Energy Research & Social Science 121 (2025) 103966

Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

Original research article

From vulnerability to resilience: Empowering stakeholder-driven just transitions in island tourism economies

Ivelina Mirkova *, Noemi Padrón-Fumero

Department of Applied Economics and Quantitative Methods, Universidad de La Laguna (Tenerife), Spain

ARTICLE INFO

Keywords:
Just transition
Q methodology
Stakeholder perception
Island economy

ABSTRACT

Achieving a just transition is essential for addressing the climate emergency, particularly in tourism-dependent island economies that face unique vulnerabilities such as environmental pressures, small-scale electricity networks, and heavy reliance on tourism. This study investigates how political dynamics, economic dependencies, and equity concerns influence stakeholder perceptions in tourism-dependent island economies, offering guidance for governance frameworks aimed at sustainable and inclusive outcomes. Framed within the concept of "just transition," it addresses the multi-sectoral challenges of energy transitions, climate resilience, and sustainability, integrating environmental, social, and economic justice across key sectors like transportation, water management, and tourism. To explore this, we use a mixed-methods approach, engaging 36 stakeholders from various sectors to explore essential elements for a fair transition, including access to information, stakeholder engagement, transparency, and governance. Our findings using Q methodology reveal a range of views influenced by political contexts, from skepticism about policy effectiveness to debates on energy management strategies. The analysis suggests that framing transition issues in a way that prioritizes collaborative problem-solving over ideological divides can reduce polarization, enhance focus on shared goals, and improve perceptions of fairness and inclusiveness making discussions more pragmatic and solution-oriented. To effectively address the social and environmental challenges faced by island regions, policymakers must develop inclusive frameworks that integrate transparent policy evaluation, stakeholder collaboration, and adaptive governance.

1. Introduction

Addressing the global climate emergency requires transformative shifts toward cleaner and more resilient economies and societies [1]. Such adaptations are essential not only for maintaining environmental integrity but also for ensuring social equity and cultural preservation [2].

In this context, just transitions have emerged as a framework to integrate environmental sustainability with social and economic justice. While substantial research has focused on industrialized nations reliant on fossil fuels, there is a notable gap in understanding how these transitions unfold in island economies, which face unique vulnerabilities due to their reliance on tourism, exposure to climate risks, and systemic dependencies on external resources. This paper seeks to address this gap by investigating the Canary Islands, a tourism-dependent territory pursuing ambitious carbon neutrality goals by 2040 [3].

Island economies like the Canary Islands are at the forefront of the climate emergency, disproportionately affected by its impacts despite contributing minimally to global emissions. Their small-scale energy systems, reliance on imported energy [4], and tourism-dependent economies exacerbate their vulnerability, creating complex governance and socio-economic challenges. The Canary Islands provide a critical case study to explore the intricacies of just transitions in such contexts. Unlike many industrialized countries studied in the literature, the Canary Islands lack a significant domestic fossil fuel industry but face other systemic barriers, including governance lock-ins, resource dependencies, and the dual role of tourism as both an economic driver and a source of environmental and social pressure.

The research challenge lies in understanding how the specific dynamics of tourism-dependent island territories shape stakeholder perspectives on just transitions. While much of the just transition literature has focused on industrialized economies with established fossil fuel industries [5], existing frameworks often fail to address the nuanced socio-economic, governance, and environmental challenges unique to island contexts. For instance, island economies must balance global sustainability imperatives with local realities, such as their dependence on

* Corresponding author.
E-mail addresses: imirkova@ull.edu.es (I. Mirkova), npadron@ull.edu.es (N. Padrón-Fumero).

https://doi.org/10.1016/j.erss.2025.103966
Received 9 July 2024; Received in revised form 10 December 2024; Accepted 31 January 2025
Available online 8 February 2025

tourism-driven economic models, fragmented governance structures, and heightened vulnerability to climate change. These dynamics raise pivotal questions:

- How do governance inefficiencies, resource dependencies, and socio-economic disparities influence stakeholder perceptions of sustainability in tourism-specialized island economies?
- What strategies can participatory governance frameworks employ to navigate these challenges and foster equitable, resilient transitions in such regions?

By addressing these questions, this study contributes to filling a critical gap in the literature. The Canary Islands are not merely a case of incremental policy adaptation but represent a microcosm of global tensions in the transition to sustainability. The study illustrates how theoretical justice frameworks can be contextualized and adapted to multi-sectoral challenges in unique socio-economic settings, providing insights that may inform broader applications to other island economies and tourism-dependent regions.

This research employs a multi-sectoral lens, extending the scope of just transitions beyond the energy sector to explore the integration of energy systems with tourism, water management, and governance structures. Using Q-methodology [6] and follow-up interviews with 36 stakeholders across diverse sectors, the study examines the interplay between governance inefficiencies, socio-economic inequities, and resource dependencies that shape stakeholder perceptions and influence pathways toward a just transition.

The findings reveal polarized stakeholder perspectives influenced by competing priorities and institutional constraints, highlighting the importance of participatory, inclusive, and transparent governance in building trust and minimizing tensions. By focusing on the Canary Islands, this study demonstrates how tourism-dependent economies can transform their vulnerabilities into resilience factors through innovative governance strategies, participatory approaches, and integrated policy frameworks. However, achieving such transformations requires aligning global decarbonization goals with the unique socio-economic and governance challenges of island economies, emphasizing the need for flexible, context-specific strategies.

2. Literature review and background

Just transitions aim to transform economies from carbon-intensive systems to ones that are environmentally sustainable, economically resilient, and socially equitable, focusing on minimizing adverse impacts on vulnerable groups [7]. Initially rooted in concerns about job displacement, worker reskilling, and the socio-economic effects of energy sector transitions [8], the concept has expanded to encompass a broader spectrum of justice issues, including environmental, climate, and energy justice [9–11]. Over time, it has intersected with social justice, emphasizing equity, inclusivity, and fairness in societal transformations.

This evolution reflects a growing recognition that transitions are not solely technological or labor market shifts but must address systemic inequities in resource distribution (distributional justice), participation and transparency in decision-making (procedural justice), and acknowledgment of diverse stakeholder needs and identities (recognitional justice), as articulated in McCauley et al. (2013) [12]. To better address contemporary challenges, frameworks have incorporated dimensions like restorative justice, which rectifies historical harms, and cosmopolitan justice, which accounts for global equity considerations [13]. Political ecology has further enriched these frameworks by highlighting systemic injustices in mitigation efforts [5]. In addition, efforts to move beyond energy-specific justice to a multi-sectoral perspective of just transitions have extended energy justice principles to more holistic perspectives [9].

Justice frameworks provide essential lenses for designing and evaluating policies, shaping stakeholder engagement, and addressing socio-political implications, by integrating diverse perspectives and ensuring sustainability initiatives align with both global principles and local realities. In this study, they underpin our analysis of how stakeholder-driven policy recommendations reflect justice principles and address systemic challenges in multi-sectoral transitions.

Translating social justice principles into actionable policies remains a significant challenge. While justice frameworks offer a robust theoretical foundation, their practical implementation often falters in complex, real-world contexts shaped by diverse realities, competing interests, and systemic constraints. Crespy and Munta (2023) [14] highlight this gap in their analysis of the EU's Just Transition Fund and Social Climate Fund, noting that these initiatives often prioritize economic and technical aspects over social considerations. Similarly, Ullman and Kittner (2021) [15] critique current just transition strategies for their lack of specificity, observing how broad slogans fail to address systemic challenges such as energy access, gentrification, and biodiversity loss. These limitations stress the importance of aligning justice frameworks with lived experiences and stakeholder perceptions to ensure transitions are equitable and effective.

Justice frameworks in existing literature often focus on industrialized, fossil-fuel-reliant nations, particularly in Western, Educated, Industrialized, Rich, and Democratic (W.E.I.R.D.) societies, which limits global applicability [5]. This "one size fits all" approach inadequately addresses the socio-economic, political, and environmental complexities of regions like the Global South, where challenges like labor informality, energy inequities, and economic vulnerability prevail. For instance, Indonesia's Energy Transition Mechanism (ETM) highlights how donor-driven initiatives can reinforce power dynamics, sidelining local priorities [16].

Island territories face disproportionate risks and challenges in just transitions, exacerbated by their geographic isolation and systemic dependencies. While contributing minimally to greenhouse gas emissions, islands bear the brunt of climate change impacts, such as rising sea levels and extreme weather events [17,18]. Their reliance on fossil fuels, resource-intensive sectors like tourism, and fragmented governance structures compound these vulnerabilities [19]. The unique socio-cultural dynamics of islands further influence transition pathways, making stakeholder engagement critical for understanding and addressing governance challenges, resource allocation dilemmas, and socio-economic trade-offs [20].

Energy transitions, as a critical component of the broader just transition framework, are conceptualized as socio-technical and socio-economic processes [21], portraying islands as "living labs" for renewable energy innovations such as photovoltaics, energy storage, and electric vehicles [19,22,23]. While their small size and close-knit communities make them ideal for experimenting with cutting-edge technologies and governance models, this framing often neglects the importance of context-specific and community-driven approaches to ensure socially acceptable outcomes in island settings [24,25].

Structural constraints such as energy dependency and governance lock-ins exacerbate challenges [26], as seen in EU islands struggling with energy imports despite renewable energy projects [27]. Stakeholder engagement plays a pivotal role in designing sustainable energy systems and addressing socio-economic trade-offs, governance challenges, and resource allocation dilemmas [28–30].

Stakeholder engagement has been shown to strengthen energy transitions by incorporating diverse perspectives, fostering trust, and aligning policies with local socio-economic conditions [28,31]. In rural island electrification projects, for example, community involvement has proven crucial for enhancing the sustainability of energy systems [29]. However, narrowly focusing on the power sector, without addressing interconnected energy demands such as heating, cooling, water desalination, and transport risks neglecting the broader systemic challenges of island economies [32]. These interconnected challenges are especially pronounced in tourism-intensive regions, where energy-intensive

activities exacerbate infrastructure pressures, resource inequities, and environmental degradation [33,34].

Tourism's dual role as both an economic driver and a sustainability challenge further complicates just transitions. While it fosters renewable energy investments and economic growth, it can also exacerbate inequalities and environmental pressures if governance strategies fail to account for cross-sectoral impacts [35,36]. For instance, tourism's high demand for energy, water, and waste management infrastructure intensifies competition for resources, often prioritizing visitor needs over local community requirements. Adaptive governance approaches are essential to balance these dualities, particularly in addressing seasonality and peak demand pressures while ensuring equity and sustainability [37,38].

Empirical evidence highlights the centrality of stakeholder perceptions in shaping the success of just transitions. Perceptions of fairness—who benefits and who bears the costs—are pivotal in determining trust and participation in governance processes [39]. Studies show that perceived exclusion from decision-making amplifies distrust, particularly in regions with historical socio-economic disparities [40]. Similarly, failing to address localized vulnerabilities reinforces perceptions of systemic inequity and governance failures [41]. Aligning transition strategies with the lived experiences of stakeholders is therefore critical for fostering trust and minimizing resistance.

