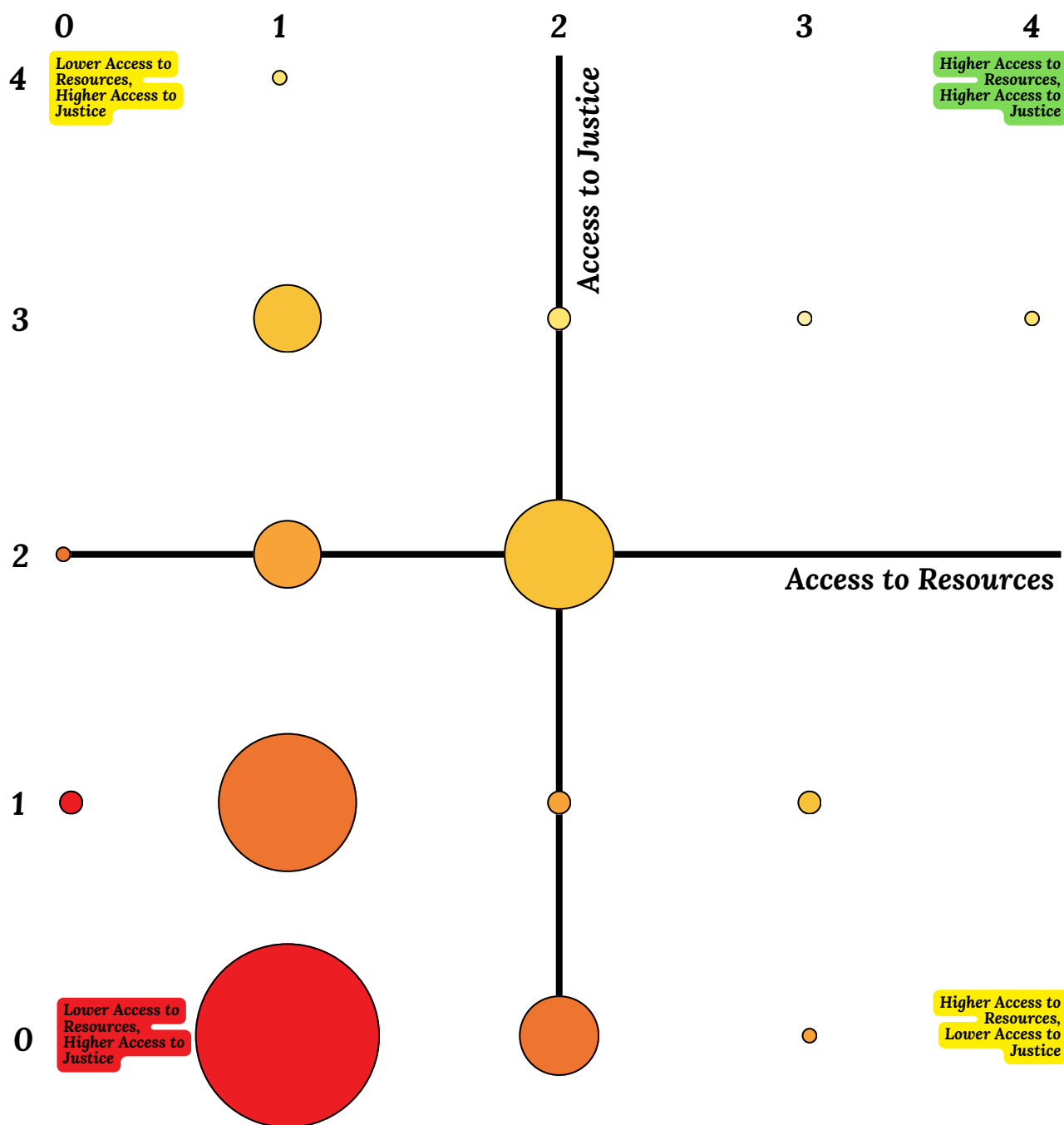


Figure 2. A summative appraisal of analysed policies, based on grading scores according to procedural and recognitional justice tenets (Access to Justice) as the y-axis plotted against distributional and spatial justice tenets (Access to Resources) as the x-axis. The size of the plotted circle is proportional to the number of policies represented and are colour-coded according to the total energy justice scoring.



The energy poverty policies in the PRS generally do not address access to justice and access to resources simultaneously, and most **primarily provide aid via access to resources**, reflected by the prevalence of plots on the bottom half of the graph. These also reflect the energy justice dimension of EU countries' National Energy and Climate Plans, which when plotted on the same axes of access to resources versus access to justice, also show a broad lack of engagement with both dimensions, and a greater tendency of countries to improve access to resources. This is due to the complexity of designing policies that target procedural and recognitional injustices, which tend to be structurally and institutionally embedded [2].

ENPOR investigated the structural factors that contribute to the complexity of designing and implementing energy efficiency policies for the PRS [14]. In this respect, the factors that work as barriers to, and solutions for, the successful implementation of energy efficiency policies for the alleviation of energy poverty in the PRS across Europe were analysed. These factors encompass a wide range of financial, social, political/regulatory, and technical aspects, which cannot be considered separately, and thus, ENPOR aimed to bridge the gap in the scientific literature with knowledge from stakeholder consultations to evaluate them in a holistic way [13], [15]–[23]. The identified categories of barriers are presented in Table 2.

[14] D. Papantonis, D. Tzani, M. Burbidge, V. Stavarakas, S. Bouzarovski, and A. Flamos, "Energy Research & Social Science How to improve energy efficiency policies to address energy poverty? Literature and stakeholder insights for private rented housing in Europe," *Energy Res. Soc. Sci.*, vol. 93, no. September, p. 102832, 2022, doi: 10.1016/j.erss.2022.102832.

[15] N. Eyre, "Barriers to Energy Efficiency: More Than Just Market Failure," *Energy Environ.*, vol. 8, no. 1, pp. 25–43, Mar. 1997, doi: 10.1177/0958305X9700800103.

[16] S. Bird and D. Hernández, "Policy options for the split incentive: Increasing energy efficiency for low-income renters," *Energy Policy*, vol. 48, pp. 506–514, 2012, doi: 10.1016/j.enpol.2012.05.053.

[17] L. Castellazzi, P. Bertoldi, and M. Economidou, *Overcoming the split incentive barrier in the building sector*, vol. 148, 2017.

[18] K. Wrigley and R. H. Crawford, "Identifying policy solutions for improving the energy efficiency of rental properties," *Energy Policy*, vol. 108, no. June, pp. 369–378, 2017, doi: 10.1016/j.enpol.2017.06.009.

[19] S. D'Oca et al., "Technical, financial, and social barriers and challenges in deep building renovation: Integration of lessons learned from the H2020 cluster projects," *Buildings*, vol. 8, no. 12, 2018, doi: 10.3390/buildings8120174.

[20] S. Sareen, H. Thomson, S. Tirado Herrero, J. P. Gouveia, I. Lippert, and A. Lis, "European energy poverty metrics: Scales, prospects and limits," *Glob. Transitions*, vol. 2, pp. 26–36, 2020, doi: 10.1016/j.glt.2020.01.003.

[21] T. W. Heffernan, E. E. Heffernan, N. Reynolds, W. J. Lee, and P. Cooper, "Towards an environmentally sustainable rental housing sector," *Hous. Stud.*, vol. 36, no. 3, pp. 397–420, 2021, doi: 10.1080/02673037.2019.1709626.

[22] S. Bouzarovski, M. Burbidge, A. Sarpotdar, and M. Martiskainen, "The diversity penalty: Domestic energy injustice and ethnic minorities in the United Kingdom," *Energy Res. Soc. Sci.*, vol. 91, no. June, p. 102716, 2022, doi: 10.1016/j.erss.2022.102716.

[23] L. Matraeva, E. Vasiutina, N. Korolkova, A. Maloletko, and O. Kaurova, "Identifying rebound effects and formulating more sustainable energy efficiency policy: A global review and framework," *Energy Res. Soc. Sci.*, vol. 85, no. November 2021, p. 102402, 2022, doi: 10.1016/j.erss.2021.102402.

Table 2. Identified categories and barriers to the implementation of energy efficiency policies in the PRS.

Identified Categories	Identified Barriers
Financial	<ul style="list-style-type: none"> • Split incentives • Lack of direct financial incentives to landlords • High upfront costs • Lack of funding schemes that target the PRS • Expected return on investment • Inability to pay increased rents (leading to renovation following housing renovations) • Energy efficiency doesn't increase the sale or rental value of the property
Technological	<ul style="list-style-type: none"> • Lack of information (for example on available technologies) • Lack of technological knowledge for implementing effective solutions • Complex tenure patterns in • Use of technologies
Political/ Regulatory	<ul style="list-style-type: none"> • Political invisibility of the PRS, lack of political interest • No definition of energy poverty/not a political priority • Lack of data on energy poverty amongst PRS tenants • Lack of targeted policies/best practice schemes to follow • Lack of energy labelling and mandatory efficiency schemes • Regulation vs Deregulation debate • Differing levels of political devolution with responsibility for energy efficiency policy • Complex tenure patterns in apartment buildings
Social	<ul style="list-style-type: none"> • Stigmatising and time-consuming, complex processes and procedures to access funding • Tenant and landlord mistrust in governmental policies • Prevalence of small-scale, low-income landlords • Broader social vulnerability in the sector (prevalence of low-income groups, single parents, ethnic minorities) • Lack of adequate skills and training in the workforce, or a lack of workers more generally
Geographical	<ul style="list-style-type: none"> • Climatic difference • Varying housing legacies between national, regional, and local contexts

4 TYPES OF STAKEHOLDERS AND THEIR CONTRIBUTIONS

The most important stakeholder groups in addressing energy poverty in the PRS are landlords and co-owners' associations, charitable and social work associations, energy agencies or consultants, municipal/regional/national policymakers, citizen groups/NGOs, tenants, and utilities providers [24]. A critical aspect of ENPOR has therefore been the engagement with stakeholders in the PRS to encompass their positions, interests, influence, networks, and other relevant characteristics in co-creating energy efficiency policies to tackle energy poverty. The engagement strategy was customized to the above-mentioned groups based on who will benefit from the energy efficiency policies, who might be adversely affected, those likely to resist change, and those holding key resources and networks from landlords and tenants. The policy design process thus was not only inclusive but also aligned with the actual needs and capacities of policymakers, landlords and tenants.

