



Original research article



# Perceptions of competing agendas in carbon neutrality policies in Portugal: Adverse impacts on vulnerable population groups

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## ABSTRACT

The links between the political agendas of climate change, the energy transition, and energy poverty are multiple, complex, and overlapping. In line with European Union policy demands, Member States are implementing the various policies necessary to address these agendas, with an emergent focus on their synergistic potential. Successful implementation requires cooperation between multiple actors, yet little research exists on how diverse actors view the agendas. This limits the ability to account for diverse perspectives in carbon neutrality policy and related insights on trade-offs and competition points between the climate change, energy transition, and energy poverty agendas. We analyse perspectives on agenda interactions based on 39 expert interviews on Portuguese carbon neutrality agendas. Our case study results suggest strong agreement regarding theoretical linkages of the agendas but mixed views on whether this transpires in practice. These perceived inconsistencies reveal several unresolved competing agendas in Portuguese carbon neutrality policies. We also reveal important influences on citizen agency in the decarbonisation agendas. We argue these insights are valuable for current policy approaches, which promote decarbonisation policies that incorporate energy poverty and rely strongly on citizen participation.

## 1. Introduction

### 1.1. Carbon neutrality and competing agendas

When implementing energy transitions at the supra-national scale through time-bound targets for carbon- and climate-neutrality, international political institutions such as the European Union (EU) have emphasised addressing issues of equity and justice in conjunction with climate change mitigation goals. A core injustice identified is the multidimensional issue of energy poverty, defined as an inadequate level of access to energy services [1]. Energy poverty has been limited to the social policy domain in some national contexts [2]; however, in the context of the modern-day climate and energy crises, we argue that the political scope of energy poverty extends beyond the social policy domain. Indeed, multifaceted and complex interlinkages bridge these three agendas, which we refer to collectively under the umbrella of a carbon neutrality agenda in this article.

By “carbon neutrality agenda”, we refer specifically to the global drive towards net zero greenhouse gas emissions by 2050 as per the 2015 Paris Agreement and the inherent energy transition required to facilitate the shift from finite fossil fuels. The energy transition itself intersects energy poverty at the level of domestic energy consumption. It is at this intersection of the climate change, energy transition and energy poverty policies that we base our study.

Notably, while European political bodies generally focus strongly on the synergies between energy and climate policies for energy poverty alleviation [3], European Commission initiatives such as the Just Transition Mechanism focus on providing support to those regions most affected by the transition away from fossil fuels, demonstrating increasing concern regarding the trade-offs between various policy initiatives [4]. Similarly, scholars have shown that what is beneficial for one policy agenda may come at the cost of realising goals associated with another agenda for example lower income households presenting reduced energy savings post retrofit [5], or climate change induced

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temperature extremes worsening energy poverty [6] and point out the need for careful evaluation of these policies to monitor progress and impacts in different domains. Additionally, movements such as the Right to Energy Coalition combine the interests of NGOs, health organisations, energy co-operatives and other groups to promote a Right to Energy for all Europeans [7]. Thus, various organisational types have indicated a preoccupation with these policy trade-offs. What is less clear is how convergent the views of the various organisations are.

Simultaneously, there is widespread consensus that successful implementation of the energy transition relies upon the interaction and cooperation of numerous actors with varying interests [8]. Transition processes also inherently imply disruption for traditional energy sector players. Based on the premise that carbon neutrality policies provide insightful examples of these competing agendas in practice, we undertake a thematic analysis of 39 expert interviews in our selected case of Portugal to assess perceptions of areas of competition and synergy in carbon neutrality policies. Our assumption is well-founded in the sense that Portugal has made rapid progress in implementing its energy transition, where installed power for electricity production increased by 3.5 GW during 2020–2021, mainly through electricity production from renewable resources [9]. Simultaneously, Portugal presents a significant vulnerability to energy poverty across different population groups [10], with 75 % of energy performance certified buildings not meeting thermal comfort requirements [11]. Therefore, this case study offers an opportunity to investigate synergies, trade-offs, and uncertainties between the agendas of climate change, the energy transition and energy poverty, to understand how they compete with or complement each other, and to pave the way for convergence.

## 2. Case study: Carbon neutrality policies in Portugal

Situated on the western extreme of the Iberian Peninsula, Portugal falls into the “energy periphery” [12], with a high prevalence of low incomes, poor building quality, low ownership rates of climatization equipment such as air conditioners and central heating, and high energy costs. Portugal's geographic position renders it especially vulnerable to the effects of climate change and increasing temperature extremes, meaning that both summer and winter energy poverty are significant problems [10,13]. Portugal's policy response to the agendas of climate change (CC) the energy transition (ET) and energy poverty (EP), is poised at an interesting juncture. Energy poverty is addressed in key climate policy documents, including the Carbon Neutrality Roadmap [14] and the National Energy and Climate Action Plan (NECP) [15]. Moreover, the Portuguese NECP is due for renewal. Additionally, energy poverty is well addressed in Portugal's Long-Term Strategy for the Renovation of Buildings [16]. However, a dedicated national energy poverty policy was published in early January following two public consultation periods in May 2021 and March 2023. At the time the interviews were undertaken this document was in draft format and thus comments on this document refer to the draft rather than the official version.

Notwithstanding the considerable climatic and economic challenges, the country has faced in recent years, Portugal has emerged as a front-runner in the implementation of the energy transition. It boasts impressive rates of renewable energy integration both in terms of the shares in gross electricity consumption and gross final energy consumption [17]. Given the stark contrast between the vulnerabilities (struggles with both winter and summer energy poverty, low incomes and generally poor building quality) mentioned above and strong progress with the implementation of the energy transition, Portugal presents an ideal scenario in which to study the interaction of climate change, energy transition, and energy poverty agendas, i.e., the policy coherence challenge of a holistic carbon neutrality agenda.

Previous authors have applied policy mix analysis to assess progress against multiple policy objectives [18], providing valuable insights into policy impacts before and after implementation, for example, Rosenow

et al. (2016) [18] find that energy efficiency obligations overlap with public finance mechanisms for energy efficiency, suggesting that applying these measures in tandem may not be the optimal approach. Kyprianou et al. [19] evaluate the effectiveness of energy poverty policies by reviewing the history and evolution of these policies at multiple scales. Stojilovska et al. [20] explore the impact of policy debates linked to energy poverty, such as welfare and housing efficiency policies. To deepen our understanding of how related policy areas interact, we map out how different groups perceive these synergies and trade-offs. Given the similarity of Portugal with other southern European zones, we argue that our findings have broader implications beyond the case study. Furthermore, as stipulated by Kleanthis et al. [21], understanding diverse actors' perspectives fosters cooperation, ultimately contributing to maximised policy benefits.

Thus, we aim to build on the knowledge of experts involved in the agendas by eliciting and analysing key insights on synergies and trade-offs between these agendas to inform future policy development and implementation for convergence.

The paper is structured as follows: Section 3 presents our methodology, Section 4 consists of the results and discussion, and Section 5 comprises the conclusions and policy implications.

## 3. Methodology

The following sections outline the research methodology and the specific methods used, this includes a description of interview protocols, reflections on the validity of the data and a description of the data treatment and analysis. The key thematic areas explored in the interviews are also introduced, along with an overview of the research areas these thematic areas contribute to. Finally, the interview method schematic (Fig. 3) presents the interview method, explaining how the interview subthemes were derived. The thematic areas chosen allow a cross-comparison of the three agendas explored and thus are insightful for deeper understandings of areas of policy synergy and or conflict between them.

### 3.1. Interview protocols

Interview candidates were identified through the process shown in Fig. 1 to generate a list of stakeholders affecting/affected by the energy poverty agenda in the Portuguese energy transition. In Fig. 1 the direction of the arrows indicates the sequence of steps followed to identify interviewees. This process combined a review of groups allocated with responsibility for the climate change, energy transition and energy poverty agendas in key policy documents (e.g., PT draft EP strategy and building renovation strategy) with expertise from the research team guiding a stakeholder analysis elaborated in [22], a precursor step to the research presented in this paper. This analysis generated a list of stakeholders affecting/affected by the energy poverty agenda in the Portuguese energy transition.

