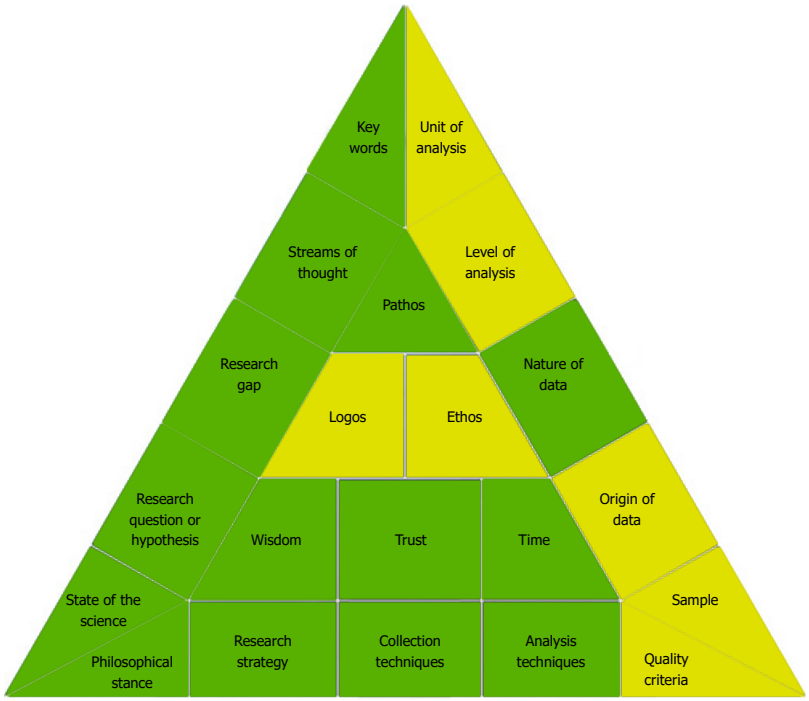
IDEAPUZZLE
DESIGN AND DEFEND YOUR PHD

Exploring Energy Poverty Measurement across the Spatial and Temporal scales: Insights for multilevel future policy-making

Author: Pedro Palma
Date: 2022-06-30 - 16:09:39 (WET)
Self-evaluation: 83%



Key words

1/21. Theoretical question: what are the two main keywords of your research?

The keywords of my research are "energy poverty measurement", "multi-spatial scale" and "future scenarios".
Energy poverty, defined as households' lack of adequate energy services, is a multi-faceted complex societal challenge, resulting from the combination of factors such as inefficient buildings, high energy prices, and low incomes [1,2,3]. It affects millions of people in Portugal and the European Union [4], causing thermal discomfort and serious health issues, and potentially leading to excessive mortality [5,6].
Diagnosis is a crucial step in the process of mitigating this issue and efforts arise from different levels of governance. At the national level, macro indicators are used to develop policies and programs that fall short in capturing and engaging specific types of vulnerability and vulnerable groups, whereas, at the regional and local level, the lack of data and scientific knowledge hinders the design of sound initiatives to target and support the energy-poor population. Moreover, policies and strategies often focus on current vulnerabilities, disregarding the need for predicting upcoming developments in policy, economy, infrastructure, and climate.
Drawing on the best knowledge and the diversity of different indicators [7,8,9], I set out to develop a comprehensive energy poverty measurement method that bridges the gap between national and local spatial scales and expands the temporal scale frame of analysis. The goal is to assess energy poverty levels in the winter and summer at multiple spatial scales and for the current situation

and future scenarios.

