

Cold homes during the winter period and excess heat in homes during the summer in Portugal

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Context

Portugal is among the warmest countries in Europe with high temperatures in the summer - the fifth highest number cooling degree-days, 267, in the European Union in 2020, considering a base temperature of 24°C. In the heating season, the country has the third lowest heating degree-days - 1008 in the same year, calculated with a base temperature of 15°C (Eurostat, 2020a). Being located in the Iberian Peninsula in southwestern Europe, identified as one of the most likely climate change impacted regions (EEA, 2017), heating and cooling energy needs are bound to change, with potential impacts on energy consumption and increased uncertainty in energy services demand projections. In fact, cooling degree-days are bound to increase in 2050, whereas heating degree-days are predicted to decrease (Meteonorm, 2020). Moreover, there is a projected increase in the frequency and intensity of heat waves in the south of Europe (Sanchez-Guevara et al. 2019). In Portugal, energy consumption per capita and space heating consumption for buildings are, on the whole, much lower than in other European countries (Eurostat, 2020b).

According to the EU Survey on Income and Living Conditions (SILC), in 2019, Portugal had the fourth highest rate of inability to maintain dwellings adequately

Source: EP-pedia Website

warm during the winter (18.9%) of all 28 European member-states (Eurostat, 2020c). It had the second highest percentage of population living in dwellings with a leaking roof, damp walls, floors or foundation, or rot in window frames of floor in the EU (24.4%) (Eurostat, 2020d). Furthermore, 4.3% of the population claims to have arrears on utility bills (Eurostat, 2020e). As for the summer, in 2012, approximately 35.7% of the population was living in a dwelling not comfortably cool, the second highest percentage in all European states (Eurostat, 2018). Data concerning this indicator is no longer being collected at the European level. The estimated energy-poor population in Portugal ranges between approximately 2.0 and 3.7 million inhabitants (Eurostat, 2020c; Eurostat, 2020f), which is between 20% and 36% of the Portuguese population.

PCS/Quercus (2017) conducted an eight question-online survey on thermal comfort, for which they obtained 795 complete valid responses. The results point to the difficulty in maintaining an adequate temperature in Portuguese homes, particularly in the heating season. Of all respondents, about 74% consider their housing cold during the winter, 24% of the people consider their houses hot during the summer, and only 1% report that their housing is at a temperature that provides in both seasons. Regarding heating, the results of this study are substantially different to the ones of EU SILC, possibility due to differences in the question that was posed to the interviewees. While in this study, the participants were questioned if their home was cold, in the EU SILC the question was in reference to a situation of inability to maintain a comfortable temperature, which pertains to a more severe situation. Of the respondents that consider their home cold, 89% feel that they need to increase their energy consumption in order to maintain adequate room temperature during the winter. About 20% said they used only clothing as a way of seeking winter thermal comfort (PCS/ Quercus, 2017). In the summer, of the respondents that claim their home is hot, 63% report the need to increase consumption. All these indicators point out to a pressing thermal discomfort issue in the Portuguese population, especially in the winter but also in summer season.

The policy debate on winter warmth and summer coolth

There is no official survey conducted by Portuguese national authorities on the number of people living in homes that are too cold in the winter or excessively warm in the summer. Nevertheless, these problems are known and acknowledged by the parliament and the government, with important mentions in policy instruments and strategies such as the National Energy and Climate Plan

(Portuguese Republic, 2019a), the Carbon Neutrality Roadmap for 2050 (Portuguese Republic, 2019b), and the Long-Term Plan for the Renovation of Buildings (Portuguese Republic, 2021). The government has is currently preparing an official national strategy against energy poverty, as required in the National Energy and Climate Plan.

Research perspective on winter warmth and summer coolth

In an OPENEXP study (OPENEXP, 2019), Portugal registered the fourth lowest score in domestic energy poverty alleviation progress, estimated through the geometric mean of three measures: the share of energy expenditures out of total expenditures, the share of the first income quintile citizens unable to keep their homes warm in winter and/or cool in summer, and the share of the first income quintile citizens living in dwellings with leaking roofs, damp walls and rot in window frames of floor. Healy (2003) reported high levels of excess mortality in the winter in Portugal, due to precarious housing conditions. Liddell *et al.* (2015) stated that Portugal presents the second highest excess winter deaths index in the EU, after Malta. Gouveia *et al.* (2019) identified whole north region and centre inland as the most likely to have cold homes in the winter and the inland north and centre regions as the most likely to have homes with excess heat in the summer. Horta *et al.* (2019) conducted interviews in the most vulnerable civil parishes, with findings that corroborate the conclusion that many households are in thermal discomfort in both seasons, despite the generally mild climate of Portugal.