Each stakeholder group was envisioned to contribute to the development of the policies in a unique and differentiated manner, ranging from providing market insights and policy expertise to offering grassroots-level support and feedback. For instance, landlords and co-owners' associations played a crucial role in improving policy feasibility and renovation initiatives, while charitable organizations assisted in identifying and aiding energy-poor households. On the other end of the spectrum, energy agencies offered insights for effective policy implementation while utilities were a key presence in implementing energy poverty alleviation schemes, and policymakers contributed to pragmatic legislative support. Lastly, citizen groups and NGOs brought in essential grassroots perspectives through their active participation and contribution in sharing struggles related to energy poverty. [25]

The stakeholder engagement strategy outlined:

- Risks and responses of the envisioned stakeholder engagement;
- Stakeholder groups and expected contributions;
- A strategy for stakeholder analysis and resulting key message development;
- Guidelines regarding the involvement of vulnerable groups in the PRS within the co-design process;
- An overview of processes, timelines and content of the first **REACT group** meetings;
- A toolbox for the co-creation of policies, considering online and offline formats; and
- The envisioned monitoring and possible indicators.

This stakeholder-centric approach was intentionally designed to foster active participation, ensuring that ENPOR policies would not only have been well-informed but also would have a higher likelihood of success and impact. The project emphasized the need for inclusive implementation, adaptability in data collection, and the consideration of physical constraints related to the restrictions surrounding the COVID-19 pandemic. Overall, the stakeholder groups involved in ENPOR have not been homogenous but rather dynamic and diverse, with varying degrees of power and interest in each country. This necessitated a tailored approach to stakeholder engagement, ensuring that each groups' needs and contributions were appropriately recognized and integrated into the policy-making process. [24]

ENPOR partners closely collaborated with various stakeholders in the REACT groups, which consisted of stakeholder groups that were brought together regularly to co-create the ENPOR policies, discuss insights, provide monitoring data and facilitate the adoption of the 10 policies in Austria, Croatia, Estonia, Italy, Germany, Greece, and the Netherlands. [24, 25, 26]

Table 3. Organisations that have participated in the co-creation of the 10 ENPOR policies

Country & Measure	Participating Organizations
Austria: Low-Threshold, Target Group-Specific Consulting	Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology, Federal Ministry of Social Affairs, Health, Care and Consumer Protection, Chamber of Labour, Caritas, Federal Environment Agency, Institute for Real Estate Building and Living, E-Control
Germany: Heating Related Energy Advice	Social Welfare Office Düsseldorf, Public Utility Working Group for the Economical Use of Energy and Water, German Caritas Association e.V., Caritas Energy Saving Service, Caritas Association Düsseldorf e.V., EnergieRevolve GmbH, Institute for Social-ecological Research, Job Centre Düsseldorf, Düsseldorf Tenants' association, Röthele Energie- und Bauberatung, Düsseldorf public utility company, Düsseldorf Municipal Housing association, Environmental Office Düsseldorf, Consumer association NRW
Germany: Pre-Paid Metering EnergieRevolve	Caritas Energy Saving Service, Caritas Association Düsseldorf e.V., EnergieRevolve GmbH, co2online gGmbH, Public utility of Düren, Consumer association NRW, Chair of Textlinguistics and Technical Communication, RWTH Aachen, ZEW – Leibniz Centre for European Economic Research
Estonia: National Reconstruction Grant	The Estonian Union of Co-operative Housing Associations, Tartu Municipality, Telia, AG Õigusbüroo, Tartu City Government, Kvatro, Kredex, Swedbank, Tartu Regional Energy Agency, Ministry of Economic Affairs and Communication, Coop bank, SEB bank, Tallinn City Government, Balti Vara Ehitus, Kinnisvarakool
Greece: EEOS and Energy Upgrade of Buildings	Hellenic Property Federation (POMIDA), Institute of Zero Energy Buildings (INZEB), City Network "Sustainable City", Ministry of Environment and Energy, EKPIZO – Certified Consumer Union, WWF, GreenPeace, Public Power Corporation, Aristotle University of Thessaloniki, National Technical University of Athens, National and Capodistrian University of Athens, University of Western Attica, Social Cooperative "Wind of Renewal", Association of Greek Valuers (A.V.A.G.), Sustainable Development – National Observatory of Athens, Heinrich-Böll-Stiftung, Hellenic Petroleum Marketing Companies Association, Institute for Environmental Research and Sustainable Development – National Observatory of Athens, SOCIALWATT project, The Green Tank, University of Western Attica
Croatia: National Programme for Renovation of Buildings	DOOR, APN, FZOEU, MGOR, OSS Buševac, Križevci city administration, Red Cross – Križevci, KLIK, Institute for Social Research in Zagreb (IDIZ), Red Cross – Zadar, Terra Hub, Brod Ecological Society-BED, Green action, Green Istria, University of Zadar – Department of Ethnology and Anthropology, City of Zagreb, Eko-Zadar, University of Zagreb Faculty of Electrical Engineering and Computing, University of Rijeka, Furman University, Zadar County Development Agency – ZADRA d.o.o., Ministry of Labour, Pension System, Family and Social Policy, Ministry of Economy and Sustainable Development, Ministry of Spatial Planning, Construction and State Property, HEP ESCO, Faculty of Geotechnical Engineering, Environmental Protection and Energy Efficiency Fund
Italy: Training and Information Campaign	ENEA, AESS Modena, Alleanza contro la povertà energetica, ANAIP, Associazione europea consumatori indipendenti, Assoesco, Assotermica, Banco dell'energia Onlus, Condofacile, Confartigiano, CONFEDILIZIA, Fondazione Snam, GSE, NOMISMA, SICET, SVIM, UNAI, UNIAT, Università degli studi di Milano, AISFOR, Banco dell'energia Onlus (Fondazione A2A), Fondazione di Vittorio, Gesticond
Netherlands: Energy Box	Municipality of Arnhem, Municipality of Utrecht, Municipality of Zeist, Woonbond, Energybox/JMA, Private Landlord, Tilburg Municipality, Project Leader Energy Box, Research centre Co-design Hogeschool Utrecht, Centre of Expertise Smart Sustainable Cities Hogeschool Utrecht, Local private investors: Bouwinvest, ASR, Synthus Achmea, REBO Altera, Local private investors: Lisman&Lisman, ASR and EBG Zeist, Mijn Groene Huis, Stichting Al-Amal, Project O, HU master students, Greenoffice HU, LSVb, Energie U, Buurtteam Overvecht, Buurtteam Sociaal West, Dock, Protestantse Diaconie Utrecht

[25] C. Tourkolias, F. Vondung, L. Nawoethnig, A. Sahin, K. Schilcher, A. Majdandzic, N. Vrieling, L. Kok, A. Urbas, E. Pandolfi, A. Amato, "Deliverable 3.4 Working Document with guidelines on setting up policies according to best practices and country specific circumstances." ENPOR Project, 2023. Retrieved from www.enpor.org

[26] A. Sahin, K. Schilcher, F. Vondung, C. Tourkolias, A. Majdandzic, N. Vrieling, L. Kok, A. Urbas, E. Pandolfi, A. Amato, "Report on the implementation of the ENPOR policies." Austrian Energy Agency, Austria. ENPOR Project, 2023. Retrieved from <https://www.enpor.eu/>



The REACT groups participated in updating and adjusting the national incumbent policies for the PRS which were selected based on their impact potential for energy poor tenants, and on the purpose of their re-design through a co-creation procedure. The involvement of citizens in the initiation and/or the design of public services was enabled to develop tailored beneficial outcomes. To connect with and communicate about the sensitive and personal issue of energy poverty experienced by tenants, about which energy poor tenants may not have been keen to discuss in a high-level setting, ENPOR offered an alternative tiered approach to interacting with this stakeholder group. The inclusion of energy poor tenant's perspectives and ideas for the purpose of policy co-creation was made possible through the establishment of **TARGET groups**, composed of tenants and in some instances landlords and homeowner associations who were consulted by REACT group members acting as intermediaries to ENPOR.