In this study, we examine how local policy dynamics, economic imbalances, and existing inequalities in tourism-specialized islands influence stakeholders' perceptions of just transitions. The next section delves into the Canary Islands' just transition pathway, highlighting the local policy dynamics shaping their energy system, the imbalances tied to tourism specialization, and the governance challenges intertwined with existing social inequalities.

2.1. Just transition challenges in the Canary Islands

The Canary Islands represent a unique case for studying just transitions in tourism-dependent island economies. Their ambitious climate and energy goals—aiming for carbon neutrality by 2040, a decade ahead of the EU's timeline—highlight both opportunities and challenges. This vision was significantly accelerated by the 2019 declaration of a climate emergency, ratified by Parliament, which provided the impetus for comprehensive actions. The resulting Canary Islands Climate Change and Energy Transition Law (2022) [42] and its accompanying Climate Action Strategy outlined a roadmap integrating energy and climate initiatives across all sectors. These frameworks aim to build resilience, reduce emissions, and promote sustainability.

However, this accelerated transition has faced criticism for overlooking historical planning failures in transforming the energy system, which have eroded trust among stakeholders. Past initiatives have struggled with governance inefficiencies, fragmented planning processes, and limited stakeholder involvement, raising concerns about the inclusivity and transparency of current efforts. Stakeholders have voiced skepticism about whether the ambitious targets align with the region's socio-economic realities, highlighting a critical gap between policy ambitions and practical implementation.

2.1.1. Energy systems and structural lock-ins

The Canary Islands' energy system is emblematic of the systemic challenges faced by island economies transitioning to sustainability. Reliance on imported fossil fuels remains a defining characteristic, with fossil fuels accounting for the majority of electricity generation (see Figs. D.1: and D.2: Appendix D). This dependency exposes the islands to price volatility, supply disruptions, and significant greenhouse gas emissions. Unlike some island regions connected to mainland grids, like the Orkney Islands in Scotland [43] and Samso in Denmark [44], the Canary Islands operate isolated electrical grids, except for the limited interconnection between Fuerteventura and Lanzarote. This lack of integration restricts economies of scale and complicates the management of renewable energy intermittency [19].

Renewable energy penetration remains low, with only 21 % of electricity generated from renewable sources in 2021. Smaller islands like El Hierro have achieved significant milestones, such as the Gorona del Viento hydro-wind project, nearing 100 % renewable energy use [45]. However, larger islands, including Gran Canaria, face persistent barriers, including reliance on diesel and heavy fuel oil, bureaucratic delays, and financial constraints. The Chira-Soria hydroelectric project illustrates these challenges, as it continues to face delays and opposition despite its potential to enhance renewable energy integration [46]. Fossil fuel subsidies and the delayed liberalization of the electricity system have further entrenched these barriers, limiting investments in grid modernization and renewable energy projects [27,47].

2.1.2. Sectoral pressures and systemic vulnerabilities

The interconnected nature of energy, water, and food systems amplifies the challenges of transitioning to sustainability in the Canary Islands. Desalination accounts for 20 % of the islands' electricity demand, while agriculture consumes over 60 % of water resources, primarily for banana exports. Tourism compounds these pressures, with visitors consuming 2.5 times more water and energy than residents [48]. Rising temperatures and extreme weather events associated with climate change exacerbate these vulnerabilities, increasing cooling demands and straining infrastructure resilience [49].

Transport systems further complicate the transition. The Canary Islands depend heavily on air and maritime transport for connectivity, both of which are significant carbon emitters. Within the islands, private vehicle use dominates, with 815 vehicles per 1000 residents, including approximately 100,000 rental cars. Efforts to integrate electric vehicles into rental fleets show promise, but distributional concerns persist, as subsidies often disproportionately benefit higher-income groups [50].

Tourism, a cornerstone of the Canary Islands' economy contributing 35.5 % to GDP and nearly 40 % to employment, presents both opportunities and challenges. Its energy-intensive nature and reliance on year-round arrivals place substantial demands on infrastructure and natural resources [33]. Tourism activities, including air travel and water-intensive accommodations, often prioritize visitor needs over those of local communities, amplifying resource competition and socio-economic inequalities. Moreover, precarious employment conditions, reliance on external operators, and over-tourism exacerbate these pressures, diluting local economic benefits and straining housing and infrastructure systems [51,52].

2.1.3. Governance and justice dimensions

Governance inefficiencies and fragmented institutional frameworks further hinder the Canary Islands' transition efforts. Overlapping responsibilities among regional, island-specific, and municipal authorities contribute to delays in policy implementation and misaligned priorities. Waste management offers a clear example of this fragmentation, as national operators struggle with reverse logistics due to the islands' remoteness, leaving the Canary Islands among Spain's lowest contributors to national recycling rates [53]. Energy system governance has similarly faced challenges, with fossil fuel subsidies and monopolistic grid operations stalling renewable energy progress and frustrating stakeholders [3].

Labor market inequalities add another layer of complexity. Women remain underrepresented in technical and decision-making roles within the energy sector, while tourism employment is characterized by low wages, instability, and limited career advancement opportunities [54,55]. These inequalities reinforce perceptions of exclusion, particularly among underrepresented groups, and hinder the ability of the labor market to support a just transition.

The challenges faced by the Canary Islands are not unique but reflect broader dynamics observed in tourism-dependent island economies worldwide [56,57]. Studies on energy transitions in the Caribbean and Pacific islands highlight similar vulnerabilities, including reliance on

fossil fuel imports, governance inefficiencies, and the disproportionate impacts of climate change [28,58]. Lessons from these regions highlight their potential to serve as a case study for exploring the interplay between systemic dependencies, governance dynamics, and stakeholder priorities in just transitions. By addressing these interconnected challenges, the Canary Islands can offer valuable insights into designing equitable and effective sustainability policies for tourism-dependent island economies.

2.2. Capturing stakeholders' perspectives: empirical approach

This study investigates how systemic challenges, governance inefficiencies, and economic dependencies influence just transitions in tourism-dependent island economies, with a focus on the Canary Islands. By developing a structured Q-set, the research explores stakeholders' concerns and conflicting priorities, connecting these themes to broader discussions in the literature on energy transitions and sustainability.

The Q-set is designed to reflect key hypotheses about the challenges and trade-offs perceived by stakeholders, such as governance transparency, equitable resource allocation, and the balance between economic development and environmental sustainability. Drawing from prior research, the study aligns with findings that stakeholder perceptions are shaped by governance dynamics, socio-economic conditions, and the interdependencies of critical sectors [59,60]. For example, studies emphasize that governance opacity and limited participation often undermine trust in energy policies, leading to resistance and disengagement [61,62]. These insights provide a foundation for examining how local realities intersect with systemic challenges in the Canary Islands.

The Q-set integrates five thematic blocks, each addressing distinct aspects of stakeholder concerns. The first block focuses on information, participation, and transparency in governance. Inclusive decision-making processes are crucial for fostering trust and alignment with stakeholder values, yet island economies frequently face challenges related to administrative opacity and fragmented governance structures [63,64]. This theme is particularly relevant to the Canary Islands, where overlapping responsibilities among regional, island-specific, and municipal authorities complicate effective communication and collaboration [47].

The second block examines funding mechanisms and equity. Financial incentives and subsidies are essential for enabling just transitions but can create disparities when they disproportionately benefit certain groups [5,19]. In tourism-dependent economies, funding allocation often favors the tourism sector at the expense of broader community needs, reinforcing perceptions of exclusion and inequity [35,65]. The Q-set captures stakeholder perspectives on grant accessibility, distribution fairness, and prioritization of vulnerable groups, reflecting widespread concerns about how financial resources are allocated.

The third thematic block explores cross-sectoral impacts, particularly in tourism, energy, water, and waste management. Tourism exerts significant pressure on infrastructure and resources while simultaneously presenting opportunities for driving renewable energy investments [33,37]. However, its energy-intensive nature and broader environmental implications create tensions between economic and sustainability goals [34,36]. The Q-set investigates these trade-offs, examining stakeholder views on tourism's role in just transitions, including its potential to exacerbate resource inequities or contribute to sustainability.

The fourth block focuses on training and employment, highlighting the need for workforce development aligned with the demands of a green economy. Skill mismatches and inadequate vocational training have been identified as barriers to inclusive transitions, limiting communities' ability to benefit from emerging opportunities. Stakeholders frequently express concerns about whether transitions will perpetuate existing disparities or create inclusive pathways for underrepresented groups, including women and low-income workers [66,67].

Finally, the fifth block addresses governance dynamics, emphasizing the importance of inter-administrative collaboration, public-private partnerships, and transparent processes. Governance lock-ins, such as fossil fuel subsidies and systemic inertia, hinder large-scale transitions in island economies [27]. The Q-set probes stakeholder perceptions of bureaucratic inefficiencies, the need for integrated governance frameworks, and the barriers posed by excessive red tape, reflecting long-standing challenges in regional sustainability efforts [61].

By capturing these diverse perspectives, the Q-set facilitates an in-depth examination of the systemic barriers and stakeholder priorities shaping just transitions. This empirical approach builds on the literature to highlight the interconnected challenges faced by tourism-dependent islands and the critical importance of designing policies that are inclusive, responsive, and aligned with local realities. Situating the Canary Islands within this discourse, the research contributes to the broader understanding of how global sustainability goals can be reconciled with the unique socio-economic and environmental dynamics of island economies.

2.3. Q methodology in the context of energy

Understanding stakeholder perspectives is crucial for addressing the socio-economic, cultural, and governance complexities inherent in just transitions. Stakeholder views shape the design and implementation of policies, influencing their acceptance and long-term success. To capture these diverse viewpoints, researchers have employed a range of methods, including qualitative interviews, focus groups, quantitative surveys, and Delphi techniques. While qualitative approaches provide in-depth insights into stakeholder trade-offs and values, they often lack scalability and broad applicability. Conversely, quantitative methods, though efficient for identifying general trends, can miss the nuanced priorities and conflicts among specific groups. Q-methodology bridges this gap by combining the depth of qualitative methods with the statistical rigor of quantitative analysis, making it especially suitable for exploring contentious issues in just transitions.

Developed by Stephenson in 1935 [68], Q-methodology has emerged as a robust tool for examining subjective viewpoints across disciplines. Its core strength lies in its ability to uncover the diversity of opinions rather than forcing consensus, as is often the case with techniques like Delphi or Likert scales. Participants rank pre-selected statements according to their priorities and beliefs, revealing distinct attitudes and perspectives. The method's forced distribution design reduces common biases such as central tendency and social desirability, ensuring that participants clearly prioritize their preferences. By applying factor analysis, Q-methodology clusters similar viewpoints, providing a structured understanding of stakeholder priorities and conflicts.

Q-methodology has been widely applied in energy and environmental research to investigate topics such as renewable energy adoption, energy poverty, and infrastructure resilience [4,69–77]. For instance, Carr & Liu (2016) [78] examined conflicting stakeholder priorities in balancing tourism-driven economic stability with environmental preservation in the Turks and Caicos Islands, while Medina-Jiménez et al. (2024) [50] analyzed decarbonization strategies in the Canary Islands' tourism sector, emphasizing the challenges of stakeholder engagement and regulatory barriers. These applications demonstrate the method's ability to uncover underlying tensions and competing interests, offering actionable insights for policymakers.