This stakeholder analysis was used to gain insights into the respective roles, responsibilities and influences of these groups and, along with the results of the previous steps, research team contacts and the snowball effect [23] led to identifying agents with expertise in the climate change, energy transition and energy poverty agendas for interviews, as per Fig. 1.

### 3.2. Notes on data validity

While acknowledging potential pitfalls of the ‘experience of the researcher’ approach as per Galvin [24], we find this approach appropriate in our case (as stipulated above) to contribute to the selection of interview candidates. We emphasize that our sample size ( $n = 39$ ) is not definitive of the “correct” number of interviews to conduct with regard to our research subject.

Numerical values expressed in the following sections should not be

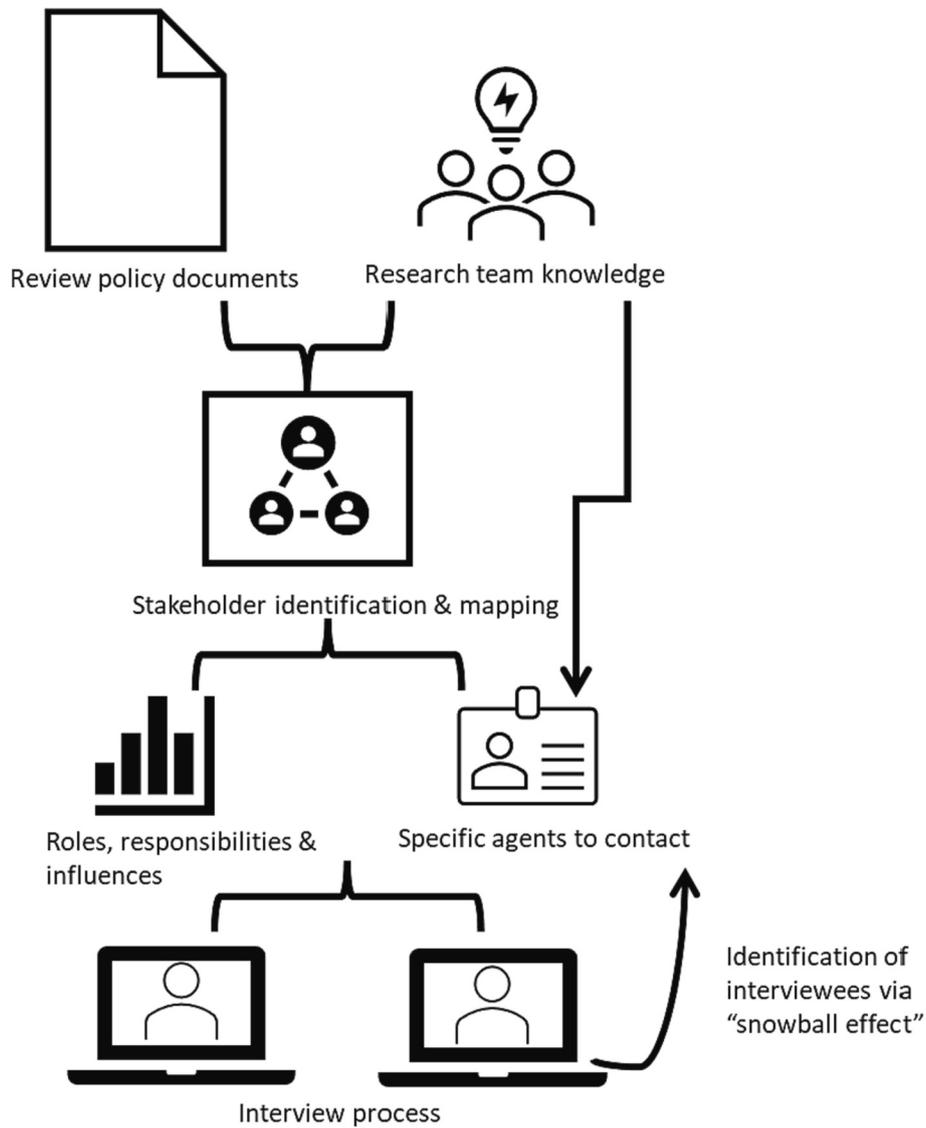


Fig. 1. Identification of actors for the interview process.

interpreted as generalisable across the organisational sectors in our interview sample in Portugal or any other context; instead, our results intend to provide insights into which types of issues are considered significant by which types of actors within our study sample. Further comments on the utility of our findings are provided in Section 4.

### 3.3. Data treatment and analysis

Following the interview guide provided in Annex A, 39 interviews were conducted, applying an exploratory semi-structured qualitative interview approach, where a pre-set list of questions was designed by the research team (Annex A), but which also left room to explore individual areas of expertise of the interviewees. This flexible approach is recommended when the topic of investigation remains relatively uncharted [23] and intentionally allows for serendipitous insights into competition points between the agendas [25].

Thirty-eight interviews were held via Zoom, with one respondent sending written answers. Fig. 2 shows the interviewee profile, comprising a range of organisational types. While a more even spread across interviewees per participant type would have been ideal, overall, this interviewee profile represents a broad spread of interests across the climate change, energy transition and energy poverty agendas in Portugal. We do not specify key interests more granularly to ensure

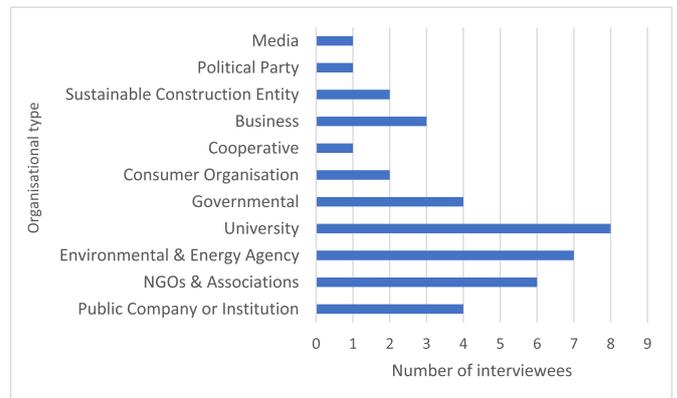


Fig. 2. Interviewee profile (number and organisation).

anonymised treatment. On a related note, while some interviewees did not want the views expressed to be considered representative of the organisation for which they worked, these views have been categorised as representative of perspectives of their respective organisational

sectors, with the rationale that the interviewees' professional experience shaped perspectives expressed during interviews. That said, every effort has been made to retain the anonymity of the interviewees, and we abide by specific requests for the non-inclusion of interview content.

The interviews were held in English or Portuguese, recorded and subsequently transcribed with the participant's consent. The transcriptions were realised by the interviewer, which has the advantage of the researcher becoming thoroughly familiar with the data [26,27]. Interviews lasted between 40 and 60 min, representing approximately 900 min (15 h) of total interview time. From this extensive material, we draw on policy-related sections of the interviews to focus the empirical analysis for this paper.

The NVivo<sup>1</sup> software tool was used to code and analyse the interview responses, using a deductive approach where responses were coded under corresponding thematic headings, as per Table 1. The questions in the policy section of the interviews focused on the perceived interactions of the agendas. Our focus on perceptions is based on a constructivist approach, with the argument that perceptions have a bearing on reality [28]. Following a thorough review of this content and to contribute to research gaps relevant to the case, we opted to investigate the four thematic areas presented in Table 1 which explains the relevance of these areas to the Portuguese case or more broadly where applicable. The thematic areas were based on the interview questions (outlined in Annex A). It is important to note that areas 3 and 4 are merged in the Results and Discussion Section. The research gaps and supporting resources highlighted in the table guided our deductive approach.