[1] Garcia, M., Campbell, R., Donaldson, L., Brolis, M., Ghidorzi, S., Van Ing, D., ? Poussard, E. (2009). Tackling Fuel Poverty in Europe: Recommendations Guide for Policy Makers, European Fuel Poverty and Energy Efficiency;
[2] Pye, S., Dobbins, S., Baffert, C., Brajkovi?, J., Grgurev, I., Miglio, D.R., Deane, P. (2015). Energy poverty and vulnerable consumers in the energy sector across the EU: analysis of policies and measures.
[3] Dobbins, A., Fuso Nerini, F., Deane, P., Pye, S. (2019). Strengthening the EU response to energy poverty. Nature Energy, 4(1), 2?5. https://doi.org/10.1038/s41560-018-0316-8;
[4] Eurostat (2022). Inability to keep home adequately warm - EU-SILC survey. Database. Available at: [http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_mdes01&lang=en]
[5] Parsons, K. (2014). Human thermal environments - The Effects of Hot, Moderate, and Cold Environments on Human Health, Comfort, and Performance. CRC Press. https://doi.org/10.1201/b16750;
[6] Liddell, C., Morris, C., Thomson, H., Guiney, C., (2015). Excess winter deaths in 30 European countries 1980?2013: a critical review of methods. Journal of Public Health 38 (4), 806?814. https://doi.org/10.1093/pubmed/fdv184;
[7] Thomson, H., Bouzarovski, S., & Snell, C. (2017). Rethinking the measurement of energy poverty in Europe: A critical analysis of indicators and data. Indoor and Built Environment, 26(7), 879?901. https://doi.org/10.1177/1420326X17699260
[8] Tirado-Herrero, S. (2017). Energy poverty indicators: A critical review of methods. Indoor and Built Environment, 26(7), 1018?1031. https://doi.org/10.1177/1420326X17718054
[9] Siksnelyte-Butkiene, I., Streimikiene, D., Lekavicius, V., Balezentis, T. (2021). Energy poverty indicators: A systematic literature review and comprehensive analysis of integrity. Sustainable Cities and Society, 67, 102756. https://doi.org/10.1016/j.scs.2021.102756

Self-evaluation: 100%

Streams of thought

2/21. Theoretical question: what are the two main streams of thought of your literature review?

Scholarship on energy poverty has significantly increased over the last three decades in the research and policy arenas, but measurement remains one of the most significant challenges. Three different axes can be identified regarding the difference in approach: the type of method, the scale of analysis, and the timeframe. Regarding the spatial scale, analyses can focus on a country scale [10,11]; they can integrate regional-level case studies, with varying levels of spatial resolution [12,13]; or study this phenomenon directly at household-scale [14]. As for the timeframe, assessments can be diagnostic [10] or predictive [15].
Methods can be categorized as quantitative or qualitative [16,17]. Quantitative metrics focus on the objective measurement of one or more quantitative indicators such as the level of energy services and energy cost and expenditure, or in several dimensions simultaneously, composing aggregate indexes or models [18,19,20,21]. Qualitative approaches are based on a subjective self-reported evaluation of housing conditions and perception of thermal comfort, collected through interviews and surveys [22,23]. On the other hand, there are three main types of indicators used to assess energy poverty: expenditure-based, focusing on energy costs in relation to income; consensual-based, based on households' self-reported assessment of indoor conditions; direct measurements, where energy services' level is compared to a defined standard [24]. Several authors opt for one-dimensional approaches, focusing on one of these groups of indicators to perform their analysis [25,26,27], whilst others develop composite multi-dimensional indexes using climate indicators, building stock parameters and statistics, energy costs, health, and socioeconomic indicators [12, 13,20].