Building on these foundations, this study applies Q-methodology to explore stakeholder perceptions of just transitions in the Canary Islands. Unlike many previous studies that focus on single-sector challenges, this research adopts a multi-sectoral approach encompassing energy, water, waste, and tourism systems. This reflects the systemic nature of the challenges faced by island economies and the interconnected impacts of just transition policies. The Q-set statements are designed to capture competing priorities, systemic barriers, and justice concerns highlighted

in the literature. For example, they address issues such as the accessibility of green funding, the persistence of governance inefficiencies, and the inclusivity of decision-making frameworks. By integrating these themes, the study aligns with recent advances in just transition research, emphasizing the importance of capturing diverse and often conflicting perspectives to inform equitable and effective policy solutions [6,79,80].

While Q-methodology offers significant advantages, it is not without limitations. The reliance on purposive sampling, which selects participants based on their relevance to the research question, can limit the generalizability of findings. Additionally, the researcher-driven process of selecting Q-set statements may introduce bias, potentially overlooking certain viewpoints [81]. Another limitation is the method's static nature—it provides a snapshot of stakeholder perspectives at a specific time, without accounting for how these perspectives may evolve over the course of the transition. Despite these challenges, Q-methodology remains a powerful tool for revealing the trade-offs and tensions that shape complex policy landscapes, particularly in regional contexts where systemic vulnerabilities and sectoral interdependencies intersect.

3. Methodology: Q method implementation and follow-up interviews and robustness

The implementation of Q methodology began by establishing a concourse, or a population of statements. This initial step involved collecting a comprehensive array of discussions, perspectives, beliefs, preferences, and knowledge, drawing from both formal and informal sources relevant to the research topic [6,82]. This initial pool was derived from both academic literature and non-academic just transition documents, ensuring a broad range of viewpoints was considered. Following the collection phase, the statements were synthesized and refined into a Q-set, capturing the essential thematic dimensions pertinent to our study. This Q-set was structured to be perceptual, focusing on subjective opinions rather than factual assertions.

To validate the content, the Q-set underwent testing with a focus group consisting of five experts. This process ensured the statements were clear, comprehensive, and manageable within the survey context, with adjustments made based on feedback to optimize understanding and response accuracy. The final Q-set (Table A.1) comprises five thematic blocks corresponding to key just transition themes: information, participation, transparency, funding, governance, training and employment, and green economy. These blocks were designed to align with the literature on just transition as a governance strategy, a labor-oriented concept, and a theory of socio-technical transition [64].

Upon establishing the Q-set, we moved forward with selecting a targeted group of participants, referred to as the P-set. Using snowball sampling [83], we compiled a comprehensive list of 61 expert stakeholders, with representation from the seven main islands to ensure territorial inclusivity. Our selection strategy focused on cross-sectional representation, including a diverse array of participants across fields and levels of hierarchy to achieve a broad and inclusive perspective in our research (Table B.1).

Out of the initial list, 36 stakeholders participated in the study, which was conducted between June and September of 2022. Although efforts were made to engage stakeholders equitably in terms of gender, the final distribution was 33 % female and 67 % male participants, highlighting a notable gender gap and reaffirming the underrepresentation of women in sectors such as renewable energy generation and energy efficiency [84,85]. The survey and interviews were conducted either in person or via a video call. We targeted a range of organizations, including large utilities, small non-profit green energy cooperatives, and small privately-owned companies specializing in renewable energy installations, with the intention of ensuring inclusivity and representativity.

Participants were tasked with rank-ordering the statements by placing them along a spectrum designed like an inverted pyramid, akin to a quasi-normal distribution curve, thereby capturing the relative importance or relevance of each idea to the participant [86]. The sorting process was conducted using Lloyd's Q-Sort Tool [87]. Participants were allowed to change their initial rankings and reorder the statements according to their priorities at any point during the Q-sorting (Fig. 1). After completing the rank-ordering, participants were invited to explain their sorting choices, offering insights into their decision-making processes. They were guaranteed anonymity, and the post-survey transitioned into an in-person interview where participants freely expressed their opinions, with most proposing concrete measures for achieving just transition goals in their areas of expertise.

Criticism of Q methodology frequently centers on the generalizability of results. Critics contend that because Q methodology does not typically use large, randomly selected samples, the findings cannot be statistically generalized to a larger population. However, Ramlo, (2023) [88] asserted that substantive generalization—rather than statistical generalization—presents distinct advantages, especially for qualitative and mixed methods, including Q methodology. This form of generalization focuses on elucidating the types of viewpoints present rather than quantifying their prevalence in the wider population. Thomas and Baas (1993) [89] further argued that substantive generalization is particularly effective for grasping the nature and dynamics of specific phenomena. This understanding is crucial for crafting interventions and policies that are thoroughly informed by the contextual and subjective intricacies inherent in such fields.

Q methodology captures a static snapshot of stakeholders' opinions at a single point in time. This approach may be seen as a limitation when studying dynamic phenomena such as just transitions, which are expected to evolve due to external influences and internal shifts in participants' views. Previous research has addressed this by conducting test-retest studies, where the same individuals are assessed at different time points. These studies have consistently reported high correlation coefficients, typically 0.8 or above [90], indicating reliability. To further validate this reliability in the context of just transitions, future studies could reapply the just transition Q-set with the same experts at subsequent time points. This would help confirm whether the initial findings remain consistent as conditions and perspectives evolve.

4. Results

The findings from this study are presented in two main sections, with extended discussion in Section 5 and policy recommendations detailed in Section 7. We begin by detailing the Q methodology factor analysis and the resulting stakeholder profiles, which reveal how perceptions are grouped among participants. We then delve into the results of individual interviews, providing insights into the personal views and reactions of the stakeholders involved, thus enriching the contextual interpretation of the findings.

4.1. Factor extraction and analysis

Following the completion of the sorting by all respondents, we employed the KADE version 1.2.1 statistical software [91], which is specifically designed for Q methodology. The software was pivotal in analyzing our data, which was exported from Lloyd's Q-Sort Tool in PQMethod format.

Our analysis began with principal component analysis (PCA) to explore the structure of our dataset. In Q methodology, each group of similar opinions forms what we refer to as a factor. By examining the correlations among respondents' Q-sorts, PCA helped us identify underlying patterns in the data, revealing distinct groupings of factors that represent common perspectives among participants [92]. Initially, eight factors were identified, and a varimax rotation was performed to enhance the interpretability of the factor loadings after the initial factor extraction (Table C.1). The varimax rotation maximizes the variance of loadings and aims to simplify the factors by making the loadings of each

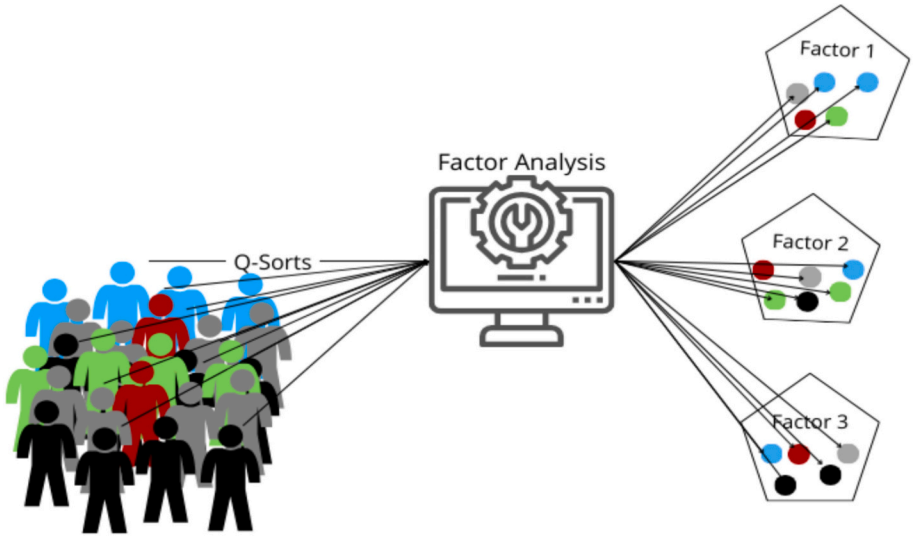


Fig. 1. Illustration of factor analysis in Q methodology, including participant Q-sorts and distinct factors.
Source: Authors.

statement as close to 0 or 1 as possible [93].

When refining the analysis after rotation, participants' responses are sometimes mixed or unclear, making it difficult to determine which group they belong to. We refer to these as confounded Q-sorts. To maintain the integrity of our analysis, we excluded these unclear cases. Out of the total 36 experts analyzed, seven were found to load on two different factors, indicating indecisiveness, and their Q-sorts could not be clearly classified. Consequently, these participants with confounded Q-sorts were excluded from the analysis, resulting in a final sample of 29 individuals.

Occasionally, a factor displays bipolar characteristics, meaning the opinions within it are strongly divided into two opposing ends [94]. In such cases, we split the factor to better understand these contrasting viewpoints. For instance, Factor 3 (further explained in Section 4.2.3) showed bipolar characteristics with high positive and negative loadings at opposite ends. This indicates that it contained participants with divergent opinions, leading us to divide it into two subfactors: 3.1 and 3.2.

There are three criteria to consider when deciding on the number of factors to consider: eigenvalues, the scree plot, and cumulative explained variance. After applying varimax rotation, we assessed these factors using a scree plot (Fig. 2) and the cumulative explained variance (Table C.2). The plot demonstrated a leveling off after the fifth factor, suggesting that additional factors did not contribute significantly to the model. These five factors collectively explained 56 % of the variance, a reasonable threshold exceeding the 50 % mark, indicating a robust representation of the dataset (Table 1). An eigenvalue is another crucial statistic we examined to determine how many of these groups (factors) to consider. An eigenvalue indicates how much of the overall variation in opinions each group explains. We only included groups that explain a significant amount, typically those with an eigenvalue greater than 1.0, which suggests they account for more variance than would be expected by chance. The eigenvalues in our study were notably high, with Factor 1 exceeding 10 and subsequent factors also exceeding the 1.0 threshold.

Since varimax is an orthogonal rotation, it maintains factors independent of one another, thus preserving the assumption that different factors (perspectives) are distinct. This is supported by the low average correlation between factors of approximately 0.1910, which indicates heterogeneity in the responses of stakeholders (Table 2).

Factor 3.1 is the most different factor: it exhibits the lowest correlation coefficient with other factors, particularly in comparison to its counterpart, Factor 3.2, suggesting opposing views or characteristics held by these two subgroups. Factors 1 and 5 are the most similar, indicating close alignment in the perspectives or evaluations of these subgroups (Table 2).

After selecting the relevant factors, we conducted a detailed interpretive analysis, which involved examining each factor's loadings and focusing on distinguishing statements combined with their *Z*-scores. Distinguishing statements are those that significantly differentiate one factor from others, highlighted by their notably high or low Z-scores relative to the same statements in other factors. These Z-scores, calculated by applying weights according to their factor loadings, provide a quantitative measure indicating how many standard deviations a statement is from the mean, thereby emphasizing the unique perspectives that each factor represents.