Fig. 3 presents the interview analysis method, where relevant responses were categorised under each thematic heading. These themes then underwent several phases of analysis for the eventual development of subthemes. It should be noted that a single interviewee may be categorised as having more than one viewpoint (or as having identified more than one subtheme), having given a range of views in response to the same question. While what constitutes a thematic analysis is debatable [23], we apply an adapted version of the framework approach [28] to thematic analysis. Here, themes are based on the questions posed to interviewees, and a coding framework is built using functionalities in NVivo. We thus analysed key trends in the subthemes derived for each

**Table 1**  
Thematic areas explored in interviews with corresponding contributions and references.

Thematic area	Research contribution	Supporting references
1. Perceptions of the CC, ET and EP agendas in Portugal	Links imposed at EU & PT policy level, insights needed into benefits & trade-offs at the practical level	[6,18,22]
2. Perceptions of policies central to the CC, ET and EP agendas in Portugal	Policies are early attempts to mitigate EP under umbrella of carbon neutrality, important juncture for evaluation of effectiveness	[20]
3. Views on public awareness of and capacity to participate in the CC and ET agendas	Citizen participation key tenet of carbon neutrality agenda, contributes to knowledge on the challenge of reduced participatory culture in Southern Europe	[29,30]
4. Views on public awareness of EP and ability to mitigate	EP recent concept in PT, evidence suggests resignation to condition, more evidence needed on who is affected & how	[13]

interview question. Considering which subthemes were identified by which organisational types yielded insights into how actors from different sectors viewed the various topics broached. We interpreted these results to derive conclusions about the perceived synergies and competing agendas in climate change, energy transition and energy poverty policies and their practical implications.

## 4. Results and discussion

The following section presents our analysis and discussion, focusing on how interviewees perceived the interactions of the climate change, energy transition and energy poverty agendas.

Sections 4.1-4.3 explore responses under the thematic headings set out in Subsection 3.3 and outlined in Annex A. In each subsection, we comment on policy synergies and competing policy agendas in the context of the subthemes identified, where the quotes presented represent responses to questions presented in Annex A (where sections 4.1 and 4.3 present responses to questions asked in 1,2, and 3 in Part 2 of the Annex and 4.2 presents the responses to questions set out in part 4 of the Annex). In the later subsections, we reflect on issues of participation in decarbonisation agendas through what we label factors of awareness and capacity, and compounding effects. We include relevant quotes to validate our arguments throughout.

Sections 4.1.1, 4.2 and 4.3 feature charts linking the number of interviewees by organisation type to subthemes, where we found it valuable to explore what is considered important by whom within our interviewee profile. As explained previously, not all interview participants answered the same questions, and the number of interviewees by organisation type varies; hence, these values represent the number of interviewees who identified each subtheme, which does not constitute the same set of interviewees across all subthemes.

Furthermore, our findings do not attempt to fully represent the range of themes and perceptions encompassed within the Portuguese climate change, energy transition and energy poverty agendas. Results that present the comparative frequency with which a subtheme is identified should be considered as only strictly relevant within our interviewee profile. We do, however, draw on relevant findings from broader literature to support our results and discussion. Critically, our primary purpose in presenting comparative empirical weightings between subthemes is to compare organisational views rather than attributing significance to comparative values. Finally, described trends by organisational type can, once again, only be attributed to the representatives of these various organisational types within our interviewee profile, not across Portugal as a whole.

### 4.1. Perceptions of the climate change, energy transition and energy poverty agendas in Portugal

Interviewees were asked if they perceived the agendas of climate change, the energy transition and energy poverty as linked or separated. The purpose of these questions was to explore to what extent our interviewees perceived the agendas as synergistic, and to contribute to broader assessments of the policy approaches in Europe and Portugal (where energy poverty is incorporated into wider decarbonisation policy). We categorised responses to this question according to whether an interviewee identified the agendas as linked, separated, or expressed mixed views. These results are presented in Fig. 4, which outlines the spread of views by organisational type and the number of interviewees who mentioned the relevant subtheme.

#### 4.1.1. "Separated" views

Overall, Fig. 4 shows that overall, a minority of interviewees identified the agendas as spilt. The remaining organisational types either perceived the agendas to be linked or presented mixed views. Notably, only interviewees from the Political Party and Consumer Organisations wholly viewed the agendas as linked.

<sup>1</sup> <https://lumivero.com/products/nvivo/>

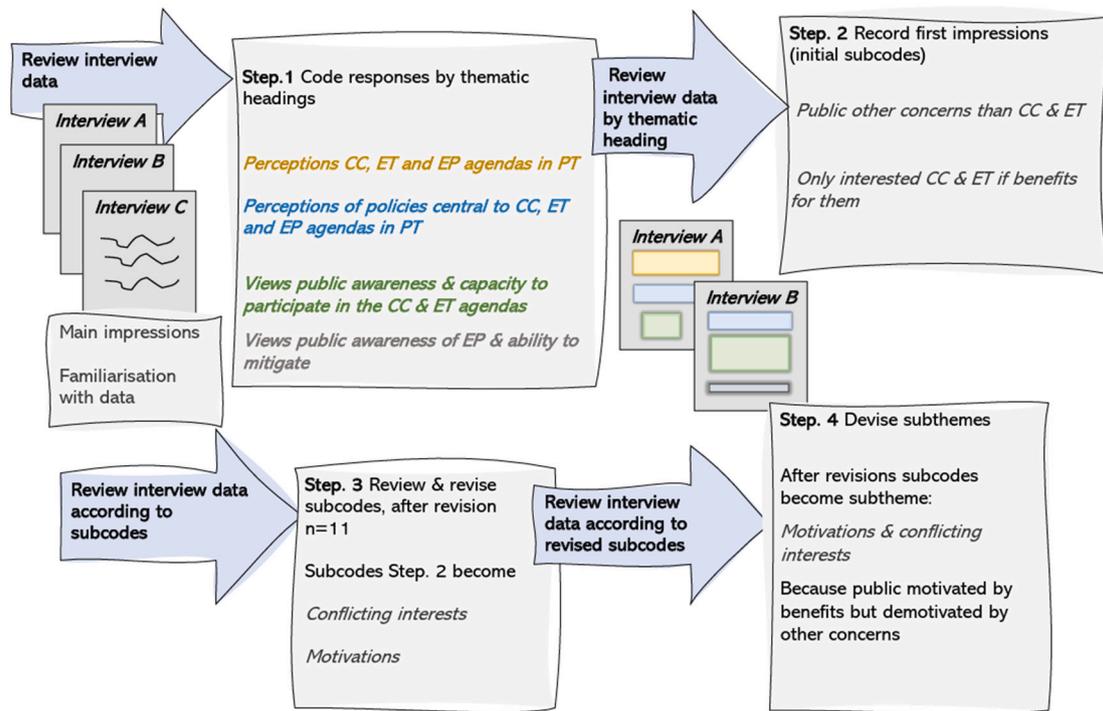


Fig. 3. Interview method schematic.

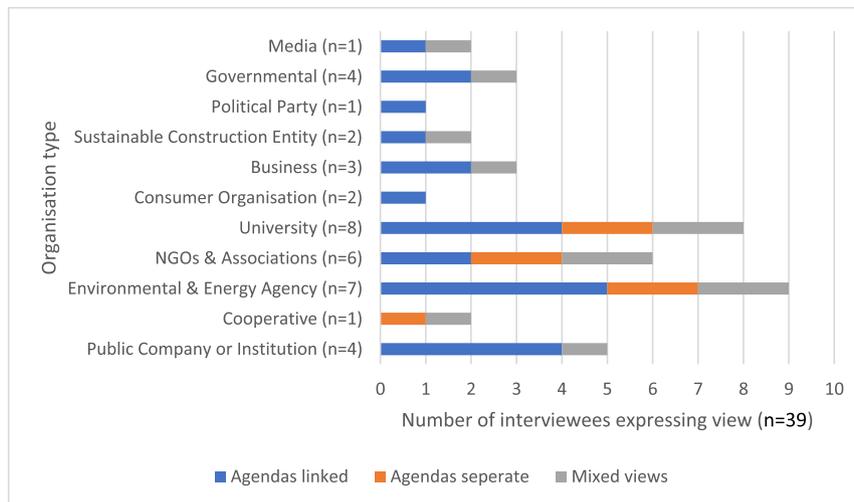


Fig. 4. Views on whether CC, ET, and EP agendas are linked or separate (n = 39).