[10] Karpinska, L., & Smiech, S. (2021). Escaping Energy Poverty: a Comparative Analysis of 17 European Countries.Energies, 14(18), 1-16. https://doi.org/10.3390/en14185761
[11] Rodriguez-Alvarez, A., Llorca, M., & Jamasb, T. (2021). Alleviating energy poverty in Europe: Front-runners and laggards. Energy Economics, 103(September), 105575. https://doi.org/10.1016/j.eneco.2021.105575
[12] März, S. (2018). Assessing the fuel poverty vulnerability of urban neighbourhoods using a spatial multi-criteria decision analysis for the German city of Oberhausen. Renewable and Sustainable Energy Reviews, 82(July 2017), 1701?1711. https://doi.org/10.1016/j.rser.2017.07.006
[13] Martín-Consuegra, F., Gómez Giménez, J. M., Alonso, C., Córdoba Hernández, R., Hernández Aja, A., & Oteiza, I. (2020). Multidimensional index of fuel poverty in deprived neighbourhoods. Case study of Madrid. Energy and Buildings, 224. https://doi.org/10.1016/j.enbuild.2020.110205
[14] Sokolowski, J., Frankowski, J., & Lewandowski, P. (2020). Energy poverty, housing conditions, and self-assessed health: evidence from Poland. December. IBS working paper. Institute for Structural Research
[15] Pérez-Fargallo, A., Rubio-Bellido, C., Pulido-Arcas, J. A., & Javier Guevara-García, F. (2018). Fuel Poverty Potential Risk Index in the context of climate change in Chile. Energy Policy, 113(October 2017), 157?170. https://doi.org/10.1016/j.enpol.2017.10.054
[16] Rademaekers, Koen, Yearwood, Jessica, Ferreira, Alipio, Pye, Steve, Hamilton, Anisimova, N. (2016). Selecting Indicators to Measure Energy Poverty. Trinomics;
[17] Thomson, H. (2019). Prevalent Approaches. In Moving beyond the state of the art in energy poverty measurement ENGAGER. Energy Poverty Action;
[18] Hills, J. (2012). Getting the measure of fuel poverty. final report of the fuel poverty review. case report 72. Available at:

[https://www.gov.uk/government/ publications/final-report-of-the-fuel-poverty-review];
[19] Papada, L., Kaliampakos, D. (2018). A Stochastic Model for energy poverty analysis. Energy Policy 116, 153?164;
[20] Gouveia, J.P., Palma, P. Simoes, S. (2019). Energy poverty vulnerability index: A multidimensional tool to identify hotspots for local action. Energy Reports, Volume 5, 187-201 https://doi.org/10.1016/j.egyr.2018.12.004;
[21] Sanchez-Guevara, C., Peiró, M. N., Taylor, J., Mavrogianni, A., & González, J. N. (2019). Assessing population vulnerability towards summer energy poverty: Case studies of Madrid and London. Energy and Buildings, 190, 132?143. https://doi.org/10.1016/j.enbuild.2019.02.024;
[22] Thomson, H., Snell, C., Bouzarovski, S., (2017). Health, well-being and energy poverty in Europe: A comparative study of 32 European countries. Int. J. Environ. Res. Public Health 4 (6), 584. http://dx.doi.org/10.3390/ijerph14060584.
[23] Aristondo, O., Onaindia, E. (2018). Counting energy poverty in Spain between 2004 and 2015. Energy Policy 113, 420?429. https://doi.org/10.1016/j.enpol.2017.11.027;
[24] Thomson, H., Bouzarovski, S., & Snell, C. (2017). Rethinking the measurement of energy poverty in Europe: A critical analysis of indicators and data. Indoor and Built Environment 26(7), pp 879?901. https://doi.org/10.1177/1420326X17699260.
[25] Boardman, B. (1991). Fuel Poverty: From Cold Homes to Affordable Warmth. Belhaven Press, London
[26] Hills J. (2011) Fuel Poverty: the Problem and its Measurement. Interim Report of the Fuel Poverty Review. London: Centre for Analysis of Social Exclusion, LSE.
[27] Aguilar, J. M., Ramos-Real, F. J., & Ramírez-Díaz, A. J. (2019). Improving indicators for comparing energy poverty in the Canary Islands and Spain. Energies, 12(11). https://doi.org/10.3390/en12112135

Self-evaluation: 100%

Research gap

3/21. Theoretical question: what is the main gap that your research addresses?

My research aims to address two different shortcomings in literature: the lack of approaches that measure energy poverty across the spatial scale, from national to local [28,29] and the lack of studies focusing on the prediction of future energy poverty vulnerability [29,30] There is a need for a replicable multi-indicator framework, combining the best practices and knowledge from quantitative and qualitative metrology, that provides a comprehensive and nuanced identification and analysis of the energy-poor population. Therefore, the proposed framework would address a methodological gap.