4.2. *Viewpoint analysis*

After grouping the opinions, we analyzed these groups to identify common themes and unique perspectives. This analysis helped us create group profiles to describe the typical viewpoints and characteristics of stakeholders in each group. The subsequent section presents the factors that represent distinct stakeholder profiles. These profiles were defined after a careful review of various elements, including the distinguishing statements for each profile, the highest and lowest *Z*-score ratings at both extremes, and rankings of −1, 0, and 1, which indicate the aspects considered unimportant by stakeholders, and the potential personal biases arising from stakeholders' professional positions (Fig. 3).

The first profile, transition policy skeptics, includes stakeholders skeptical of current transition policies. This group's viewpoints reflect a cautious or critical approach to proposed changes. Proactive transition reformers support progressive policy changes, pushing for rapid structural changes and significant policy shifts. Centralized energy transition (ET) management supporters prefer a centralized utility-based approach

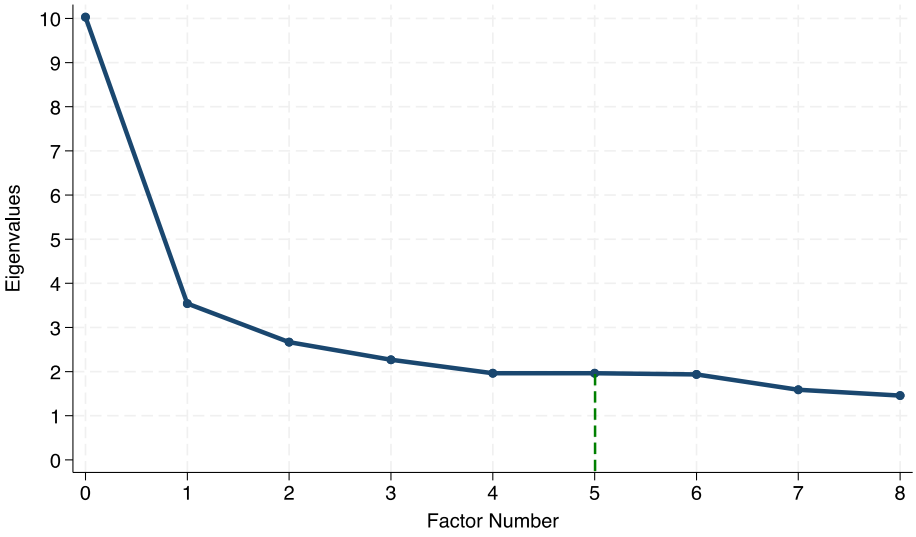


Fig. 2. Scree plot.
Source: Authors.

Table 1
Eigenvalues and explained variance.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Eigenvalues	10.0306	3.5417	2.6675	2.2688	1.9628	1.9370	1.5899	1.4580
% explained var.	28	10	7	6	5	5	4	4
Cumulative % explained var.	28	38	45	51	56	61	65	69

Source: Authors.

Table 2
Factor correlation matrix.

	Factor 1	Factor 2	Factor 3.1	Factor 3.2	Factor 4	Factor 5
Factor 1	1	0.1894	0.1322	0.2277	0.2424	0.5172
Factor 2	0.1894	1	−0.0385	0.2120	0.2087	0.4133
Factor 3.1	0.1322	−0.0385	1	−0.4460	0.1537	0.1007
Factor 3.2	0.2277	0.2120	−0.4460	1	0.3281	0.3337
Factor 4	0.2424	0.2087	0.1537	0.3281	1	0.2852
Factor 5	0.5172	0.4133	0.1007	0.3337	−0.2852	1
Average correlation between factors: 0.191						

Source: Authors.

to managing energy transitions, advocating for strong, top-down governance. Decentralized ET management supporters support localized, community-based management strategies, favoring autonomy in decision-making. Inclusive reform advocates promote gender-inclusive and comprehensive reforms, focusing on broad participation and equity in policy development. Finally, transition pragmatics focus on practical and achievable goals, emphasizing realistic and sustainable approaches to energy transition. These profiles enabled us to delve deeper into stakeholder insights and inform the discussions and policy implications detailed in the subsequent sections of the paper. We examined each stakeholder profile based on their core concerns (the most pressing challenges they identified), priorities, values, principles, approaches (the practical steps or actions they advocated), and critical differences (the most distinctive features of each profile compared to others).

4.2.1. Profile 1: transition policy skeptics

The transition policy skeptics group, accounting for 15 % of the variance, represents the most influential perspective group among participants. This profile includes individuals from small and medium-sized enterprises (SMEs) in the private sector, non-profit organizations, one academic, and one politician. Their pervasive skepticism toward government policies is rooted in concerns about the effectiveness and focus of current transition strategies, particularly regarding the pace and implications of these policies (Figs. 4 and 5).

Core concerns: Transition policy skeptics are deeply concerned about the efficiency and effectiveness of government actions in addressing the direct impacts of climate change, highlighting administrative barriers (Statement 31),[1] misallocation of funds (S6, S7, S9), and a lack of information and participation (S1, S2, S5). They exhibit strategic skepticism, advocating for a meticulous evaluation of policies to ensure they do not exacerbate social inequalities.

Emphasis: This group is particularly cautious about the rapid decarbonization of the economy and its potential negative social impacts. Their skepticism extends to the bureaucratic processes that they view as cumbersome and often more obstructive than facilitative, especially for the pivotal SME sector in the Canary Islands' economy (S31).

Approach: Transition policy skeptics advocate for a deliberate and careful approach, emphasizing the need to slow down and comprehensively assess potential negative outcomes of energy transition policies. This approach is driven by their aim to ensure that transition measures are not only effective but also equitable.

Critical differences: Compared to other groups, transition policy skeptics are more critical and cautious about the implementation of policies. They highlight significant concerns about the deployment of NextGenerationEU funds (S7), criticizing the allocation process and

[1] In the subsequent sections, numbers in round brackets refer to specific statements listed in Appendix A, Table A.1 to differentiate them from the citation references in square brackets. For example, (S5) refers to statement 5 in Table A.1.

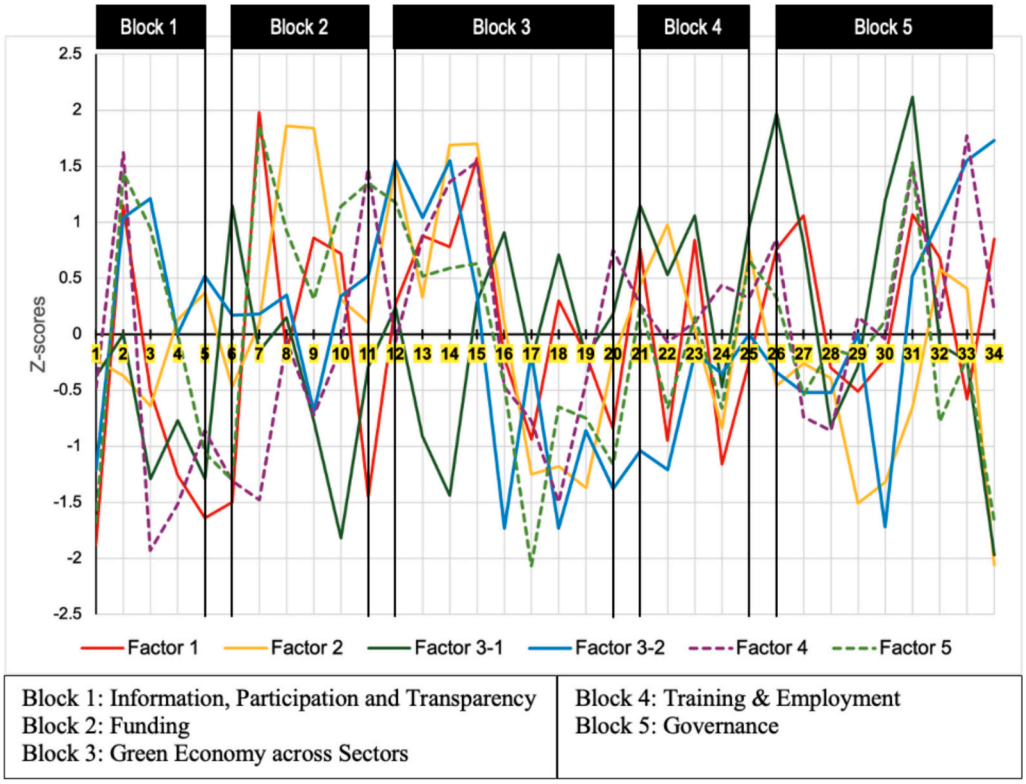


Fig. 3. Profiles of stakeholders' perspectives by theme block.
Source: Authors.

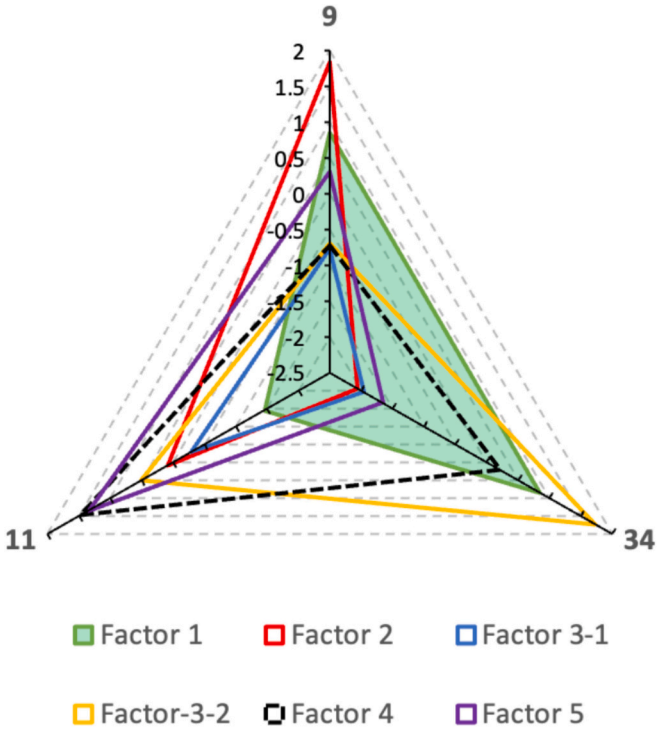


Fig. 4. Distinguishing statements' average factor loadings for Profile 1.