References

- ADENE. (2019). Pobreza Energética em Debate [Energy Poverty in Debate]. Agência para a Energia [Portuguese Energy Agency]. Available at: <https://www.adene.pt/pobreza-energetica-em-debate/>
- ASHOKA and Schneider Foundation (2018). Social Innovation to Tackle Fuel Poverty. Available at: <http://tacklefuelpoverty.com/community/>
- BPIE, (2017). Is Europe ready for the smart buildings' revolution? Buildings Performance Institute Europe. Available at: www.bpie.eu
- CML. (2020). Energy Poverty. Municipal Housing Chart. Municipality of Lisbon.
- DGEG. (2020). Synthetic National Energy Balance 2019. Statistics and Prices. General Directorate of Energy and Geology. Portugal.

Source: EP-pedia Website

EEA. (2017). Climate Change impacts and vulnerability in Europe 2016 – An indicator-based report. No 1/2017. European Environmental Agency.

Eurostat. (2020a). Cooling and heating degree days by country - annual data. Database. Available at:

https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_chdd_a&lang=en

Eurostat. (2020b). Disaggregated final energy consumption in households – quantities. Database. Available at:

https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_d_hhq&lang=en

Eurostat. (2020c). Inability to keep home adequately warm - EU-SILC survey. Database. Available at:

https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_mdcs01&lang=en

Eurostat. (2020d). Share of total population living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames of floor - EU-SILC survey. Database. Available at:

<https://ec.europa.eu/eurostat/databrowser/product/view/tessi292?lang=en>

Eurostat. (2020e). Arrears on utility bills - EU-SILC survey. Database. Available at:

https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_mdcs07&lang=en

Eurostat. (2020f). Share of population living in a dwelling not comfortably cool during summertime by income quintile and degree of urbanization. Database. Available at:

https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_hcmp03&lang=en

FEE (2018). AVISO 25 - Eficiência Energética nos Edifícios. Plano Nacional de Ação para a Eficiência Energética. (in Portuguese)

Gouveia J.P. (2017) Residential Sector Energy Consumption at the Spotlight: From Data to Knowledge. PhD thesis on Climate Change and Sustainable Development Policies – Sustainable Energy Systems. Faculty of Sciences and Technology, Nova University of Lisbon.

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>

Healy, J.D. (2003). Excess winter mortality in Europe: a cross country analysis identifying key risk factors. J Epidemiol Community Health 57, 784–789. DOI: [10.1136/jech.57.10.784](https://doi.org/10.1136/jech.57.10.784)

Source: EP-pedia Website

Horta, A., Gouveia, J.P., Schmidt, L., Sousa, J., Palma, P., Simões, S. (2019). Energy poverty in Portugal: Combining vulnerability mapping with household interviews. *Energy and Buildings*. Volume 203, 109423
<https://doi.org/10.1016/j.enbuild.2019.109423>

Liddell, C., Morris, C., Thomson, H., & Guiney, C. (2015). Excess winter deaths in 30 European countries 1980 – 2013: a critical review of methods, 38(4), 806–814. <https://doi.org/10.1093/pubmed/fdv184>

Meteonorm. (2020). Hourly Outside Temperature. Available at:
<https://meteonorm.com/download>

NEEAP (2020). Enquadramento [Framework]. National Energy Efficiency Action Plan [Plano Nacional de Acção para a Eficiência Energética]. Available at:
<http://www.pnaee.pt/pnaee#resultadospnaee>

Observatório da Energia (2019). Estudo sobre a aplicação da tarifa social de energia em Portugal. https://www.observatoriodaenergia.pt/wp-content/uploads/2019/04/estudo_tarifa_social.pdf (in Portuguese)

OPENEXP. (2019). European Energy Poverty Index: Assessing Member States' Progress in Alleviating the Domestic and Transport Energy Poverty Nexus. European Climate Foundation. Available at: <https://www.openexp.eu/european-energy-poverty-index-eeepi>

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>

PCS/Quercus (2017). Inquérito realizado, em Portugal Continental, sobre o conforto térmico em casa – 1ª Análise dos resultados do inquérito. Quercus e Portal da Construção Sustentável. Available at:
http://www.csustentavel.com/wp-content/uploads/2017/12/an%C3%A1liseresultadosinqu%C3%A9rito_esta%C3%A7%C3%A3ofria.pdf (in Portuguese).

PORDATA, (2020). Europe – Environment, Energy and Territory. PORDATA. Available at: www.pordata.pt

Portuguese Republic. (2019a). National Energy and Climate Plan 2021-2020. Portugal

Portuguese Republic. (2019b). National Roadmap for Carbon Neutrality 2050 (RNC 2050). Environmental Fund/Portuguese Environmental Agency. Portugal

Source: EP-pedia Website

Portuguese Republic. (2021). Long-term Strategy for the Renovation of Buildings. Portugal. Resolution of the Council of Ministries nº8-A/2021. 3rd February 2021.

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>