Three **REACT group meetings** shaped the ENPOR co-creation process in order to consider and address the perspective of energy poor tenants and landlords regarding energy poverty as both groups' interests were simultaneously represented in the meetings by representatives of tenant/landlord associations, charitable organisations or similar. This direct exchange with REACT groups made the development of practical and targeted policies possible, as in the case of the **Dutch Energybox**, where the needs of energy poor tenants were taken to account and the contents of the box were altered to better suit their needs, or in the case of the **Austrian energy efficiency materials**, which were adapted to be internationally oriented using pictures and information in multiple

languages, as many renters in Austria are expats or migrants.

Accordingly, the **first REACT group meeting** served as a constituting session, in which the REACT group members were introduced to the project setup and objectives. In this setting, ENPOR partners provided a brief analysis of the selected policies to be further developed, including their linkages to social and other relevant policies, and highlighted the main challenges to be addressed by the co-creation. Moreover, participants presented the main elements they believed were needed to tackle policy re-design, which were then taken into account by the ENPOR partners. In Germany, this particular process facilitated the creation of **energy-saving advice and low-cost solutions** provided free of charge to low-income households, thereby allowing for more tenants to be engaged by energy experts who could help them become more energy efficient regarding their heating and ventilation practices. [24, 25]

Subsequently, the **second REACT group meeting** kicked off the actual co-design process. In an effort leading up to an initial policy proposal, ENPOR partners presented European best practices regarding the delivery of the services/benefits in question, insights on structural factors impacting energy poverty in the PRS as well as tenant/ landlord perspectives collected in the previous step to be considered within the policy design. Following this, the proposal was presented and discussed. To this end, the group provided feedback and highlighted potential flaws in the design and barriers in its specific policy implementation as well as possible solutions to overcome them.

This allowed, for example, the elaboration of the Greek “Energy upgrade of buildings” policy, where the number of rented houses which was supported financially was higher compared with the previous rounds since distinct aid was earmarked for them [24, 25]

Lastly, the **third REACT group meeting** fine-tuned the policy design process based on the tenants’ feedback and prepared the policy implementation as well as its monitoring. In case there were several – potentially mutually exclusive – adaptation options on the table, the group decided which option provided the greatest benefit to the previously defined target group and/or was considered to maximise the overall policy impact. Furthermore, the mode and timeline for policy monitoring was defined while including milestones, after which the accompanying policy delivery and impact evaluation informed potential adjustments. In Croatia, follow up policies in 2026 related to the ETS system for private residential buildings will be developed based on lessons learned through this process, while in Estonia these efforts have influenced the development of proposals for updating the National Renovation Grant [24, 25]

These exchanges and the co-creation process with stakeholders led to considerable policy improvements while taking into account the national characteristics, needs and capacities of national administrations that set up and implement these policies.



5 ENERGY EFFICIENCY POLICIES IN THE PRIVATE RENTED SECTOR

The collective experiences from Austria, Croatia, Estonia, Germany, Greece, Italy, and the Netherlands offered valuable insights into the importance of targeted and inclusive policies, stakeholder engagement, and flexible adaptation in combating energy poverty. The REACT groups provided an ideal tool to support the alleviation of energy poverty in the PRS, while also raising awareness among new stakeholders in the private rented sector across the EU.

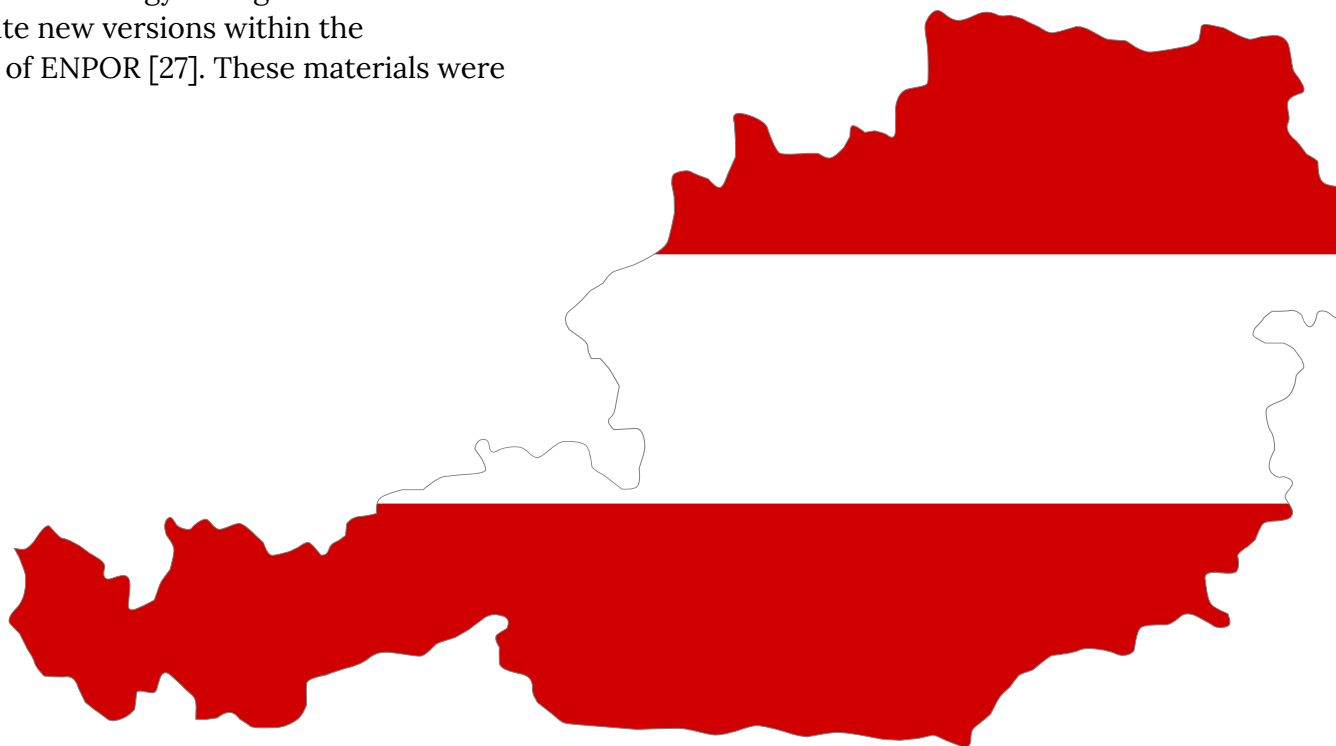


AUSTRIA



In **Austria**, two policies were implemented in ENPOR, including a low-threshold, target group-specific consulting measure, as well as the development of a concept for structural energy poverty mitigation. Various support services were in place to assist low-income households to reduce their energy expenditures, and to upgrade their buildings. These services ranged from on-site consultations to various information campaigns. However, these formats were often not suitable, as the target group(s) seldom had the time and resources to deal with sophisticated tools and detailed materials to increase their home's energy performance, while energy poor households and tenants were not specifically targeted either. The work carried out in the Austrian REACT group, in close cooperation with DIE UMWELTBERATUNG, which has been offering energy counselling for energy poor households in the target region of Vienna for many years, led to the decision to revise already existing information materials on various topics of energy saving in the household and to create new versions within the framework of ENPOR [27]. These materials were

intended to stand out from previous offers by placing a clear focus on figurative language, thus offering an advantage for energy poor tenants with language barriers. The information was customized to be presented as short clear texts focusing on illustrations and pictograms. This finally made it easier to overcome linguistic and knowledge hurdles. Additionally, the inclusion of translations as well as the cooperation with the Ministry of Climate Action to enable nationwide adoption further stressed the importance of accessibility and stakeholder collaboration, as well as ENPOR's success in attaining these.



CROATIA



In **Croatia**, the National Programme for the Renovation of Buildings for the period 2014-2020 was the core policy improved by ENPOR to help households undertake renovation activities, ensuring that part of the beneficiaries was among tenants in energy poverty. The programme was implemented through four total sub-programmes, but ENPOR's focus was on the following two:

1. Programme of energy renovation of family houses 2014-2020: in 2020 there was an amendment to the programme – *A public call for citizens to finance the energy renovation of family houses for vulnerable groups of citizens at risk of energy poverty* – with 20 % of the total funds that were set aside for such vulnerable groups of citizens;
2. Programme of energy renovation of multi-apartment buildings for the period 2014-2020.



During ENPOR, two new programmes and corresponding public consultations were launched, to which DOOR, the partner responsible for co-creating measures for energy poverty alleviation in Croatia, responded in the form of official statements with comments:

- Program for the alleviation of energy poverty, which includes the use of renewable energy sources in residential buildings in areas of special state until 2025 (Official Gazette, No. 143/2021)
- Program for energy renovation of multi-apartment buildings for the period up to 2030 (Official Gazette, No. 143/2021)

The significant change between the programs implemented during the period 2014-2020 and the new programs for 2021-2030 is the inclusion of the energy poverty concept and the recognition of it as being a pressing issue that needs to be addressed. The identification of energy poor households as a problem to be tackled is a resulting crucial development. Additionally, the introduction of a dedicated program specifically targeting the renovation of energy poor buildings is a notable innovation compared to the previous programs. Furthermore, Croatia will develop follow up policies in 2026 related to the ETS system for private residential buildings, including both family houses and multi-apartment buildings. Furthermore, the cities where surveys to identify energy poor groups (including tenants) were conducted (in collaboration with several EU projects) will receive individual reports with data on the private rented sector and energy poverty in their respective areas. Proposed measures for energy poverty alleviation will then be linked to existing renovation programs. The cities and municipalities involved in the ENPOR policy co-design, which will continue benefitting from the work conducted in ENPOR, are the City of Zagreb, the City of Zadar, the City of Križevci, and the Municipality of Buševac.