[28] ENGAGER. (2018). European Energy Poverty-Agenda Co-Creation and Knowledge Innovation (ENGAGER 2017-2021) Policy Brief No.1, December 2018. Eds: Bouzarovski, S. ENGAGER. Energy Poverty Action;
[29] Sareen, S., Thomson, H., Tirado Herrero, S., Gouveia, J. P., Lippert, I., & Lis, A. (2020). European energy poverty metrics: Scales, prospects and limits. Global Transitions, 2, 26?36. https://doi.org/10.1016/j.glt.2020.01.003
[30] Baker, K. J., Mould, R., Restrick, S. (2018). Rethink fuel poverty as a complex problem. Nature Energy, 3(8), 610?612. https://doi.org/10.1038/s41560-018-0204-2

Self-evaluation: 100%

Research question or hypothesis

4/21. Theoretical question: what is the main question or hypothesis of your research?

My research aims to address the question of "How to effectively measure energy poverty at multi-spatial and multi-temporal scales through a multi-indicator replicable approach".

Self-evaluation: 100%

State of the science

5/21. Theoretical question: what is the current answer to your research question or hypothesis?

Most studies on this topic have not delved into the development of multiscale assessments and rather focus on only one spatial and/or temporal scale. These approaches result in case studies that provide interesting learnings relating to the specific context but fail to paint a complete and nuanced picture of the problem and provide more useful insights for policy making. The lack of data, especially at smaller scales, is a major bottleneck preventing further research on these crossover assessments. Nevertheless, there are authors that managed to bridge different spatial scales in their assessments. Authors like Aguilar et al. [27] and Panão et al. [31] and use disaggregated national expenditure statistics to assess energy poverty at national and regional levels. Karpinska et al. [31] advanced a two-method statistical approach to investigate energy poverty vulnerability at country and regional levels. Gouveia et al. [20] proposed a method that enables estimating energy poverty levels from the national to parish level, using the same framework of indicators. Besagni and Borgarello [32] developed a method integrating buildings energy modeling and surveys data to connect the country to household scale. Regarding the temporal scale, only a few studies go beyond past or present contexts. The exceptions consider future scenarios in terms of climate variability. Pérez-Fargallo et al. [33] measured energy poverty in the context of future

climate change scenarios using modeled climate data. Alba-Rodríguez et al. [34] also consider climate change scenarios to assess the impact of retrofitting on energy poverty levels.

[20] Gouveia, J.P., Palma, P. Simoes, S. (2019). Energy poverty vulnerability index: A multidimensional tool to identify hotspots for local action. Energy Reports, Volume 5, 187-201 https://doi.org/10.1016/j.egyr.2018.12.004;
[27] Aguilar, J. M., Ramos-Real, F. J., & Ramírez-Díaz, A. J. (2019). Improving indicators for comparing energy poverty in the Canary Islands and Spain. Energies, 12(11). https://doi.org/10.3390/en12112135
[30] Panão, O.M. J. N. (2021). Lessons learnt from using energy poverty expenditure-based indicators in a mild winter climate. Energy and Buildings, 242. https://doi.org/10.1016/j.enbuild.2021.110936
[31] Karpinska, L., ?miech, S., Gouveia, J. P., & Palma, P. (2021). Mapping Regional Vulnerability to Energy Poverty in Poland. Sustainability, 13(19), 10694. https://doi.org/10.3390/su131910694
[32] Besagni, G., & Borgarello, M. (2019). The sociodemographic and geographical dimensions of fuel poverty in Italy. Energy Research and Social Science, 49(October 2018), 192?203. https://doi.org/10.1016/j.erss.2018.11.007
[33] Pérez-Fargallo, A., Rubio-Bellido, C., Pulido-Arcas, J. A., & Javier Guevara-García, F. (2018). Fuel Poverty Potential Risk Index in the context of climate change in Chile. Energy Policy, 113(October 2017), 157?170. https://doi.org/10.1016/j.enpol.2017.10.054
[34] Alba-Rodríguez, M. D., Rubio-Bellido, C., Tristancho-Carvajal, M., Castaño-Rosa, R., & Marrero, M. (2021). Present and future energy poverty, a holistic approach: A case study in Seville, Spain. Sustainability (Switzerland), 13(14), 1?15. https://doi.org/10.3390/su13147866

Self-evaluation: 100%

Philosophical stance

6/21. Methodological question: what is the philosophical stance of your research?