-4	-3	-2	-1	0	1	2	3	4
1	6	24	33	30	32	23	27	15
5	11	22	29	16	10	34	31	7
	4	17	3	19	26	9	2	
		20	28	8	21	13		
			25	12	14			
				18				

"Transition Policy Skeptics"

Fig. 5. Idealized Q-sort for Profile 1.
Source: Authors.
Note: In Fig. 4, the shaded area corresponds to the factor currently under analysis, with the shading matching the factor's color for visual consistency. The axes show *Z*-scores for distinguishing statements specific to the analyzed factor. The shape of the graph varies depending on the number of distinguishing statements associated with a factor. This color coding remains consistent across all visualizations to facilitate tracking of specific factors across different graphs. The numbers 9, 11, and 34 on the axes refer to the distinguishing statements associated with the factor being analyzed, a labeling convention used consistently across all related visualizations. The shaded area in Fig. 5 represents the consensus statement.

suggesting that the funds are not reaching the sectors and projects where they are most needed. This misalignment between policy intentions and actual outcomes on the ground suggests that the funds may not be adequately reaching smaller enterprises or sectors most in need of support, further supporting stakeholders' skepticism regarding the effectiveness of fund distribution in fostering an inclusive and just energy transition.

In their discussions on information and participation, they expressed that there is a significant disconnect between policymakers and stakeholders, driven by a lack of transparent communication and inadequate involvement of relevant actors (S1, S2, S5). Unlike other groups that might prioritize vulnerable populations for subsidies or support, transition policy skeptics argue for more inclusive measures to mitigate rising energy costs, benefiting a broader spectrum of the population to foster a more equitable economic impact (S11). They also recognize a significant untapped potential for energy efficiency (S15), further illustrating their critical stance on the current approaches to energy transition.

Broader implications: Transition Policy Skeptics illustrate how systemic governance inefficiencies and misallocation of resources exacerbate mistrust and reinforce perceptions of inequity in energy transitions. Their critiques align with findings that emphasize the importance of governance transparency and participatory processes [62]. In the Canary Islands, governance lock-ins, such as fossil fuel subsidies and fragmented administrative frameworks, perpetuate this mistrust, limiting stakeholder alignment [26,95]. Addressing these perceptions requires demonstrating tangible improvements through transparent evaluations and participatory decision-making, highlighting progress in resource allocation and equity.

4.2.2. *Profile 2: proactive transition reformers*

This group, accounting for 13 % of the explained variance, comprises six high-level political and union officials along with one representative from a non-profit organization. Exhibiting strong support for the climate actions undertaken by the regional Ministry of Ecological Transition (S29), proactive transition reformers express unwavering confidence in both the direction and effectiveness of current government strategies aimed at ecological and energy transformation. They specifically emphasize the government's role in facilitating the energy transition for businesses, advocating for proactive support over merely compensating for the losses associated with moving away from fossil fuels (S8) (Figs. 6 and 7).

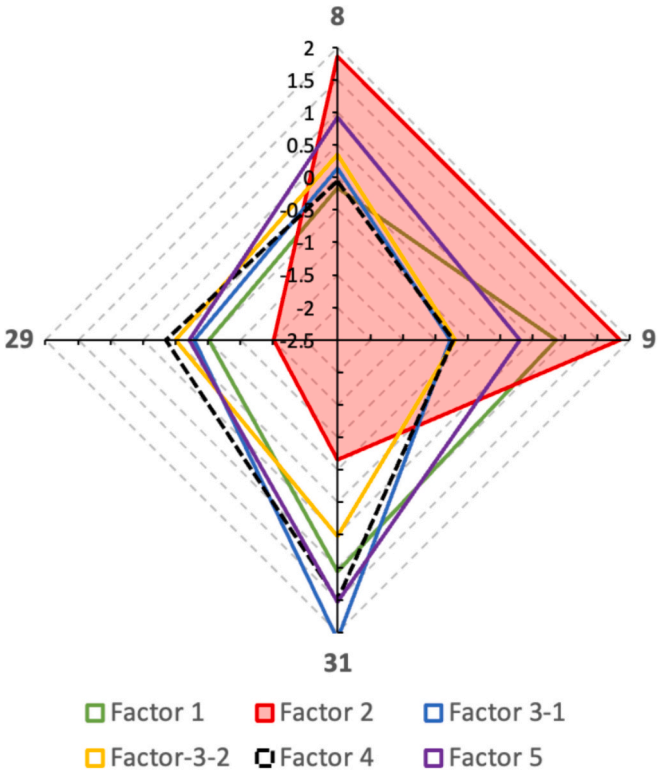


Fig. 6. Distinguishing statements' average factor loadings for Profile 2.

-4	-3	-2	-1	0	1	2	3	4
34	19	18	6	1	4	21	12	9
29	30	24	26	20	10	32	14	8
	17	31	28	23	13	25	15	
		3	2	7	5	22		
			27	16	33			
				11				

"Proactive Transition Reformers"

Fig. 7. Idealized Q-sort for Profile 2.
Source: Authors.

Core concerns: Proactive transition reformers stress the importance of strategically allocating just transition funds. Participants argue that these funds should focus primarily on retaining workers within the new green economy rather than dispersing these funds for new social benefits (S9). This perspective highlights their core concern for efficiency and strategic implementation of transition policies, ensuring that government actions are both effective and timely.

Emphasis: In terms of administrative processes, unlike other groups, proactive transition reformers do not view bureaucracy as a major barrier to decarbonization efforts in the Canary Islands (S31). Instead, they see the administrative framework as a facilitator that can support rapid and effective policy implementations. This reflects their key emphasis on structural changes in government support frameworks and the importance of effective bureaucracy. They are optimistic about the potential economic benefits of swift decarbonization, suggesting that such actions will not only mitigate climate change impacts but also catalyze economic growth and innovation in the region (S34).

Approach: Their approach champions structural changes in energy policy and workforce development to foster sustainable and inclusive economic transitions. Proactive transition reformers provide a perspective that is inherently supportive of current governmental actions and optimistic about the future outcomes of these initiatives.

Critical differences: Unlike more socially focused groups, proactive transition reformers are particularly focused on the structural and systemic changes necessary for effective policy implementation. This highlights their critical differences from other groups. Their opinions emphasize the importance of holistic and integrated approaches in environmental policy to address immediate ecological challenges while ensuring economic and social stability. This strategic and forward-thinking viewpoint on the energy transition in the Canary Islands offers constructive insights into the potential for holistic policy success.

Broader implications: Proactive Transition Reformers highlight the role of institutional leadership and the strategic allocation of transition funds in fostering stakeholder confidence. Their optimism about centralized strategies reflects broader discussions on the potential of institutional efficiency to drive transitions [60]. However, overreliance on top-down approaches risks overlooking localized needs and stakeholder diversity [25]. In the Canary Islands, balancing structural reforms with adaptive governance that incorporates stakeholder feedback is critical, particularly in aligning regional climate goals with community resilience and socio-economic equity.

4.2.3. Profile 3: ET management supporters

Profile 3 accounts for 8 % of the explained variance and consists of four individuals who displayed diametrically opposing views on key issues concerning energy transition. This bipolarity in opinions led to the division of the profile into two subgroups, each comprising two representatives with similar perspectives (Fig. 8). The areas of contention highlight significant debates in the energy sector and broader societal implications, specifically regarding the energy transition in the Canary Islands. These areas include:

i) Distrust in electric vehicles and green technologies (S13)

Many citizens in the Canary Islands exhibit skepticism toward electric vehicles (EVs) and green technologies, questioning their efficacy, cost, and the readiness of the infrastructure needed to support them. This distrust can significantly limit adoption rates and public support for green initiatives.

ii) Transparency in decarbonization projects (S30)

Transparency in how administrations handle decarbonization projects is crucial for public trust and support. Lack of transparency can lead to suspicions of inefficiency or corruption, undermining the legitimacy of environmental policies.

iii) Importance of developing energy communities (S14)

Energy communities represent a transformative approach to energy production and consumption, promoting local energy generation with shared benefits. Their development can be a cornerstone of democratizing energy access and ensuring community engagement in renewable energy initiatives.

iv) Political consensus on climate action (S3)

The existence of a political consensus on climate action is fundamental for the continuity and effectiveness of environmental policies. When political leaders are divided, it can lead to policy inconsistencies and hinder long-term planning.

v) Potential for social inequality generated by rapid decarbonization (S34)

Rapid decarbonization, while necessary to mitigate climate change, can inadvertently lead to social inequalities if not managed carefully. Vulnerable populations may face disproportionate costs or be inadequately compensated.

4.2.3.1. Profile 3.1: centralized ET management supporters. This profile comprises two men in high-level executive positions at large utility companies. Proponents of centralized energy systems argue for the efficiency of scale and stability in transition management despite the global push toward decentralized energy systems aimed at enhancing community engagement and local governance.

Core concerns: The group is primarily concerned with the efficiency of centralized management and the clarity of administrative processes. These experts also expressed concerns about the lack of representation of their interests (S4) and perceived inadequacies in public administration efforts (S30, S31), which they believe hinder effective management and implementation of energy policies (Figs. 9 and 10).

Emphasis: Their strong preference for centralized systems over decentralized approaches is evident as they argue against the trend of energy democratization and the creation of energy communities (S14), emphasizing that centralized systems offer greater efficiency of scale and stability in managing the energy transition. These executives firmly asserted that equal opportunities are adequately provided in the transition sectors, dismissing any perceived vulnerabilities or inequalities related to gender in the labor market (S33) or accessibility of green transformation funds across sectors (S6).

Approach: Advocating for a top-down, centralized management style that can more effectively handle the large-scale requirements of energy transitions, these executives highlighted their commitment to ensuring that energy transition policies are efficient. Their focus on a clear administrative process demonstrates their dedication to streamlined and

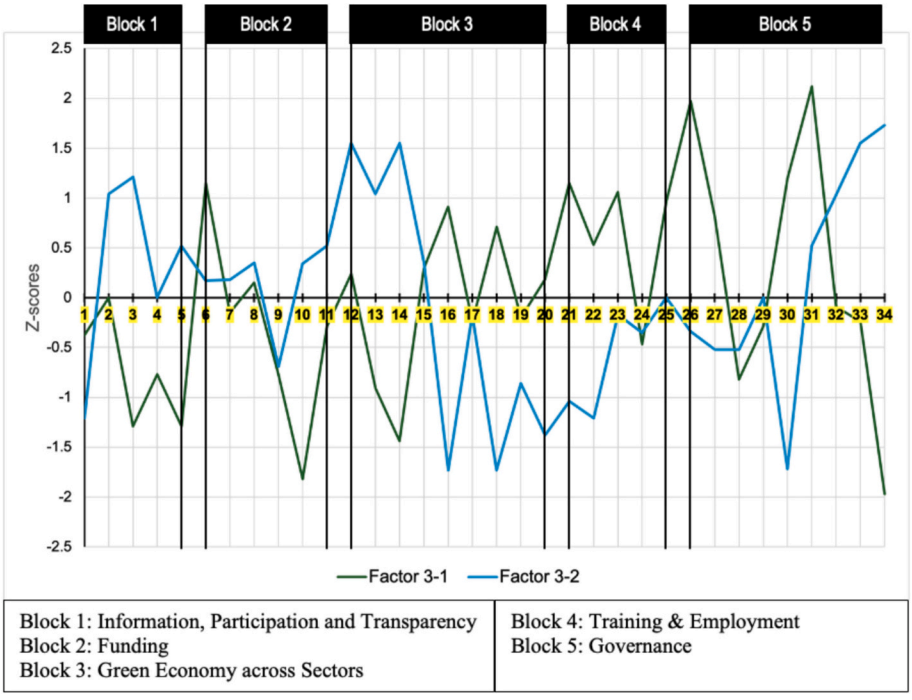


Fig. 8. *Z*-score comparison between centralized and decentralized ET management supporters.
Source: Authors.