#### 4.1.2. Linked views

In cases expressing linked views, several interviewees highlighted that energy poverty should be integrated into the climate change and energy transition agendas for a just transition. They associated the lack of a holistic view with the potentially negative consequences of viewing the agendas separately- “Looking at them as if they were different things, this can bring unexpected consequences which could even be prejudicial for other sectors” (interviewee PT027).

In linked cases, participants often connected building quality issues with the challenges of meeting the energy needs of the energy poor while reducing energy consumption. Viewing the agendas as linked or presenting a mixed view commonly coincided with references to energy transition and energy poverty solutions, such as renewable energy, electrification, sustainable transport and the social electricity tariff currently in place to mitigate energy poverty in Portugal. Interestingly,

interviewees viewed emergent (in the Portuguese context) energy transition tools with mitigatory capacity for energy poverty (such as energy communities) as more efficient than the existing social electricity tariff. Here, a competing agenda arises, where Portuguese policy documents emphasize the potential of “prosumer” energy models [15]. Yet, the current political approach in Portugal (as well as Italy and Spain) generally favours the development of renewables by large utility companies, with a potentially limited space for alternative actors [29]. A reduced ability of community energy projects to engage with vulnerable energy consumers has been observed in other contexts [31]. Below the typical demographic of energy transition and energy co-operative participants in Portugal, according to interviewee PT002 from an energy co-operative is outlined:

“But let’s be frank...this transition, the members of the parties involved in the transition are normally middle-class citizens, upper middle class...

*Incidentally, the members of co-operatives, also the managers, are normally middle-class citizens, upper middle class, white and over 40."*

These assertions are important considerations for the Portuguese context and questions of who is included or excluded from energy transition activities, which are often considered to have co-benefits for energy poverty.

#### 4.1.3. Mixed views

Mixed views related to the broader political framings of the agendas, both in the Portuguese and EU contexts, where energy poverty was perceived to be a sub-agenda subsumed under the broader energy transition agenda. Recognising the gap between the theoretical linking of the agendas at the political level and the actual degree to which this occurred at the practical level was common among interviewees who expressed mixed views and identified the agendas as separated. As interviewee PT031 stated: *"It's like this at this moment; you notice some preoccupation with already having the programmes which tackle energy poverty. Meanwhile, to me, it seems that things are still disconnected; they are still two worlds, two different worlds, two different worries, despite the connection being obvious. But it doesn't seem there is a guide to incorporate energy poverty, taking into account the energy transition."*

This reference to the current disconnection at the policy level *"despite the connection being obvious"* is symbolic of a trend wherein interviewees rarely advocated for the agendas to be viewed separately. Instead, interviewees generally believed that the agendas should be linked while highlighting failings in the current policies to facilitate this integration.

#### 4.1.4. Synergies and competing agendas

Consensus on the value of agenda linkage is encouraging from the perspective of creating policy synergies. However, conflicting views on electrification unearth a competing agenda where efforts to decarbonise the energy supply may deepen existing levels of energy poverty through potential price increases. Navarro-Espinosa and Thomas-Galán [32] report price increases following the replacement of firewood with electricity to supply heating in Chile. Several interviewees expressed concerns about the costs of electrification being passed on to the consumer in the Portuguese context, where 25 % of households use fuelwood [33], electricity prices were the eighth highest within Europe in 2019, including taxes and levies (COM 2020 951 final) [34], and where 22.4 % of the population was at risk of poverty or social exclusion in 2021 [35].

Notably, the organisations that explicitly identified separation in the agendas were primarily those with a high level of consumer contact or those with analytical roles in policy evaluation rather than those designing policy. Finally, while not explicitly mentioned in response to this question, an interviewee from a Sustainable Construction Entity noted that using unsustainable construction materials in the supply chain is common, mainly due to being the less costly alternative.

#### 4.2. Perceptions of policies central to the climate change, energy transition and energy poverty agendas in Portugal

Following our assessment of how the agendas were perceived at the policy implementation level, we now present our interviewees' perceptions of specific Portuguese policies. The interviewees were asked if they were familiar with key policies and related funding schemes intersecting the Portuguese climate change, energy transition and energy poverty agendas. These consist of national climate policies, the Roadmap for Carbon Neutrality, RCN 2050 [14] and the National Energy and Climate Action Plan (NECP 2030) [15]. These also include the Long-Term Strategy for the Renovation of Buildings (LTRS) [16] and the draft Energy Poverty Strategy [36]. Strategies differ from policies in that policies consist of a set of shared rules and regulations to guide decision-making. In contrast, strategies are plans dedicated to attaining measurable objectives, hence more targeted in this sense.

The Portuguese RRP (Recovery and Resilience Plan) is the national COVID recovery plan following the attribution of funding from the EU. The More Sustainable Buildings II and the Efficiency Voucher are dedicated energy efficiency funding schemes to improve Portuguese dwellings under the umbrella of the RRP [37]. Fig. 5 shows the degree of familiarity with the respective policies expressed by the interviewees.

Overall, the interviewees showed a comprehensive knowledge of the various policies, with the majority being familiar with all policies. More Sustainable Buildings II was the only policy with which all interviewees expressed a thorough knowledge. This policy was a national energy efficiency improvement scheme with a high adhesion level, particularly when compared with its "sister" programme, the Efficiency Voucher, which targeted energy efficiency measures at energy-poor consumers. The More Sustainable Buildings II scheme ran between June 2021 and May 2022. Due to high interest, the scheme's duration was increased past the original deadline of December 2021, and an extra several million euros were directed into the programme for a total of almost 123 M€. In November 2021, the programme reported 46,000 applications [38]; by the end, the programme registered 70,511 successful applications from 106,131 applications [39].

In contrast, the Efficiency Voucher was launched in September 2021, and the first phase aimed to deliver 20,000 vouchers. The first deadline for vouchers application submission was the 31st of December 2021, or until all vouchers were spent [38]. In June 2023, with the submissions closed, only 11,300 vouchers were given.

#### 4.2.1. Policy successes and failures-feedback for the path ahead

Many interviewees commented on the divergent levels of success between the two programmes and criticised the design of the Efficiency Voucher programme. Specifically, they identified that the values attributed through the programme were insufficient (€1300 + VAT), perhaps facilitating the purchase of climatization equipment or minor efficiency improvements but not sufficient to implement passive measures such as wall and roof insulation, which were generally viewed as the most impactful. On occasion, the Efficiency Voucher elicited strong views from participants, being described on separate occasions as a "flop" and as an "insult" to vulnerable consumers. These views reflected a frustration that the programme did not go far enough to help those most in need. The programme's eligibility criteria, which combined requirements for applicants to be homeowners and in receipt of the social tariff [36], were also criticised, with the argument that those in energy poverty rarely united these requisites.

These comments fed into broader views that the policies were not generally accessible to vulnerable members of society and continued to exclude them from the energy transition. This applied to insufficient mobilization of funds to renovate the building stock in the LTRS and RRP policies (following quote). These observations are substantiated by the findings of Palma et al. [40], who posit that €71,700 million is needed to rehabilitate the building stock versus the approximate €240 million that is allocated in the RRP for this purpose [37].

*"The Long-Term Strategy for the Rehabilitation of Buildings. They also present some costs, numbers of how much remains, how much it would cost to rehabilitate the buildings, and what's there compared to the funding available in the RRP to do it. The RRP is a drop of water of what is necessary, isn't it?"* Interview PT013.