The philosophical stance of my research is quantitative objectivism, as it deals with the measurement and prediction of a social phenomenon, which is an objective reality, aiming to shed light on facts.

Self-evaluation: 100%

Research strategy

7/21. Methodological question: what is the qualitative, quantitative, or mixed-method of your research?

Following Mintzberg [35] distinction of qualitative and quantitative based on the nature of data, my research strategy can be considered quantitative, as it focuses on developing a model supported by quantitative data and statistical analyses. Although qualitative indicators will be used, for instance regarding the perception of thermal comfort, these will be transformed into quantitative results, as described by Srnka and Koeszegi [36].

[35] Mintzberg, H. (2005). Developing Theory about the development of theory. In K. Smith & M. Hitt (Eds) Encyclopedia of case study research (Vol. 2, pp 840-842). Thousand Oaks, California: Sage Publications.
[36] Srnka, K. J., Koeszegi, S. T. (2007). From Words to Numbers: How to Transform Qualitative Data into Meaningful Quantitative Results. Schmalenbach Business Review volume 59, pp 29?57.

Self-evaluation: 100%

Collection techniques

8/21. Methodological question: what are the data collection techniques of your research?

The main data collection technique is the consultation of documents and databases for retrieving statistics, research data, and model predictions, to feed the selected objective quantitative indicators. Surveys and interviews, conducted externally, will also be used to inform the necessary qualitative indicators.

Self-evaluation: 100%

Analysis techniques

9/21. Methodological question: what are the data analysis techniques of your research?

The data analysis techniques are of quantitative nature, as the research aims to create a model that produces numerical objective results, through the application of quasi-statistics and multivariate statistical analysis methods.

Self-evaluation: 100%

Quality criteria

10/21. Methodological question: what are the tactics of your research to ensure scientific quality criteria?

Scientific quality criteria of my research are of objectivistic nature [37], assured by external validation in the form of analytical generalization, as the developed model focus on making projections based on a theoretical evaluation of the determining factors which are selected and prioritized according to current theory. Moreover, as stated by Yin [38] previously developed theory is used as the background to compare the results of a case study, in this case, my research. It is considered a generalization to theory, the appropriate form of generalization for a case study analysis.

[37] Guba, E. G., & Lincoln, Y. S. (2005). Paradigmatic Controversies, Contradictions, and Emerging Confluences. In N. K. Denzin & Y. S. Lincoln (Eds.), The Sage handbook of qualitative research (pp. 191?215). Sage Publications Ltd.
[38] Yin, Robert K. (2003) Case Study Research: Design and Methods, 3rd edition. Thousand Oaks, CA: Sage.

Self-evaluation: 50%

Unit of analysis

11/21. Empirical question: what is the unit of analysis of your research?

The analysis unit of my research is the level of vulnerability to energy poverty, which is represented by a numerical value. This value can either be a percentage of people and/or a composite number resulting from the aggregation of the different indicators that represent the factors determining this phenomenon.

Self-evaluation: 50%

Level of analysis

12/21. Empirical question: what is the level of analysis of your research?

The goal of the research is to develop a model that produces results at different levels of spatial and temporal analysis. Exploring the level expansion of energy poverty analyses is precisely the goal of my research.

Self-evaluation: 50%

Nature of data

13/21. Empirical question: what is the nature of the data of your research?

The nature of data of my research is quantitative, feeding quantitative research, as the research question pertains to a measurement, thus being answered by the obtained numerical value resulting from the conducted analysis. Data on building fabric characteristics, climate variables, socioeconomic indicators, energy consumption statistics, energy needs modeled data, and perception of thermal comfort are currently being used in the research.

Self-evaluation: 100%

Origin of data

14/21. Empirical question: what is the origin of the data of your research?

The origin of the research data is mostly secondary, stemming from sources such as governments, organizations, and researchers, providing current statistics, modeled datasets, and data projections for future scenarios. Secondary data from interviews and surveys conducted by technicians in the context of a project I am participating in is also included in the research.