ESTONIA



In **Estonia**, the National Renovation Grant [28], [29], [30] is a highly influential tool for mitigating the long-term effects of energy poverty. Analysing, learning from, and improving the energy poverty dimension of the national renovation grant was the focus of ENPOR, resulting in the development of proposals for updating the National Renovation Grant. The recommendations for political decision-makers were presented in November 2022 and focused on various aspects including (i) emphasizing the importance of renovation capacity in regulations

importance of renovation capacity in regulations and legislation; (ii) enhancing the role of tenants in the apartment building renovation process and involving them in the decision-making process alongside the owners of rental apartments or as their representatives; (iii) increasing renovation capacity with the assistance of the National Renovation Grant; and (iv) creating additional measures for supporting building associations lacking renovation capacity in the process of full renovations.



[28] Renovation support, retrieved on 12/12/2023 from <https://kredex.ee/en/services/ku-ja-kov/renovation-support>

[29] Reconstruction Grant 2019, retrieved on 12/12/2023 from <https://kredex.ee/en/services/ku-ja-kov/renovation-grant-2019>

[30] Reconstruction Grant 2020, retrieved on 12/12/2023 from <https://kredex.ee/en/services/ku-ja-kov/renovation-grant-2020>

GERMANY



In **Germany**, the most prominent measure to tackle energy poverty is the “StromSparCheck” [31] or “Energy Saving Check” project, where long-term unemployed are trained to provide energy-saving advice and low-cost technical devices free of charge to welfare recipients and low-income households. While the German Government fully covered the heating expenditure of welfare recipients, these needed to cover electricity costs from a capped budget for overall living expenditure. The REACT group helped identify and develop novel approaches to engage households with a view to energy efficient heating and ventilation and thus increase the effectiveness of the heating advice. As a result, more emphasis was put on comfort and to some extent health benefits within the communication and to support and strengthen the consulting contents through visual aids.

Furthermore, a second measure in Germany, EnergieRevolve [32], implemented by a subsidiary of Stadtwerke Düren, offered its customers an innovative model of prepaid metering and free switch from existing electricity provider to a digital prepaid meter that could be monitored by customers and charged live via a smartphone application or online interface. This allowed users more autonomy in their energy monitoring and usage. As a result of ENPOR’s interventions, the yearly consumption curve in the consumption display was amended with an additional line reflecting the user’s monthly consumption of the previous year, thereby improving the transparency for users with view to their electricity consumption and costs. In addition, a new website was developed and linked in the app, providing additional information related to electricity conservation and external financial support and advice offers.



[31] STROMSPAR-CHECK IN IHRER NÄHE, retrieved on 12/12/2023 from <https://www.stromspar-check.de/>

[32] Energie Revolte, retrieved on 12/12/2023 from <https://portal.energierevolte.de/signin>

GREECE



In **Greece**, two policies were implemented under ENPOR. The first one was the national “Energy upgrade of buildings” programme, which provided financial aid to energy poor households for improving the energy efficiency of their buildings. The REACT group foresaw the inclusion of the tenants as decision-makers while ENPOR’s activities ensured that the provided public aid must take into account the shared benefits among landlords and tenants. Additionally, a special provision for rented buildings was introduced foreseeing the provision of 40% subsidy to landlords. Another contribution to the policy stemming from the co-creation process was the insertion of a targeted reference regarding the split incentive problem into the Action Plan for the Confrontation of the Energy Poverty, which refers to the energy upgrade of energy poor households’ buildings in the period 2021-2030. Finally, a dedicated portion of the foreseen public budget will be allocated to energy poor households within the framework of the new programme, thereby fostering the implementation of targeted policies for tackling energy poverty in compliance with the targets of the Action Plan for the Confrontation of the Energy Poverty in Greece. The “Energy upgrade of buildings” programme managed to support a higher number of energy poor households mainly due to the dedicated budget for them within the RRF plan, while according to preliminary results, the number of rented houses which was supported financially was higher compared with the previous rounds due to the fact that a distinct aid was foreseen for them.

The Energy Efficiency Obligation Scheme (EEOS) [33] constitutes the second pilot policy in Greece. The EEOS started in 2017, imposing an obligation to achieve a specific energy savings target through energy efficiency interventions.

The REACT group proposal for the case of the EEOS foresaw the conduction of targeted information and awareness-raising activities by the energy suppliers, providing useful and effective guidance to energy poor households dwelling in rented buildings, so as to begin addressing the phenomenon of energy poverty. Following the co-creation of the scheme, specialised information material and interactive tools can now be utilised providing recommendations for the effective alleviation of energy poverty, while dedicated training programmes can also be organised for enhancing the current knowledge of the energy poor households. Finally, the conduction of simplified energy audits can foster the identification of the most cost-effective energy efficiency interventions facilitating the achievement of a minimum level of comfort.



[33] Energy Performance Obligation Enforcement Regime, retrieved on 12/12/2023 from [Energy Performance Obligation Enforcement Regime, http://www.cres.gr/obs/](http://www.cres.gr/obs/)



Within **Italy**, the Italian Ministry of Environment and Energy Security assigned a specific role to information and training as a fundamental driver to create, reinforce and develop the attention towards energy saving and energy efficiency. Article 13 of Legislative Decree 102/2014 [39] (National transposition of EED) envisaged a specific three-year training and information programme, which was realised by ENEA, ENPOR's Italian policy partner, and involving different actors such as regions, consumer associations, as well as associations of ESCOs and energy services companies. Currently the program is foreseen until 2030, according to art.12 of Legislative Decree 73/2020. The activities are characterized by information and training initiatives and projects focused different on the public at large, under “Italia in Classe A” [40] campaign. The ENPOR objectives, in relation to the programme, were to analyse the most appropriate communication modalities to reach energy poor households in the PRS, tailoring feasible information materials, and helping them access information on fiscal incentives for energy renovation, or alternatively helping promote a change in behaviour and allowing them to make more informed decisions on energy use and energy efficiency of their homes. As a result of ENPOR's interventions, two concise handbooks have been published and distributed through the REACT group and Italia in Classe A. The first handbook targets building managers and provides guidance on structuring communication campaigns within the buildings they manage. The objective is to incentivize owners to adopt renovation measures that enhance energy efficiency and reduce consumption. The second handbook for tenants and owners offers a series of simple good practices and advice on improving energy usage at home, along with potential savings, while special attention has been given to comfort, safety and health-related aspects.

[34] EED implementation in ITALY, retrieved on 12/12/2023 from <https://www.ca-eed.eu/wp-content/uploads/2021/09/National-Implementation-Report-2016-Italy.pdf>

[35] ITALIA IN CLASSE A, retrieved on 12/12/2023 from <https://italiainclassea.enea.it/>

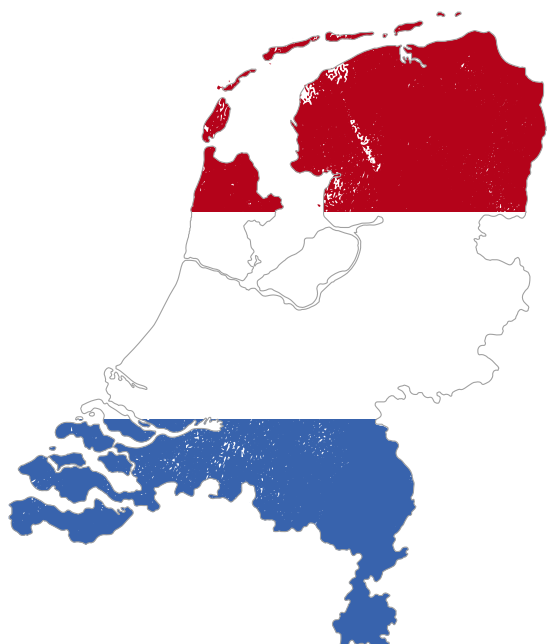
NETHERLANDS



In the **Netherlands**, the Energybox [36] was further developed by ENPOR. Energybox is a social enterprise created with the triple purpose of reducing the energy consumption of residents, fighting energy poverty, and providing jobs for long-term unemployed people. The Energybox programme consists of a consultation with an energy coach, an advisory report, and a box with easy to implement energy-saving products. During a first step in the process, an appointment is made with the client. Secondly, energy coaches visit the households for a consultation. After the visit, an Energybox containing materials to reduce their energy consumption such as radiator foils and weatherstrips is given free of charge. Finally, clients receive a personalized report featuring tailored tips on reducing their household's energy consumption. Together with the representatives of relevant stakeholders that took part in the REACT group, the full Energybox procedure was examined to look for possible improvements. This led to a list of adjustments to the initial procedure, which have all been tested and implemented in several ways in various Dutch cities. The list includes a tool for neighbourhood analysis; more choices for energy saving products, practical help, more

languages for the consultation and visits with the Energybox, promotion of the box via social networks, and focusing on students who most often inhabit the worst performing buildings and therefore are thrust into energy poverty. Energybox was delivered to approximately 17,000 households throughout the province of Utrecht. Of these, 10% were in the PRS, hence 1,330 households (~2,200 tenants) in the PRS were affected (8%). Following a survey where households that received the Energy box were questioned, it was found that on average such household would save 2,259 kWh (257 m³) of natural gas and 268 kWh of electricity per year thanks to the box with measures, the energy advice and additional own investments. This positive response has led to a permanent adoption of the procedures of the Energybox in various areas. Energyboxes are currently offered in the municipalities of Albrandswaard, Amersfoort, Barendrecht, Barneveld, Ede, Eindhoven, Lansingerland, Nieuwegein, Nissewaard, Ridderkerk, Son en Breugel, Stichtse Vecht, Tilburg, Utrecht, and Waalre (as of May 2023). In Utrecht, the municipality developed policy measures directed at energy poor citizens, with a focus on rented units.