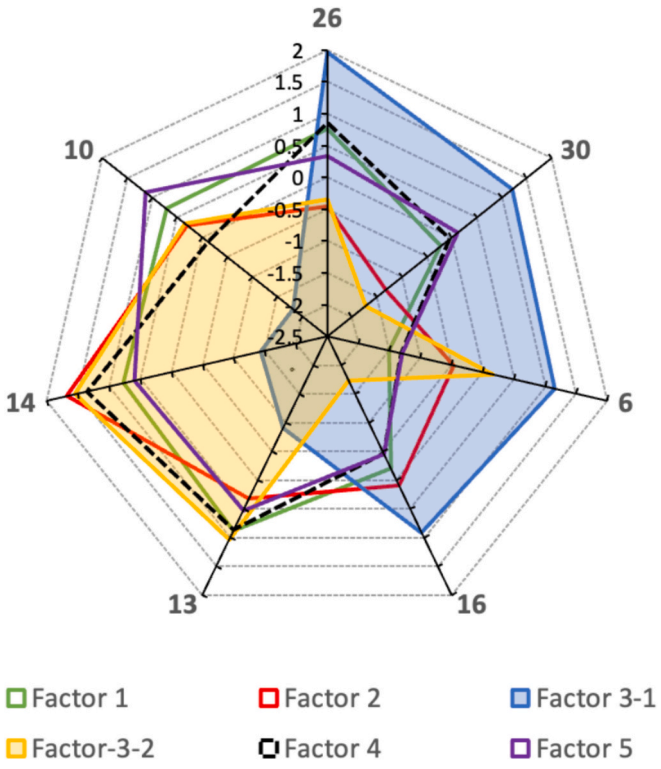


Fig. 9. Distinguishing statements' average factor loadings for Profile 3.1.

-4	-3	-2	-1	0	1	2	3	4
34	14	13	24	17	20	27	21	26
10	5	28	1	19	12	16	6	31
	3	9	29	7	15	25	30	
		4	11	32	22	23		
			33	2	18			
				8				

"Centralized ET Management Supporters"

Fig. 10. Idealized Q-sort for Profile 3.1.
Source: Authors.

effective governance mechanisms.

Critical differences: Unlike other groups that may favor decentralized, community-based energy solutions, this profile shows a strong preference for centralized, utility-driven approaches. This preference contrasts sharply with groups that advocate for local control and community engagement in the energy transition, highlighting the critical differences in their perspectives on energy policy implementation. Their views point to the importance of holistic and integrated approaches in environmental policy, which not only address immediate ecological challenges but also ensure economic and social stability.

4.2.3.2. Profile 3.2: decentralized ET management supporters. This profile

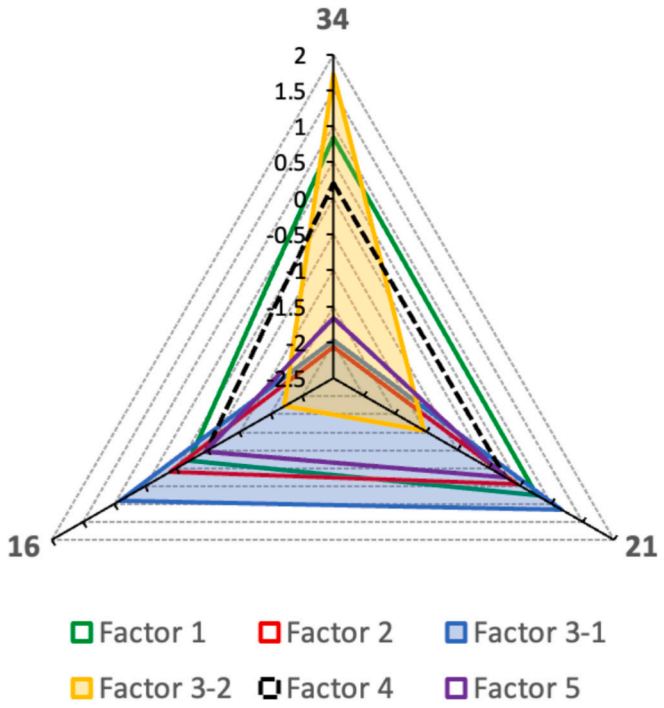


Fig. 11. Distinguishing statements' average factor loadings for Profile 3.2.

-4	-3	-2	-1	0	1	2	3	4
18	30	1	28	17	10	5	3	12
16	20	21	27	29	15	32	33	34
	22	19	24	25	8	13	14	
		9	26	4	31	2		
			23	6	11			
				7				

"Decentralized ET Management Supporters"

Fig. 12. Idealized Q-sort for Factor 3.2.
Source: Authors.

represents decentralized energy transition management stakeholders, comprising two women leading green energy projects. These leaders provide a contrasting perspective to their counterparts who favor centralized management, as seen in Factor 3.1. Advocating for decentralized approaches, they emphasize community-based strategies and local involvement in energy decisions (Figs. 11 and 12).

Core concerns: Decentralized energy transition management stakeholders are fundamentally concerned with the potential for the energy transition to exacerbate social inequalities (S34). Viewing decentralized approaches as essential, they aim to mitigate these effects through the empowerment of local communities, ensuring equitable resource distribution, and enhancing community resilience. Their belief in an equitable ecological transition is strong, particularly one that ensures employment opportunities are accessible to all, with a specific focus on fostering gender equality (S33).

Emphasis: These stakeholders prioritize microgeneration and the

development of energy communities (S14) as pivotal strategies for achieving a successful transition to renewable energy. They emphasize the importance of local empowerment and energy autonomy, advocating for energy systems that democratize access to resources and decision-making, aligning with their vision of fostering local engagement and governance.

Approach: They support community-driven and gender-inclusive energy policies that integrate social equity with environmental sustainability. Their approach involves actively opposing pricing strategies that could make essential resources like electricity (S16) and water (S18) less affordable, particularly for lower-income households. Experts belonging to this group advocate for a bottom-up, decentralized management style as a pathway toward a just transition rather than imposing punitive pricing mechanisms. This reflects a broader philosophy of integrating environmental objectives with social equity to ensure that all stakeholders are included in the transition process and protected from undue economic pressures.

Critical differences: Unlike their counterparts in Profile 3.1, who support centralized management, these advocates are distinguished by their strong preference for decentralized systems. This preference is rooted in a belief that decentralized energy management can better address socio-economic disparities in the energy transition. Their opposition to creating new expert groups for vocational training (S21) shows a wariness toward adding new bureaucratic layers and a preference for optimizing existing structures.

Broader implications: The divergence between Centralized and Decentralized ET Management Supporters highlights the fundamental tension between operational efficiency and community-driven equity. Centralized governance risks perpetuating lock-ins and excluding vulnerable groups, while decentralized systems aim to empower communities and mitigate inequities [24]. In the Canary Islands, reliance on centralized grids and subsidies demonstrates the persistence of structural constraints, while the potential for energy communities offers pathways for more equitable resource distribution. Bridging these perspectives requires participatory frameworks that address power asymmetries and align community-driven initiatives with broader systemic goals.

4.2.4. *Profile 4: inclusive reform advocates*

This profile, representing the inclusive reform advocates, comprises four members deeply involved in educational, training, and research domains and accounts for 9 % of the explained variance. They provide a unique perspective on the integration of social issues in energy transition policies (Figs. 13 and 14).

-4	-3	-2	-1	0	1	2	3	4
3	18	28	9	22	29	20	11	2
4	7	5	1	12	34	26	31	33
	6	17	16	8	21	13	15	
		27	19	30	25	14		
			10	23	24			
				32				

"Inclusive Reform Advocates"

Fig. 14. Idealized Q-sort for Profile 4.
Source: Authors.
Note: The graphical representation in Fig. 13 differs from the others since this factor has only two distinguishing statements.

Core concerns: Inclusive reform advocates are primarily concerned with the political disunity on climate action (S3), which they believe undermines effective policymaking and implementation in environmental sustainability. They also highlight the insufficient involvement of key stakeholders—firms, unions, and social organizations—in regional government planning processes (S2, S4). This lack of involvement, according to them, leads to policies that fail to fully represent or respond to the collective needs and expertise of these essential groups.

Emphasis: Members of this profile are vocal advocates for gender equality (S33). They emphasize the importance of providing equal opportunities in sectors impacted by energy transition policies, stressing that true progress in sustainability must also address systemic gender disparities.

Approach: Inclusive reform advocates call for greater stakeholder engagement in policymaking to create more comprehensive and inclusive policies. By advocating for the inclusion of a broader range of voices, particularly from academia, unions, and social organizations, they seek to ensure that energy policies are not only ecologically viable but also socially just.

Critical differences: Their broader focus on inclusivity in both policy

Fig. 13. Distinguishing statements' average factor loadings for Profile 4.

formation and implementation sets them apart from groups that prioritize economic efficiency or specific environmental outcomes. Uniquely among the profiles, inclusive reform advocates believe that NextGenerationEU funds are being utilized efficiently (S7). This view distinguishes them from others who criticize the management of these funds.

Broader implications: Inclusive Reform Advocates emphasize the necessity of integrating social equity into energy transitions, aligning with justice frameworks that advocate for participatory governance and gender inclusivity [54]. Their focus on political disunity and limited stakeholder engagement reflects broader governance inefficiencies in the Canary Islands, where fragmented institutions and entrenched interests hinder inclusivity [19]. Addressing these challenges involves embedding systemic equity measures into policy frameworks, ensuring that transitions foster both ecological sustainability and social cohesion.

4.2.5. *Profile 5: transition pragmatics*

The transition pragmatics profile features a diverse group of seven stakeholders, including political leaders from the opposition, representatives from energy SMEs, tourism professionals, and academics. Accounting for 11 % of the explained variance, this group brings a broad spectrum of insights into the transition process (Figs. 15 and 16).

Core concerns: The transition pragmatics group is fundamentally concerned with the significant gap in public awareness and understanding of climate issues and the specifics of policy measures (S1). They are particularly focused on the practicality and realistic implementation of transition policies, evidenced by their critical view of using organic waste and sewage sludge in agriculture (S17) due to potential environmental, health, and regulatory challenges. This practical focus extends to their economic concerns, particularly regarding the effectiveness and administrative efficiency in managing financial resources (S6) and implementing sustainable development policies. Their skepticism about the efficacy of raising urban water tariffs to reduce water losses and encourage efficient usage (S18) reflects their broader concerns over policy measures that might unduly burden consumers and fail to consider economic impacts.

Emphasis: The transition pragmatics group places a strong emphasis on practical solutions that are implementable and grounded in economic realism. They highlight the need for stringent safety measures and a comprehensive evaluation of potential risks in agricultural practices involving organic waste (S17).