Comments regarding the failure of the More Sustainable Buildings policy to reach those in energy poverty were often made by participants from NGOs and Environmental and Energy Agencies. They were countered by views from the Governmental sector, which emphasised that they were attempting to improve on the learnings from previous policies under the pressures of tight resource constraints. One interviewee from the Governmental sector also identified a high level of "elasticity" in the political response to less successful policy elements, allowing for a high degree of flexibility in redesigning policies. *"The Government has been very, very elastic and has permitted us to adapt the notices to reach, to reach the people; therefore, we are always in constant evolution."* - Interview

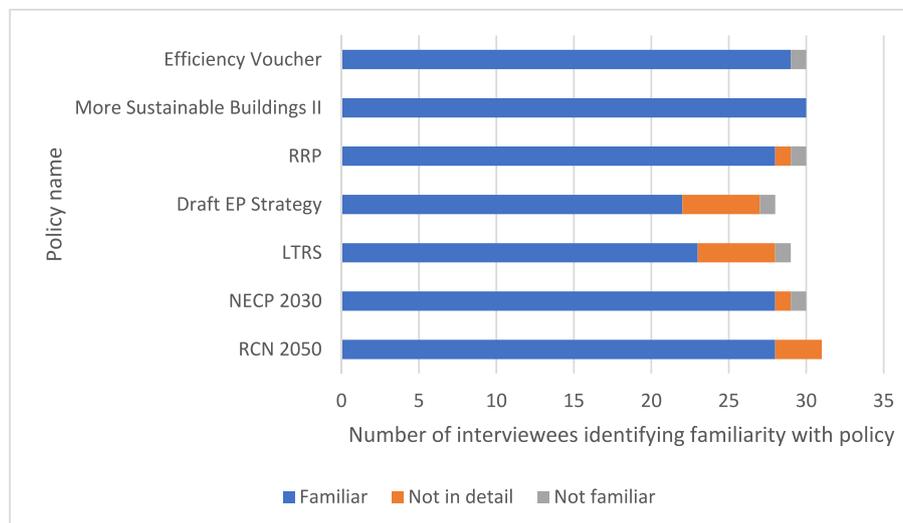


Fig. 5. Awareness of policies central to the CC, ET and EP agendas ( $n = 39$ ).

#### PT029.

Despite criticism of the policies, many interviewees outside the Governmental sector did recognise a strong commitment (as demonstrated by the cited increases in renewable energy installations in the Introduction) to climate change and energy transition agendas in Portuguese policy. They noted that energy poverty was increasingly becoming an important political focus. The importance of the 2050 carbon neutrality roadmap and the NECP2030 as guiding documents was also recognised, as was the important influence of the EU on the evolution of Portuguese policy. This influence was generally viewed as positive in holding the Member States accountable. However, one interviewee from the NGO sector identified that responding to a continuously changing paradigm did not allow sufficient time for policy maturation. Stressing that under the current policy scenario, Portugal was required to install more renewable power in eight years than they had in the past twenty. This comment highlights the pressures imposed by the speed at which energy transitions need to occur to meet climate change targets. This speedy implementation has implications for the contemporary institutional bodies responsible for putting these goals into practice.

These observations are further evidenced by the fact that the measure with the highest number of applications in the More Sustainable Buildings II programme was solar photovoltaic, followed by heat pumps [39]. Each measure implies a high upfront investment and associated electricity production costs, thus implying limited access to such measures for those in energy poverty. This shows a parallel between the Portuguese case and the work of Sheriff et al., [6] primarily in the UK, which refers to tight deadlines imposed by the urgency of climate change resulting in inequitable access to energy poverty mitigation measures.

#### 4.3. Factors influencing public awareness and participation in the climate change, energy transition and energy poverty agendas

Two separate but complementary sections of the interviews focused on the public's awareness of climate change, energy transition and energy poverty agendas. These sections explore whether the interviewees perceived differences in public awareness of energy poverty and the broader agendas of climate change and the energy transition. This area was explored during the interviews under thematic areas 3 & 4 (Section 3, Annex A part 2, questions 2 & 3). We consider these investigations valuable as Portugal has only recently begun to engage politically with energy poverty. Furthermore, insights on public knowledge of climate change and energy transition agendas are more generally informative

for contemporary decarbonization strategies.

In the case of the climate change and energy transition agendas, due to strong EU impetus on citizens as active transition agents, we focused on public capacity for general participation in climate change and energy transitions. In the case of energy poverty, we referred to participation in the sense of capacity to mitigate the condition. With limited data on the Portuguese public's experience of energy poverty a cross-comparison of the subthemes (presented in Figs. 6 & 7) identified is informative regarding the policy links between energy poverty and broader decarbonisation goals. In one of the existing surveys relatively high levels (40 %) of thermal discomfort are reported in the winter in Porto and Lisbon [41], which represent a high proportion of Portugal's purchasing power [42].

Comparison of the figures reveals important similarities and differences between the subthemes linked to the agendas; in both cases, the subthemes of literacy, information & education and elitism and inequality are identified. On the other hand, several subthemes are uniquely associated with either the climate change and energy transition agendas or energy poverty, such as stigma and poverty in the case of energy poverty and extreme events in the case of climate change and energy transition agendas. These divergences between subthemes partially reflect the respective scopes of the agendas in question. We argue this difference also ties into the perceived divergence in awareness levels between the climate change and energy transition agendas compared with energy poverty. This is shown in the comparison of the following quotes, showing that according to our interviewees awareness of climate change was higher than of energy poverty:

*"It's like this, I think currently it's a problem, it's a theme that doesn't escape anyone. It seems that everyone is aware"*, interviewee PT030 about climate change.

This is compared with the low level of awareness of energy poverty as per:

*"I think that it's a concept which is very unknown, practically unknown"* (Interview PT019).

In the case of climate change and the corresponding energy transition, high levels of awareness were attributed to intensified media coverage of extreme climate change induced events in recent years. Views regarding public awareness of energy poverty presented an interesting nuance, where some noted that while the general public may be familiar with the symptoms of energy poverty, such as being unable to maintain comfortable temperatures in the home, general issues related to building quality and high energy costs, they may not necessarily use the term "energy poverty" to describe these phenomena, in part due to stigma attached to the term as per Interviewee PT008:

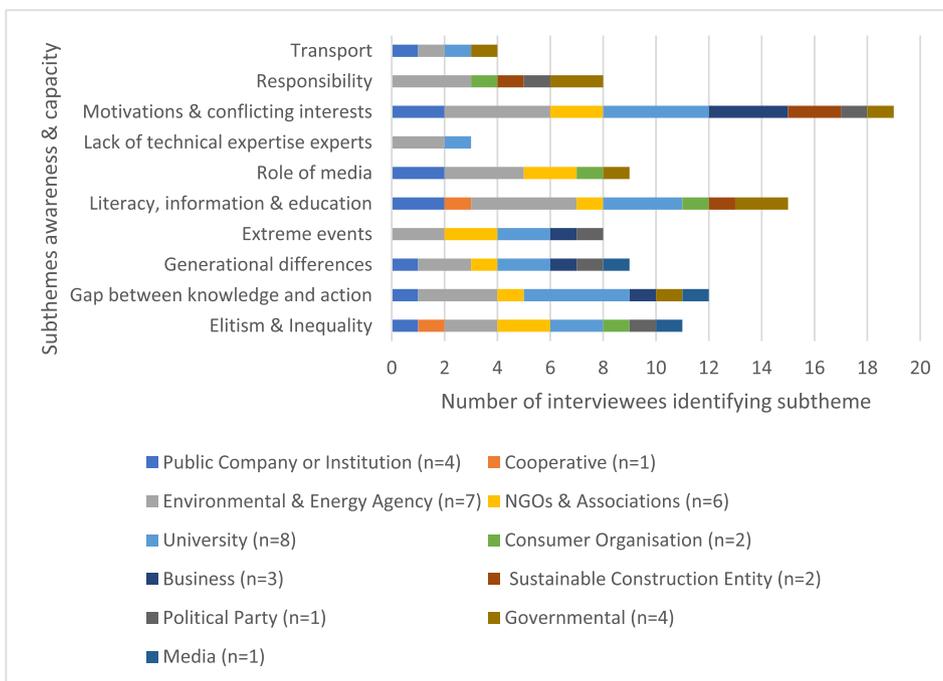


Fig. 6. Subthemes awareness of & capacity to participate in CC & ET agendas (n = 39).