The success factor of ENPOR in the policy field is that the co-creation process with the REACT groups led to the redesign of 10 policies which have been tailored to suit the needs of the PRS. ENPOR identified the importance of and therefore calls for the further customization of inclusive and locally rooted measures for addressing energy poverty in the PRS. Stakeholder engagement, flexible adaptation, and collaborative efforts with various partners are essential components of effective energy poverty alleviation strategies. Moving forward, the lessons learned from these countries during ENPOR can serve as valuable guidance for other countries that develop energy efficiency policies to alleviate energy poverty (as also prescribed under the ringfencing target of energy poverty in the new Energy Efficiency Directive).



The 10 ENPOR policies and the changes implemented over a 3 year period (2020-2023) and resulting from the co-creation process are described below.

Table 4. Summary of the ENPOR policies

Country	Description of Policy
Austria (AT)	<p>Low-threshold, target group-specific consulting</p> <ul style="list-style-type: none"> • Development of target group-oriented information materials taking into account the specific needs of the targeted population with the involvement of energy advisors and the use of figurative language for better accessibility.
Austria (AT)	<p>Since the original measure could not be implemented as planned, a concept for policymakers was developed instead, with various measures to reduce energy poverty at the structural level. These include:</p> <ul style="list-style-type: none"> • Decentralized advisory service • Quality assurance • Training for energy and social advisers • Stakeholder participation • Data collection • Establishment of an energy poverty coordination center for citizens
Germany (DE)	<p>Heating related energy advice</p> <ul style="list-style-type: none"> • Informative materials centered on heating advice were tailored to the PRS, focusing on the health and comfort issues in the communication, while the integration and distribution of more effective visual aids and tools for monitoring hot water consumption led to better understanding of information and higher energy savings. • Strategic expansion by Caritas led to the adoption of the policy in all of its 150 locations, resulting in the materials being embedded it into their long-term operational framework.
Germany (DE)	<p>Pre-paid metering EnergieRevolve</p> <ul style="list-style-type: none"> • Improved visualization of the electricity consumption with reference values from the previous year for better transparency. • Development and integration of a website with additional information on energy conservation (e.g., efficient appliance use), external energy advice offers and state support options. • Development of a website with information on efficient appliance use and energy-saving tips.
Estonia (EE)	<p>National reconstruction grant</p> <ul style="list-style-type: none"> • The national renovation grant program was extended and included the provision of specific recommendations highlighting the importance of increased renovation capacity, enhancing tenants' role and capacity in the renovation decision-making process, focusing on the renovation of whole buildings, and adapting the available public grant funds to increase the renovation capacity including proposals to Tartu City Government.





Country	Description of Policy
Greece (GR)	Energy Efficiency Obligation Scheme (EEOs) <ul style="list-style-type: none">• Conduction of targeted information and awareness-raising activities by the energy suppliers providing useful and effective guidance to energy poor households.• Specialised materials and interactive tools were developed for use by energy-poor households, also living in rented buildings.
Greece (GR)	Energy upgrade of buildings <ul style="list-style-type: none">• Inclusion of the tenants as a distinct social criterion in the “Energy upgrade of buildings” programme foresees the development of a framework for taking into account the shared benefits among landlords and tenants, including a 40% subsidy to landlords and a focus on shared benefits.• Energy poverty in the PRS included and recognized in the national Action Plan for the Alleviation of Energy Poverty, thereby addressing the split incentive issue and including tenants in the framework.
Croatia (HR)	National Programme for Renovation of Buildings <ul style="list-style-type: none">• Materialization of targeted measures, introduction of specific criteria and promotion of more systematic education about energy poverty.• Inclusion of buildings for renovation in the “Program for alleviation of energy poverty,” and establishment of offices in cities for assistance in energy renovation.• The project’s best practices were documented and implemented in two new national energy policies.
Italy (IT)	Training and Information Campaign <ul style="list-style-type: none">• Conduction of targeted communication initiatives and development of information tools to facilitate the decision-making process.• The national training program “Italia in Classe A” was adapted to better reach energy-poor households in the PRS, with tailored information materials and guidance on fiscal incentives for energy renovation for both tenants and landlords.• Targeted initiatives for youth to promote energy-efficient practices.
Netherlands (NL)	Energybox <ul style="list-style-type: none">• Development of a tool for analyzing the energy poverty problem in targeted neighborhoods through technical, social and area-dependent indicators.• Improved promotion strategies for the Energybox.• Tailored approaches for specific target groups like migrants and students.• Modifications to the Energybox including language adaptations to reach diverse tenants and the provision of practical help to citizens.• Developed a follow-up project based on ENPOR policy to engage broader target groups.

6 THE ENPOR TOOLS

An innovative tool developed within ENPOR was the Energy Poverty Dashboard (EPD), which presents up to date information on energy poverty within the PRS across the EU so as to inform policy makers, energy agencies, energy experts, and of course tenants about existing policies, thereby providing a comprehensive, spatially and temporally disaggregated view of energy poverty measures, specifically tailored to the PRS [7, 37].

The EPD allows users to visually study the geographies of energy poverty measures catering to the PRS, along with the informational cluster distribution of these measures. Utilizing online maps, the dashboard presents data at national, regional, and sub-regional scales powered by datasets from sources such as EU-SILC, EU EPOV, National Censuses, and Household Budget Surveys. By presenting this information in a visually accessible format, the EPD makes it easier to share good practices and develop suitable policies to alleviate energy poverty [7, 37].

A novelty of ENPOR are the STEPP (Share of Tenants in the Energy Poor Population) indicators, which amend existing indicators by highlighting to what extent energy poverty is concentrated within the PRS in different regions. Additionally, the integrated Rented Private Housing Energy Poverty Indicator (REPI) was added as a specialized, multidimensional indicator, developed to capture the nuances of energy poverty in the PRS, providing information based on the proportional size of the PRS in a given area [37].

By design, the dashboard also emphasizes transparency and accessibility of data by displaying information about the underlying sample size and the statistical significance of differences between the overall population and the PRS. Moreover, all of the statistics presented on the dashboard are available for download, adhering to an open-access approach to data sharing.