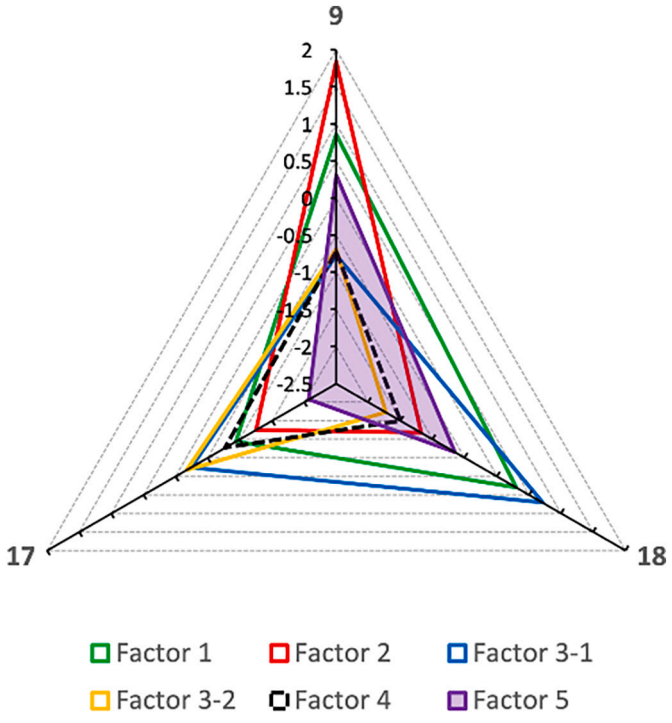


Fig. 15. Distinguishing statements' average factor loadings for Profile 5.

-4	-3	-2	-1	0	1	2	3	4
17	34	5	22	29	9	25	12	31
1	6	32	18	28	26	8	11	7
	20	19	27	4	13	3	2	
		24	16	30	14	10		
			33	23	15			
				21				

"Transition Pragmatics"

Fig. 16. Idealized Q-sort for Profile 5.
Source: Authors.

Approach: Transition pragmatics emphasize practicality over ideology in crafting and implementing transition policies. They advocate for meticulously developed frameworks that address safety and effectiveness, particularly in environmental practices involving significant risks (S17). This group also prioritizes the strategic use of financial resources (S9) and administrative efficiency (S31) to ensure that sustainability efforts are both feasible and grounded in economic realities. Their pragmatic approach seeks to balance environmental goals with the socio-economic impacts of policy measures, ensuring they are implementable and beneficial across the community.

Critical differences: Distinguished by their mixed composition and practical outlook, transition pragmatics stand out for their comprehensive critique of both policy formation and execution. Unlike groups that may favor more aggressive policy shifts, they advocate for a balanced approach that considers both the economic impacts and the practical challenges of environmental sustainability measures.

Broader implications: Transition Pragmatics prioritize the feasibility and practicality of energy transition policies, aligning with literature that critiques the socio-economic impacts of poorly designed sustainability measures [60]. Their emphasis on addressing governance inefficiencies and unintended consequences resonates with findings on the importance of context-sensitive policies in tourism-intensive regions like the Canary Islands [33]. Transparent policy evaluations, alongside pragmatic stakeholder engagement, can reconcile environmental objectives with socio-economic realities, fostering broader alignment and support.

4.2.6. *Consensus and neutrality*

In Q methodology, consensus statements are those that reflect viewpoints agreed upon across diverse groups, offering valuable insights into shared beliefs or concerns among stakeholders (Table 3). Our research identified just one clear consensus among all profiles: skepticism toward the role of the recently established Energy Observatory of the Canary Islands in overseeing the economic and employment impacts of the decarbonization transition (S28). In this context, stakeholders expressed a preference for implementing corrective redistributive measures to address these impacts over creating new oversight bodies.

Moving from areas of consensus to those of neutrality, we found that stakeholders' neutral responses (statements with rankings of −1, 0, or 1) often emerge from an understanding of the complexity and potential trade-offs involved rather than from outright disapproval or endorsement. This pattern suggests that stakeholders possess a sophisticated

Table 3
Consensus statement *Z*-scores.

Statement	Z-scores					
	F1	F2	F3.1	F3.2	F4	F5
28. The Canary Islands Energy Observatory should oversee the economic and employment impacts of decarbonization and suggest redistributive measures.	−0.299	−0.394	−0.820	−0.521	−0.860	−0.120

Source: Authors.

understanding, recognizing that many issues in ecological transition are not simply black and white but require nuanced approaches that consider multiple factors and potential outcomes.

4.3. Follow-up interviews

As part of the Q-methodology post-survey process, follow-up interviews were conducted to deepen the analysis of stakeholder perspectives on the regional government's just transition and climate justice strategies. Stakeholders were invited to propose measures to address the bottlenecks identified during the Q-sorting and interview phases. These recommendations were classified into themes based on three core areas of concern: education, training, and labor market; economic incentives and reforms; and the transformation of productive sectors toward a circular economy. The selection of these themes was rooted in the literature review that informed the Q-set used during the Q-methodology phase. These themes were designed to reflect governance inefficiencies, socio-economic impacts, and cross-sectoral dynamics, providing a structured framework for exploring stakeholder perspectives. The semi-structured interviews allowed participants to elaborate on their Q-sort responses and introduce new insights into barriers and opportunities for a just transition in the Canary Islands.

While not all participants provided specific recommendations, those that did were carefully documented and categorized according to the critical topics highlighted in the literature. Stakeholders frequently addressed systemic challenges such as fostering a circular economy, promoting equitable resource distribution, and improving cross-sectoral integration. Stakeholders' recommendations often extended beyond their immediate interests, addressing systemic challenges such as fostering a circular economy, promoting equitable resource distribution, and improving cross-sectoral integration. Although many recommendations resonated with challenges identified in the literature—such as socio-economic inequities and governance barriers—some issues, like energy poverty, participatory governance, and land-use conflicts, were less explicitly addressed. This suggests that while the recommendations provided valuable insights into systemic issues, they were also shaped by stakeholders' immediate contexts and priorities. As a result, certain broader concerns may have been overlooked, underscoring both the depth and the contextual limitations of the stakeholder input.

Nevertheless, this iterative process ensured that the qualitative analysis bridged theoretical insights with stakeholder input, providing a comprehensive understanding of the complexities involved in achieving a just transition in the Canary Islands. The integration of stakeholders' perspectives with literature-derived themes highlights the importance of combining theoretical and practical approaches in addressing systemic challenges and developing actionable, context-specific strategies.

4.3.1. Education, training, and labor market

In this context, stakeholders have outlined a comprehensive set of initiatives aimed at revamping the educational and professional landscapes to align with the requirements of a just energy transition. Central to these initiatives is the development of an integrated educational strategy that aligns curricula with sustainable development goals (SDGs), enhances renewable energy knowledge, incorporates innovative pedagogical methods, and supports blended learning through both formal and informal pathways.

To foster stability and a more inclusive workforce, stakeholders advocate for streamlining accreditation processes, promoting lifelong learning, and enhancing the role of vocational training faculties in guiding energy transitions. These efforts are designed to diversify skills in administrative roles and promote broader representation and accessibility. Additionally, there is a significant focus on enhancing administrative capabilities to support the energy transition, including increasing the number of skilled technicians and overhauling administrative structures to enable more equitable participation in decision-making processes.

In terms of employment equity, particularly in vocational training, measures to address gender disparities and enhance the labor market's responsiveness to sustainable development needs were also proposed. These include hosting job fairs, promoting technical roles, innovating curricula, and addressing gaps in critical sectors such as water management. Furthermore, the proposals emphasize improving communication and stakeholder engagement. This includes using change agents to highlight the urgency of energy transitions and enhancing the visibility of green initiatives across various media platforms to ensure that sustainability discussions reach all societal segments.

4.3.2. Economic incentives and reforms

A comprehensive fiscal strategy for the green transition is at the forefront, with stakeholders advocating for a tax reform that includes refining investment incentives and reassessing fuel-centric tax structures to support renewable energy ventures beyond the tourism sector. This aims to subvert fossil fuel supremacy and democratize benefits across sectors.

In the context of education and mobility support, highlighted as essential, tax exemptions were proposed for educational institutions, particularly on the fluorinated greenhouse gases tax and the creation of an economic intelligence office. These measures are designed to reallocate funds toward educational opportunities and inform decisions on sustainable mobility, enhancing access and fostering an inclusive transition.

The support for developing a second-hand market for EVs is intended to overcome the high costs of EVs and their heavy subsidies for high-income citizens, particularly in the Canary Islands, where fuel is highly subsidized relative to the national market.

Alongside proposals to address barriers imposed by utility monopolies, these actions are intended to amplify sustainable mobility access and facilitate a seamless energy transition, bridging disparities between the Canary Islands and mainland Spain. Lastly, tourism sector sustainability reforms focus on tailoring incentives to the unique challenges of tourism-dominated economies in the Canary Islands, ensuring equitable access and fostering sustainable pathways that are region-centric. Incentive alignment for sustainable development involves aligning tax reforms with tourism sector investments to ensure that regulation and policy amendments support both renewable energy ventures and sustainable tourism practices.

4.3.3. Transformation of productive sectors: The circular economy

Stakeholders advocate for an integrated mobility and energy transition strategy, highlighting a comprehensive sustainable mobility blueprint that includes public transport enhancements and urban planning revisions and promotes active mobility. This strategy marks a deliberate shift from entrenched individual and carbon-intensive transport modes toward broader accessibility and sustainable urban

ecosystems in the Canary Islands. Additionally, stakeholders recognize the potential of electric scooters and motorcycles, advocating for measures in sustainable mobility and market development to accelerate technology adoption by extending subsidy periods. This effort, aimed at involving socially disadvantaged groups, addresses themes of inclusion and innovation, reflecting a commitment to an energy transition that is equitable and forward-looking.

Building on this foundation, the community-led sustainable development strategy highlights the significance of decentralized energy systems and projects rooted in the community for promoting fairness, equity, and local governance. This strategy supports a balanced integration of decentralization and centralization, advocating for democratic decision-making processes and the formation of cohesive communities to tackle both social and ecological issues.

Further enhancing these efforts, the energy–industrial convergence in the Canary Islands serves as a testament to the strategic alignment of industrial development with renewable energy pursuits, aiming to democratize access, optimize resource usage, and minimize environmental impacts. This initiative emphasizes the importance of integrating circular economy principles through carbon offset endeavors and decentralized wastewater management, aiming for comprehensive resource optimization and environmental health.

Lastly, complementing these initiatives, stakeholders highlighted the need for environmental infrastructure and management, advocating for the rejuvenation of aging water infrastructure, the augmentation of sewerage networks, and the use of regenerated water in the context of severe droughts in the Canary Islands.

5. Discussion

The just transition in the Canary Islands offers a valuable context for exploring how policy evaluation, stakeholder engagement, and local socio-economic dynamics can inform fair and effective outcomes in tourism-dependent regions. Based on the analysis of stakeholder perceptions, this discussion proposes two key priorities to bridge these views: utilizing policy evaluation to address systemic barriers and establishing negotiated pathways to align global decarbonization goals with the islands' unique challenges. Together, these proposals provide a foundation for an inclusive and adaptable approach to sustainability.