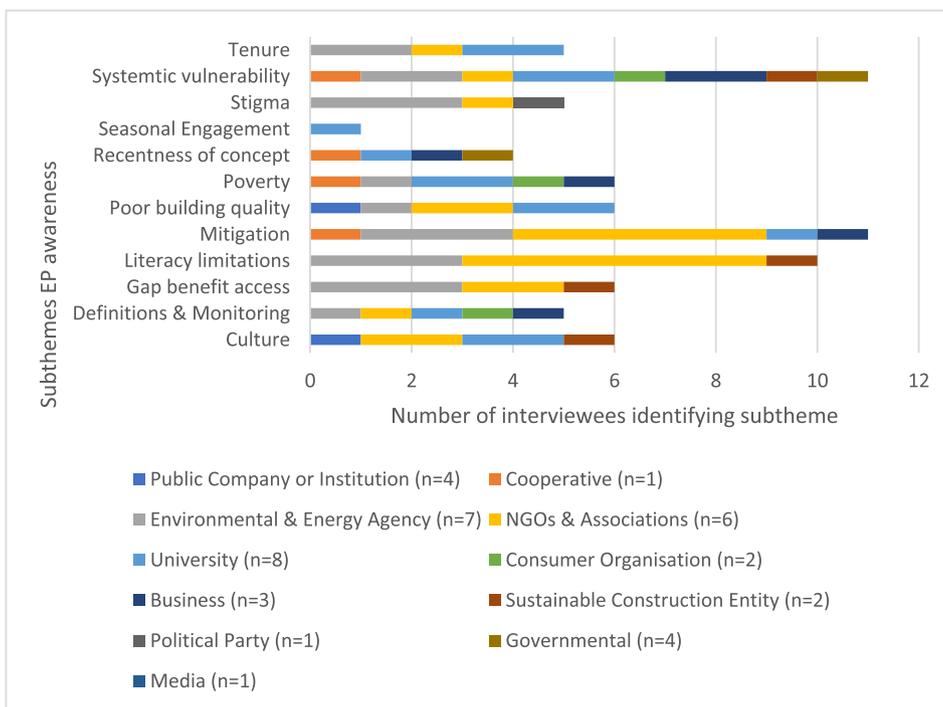


Fig. 7. Subthemes public awareness of EP (n=39).

“I think it's a matter, because the people still don't like to assume the concept itself maybe, it makes it that people don't like, they don't like to admit that they are in energy poverty.”

In Fig. 7 we observe that Energy Agencies, NGOs & Associations and a Political Party perceive this stigma, it was not, however, referred to by representatives from the Governmental sector. Pellicer-Sifres et al. [43] highlight that energy poverty stigma can lead to citizens concealing hardship from outsiders; combining this knowledge with the assertions of our interviewee, we argue that denial of the condition makes citizens

less likely to seek help. A reflection on the language used in targeted schemes would potentially increase adhesion to energy poverty policies.

The subtheme of lack of technical expertise was only identified by two organisational types (Environmental & Energy Agency & University representatives), referring specifically to a deficit of expertise among technicians in the energy transition supply chain (Fig. 6). While this subtheme was not directly mentioned regarding energy poverty, it has implications for the speed at which energy efficiency works can be realised, where a dearth of qualified agents represents risks to energy

transition success and thus indirectly to the mitigation of energy poverty and climate change. Therefore, an important next step for Portuguese policy, as for Southern European counterparts, is to increase the level of qualified expertise in the country, particularly as training activities can imply an undesirable time lag.

Energy poverty was considered a relatively recent concept, even at the political level. Uncertainties regarding definitions, measures and corresponding strategies impacted the public's awareness of the topic and their ability to improve their situation (as reflected in the corresponding subthemes in Fig. 7). The lack of agreement around definitions and monitoring was considered problematic at the national level and EU levels. There has been much well-intentioned discussion on how best to define and measure energy poverty [44]; here, we reveal that prolonged debate can impede progress, which is a worthy reflection for policymakers.

Due to the poor quality of the building stock, a systemic level of energy poverty almost independent of income level was described, with several of the interviewees drawing on first-hand experience to describe coping strategies, as per interviewee PT004:

*"...I live in the centre of Lisbon, and my apartment is from the '70s. It's so cold that I had to buy a dehumidifier because inside my house, the walls sweat".*

This idea of a systemic vulnerability outside the constraints of income is substantiated in interview PT005 by a representative of a consumer organisation.

*"...What we have defended is that energy poverty is not the poverty of those who are economically most vulnerable, it's all those who, in their homes, independent of their income can't, don't have the capacity to maintain the respective thermal comfort and this is, this difficulty has direct implications for the consumer in question. Be it at the social level, be it at the economic level, be it at the health level."*

Systematic vulnerability links closely with a concerning level of cultural acceptance of energy poverty outlined in the quote below, highlighted in Fig. 7, which identifies culture as a subtheme and substantiated in the work of Horta et al. [13].

*"Many times, it's a question of choice and it's difficult to explain that to the person in question... The person prefers to put on a jumper, prefers to suffer than to maintain the house at 21 degrees.... It's a big fringe of society... these are people with good incomes that are like this" interviewee PT012.*

Thus, improving building quality reduces the incapacity to achieve thermal comfort, correspondingly our findings support the strong drive for building stock renovation in Portuguese policy [36]. Indeed, as some interviewees commented, younger generations have higher thermal comfort expectations, this cultural shift is also found by Castro and Gouveia [45] and may help promote policy success.

Several interviewees pointed out that the result of this systemic vulnerability manifested in adverse health effects. The reduced recognition of the severity of these impacts was a serious concern, as the below excerpt from Interview PT0026 shows:

*"We are a country with really good weather, but we are among the countries where more people die from cold... Now, this theme people don't discuss much".*

Importantly, under-recognition of the link between poor quality buildings and health implies a lower likelihood for citizens to undertake costly investments in energy efficiency, especially considering the economically constrained context of Portugal. Here an interesting contrast between the lack of engagement with the issue of Excess Winter Deaths in Portugal (as described in the above quote) and EU survey data arises. Where data from an EU survey showed that when asked whether climate change and environmental issues should be tackled as a matter of public health, 94 % of Portuguese respondents agreed [46]. Building on our previous arguments, we suggest the reason for this discrepancy is a missing link in public perceptions between improving domestic energy efficiency and public health. Building quality issues were also viewed as problematic in the context of property tenure, concerning both private

rentals and social housing. In the case of private rentals, interviewees raised the question of whether landlords or tenants should be responsible for energy efficiency investments.

Finally, a comparison of the two figures shows that overall, the subthemes linked with energy poverty tended to pertain less to the personal agency of citizens. For example, in the case of the climate change and energy transition agendas, subthemes of responsibility and motivations and conflicting interests suggest a degree of personal choice on the part of the citizens. We provide further reflections on this point in the following sections.

#### 4.3.1. Factors of awareness and capacity

A deeper analysis of these subthemes and the interviewees' responses revealed three broad categories worthy of further investigation: Factors of awareness, factors of capacity and compounding effects. Awareness factors were those subthemes that affected the public's perceptions of the climate change, energy transition and energy poverty agendas, such as the role of the media. Capacity factors were defined as those subthemes which affected the public's ability to participate in the agendas, such as poverty. Applying this new lens revealed that the interviewees had identified several compounding effects in reference to participation in the agendas, which were typically amplified by the respective awareness and capacity factors, (shown in Fig. 8). These compounding effects are not definitively either positive or negative, instead, the direction of their influence is context-specific. For example, the visibility of impacts when applied to climate change could equally imply reduced visibility of impacts due to lower literacy levels or increased visibility due to the increased frequency of extreme weather events. In both cases, however, the visibility of impacts is compounded by the relevant awareness factors in this case, literacy information and education and extreme events.

Importantly, similar subthemes, such as literacy limitations and literacy, information and education have been merged, as the latter seemed more appropriate to generically describe capacity to participate in the agendas. Others, such as mitigation or the gap in benefit access are more generally implied in this analysis, i.e., our exploration focuses on how the factors of awareness, capacity, and the corresponding compounding effects influence citizen's ability to access benefits or mitigate energy poverty, these subthemes aren't included in Fig. 8 for this reason. Finally, our analysis indicates inter and intra-relations between the factors of awareness and capacity, often through the compounding effects. While the degree of inter-relation of awareness and capacity factors and the compounding effects differs, for example, transport does not obviously relate with extreme events, we find several inter-relations which have implications for citizen agency in the agendas of climate change, the energy transition and energy poverty in Portugal and explore these in the following sections through the combined results of Figs. 6, 7 and 8.