Self-evaluation: 50%

Sample

15/21. Empirical question: what is the sample of your research?

The research uses descriptive sampling, as it aims to draw insights and conclusions about the energy poverty vulnerability in one case study, Portugal, without any planned inferential purpose. This is a composite case study because it crosses over different spatial scales, therefore considering country, city, neighborhood, and household "subcase-studies". The assessment performed at any scale only respects the population sample corresponding to that same spatial analysis, without inferring about a large population. The same logic is applied for the present or future analysis, which only respects the corresponding population sample. Several units of observation, relating to the different indicators that will be used, will result in one unit of analysis, the level of vulnerability.

Self-evaluation: 50%

Pathos

16/21. Rhetorical question: what are the positive and negative emotions of your research?

My research stands on the conviction that access to adequate housing, assuring thermal comfort for its occupants, is an inalienable universal human right, and should be guaranteed to everyone regardless of their socioeconomic status, as highlighted by the United Nations [39, 40]. We are still a long way from this conviction becoming reality, so there is still a path to tread for achieving this goal. In my opinion, this research can represent a small step in that path, as it aims to improve the understanding and prediction of energy poverty, providing policymakers at different levels of governance with valuable information that enables more tailormade action to eradicate this issue. This is the main positive emotion of my research.
As for the negative emotions, I would highlight the potential lack of traction and subsequent low impact of this research at the policy level, both due to other policy priorities or its inability to produce sufficiently interesting and useful results that could be used in a practical level to support efforts for energy poverty mitigation. I believe the connection between research and policymaking is not straightforward because languages and needs are often misaligned, and collaboration and synergetic action between both sides require more than a written academic document.

[39] United Nations. (1948). Article 25. Universal Declaration of Human Rights.
[40] United Nations. (2015). Transforming our world: the 2030 Agenda for Sustainable Development. Resolution adopted by the General Assembly on 25 September 2015.

Self-evaluation: 100%

Logos

17/21. Rhetorical question: what is the scientific logic of your research?

The logos of my research is hypothetic-deductive, as it draws on previous knowledge and theory on energy poverty literature and practice, to create a more thorough method to analyze the issue. The hypothesis advanced by this research is precisely the production of a more competent model to identify and analyze the energy-poor population at different scales.

Self-evaluation: 50%

Ethos

18/21. Rhetorical question: what are the limitations of your research?

The limitations of this research start with the fact that the own definition of energy poverty is widely debated, without common consensus in the EU [41]. It is in fact susceptible to different interpretations, which inevitably impacts the whole research process - from what the most adequate datasets and analysis techniques are, to what results and conclusions mean. These different interpretations are also a consequence of the subjectivity that characterizes thermal comfort, which is affected by several factors, including social and cultural norms [42], adding to the inherent difficulty in reaching and engaging vulnerable people.
As for the specific research process, it heavily relies on data availability, particularly on secondary datasets, which are obtained through collection methods and with purposes that are not fully aligned with the intended purpose of my Ph.D. and research questions. These datasets incorporate limitations in the data collection and analysis faced by the entity responsible for its collection, inevitably shaping the process and influencing the quality of the collected data.
Data scarcity is also a concern, especially at local scales. The surveys and interviews I will be using are being conducted by technicians in a project in which I am also participating. Although I was one of the people responsible for tailoring the structure and questions of the surveys, the collection of these datasets is in some ways out of my control. It is dependent on the technicians who conduct the process and the successful engagement and participation of the population. The timely execution of this task is also not under my control, and it can impact my work plan. Changes in the available data could determine the need for reshaping the study, with potentially negative consequences for the aimed outcome.
As the research draws on previous research work that has focused separately on different scales, bringing together the learnings to develop a method that is effective in identifying and analyzing the energy-poor across the whole spatial spectrum and for an extended timeframe can prove daunting, ultimately incurring in the loss of nuance and detail and lack of coherence and scientific soundness in some steps of the method.