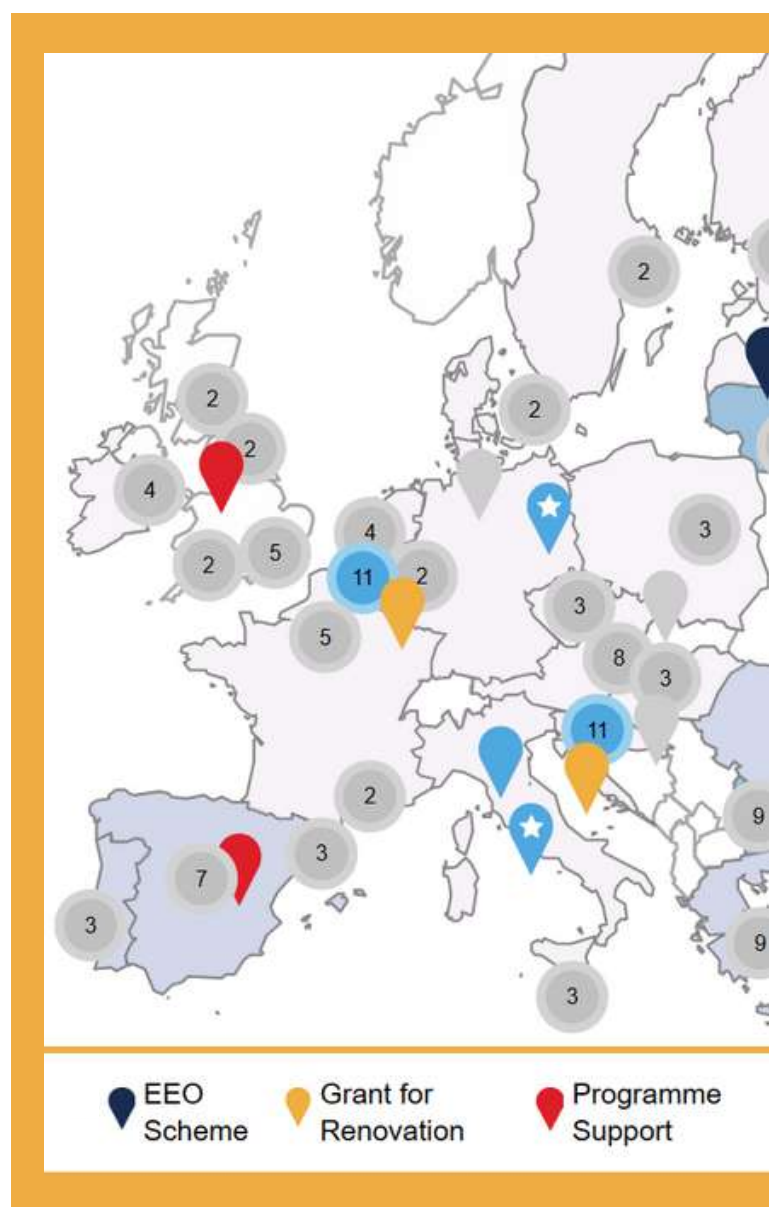
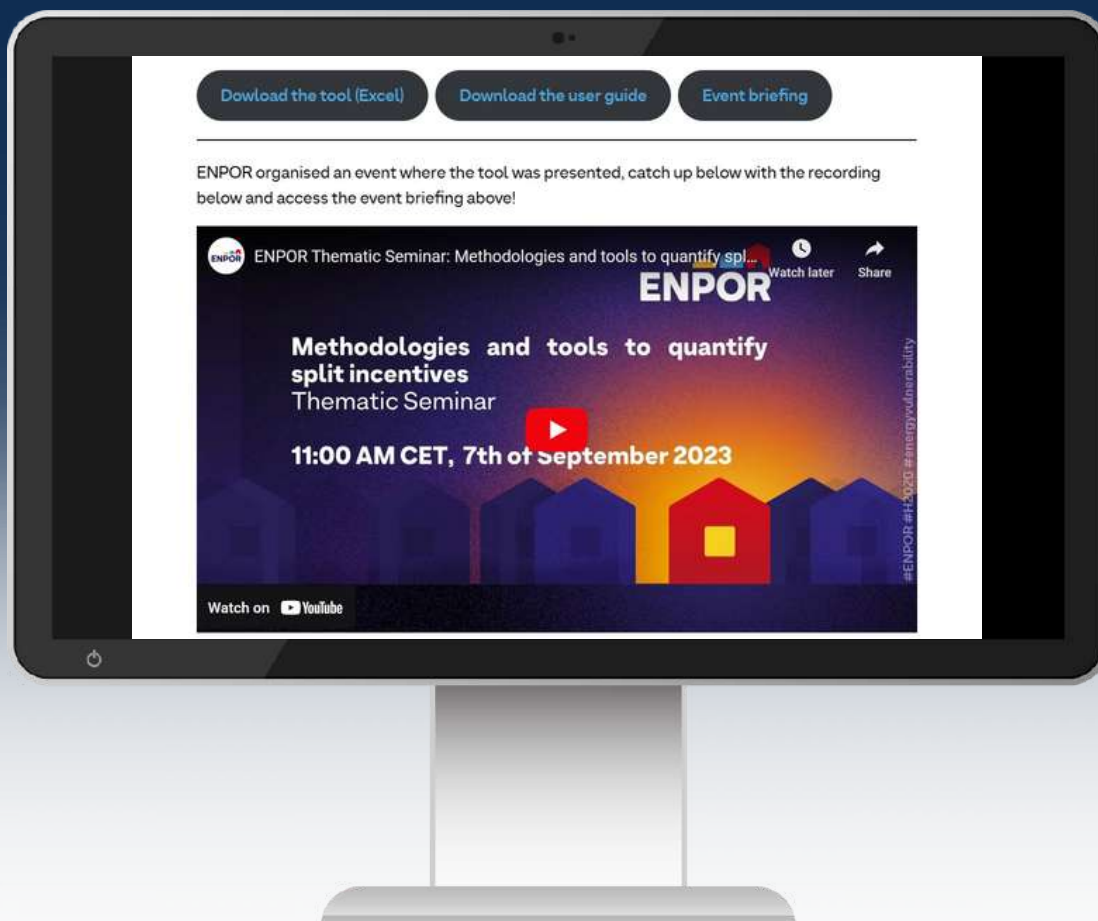


Figure 3. The Energy Poverty Dashboard displaying a selection of national policies relevant to the alleviation of energy poverty in the PRS.



The second novelty of ENPOR is the Split Incentive Quantification Tool, which addresses the split incentives dilemma that arises when the benefits of an investment, particularly in energy efficiency upgrades or renovations, do not align with the party bearing the costs. The tool's allocates the costs and benefits of energy efficiency interventions between landlords and tenants, thereby facilitating a more equitable and efficient implementation of energy efficiency policies in the PRS. [38, 39]

The tool operates on the quantification of energy savings and the assessment of positive externalities from energy efficiency interventions. Firstly, energy savings calculations are based on specific assumptions varying by country, such as average energy consumption, space heating and cooling energy consumption percentages, as well as energy prices. Offline user inputs like country, construction year, building area, and heating source, along with pre-determined assumptions, enable the tool to compute the energy saving rate for each energy efficiency scenario in kWh and Euros. Secondly, given that energy efficiency investments yield benefits beyond energy savings, including environmental, macroeconomic, building value increase, and other non-energy benefits like improved comfort and health, these externalities are divided between landlords and tenants, with the tool assessing the Net Present Value (NPV) of these benefits for both parties while factoring investment contributions by each party. [38, 39] A critical aspect of the tool is its ability to calculate the monthly impact on rental prices due to the energy efficiency interventions. This feature considers each party's energy efficiency upgrades affect both landlords and tenants financially.

In summary, the EPD and the split incentive tool present novel perspectives to observe and address the lack of consistency in framing energy as well as the split incentives issue in the PRS. By quantifying the costs and benefits of energy efficiency interventions for both landlords and tenants, ENPOR seeks to provide policy makers with the tools for devising policies that are more equitable and effective. Both tools are not just theoretical models but practical solutions that aid policymakers and stakeholders in making informed decisions to promote energy efficiency in the rental sector. [7, 37, 38, 39]

[38] Split Incentive Tool, retrieved on 30/11/2023 from <https://www.enpor.eu/the-enpor-split-incentive-tool/>

[39] Split Incentive Tool GUIDE, retrieved on 30/11/2023 from https://www.enpor.eu/wp-content/uploads/2023/11/Split-incentives-tool-user-guide_final.pdf

Below, the applicability of the Split Incentives Quantification Tool is demonstrated for the geographical and socio-economic context of Greece.

INPUTS

As shown in Figure 4, users should input several parameters, such as country, construction year, building area (m²), and heating source (Step 1), the chosen energy efficiency scenario and the participation of each actor in the investment (%) (Step 2), and assumptions based on the dwelling's characteristics (Step 3). In Step 3, users can choose to proceed with data provided by the tool based on the inputs inserted in Steps 1 and 2 or insert more detailed data, if available.

Household characteristics	
Step 1	Country: Greece
	Construction year: 1981-2010
	Building area (m ²): 80
	Energy product- Heating source: Oil

Energy efficiency scenario	
Step 2	Windows Upgrade & Thermal Insulation & Heat Pump
	Landlord's participation in the investment: 50%
	Tenant's participation in the investment: 50% <i>(calculated automatically)</i>
OK	

Proposed assumptions based on the dwelling's characteristics (i.e., country, construction year, etc.) and the chosen energy efficiency scenario		
Technical characteristics		
	Heating system power (kW/m ²)	0.08
	Cooling system power (kW/m ²)	0.07
	Windows surface	0.30
	Windows upgrade: Energy saving rate (%) heating	3.4%
	Windows upgrade: Energy saving rate (%) cooling	3.4%
	Thermal insulation: Energy saving rate (%) heating	32%
	Thermal Insulation: Energy saving rate (%) cooling	32%
	Windows upgrade & Thermal Insulation : Energy saving rate (%) heating	35%
	Windows upgrade & Thermal Insulation : Energy saving rate (%) cooling	35%
	Heat Pump: COP	4.30
	Heat Pump: EER	4.70
Intervention costs		
	Windows Upgrade: Unit implementation cost of interventions (€/m ²)	434
	Thermal Insulation: Unit implementation cost of interventions (€/m ²): external walls	42
	Thermal Insulation: Unit implementation cost of interventions (€/m ²): ceiling	37
	Heat Pump: Unit implementation cost of interventions (€/kW)	1,560
Investment parameters		
	Discount rate (%) (European average)	3.98%
	Investment's lifetime (years)	30

Figure 4. The inputs needed from the user as demonstrated in the tool.



OUTPUTS

Using the inputs that describe the unique characteristics of the case under study, the tool calculates the annual energy savings and the Net Present Value (NPV) of the landlords' and tenants' benefits while considering the investment's positive externalities. The tool then calculates the monthly impact on the rental price considering both actors' participation in and benefits from the investment, which leads to the overall monthly impact on rental price (Figure 5).

Annual Energy Savings (€) due to		Windows Upgrade & Thermal Insulation & Heat Pump		
Household category	Greece		1,011.2	
	1981-2010			
			NPV of the Landlord benefit-Property value increase	25,408.1

Annual Energy Savings (€) due to		Windows Upgrade & Thermal Insulation & Heat Pump		
Household category	Greece		1,011.2	
	1981-2010			
			NPV of the Tenant Benefits - Energy Savings	17,529.0

NPV of Multiple Benefits (€) due to		Windows Upgrade & Thermal Insulation & Heat Pump		
Multiple benefits	10%	101.1		
			NPV of the Tenant Benefits - Multiple benefits	101.1

Benefits calculation		NPV of the total Landlords' benefits (€)	
		25,408.1	
		NPV of the total Tenants' benefits (€)	
		17,630.1	

Monthly impact due to landlord participation in the investment (MIPI)	57
Monthly impact due to tenant participation in the investment (MIPI)	57

Monthly impact in rental price due to landlord's benefits (MIB)	122
Monthly impact in rental price due to tenant's benefits (MIB)	85

Monthly impact in rental price due to landlord's benefits and participation in the investment	61
Monthly impact in rental price due to tenant's benefits and participation in the investment	42

Overall monthly impact in rental price	103
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Figure 5. The outputs derived from the use of the tool.