#### 4.3.2. Awareness factors

The increasing frequency of extreme events was seen as a clear contributor to increased agenda awareness, particularly weather catastrophes and energy price shocks due to the war in Ukraine. This intersected with the capacity factors of motivations and responsibility, as these events tend to have highly visible impacts and deepen the sense that something should be done. On the other hand, as identified previously, the recentness of the energy poverty concept and the lack of a common definition had the compounding effect of reduced awareness of the concept at both the Government and citizen levels, with corresponding impacts on the development of the supply chain.

The subtheme of literacy, education and information was seen as very influential on citizen awareness of the decarbonisation agendas. Various aspects of literacy were discussed, including general literacy, energy literacy, and digital literacy. Our interviewees generally referred to ideas of basic-energy-related knowledge, understanding the environmental impacts of energy production and consumption and

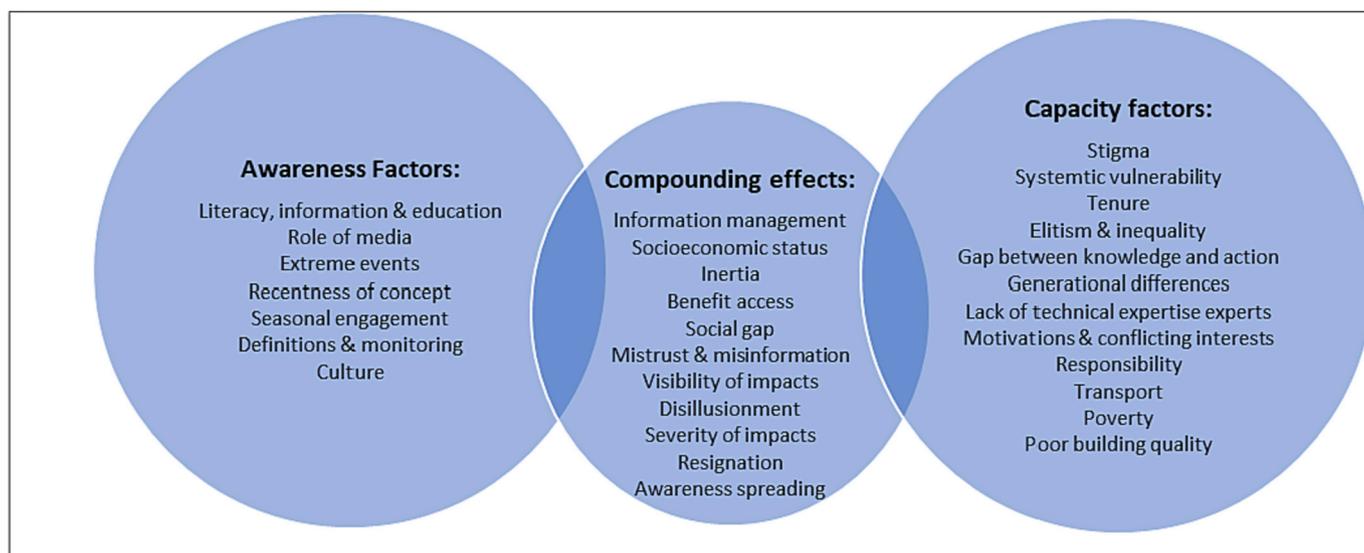


Fig. 8. Factors of awareness, capacity and compound effects in the CC, ET and EP agendas.

behavioural changes, as per DeWaters and Powers [47]. Understanding cost benefit and return on investment were also considered forms of energy literacy, as in Brounen et al. [48]. References to digital literacy pertained to skills in the online accessing and management of information, as per, Ali et al. [49]

Higher levels of these different literacy types (generally attained through higher levels of education) were perceived to enhance information management abilities (representing a positive compounding effect in this case). This, in turn, improved the capacity to participate in the agendas and, indeed, to access energy transition benefits and mitigatory measures for energy poverty (such as funding for energy efficiency measures). Digital literacy limitations were linked with generational differences, computer access, and a reduced ability to fill in funding applications based on online forums (as required by the More Sustainable Buildings II and Efficiency Voucher programmes discussed earlier). A key perceived contributor to generational differences in literacy was the pre-democracy era in Portugal, when illiteracy levels were high, at 25.7 % in 1970 [50]. These results correspond with the work of Marra and Colantonio [51], which finds that education is an important facilitator of increased public consumption of renewable energy. According to our interviewees, discrepancies in literacy skills linked to the theme of elitism and inequality (discussed in the following sections) through the creation of an increasing social gap, indicative of a negative compounding effect where lower literacy led to increased inequity.

We also observe intra-relationships between the awareness factors. For example, literacy, education, and information overlapped with the role of the media in that literacy competencies influenced the ability of the public to access and digest media material. Specifically, the role of the media was linked to ideas of scepticism and mistrust, with social media identified as a spreader of misinformation. This revealed that the role of the media was perceived to be powerful and as having both positive and negative effects on the agendas. Government officials particularly emphasised the challenge of misinformation and its impacts on policy adhesion, describing social media as ‘noise’, which is difficult to combat. Media is thus perceived to influence motivations and conflicting interests through the compounding effects of mistrust and disillusionment, which partly explains the commonly expressed view that a generally high level of awareness of climate change and the energy transition does not translate into participation. This is bolstered by the knowledge versus action gap that interviewee PT001 pertains to below:

“I think that the “knowing”, between knowledge and understanding, a person being aware of the situation to their attitude and behaviour,

sometimes a lot of time passes, and it takes a while. Therefore, it’s difficult for a person to change like that suddenly, some habits in the, in the day to day, I think. Still, there is that laziness or that natural tendency not to change, to see what happens, wait a while and see if things get better.”

The quote shows that in this interviewee’s perception, there is a level of inertia which is optional. In the description of “laziness” and the “tendency not to change”, the interviewee suggests that engagement is a matter of choice, rather than being dictated by individual circumstances (e.g., literacy level, socioeconomic status). In this sense the identified knowledge vs action subtheme highlights an important insight for understandings of citizen agency, where those who are informed and able will not automatically become active participants. This assertion contrasts with the generally positive view of citizen of citizen agency promoted in European and Portuguese policies [3,14,15].

This notion of optional participation occurred in energy poverty more at the cultural level (as described previously) and ties into the cultural norms highlighted by Horta et al. [13] where citizens who had sufficient income still suffered thermal discomfort, however, this was perceived as unconscious choice rather than as “laziness”. A relevant contributor to this occurrence may be that individual behaviour changes do not have immediate visible impacts on climate change mitigation. Similarly, an interviewee noted that investment in literacy activities does not have directly measurable impacts, which makes them less attractive to policymakers.

Despite these challenges, Portuguese policies place a strong emphasis on the potential of increasing energy literacy [14,15,36]; however, we observe that a combination of awareness and capacity factors, such as the role of the media and the knowledge vs action gap can lead to compounding effects such as inertia and disillusionment. Thus, we argue that the benefits of educational activities have limitations. Valenzuela-Flores et al., [52] found such limitations, revealing that families with higher educational levels in Chile did not necessarily reduce electricity consumption after participating in an energy literacy programme. In our case, generational gaps in literacy and the negative impacts of social media were perceived as current policy barriers, where social media can exert complex influences over context-specific climate change perceptions [53]. Portugal and Europe remain in the early stages of understanding these effects.

Ultimately, these reflections reveal different layers to the concept of citizen agency, where precise definitions of conscious choice, unconscious actions and inability to act warrant further investigation.