[41] Bouzarovski, S., Petrova, S., & Sarlamanov, R. (2012). Energy poverty policies in the EU: A critical perspective. Energy Policy, 49, 76?82. https://doi.org/10.1016/j.enpol.2012.01.033;
[42] Maxim, A., Mihai, C., Apostoaie, C. M., Popescu, C., Istrate, C., & Bostan, I. (2016). Implications and measurement of energy poverty across the european union. Sustainability (Switzerland), 8(5), 1?21. https://doi.org/10.3390/su8050483.

Self-evaluation: 50%

Wisdom

19/21. Authorial question: what is your education and experience related to your research?

My educational background is in environmental engineering. I started to study social phenomena linked to environmental problems in my bachelor's and master's degree, specifically regarding energy demand and supply and its environmental impacts. In my master's thesis, I developed research work on one of the most important causes and drivers of energy poverty in Portugal, the building stock energy performance [42]. This event marks the start of my work and interest in the topic of energy poverty.
After completing the master thesis in 2017, I joined CENSE- Center for Environmental and Sustainability Research as a researcher, and together with my supervisor and another colleague, started developing research on energy poverty, particularly creating an index that assesses the population vulnerability to this phenomenon. Since then, we have incorporated energy poverty assessment in research projects and policy strategy documents at the regional level.
During this period, I came to realize the significant impact energy poverty has on the lives of the population throughout the world, and particularly in Portugal - impacts that to a minor degree I have personally experienced, along with a considerable part of the Portuguese population. The research work that our group in CENSE has developed attracted media attention, and as a consequence, these impacts have become very visible, as the testimonies of people in great vulnerability were broadcast for the general public to witness. Our team has continued to work on the developed method, always aiming to further develop it and improve its effectiveness and quality of results, which constitutes the purpose of my Ph.D. research.

[42] Palma, P., Gouveia, J. P., Simoes, S. G. (2019). Mapping the energy performance gap of dwelling stock at high-resolution scale: Implications for thermal comfort in Portuguese households. Energy and Buildings, 190, 246-261. https://doi.org/10.1016/j.enbuild.2019.03.002

Self-evaluation: 100%

Trust

20/21. Authorial question: who are the partners of your research?

I continue to be a member of CENSE- Center for Environmental and Sustainability Research, of the School of Sciences and Technology of the NOVA University of Lisbon, as I work on my Ph.D. research. I count on the close support of colleagues in the Energy and Climate group, and colleagues with expertise in energy-environment-economic systems modeling to assess low carbon pathways, circular economy, sustainable energy transitions, and smart cities.
My supervisor is an expert on energy poverty studies, with numerous publications in peer-reviewed high-impact factor journals, and a person with whom I have collaborated since my master's thesis. I also count on the support of two co-supervisors, from the University of Alto Minho and the Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC), with extensive expertise in buildings and climate data analysis, two key drivers of energy poverty, and that can potentially unlock the access to relevant datasets stemming from projects they are involved in.
Furthermore, my Ph.D. work is connected to the "Energy Poverty Advisory Hub", a European project focusing on providing support to local governments in their energy poverty mitigation strategies and initiatives. I was responsible for the collection of knowledge and guidelines on energy poverty metrics at the local scale for supporting municipalities in their actions, a task that was part of my research plan.
My Ph.D. is also linked to the national project "Ponto de Transição", which consists in the installation of a one-stop shop in Setúbal municipality for providing advice on energy efficiency, information on public support programs, and energy audits to vulnerable households. In this project, interviews and surveys are conducted with participants, whose data will be used in the Ph.D. Furthermore, I was a member of ENGAGER 2017-2021 COST Action, an initiative that continues to promote and support researchers' collaboration for the mitigation of household energy poverty after its formal conclusion.

Self-evaluation: 100%

Time

21/21. Authorial question: what is your availability of time and resources for your research?

Currently, I have full availability to work on the Ph.D. research, as I was granted a Foundation for Science and Technology scholarship for a period of 3 years. I work at CENSE facilities in the School of Sciences and Technology of NOVA University of Lisbon, having access to the necessary equipment and resources to conduct my research. I believe I have the management skills to conduct all the planned tasks and develop my project on schedule.

Self-evaluation: 100%