7 SUMMARY OF POLICY RECOMMENDATIONS

ENPOR's recommendations [40], as presented in Figure 6, were collected through the insights gathered from the ten policies' improvements, aiming to support national and regional authorities, as well as municipalities, in both enhancing energy efficiency and alleviating energy poverty in the PRS.



Figure 6. Key recommendations to alleviate energy poverty in the European private rented sector.

[40] E. Suba, M. Oprea, V. Oikonomou. "Policy recommendations on setting up energy efficiency policies." Climate Alliance, ENPOR Project, 2023. Retrieved from <https://www.enpor.eu/>

Robust Framework for Diagnosing and Monitoring Energy Poverty

1

Member States must **establish a robust framework for diagnosing and monitoring energy poverty**. Based upon this framework, a combination of measures is required, which includes comprehensive policy approaches that focuses on the improved targeting of landlords which are the recipients of the policies for building upgrades, the pushing for energy efficiency through networking, the fostering a sense of responsibility in neighbourhoods, and the improvement of local framework conditions.



Set up revolving funds that support investing in energy-efficient renovations in PRS dwellings

2

Member States are encouraged to **set up revolving funds that support investing in energy-efficient renovations in PRS dwellings**, particularly those residing in low-income households. The success of these investments depends on the consideration of particularities relating to the local context and the community's needs, thereby creating relations of trust among landlords, tenants and energy efficiency service providers.

Framework for solution co-design for Energy Poverty Alleviation in the PRS

3

ENPOR has developed a matrix to illustrate multiple pathways for energy poverty alleviation in the PRS in various countries. This matrix includes regulatory, financial, and social measures and highlights the importance of representing and cooperating with different stakeholders involved in the PRS. It is recommended that this **framework be co-designed and set up by involving national and local stakeholders** when initiating the discussions for new or adjusted policies to alleviate energy poverty. The aim is for all participants to co-create and subsequently implement the agreed measures for the PRS. These measures should be inclusive, targeted and tailored to the needs of the energy-poor population and the financial capacity of landlords to invest, easy-to-access, and ensure long-term continuity.

Use of long-term financial instruments, improved targeting of landlords, energy labelling of properties, and representation of landlords

4

To implement successful energy efficiency policies in the PRS, it is required to address the 'split incentives' issue, where benefits of transactions do not accrue to the actor who pays for the transaction. This is particularly relevant in the context of energy efficiency in buildings, linked with cost recovery issues related to energy efficiency upgrade investments. **ENPOR suggests the use of long-term financial instruments, improved targeting of landlords, energy labelling of properties, and representation of landlords in associations to increase capacity and legislative knowledge on retrofitting**. Tax reductions are also recommended to reduce investment risks and balance impacts for tenants.

Establishing mandatory energy performance standards

5

To better address renovations in the PRS, there is a **need for mandatory energy performance standards**, requiring assessments for the worst-performing buildings with vulnerable tenants and imposing penalties for non-compliance. Clear targets for energy efficiency improvements and deadlines for compliance are vital, as is ensuring that energy performance certificates are applied to renovated dwellings.*

Tenant Rights and Tenancy Protection

6

In terms of tenant rights and tenancy protection, policies should ensure **transparency in energy bills, protection for energy-poor tenants from renovations, and establish frameworks for cost-sharing between landlords and tenants for energy efficiency improvements**. The establishment of one-stop shops to support landlords through their renovation journey and to assist them in applying to financing programs is also recommended.*

Accessible Green Financing and Support for Vulnerable Tenants

7

It is important to provide **accessible green financing for property upgrades and financial support for vulnerable tenants**. Creating targeted financial support programs for low-income tenants to help cover energy bills during extreme weather conditions and energy price shocks is vital, as is promoting collaboration with local charitable organizations and energy providers to identify and assist vulnerable households.



National Support Frameworks for Communication and Training

8

National authorities must **set-up national support frameworks to ensure appropriate communication and training measures for energy agencies and municipalities**. This involves developing target-group-specific information materials, using simple and visual language, and integrating awareness-raising into initiatives like clean heating programmes and inefficient appliance replacement schemes.

In conclusion, the ENPOR policy recommendations offer a strategic and multifaceted approach to alleviating energy poverty in the PRS. By focusing on a mix of regulatory, financial, and social measures, and emphasizing the importance of stakeholder involvement and co-creation of policies, these recommendations provide a robust framework for policymakers and energy experts to effectively address energy poverty in the EU.

8 CHECKLIST FOR POLICY MAKERS

Based on the ENPOR policy recommendations [40], the project experts compiled a checklist [41] so that policy makers can focus on tailoring the primary impact of their policies to tackle energy poverty on energy-poor households within the PRS, providing them with comprehensive

knowledge and tools for managing energy consumption and expenses more autonomously, efficiently, and with greater awareness. The steps in the checklist need to be organized in tandem with the relevant stakeholders when designing policies for the PRS.



[41] M. Oprea, & S. Livraghi, "Deliverable 5.7 Recommendations for replicating best practices for energy poverty in the private rented sector." Institute for European Energy and Climate Policy, Netherlands: ENPOR Project, 2023. Retrieved from www.enpor.org



Collaborative Outreach and Material Dissemination

The checklist begins with actions to improve *Collaborative Outreach and Material Dissemination*. It recommends decentralized consulting services with sustainable financial support and region-specific needs assessments. This involves mapping resources, planning viable financial models, and defining strategies for material dissemination using diverse channels like local media and community collaboration. Multilingual materials with easy-to-understand advice are emphasized to ensure accessibility and understanding across different communities.



Comprehensive Understanding of Energy Conservation

In terms of *Comprehensive Understanding of Energy Conservation*, the checklist advocates for low-threshold energy advice via social energy advice and training sessions focused on energy bills and conservation methods. Additionally, it suggests developing materials based on EU recommendations that can be customized for national use, ensuring consistency across Member States.



Monitoring and Evaluation for Long-term Effectiveness

The checklist stresses the importance of *Monitoring and Evaluation for Long-term Effectiveness*, suggesting setting up a monitoring system with suitable indicators, in collaboration with statistical institutes, and utilizing tools like the EPD and the Split Incentive Calculation Tool. The aim is to ensure consistency in long-term impact assessments and the use of regional data to assess energy bill savings and policy effectiveness.



Data-Driven Policy Development

Accordingly, *Data-Driven Policy Development* is another critical element to be considered in future policymaking. ENPOR advocates for continuous data collection on energy poverty and the effectiveness of implemented measures using consistent energy poverty indicators. The use of EU frameworks to guide the collection of new insights and data to inform the implementation of energy poverty policies is also emphasized.



Stakeholder Engagement and Capacity Building

Stakeholder Engagement and Capacity Building, which includes training sessions for social workers and energy advisors involving representatives from target groups in the training design and delivery process, encourages the replication of national programs within MSs through forums and working groups to promote exchange and collaboration on energy poverty.



Enhancing Resource Availability

Finally, the checklist underlines *Enhancing Resource Availability* by combining energy-saving measures with coaching, installation services, and repeat visits. It encourages the establishment of funding streams dedicated to energy efficiency renovations and simplifying the application process for these funds.

When these steps are followed in the policy design process, the policy outcomes can lead to significant advancements in the quality of life for tenants within the PRS, offering better living conditions, diminished financial burdens related to energy expenses, and enhanced energy security. Property owners and housing associations are also expected to benefit from clear information and transparency in the policy process, robust financial support, and an increase in property value post-renovation. It should be noted that the integration of comprehensive training programs with financial support mechanisms for renovations creates a more holistic approach to reducing energy poverty, combining the empowerment of citizens through knowledge with practical support.

9 ENPOR'S ACHIEVEMENTS

ENPOR has engaged European policy makers to help familiarise them with the concept and prevalence of energy poverty in the PRS, as well as to co-create solutions that have ultimately led to the adoption of measures to alleviate the issue, as documented, in some cases, in legislative documents. This demonstrates a broad spectrum of influence on energy efficiency and poverty alleviation policies focused on the PRS. While not all actions have led to legislative changes in every country, the project's role in informing policy development and establishing best practices is unequivocally clear.