#### 4.3.3. Capacity factors

We found similar discrepancies in the interviewee's perceptions of the level of personal agency in the subthemes of responsibility, elitism and inequality, and general challenges around accountability. A key influence on capacity to participate was seen as housing tenure, as per Interviewee PT020 when discussing public capacity to mitigate energy poverty:

“And then I think there is another layer of energy poverty, maybe the middle class, lower middle, which are the people that live, that live (in houses that) aren't their own and therefore they can't intervene to renovate.”

Here, comparing our results with the work of de La Paz et al. [54] shows considerable similarities with Spain regarding systemic vulnerability, building quality and tenure. Like Portugal, Spain exhibits high private home ownership rates yet presents a high level of energy poverty within this homeowner group. Furthermore, within the 12 % of properties that constitute the rental housing sector, 3.2 %–3.4 % of households are in energy poverty. A parallel in vulnerability is also evident between Portugal and Italy, where Castro and Gouveia [45] found equal levels of energy restriction behaviours among student renters in Lisbon and Padua.

Questions of who should and should not be required to adapt their behaviour due to the energy transition were raised at both the organisational and the citizen level. They linked the subthemes of responsibility, elitism, and inequality. Indeed, at the organisational level, a Government interviewee noted that responsibility for mitigating climate change is not solely a Government concern, implying the necessity of citizen action. Research at the European level shows that in Portugal, 47 % of survey participants viewed national governments in the EU as responsible for addressing climate change, compared with 28 % who saw this as a personal responsibility [46]. Questions of responsibility link to energy poverty and the need to reduce domestic energy consumption; in this vein, Interviewee PT011 reflected that:

“The answer is simple; the answer is that global objectives are a common challenge. But this doesn't mean that we all have to give the same contribution and some people, you can't demand this contribution from them. They should, they should, including, this just means an extra effort on the part of the other people who have benefitted quite a lot. Those who have emitted...”

Here, we draw a broader connection to theories of energy justice and inequities linked to the energy transition [55] and links with the identified subthemes of responsibility, elitism, and inequality. In the Portuguese case, as with many other nations, the combined pressures of climate change and energy price increases incentivise a drive for energy independence. This unintentionally contributes to a fragmented nationalised vision of energy systems, which tends to undervalue trans-local adverse impacts [56]. In Portugal, the drive to decarbonise is generally viewed from a national policy perspective, with less accounting for regional nuances of policy effects [22]. This national policy approach does not account for just the allocation of energy transition benefits and burdens. With protests against mining exploration occurring in rural areas of the country [57] and the rapid deployment of large-scale solar plants in economically disadvantaged zones [58], this centrist approach poses risks to the acceptance of energy transition in Portugal.

Finally, linking to discussions of citizen agency in the previous section, the subtheme of motivations and conflicting interests added a further dimension to the question of citizen agency. Specifically, interviewees noted that due to the demands of daily life, some simply did not have additional resources (time or economic to give to climate change). This overlapped with the subtheme of elitism and inequality and the perception that involvement in decarbonisation agendas was a luxury, rather than a choice (as below when discussing knowledge and participation in climate change and energy transition agendas):

“It's an elite, continues to be an elite, uh, uh, in the end speaking about the matter (climate change), discussing it and worrying about it.” Interview PT011.

Here we find that citizen capacity to participate in both climate change, energy transition (which we view jointly here) and energy poverty policies is compounded by socioeconomic status and unclear understandings of responsibility. Critically, drawing on the outputs of the previous sections, which uncover various nuances to citizen agency including factors which can detract from citizens motivations (such as contradictory media information) we argue that those who don't perceive themselves as responsible will be less incentivized to participate.

## 5. Conclusions and policy implications

We employ an exploratory qualitative interview approach to evaluate the political agendas of climate change, energy transition and energy poverty in the Portuguese national context. Our interviews with experts with diverse experiences in these various agendas reveal several areas of agreement, including a perceived gap between the theoretical ideal of linking these agendas and the reality on the ground, a shared perception that the current policy approach remained inaccessible to the most vulnerable groups in society and the perception of a general level of energy poverty in Portugal, sometimes independent of income level (due to poor building quality and cultural habits). This suggests that a broader fringe population group is affected by energy poverty in Portugal than those captured by income-based measures alone. In identifying these policy gaps, we achieved our aim of gaining a better understanding of how the policy agendas of climate change, the energy transition and energy poverty intersect. We also deepened insights into the perceptions of different groups and the relevant implications for policy synergies.

The results of agenda disconnection at the policy level led to several “competing agendas” centring on uneven access to energy transition benefits, including alternative energy models and adhesion challenges for the energy poor concerning energy efficiency programmes. Other important competition points were the use of sustainable building materials in the supply chain, essentially putting human needs above those of nature and a lack of visible return on investment both at the political and the domestic level. This referred to investment in literacy-boosting policies in the political case and to climate mitigation activities at the household level.

Identifying these competition points contributed to our development of the “influences on awareness” and “influences on capacity”, which we argue is an innovative contribution of this paper, providing a deeper reflection on the nuances of citizen agency. Citizen agency was viewed very differently by our interviewees, despite a firm reliance on this concept in both the Portuguese and the EU contexts. Critically, our results present a high level of subjectivity regarding the level of choice citizens had when it came to participation in decarbonisation agendas.

Based on a combination of the identified competing agendas and our awareness and capacity factors, we make the following recommendations for the development of the Portuguese decarbonisation policy:

1. Increase the values offered towards renovation works in targeted energy poverty schemes to achieve meaningful interventions
2. Definitions of energy poverty should reflect the broader fringe affected by poor building quality, not just those in economic poverty
3. To overcome the mentioned cultural and behavioural challenges, improving energy literacy is important but has limitations. To enhance the benefits of literacy programmes, focus on the multi-faceted positive benefits of participation to citizens, such as the betterment of personal health through improved building quality, emissions, and financial savings
4. Conduct citizen surveys and interviews to understand who can participate in carbon neutrality agendas and how. Themes of socioeconomic status, educational status, as well as digital and general literacy and how these interlink are of particular importance here

To conclude, we suggest that an essential next step in the Portuguese case would be to gain insights into these issues at the citizen level, as our results offer a first glimpse into the topics covered through the eyes of our interviewees. On this note, we emphasize that our findings refer strictly to the interviewees included in our analysis, and wider comparisons should be supported by evidence from the case in question. That said, we assert that a deeper reflection of the competing aspects of the agendas explored in this paper is essential, as is a more nuanced understanding of what enables citizens to participate in carbon neutrality agendas. We consider further work in this area urgent in the creation of just and inclusive policies that can unleash synergies as European countries work to achieve laudable ambitions in the mid-2020s and beyond.

### CRedit authorship contribution statement

**Katherine Mahoney:** Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Rita Lopes:** Writing – review & editing, Visualization, Validation, Methodology, Conceptualization. **Siddharth Sareen:** Writing – review & editing, Validation, Methodology. **João Pedro Gouveia:** Writing – review & editing, Validation, Supervision, Methodology, Conceptualization.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Data availability

The data that has been used is confidential.

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### Appendix A. Annex A

Interview Guide CC, ET & EP agendas in Portugal.

Part.1-Introductions and exploration of interviewee's experience with research topic.

Part.2- Views on climate change, energy transition and energy poverty agendas:

1. Do you see these agendas as linked or separate? Please explain.
2. What is your view on public knowledge of and capacity to participate in the CC and ET agendas?
3. What is your view on public awareness of energy poverty and ability to mitigate this condition?

Part.3- Free flowing interview section to pursue unique areas of expertise e.g.,

Sustainability of the construction & rehabilitation sector.  
Social vulnerabilities e.g., poverty, housing tenure.  
Business interests.

Part.4- Policy section discussing familiarity with and perceptions of

key CC, ET and EP agendas (e.g., are you familiar with the RCN 2050?)  
Policies:  
Carbon Neutrality Roadmap (RCN 2050).  
National Energy and Climate Action Plan (NECP 2030).  
The Long-Term Strategy for the Renovation of Buildings (LTRS).  
Draft EP Strategy.  
National COVID Recovery Package (RRP) and associated energy efficiency funding schemes:  
o More Sustainable Buildings II  
o Efficiency Voucher

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