Table 5. Summary of the ENPOR's achievements

Indicators	Results [42, 43, 44, 45]
Stakeholders engaged in co-creation (Number of Stakeholders)	<ul style="list-style-type: none"> • 528 stakeholders engaged in REACT groups • 907 stakeholders engaged in TARGET groups
Number of decision makers to have used the EPD to inform policy or local decision making as well as number of experts that have used it (# of People)	Over 60 policy makers and experts have used the tool
Number of consumers involved in the project (# of Households)	300,000 households across 7 countries
Contributions to policy development and to best practice development on energy poverty (# of Influenced Documents)	17
Policies established/adjusted for energy efficiency and/or small-scale renewable energy investments and to be sustained beyond the period of EU support (# of Schemes)	10
Replication of policies (# of Cases)	7 cases
Presentations at policy events (# of Policy Events)	172 policy events
Energy Poverty Dashboard (# of Users and Policies Listed)	<ul style="list-style-type: none"> • Number of users – 1.1K users since it's launch from 84 countries, resulting in 3933 total page views • Number of policies listed – 123 policies from 27 countries (57 crowd-source submissions)
Split Incentives Tool (# of Downloads and Views)	196

[42] M. Oprea, J. Heemann, M. Peretto, S. Livraghi, A. Sahin, E. Pandolfi, A. Majdandzic, C. Tourkolias, M. Muiste, N. Vrielink, M. Rietbergen, F. Vondung, "D3.6 Monitoring Outcomes", Institute for European Energy and Climate Policy, Netherlands. ENPOR Project, 2023. Retrieved from www.enpor.org

[43] A. Klöpper, "Deliverable 6.5 Summary of Proceedings and outcomes from ENPOR events," International Union of Property Owners, Belgium, Nov. 2023. ENPOR Project. Retrieved from www.enpor.org.

[44] E. Suba, "Deliverable 6.8 Summary of printed materials and digital content Final Version," Climate Alliance, Dec. 2023. ENPOR Project. Available: https://www.enpor.eu/wp-content/uploads/2023/12/ENPOR_D6.8_Summary-of-printed-and-digital-materials.pdf.

[45] . Amato, E. Pandolfi, "Deliverable 4.4, Proceedings on the capacity building activities," ENEA - Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile, ENPOR Project. Retrieved from <https://www.enpor.eu>.

10 KEY TAKEAWAYS

ENPOR has effectively carried out actions to tackle energy poverty in the PRS. Central to these efforts was the nuanced active engagement of stakeholders that identified key groups including landlords, charitable organizations, energy consultants, policymakers, NGOs, and utilities, each contributing uniquely to the project's objectives. Ultimately, the incorporation of these diverse stakeholders ensured that the energy efficiency policies developed, cocreated, and redesigned considered the gender dimension and also resonated with the actual needs and capacities of the targeted groups.

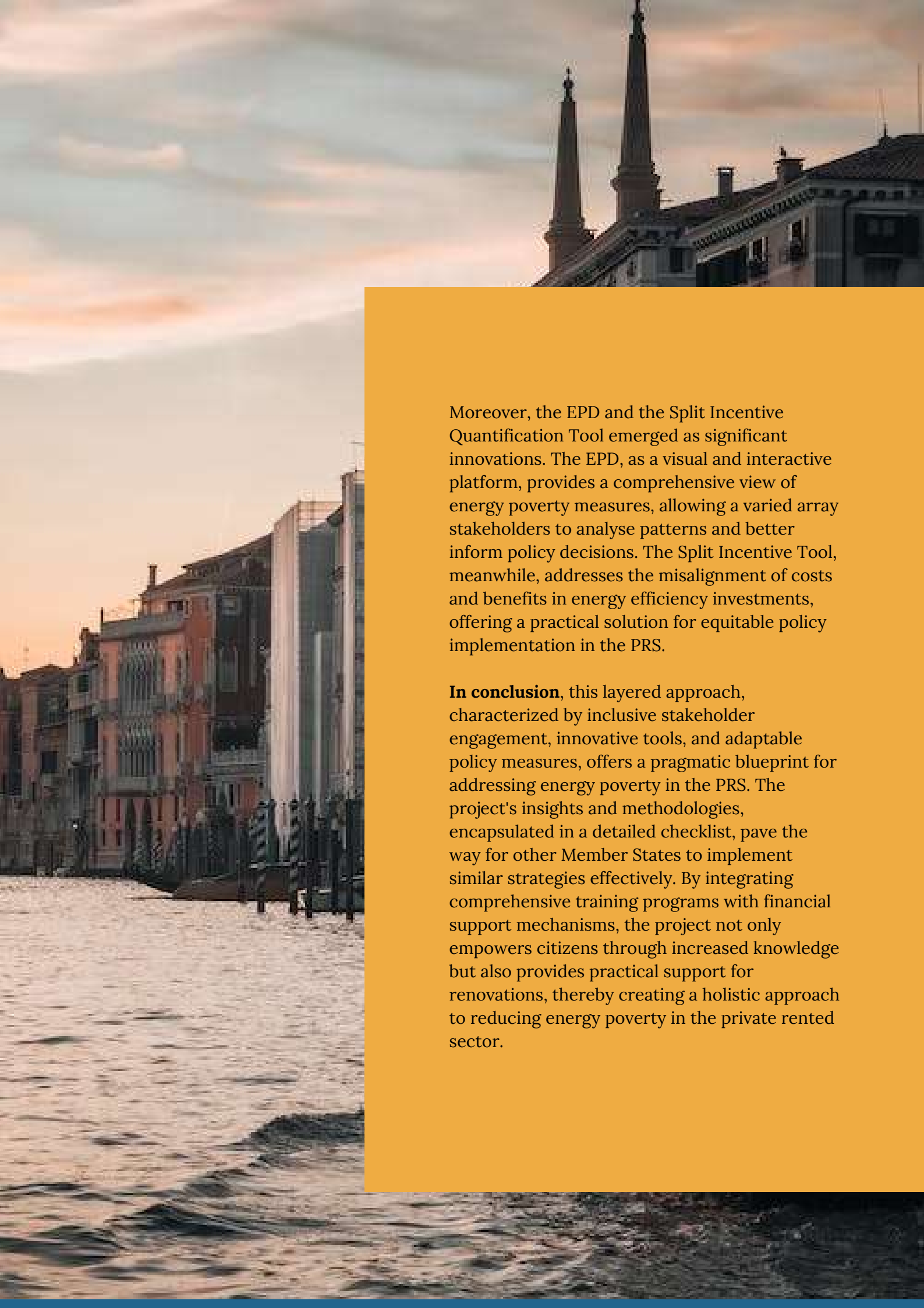
The establishment of REACT groups was fundamental in the co-creation process as they were instrumental in discussing insights, providing data, and facilitating policy discussions and adoption. This co-creation process was guided by principles like the systems perspective, emphasizing emergent actors, local adaptation, and nonlinearity to make sure that the policies were grounded in human experience and mindful of the decision-making processes, relationships, as well as governance within the energy system. These measures implemented across Austria, Croatia, Estonia, Germany, Greece, Italy, and the Netherlands highlighted the project's adaptability and responsiveness to national contexts. From consulting services in Austria to renovation grants in Croatia and Estonia, each country's approach reflected a deep understanding of local challenges and opportunities in addressing energy poverty.

The implementation in Austria highlights the significance of tailoring information and advice to specific target groups. The successful incorporation of figurative language in advisory materials underlines the potential of effective communication strategies. Additionally, the inclusion of translations and the cooperation with the Ministry of Climate Action to enable nationwide adoption showcase the importance of accessibility and stakeholder collaboration.



The experience of ENPORA in Germany emphasizes the value of well-designed advisory tools and diverse stakeholder engagement in influencing household behaviors. Strategies such as gamified self-learning activities and visual aids bridge language barriers effectively. However, the complexities of technological interventions highlight the need for flexibility and sufficient resources. ENPORA's focus on inclusivity in renovation grants in Estonia demonstrates a strategic approach to address energy poverty. The commitment to renovate buildings to a C-energy class by 2050 and the challenges presented by individual apartment ownership call for innovative and inclusive solutions. The efforts of ENPORA in Greece in supporting the renovation of buildings and raising awareness through targeted campaigns show promise in addressing energy poverty in the private rental sector. The emphasis on inclusivity, financial accessibility, and local involvement highlights a comprehensive approach. Croatia's updated programs and data-driven policy formulation through the ENPORA project offer insights into tackling energy poverty. The importance of transparency, inclusivity, and collaboration with stakeholders are central to the country's progress. Italy's "Italia in Classe A" program demonstrates a proactive approach to combatting energy poverty in the private rental sector through education, advisory tools, and awareness campaigns. Targeted handbooks and student engagement represent promising strategies for future initiatives. Finally, in the Netherlands, ENPORA supported the successful continuation of measures and diversification of options available to municipalities. The expansion of stakeholders, such as civil society organizations, has enriched the country's multifaceted approach to mitigate energy poverty. The Energybox project's success in reaching residents and supporting households further underlines the effectiveness of the various approaches of ENPORA.





Moreover, the EPD and the Split Incentive Quantification Tool emerged as significant innovations. The EPD, as a visual and interactive platform, provides a comprehensive view of energy poverty measures, allowing a varied array of stakeholders to analyse patterns and better inform policy decisions. The Split Incentive Tool, meanwhile, addresses the misalignment of costs and benefits in energy efficiency investments, offering a practical solution for equitable policy implementation in the PRS.

In conclusion, this layered approach, characterized by inclusive stakeholder engagement, innovative tools, and adaptable policy measures, offers a pragmatic blueprint for addressing energy poverty in the PRS. The project's insights and methodologies, encapsulated in a detailed checklist, pave the way for other Member States to implement similar strategies effectively. By integrating comprehensive training programs with financial support mechanisms, the project not only empowers citizens through increased knowledge but also provides practical support for renovations, thereby creating a holistic approach to reducing energy poverty in the private rented sector.