Policy evaluation is proposed as a critical tool to address entrenched challenges such as fossil fuel subsidies and economic dependencies on tourism and subsidized agricultural exports. Transparent evaluations can reveal inefficiencies in resource allocations, offering evidence for reforms that strengthen energy independence, enhance resilience, and promote fairness [5,63]. For a region shaped by geographic isolation and economic vulnerabilities, policy evaluations are essential for designing targeted and practical solutions [64].

Stakeholder interviews highlight that evaluations must go beyond data collection; they must engage stakeholders to improve trust and collaboration. Transparent processes that identify gaps in administrative capabilities and resource distribution can reduce perceptions of exclusion and ensure policies are accessible and effective [96]. Additionally, evaluations must adapt to the interconnected nature of energy, tourism, and the energy-water-food nexus, balancing environmental sustainability with local economic priorities without worsening existing imbalances [61].

Negotiated transition pathways with national and EU institutions are essential for balancing global sustainability targets with the realities of island economies. Flexible decarbonization targets reflecting local priorities, such as water security, energy independence, and fair resource use, emerged as critical priorities among stakeholders. Addressing the interdependence of key sectors—particularly tourism, energy, and water—further ensures that policies align with both vulnerabilities and opportunities [25]. Scenario planning supported by co-created narratives can help navigate trade-offs, fostering alignment among stakeholders with conflicting priorities [44].

Tourism, a cornerstone of many islands' economy, demonstrates these complexities. While the sector places pressure on local energy and water systems and benefits from infrastructure and subsidies, it also presents opportunities to promote sustainability [97]. Carbon offset programs funded by the tourism industry, for example, could support local adaptation and resilience projects. Integrating sustainability into tourism products could position the Canary Islands as a leader in responsible travel, driving demand while aligning economic benefits with transition goals. Fiscal strategies, such as tax exemptions for sustainable tourism initiatives or support for community-led renewable energy projects proposed by stakeholders, provide practical ways to balance tourism benefits with broader regional needs [62].

While policy evaluation and negotiated pathways provide strategic direction, local policy dynamics can further address pressing challenges. Stakeholders proposed initiatives such as expanding vocational training, improving public transportation, and fostering energy efficiency. These grassroots efforts can address disparities, enhance resilience, and improve administrative collaboration, particularly in preparing green job markets and addressing skills gaps [54].

Tourism's financial capacity can further support these localized actions. Revenue from sustainable tourism practices could be reinvested in projects that promote renewable energy or water-saving technologies. By linking local efforts with regional goals, policymakers can create a cohesive framework that balances immediate needs with long-term objectives, fostering shared purpose and collaboration [96].

Stakeholder interviews also emphasized the need to address systemic risks, such as social exclusion and geographic disparities, in transition strategies. For example, integrated mobility initiatives and fiscal reforms must prioritize accessibility to prevent deepening inequities [64]. Incorporating diverse voices—particularly those from underrepresented groups—into policy design ensures that decisions are equitable and reflect shared community values [62].

Ultimately, the success of the Canary Islands' transition depends on bridging gaps between governance systems, stakeholder priorities, and economic pressures. Adaptive governance models, supported by transparent evaluations and inclusive negotiation processes, can align fragmented efforts while fostering collaboration [5]. Tourism, often seen as a challenge, can become a catalyst for sustainability through its financial contributions and advocacy for resilience-building initiatives. By addressing systemic barriers, leveraging tourism's potential, and fostering inclusive decision-making, this proposal aims to contribute to the ongoing discourse on how to achieve sustainability while respecting socio-economic realities. This integrated approach not only advances decarbonization and resilience but also ensures that transitions remain fair and responsive to local needs (Table 4).

6. Conclusions and policy recommendations

Our study extends just transition literature by focusing on the unique challenges of island economies like the Canary Islands, where tourism creates vulnerabilities akin to those from fossil fuel extraction. This broadens the applicability of just transition strategies.

We discovered significant challenges stemming from political partisanship and a lack of transparency in decision-making processes. Our

Table 4
Summary of Q method results.

Profile	Core concerns	Emphasis	Approach	Critical differences
Transition policy skeptics	Effectiveness and focus of current transition policies, particularly the pace and implications of these policies.	Cautious about rapid decarbonization and its potential negative social impacts.	Advocating for strategic skepticism and meticulous evaluation of policies to avoid exacerbating social inequalities.	More critical and cautious about the implementation of policies compared to other groups, emphasizing the need to slow down and assess potential negative outcomes.
Proactive transition reformers	Efficiency and strategic implementation of transition policies.	Structural changes in government support frameworks and the importance of effective bureaucracy.	Championing structural changes in energy policy and workforce development to foster sustainable and inclusive economic transitions.	Focused on the structural and systemic changes necessary for effective policy implementation, differing from more socially focused groups.
Centralized ET management supporters	Efficiency of centralized management and clear administrative processes.	The importance of transparent governance and centralized control in managing the energy transition.	Advocating for a top-down, centralized management style that can more effectively handle large-scale requirements of energy transitions.	Strong preference for centralized, utility-driven approaches over decentralized solutions, contrasting sharply with groups that favor community-based strategies.
Decentralized ET management supporters	Social equity and the inclusion of community feedback in transition strategies.	Decentralized, community-driven approaches and gender inclusivity.	Supporting community-driven and gender-inclusive energy policies that integrate social equity with environmental sustainability.	Emphasize decentralized solutions and focus heavily on inclusivity and community involvement, opposing the more centralized approaches of other groups.
Inclusive reform advocates	Ensuring that transition policies are inclusive, equitable, and comprehensively beneficial.	Broadening participation and ensuring equitable distribution of policy benefits.	Prioritizing equity and inclusivity in environmental policies, focusing on ensuring comprehensive benefits.	Their broader focus on inclusivity in both policy formation and implementation sets them apart from groups that prioritize economic efficiency or specific environmental outcomes.
Transition pragmatics	Practicality and realistic implementation of transition policies.	Practical solutions that are implementable and grounded in economic realism.	Emphasizing practicality over ideology in crafting and implementing transition policies.	More focused on realistic and pragmatic approaches compared to groups that emphasize idealistic or highly strategic frameworks.

Source: Authors.

interviews indicate that reducing the influence of ideological divides and fostering inclusive, collaborative discussions can lead to more consensus-driven and effective measures.

Our recommendations focus on enhancing stakeholder engagement by involving diverse sectors such as academia, unions, and social organizations. This integration enriches the policymaking process through a variety of perspectives facilitated by open and unbiased dialogue. Adopting a hybrid governance model that merges centralized and decentralized strategies can accommodate diverse stakeholder preferences, thus improving both administrative efficiency and community involvement.

Clear communication strategies are essential for transparency and building trust, while streamlining administrative processes facilitates the swift and effective implementation of energy transition projects. Additionally, ensuring that policies are economically viable and practical for the local context is crucial. Addressing power and gender dynamics through targeted interviews with underrepresented groups will enrich discussions and promote inclusivity.

Moving forward, conducting extensive surveys to capture the attitudes, perceptions, and behaviors of residents toward energy use and sustainability in the Canary Islands is a crucial next step. This data will help develop tailored, community-centric strategies for effective energy transitions. Further comparative and longitudinal studies will track the impact of policies and identify best practices for similar island economies. These strategies aim to create a resilient framework for just transition in the Canary Islands, addressing sustainability and resilience goals while managing risks such as exclusion and inequity. This balanced approach is essential for transforming vulnerabilities into resilience in such socio-economic settings.

CRediT authorship contribution statement

Ivelina Mirkova: Writing – original draft, Visualization, Validation, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Noemi Padrón-Fumero:** Writing – review & editing, Supervision, Project administration, Investigation, Conceptualization.

Acknowledgments and funding sources

The study was co-financed by the Canary Islands Agency for Research, Innovation, and Information Society (Agencia Canaria de Investigación, Innovación, y Sociedad de la Información) of the Ministry of Universities, Science, Innovation, and Culture and by the European Social Fund Plus (ESF+) Integrated Operational Program of the Canary Islands 2021–2027, Axis 3 Priority Theme 74 (85 %). This research was also funded by the Spanish State Research Agency (Agencia Estatal de Investigación) under the project TED2021-131848B-I00 with European Next Generation Funding. The authors also extend their sincere appreciation to Dr. Lloyd P. Rieber of the University of Georgia for granting access to his Q methodology software and providing invaluable guidance on its use, as well as to the three anonymous reviewers for their insightful, meticulous and constructive feedback, which has significantly enhanced the rigor and clarity of this article.

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.

Appendix A

Table A.1
The Q-set.

No.	Statement
	BLOCK 1: Information, participation and transparency
1	Social agents are well-informed about climate change's direct impacts on them and are cognizant of the regional, national, and European government's climate action plans.
2	The majority of social agents remain unaware of green offices and their crucial role in providing advice on grants and subsidies.
3	A political consensus on climate action exists, fostering stability in climate initiatives.
4	Businesses, labor, and social organizations have played a direct role in shaping the regional government's climate actions.
5	Public administrations are actively engaged in educating citizens and businesses about the energy transition and climate change impacts.
	BLOCK 2: Funding
6	Green transformation grants are widely accessible, with significant media coverage and clearly articulated potential benefits.
7	The Canary Islands are not fully leveraging the financial opportunities offered by the NextGenerationEU funds for post-Covid-19 social and economic recovery.
8	Government support should favor companies transitioning to renewable energy sources, overcompensating financial losses from abandoning fossil fuels.
9	Priority government funding should focus on retraining workers within the just transition framework rather than on new social assistance programs.
10	Government grants for decarbonization unfairly exclude social and economic groups with lower purchasing power.
11	A just energy transition must include measures to mitigate energy cost increases only targeting the most vulnerable groups.
	BLOCK 3: Green economy across sectors
	TRANSPORT
12	The regressive impact of electric vehicle grants should be offset by sustainable mobility plans benefiting the entire population.
13	Electric vehicles and other green technologies are still perceived by Canarian society as futuristic, fostering distrust.
	ENERGY COMMUNITIES
14	Promoting the development of energy communities should be a governmental priority to support a just transition.
	ENERGY EFFICIENCY
15	The Canary Islands possess a significant, yet untapped, potential for energy efficiency improvements.
16	Reflecting the actual cost of electricity production tariffs would be one of the main incentives for improving energy efficiency and increasing the penetration of renewables in the Canary Islands.
	CIRCULAR ECONOMY AND TOURISM
17	There are no significant barriers preventing the use of organic waste and sewage sludge in soil recovery and agricultural development.
18	Raising the urban water tariff due to increased energy prices will decrease water losses and encourage efficient usage.
19	Building energy recovery plants in the Canary Islands conflicts with maximizing waste reduction, reuse, and recycling efforts.
20	The climate crisis justifies including air transport in the European emissions trading scheme despite potential negative effects on island tourism.
	BLOCK 4: Training and employment
21	Creating an expert group to identify future qualifications and skill needs is crucial for providing adequate and accessible vocational training.
22	Active employment policies are the most effective means to facilitate the reintegration of workers impacted by climate actions.
23	Companies and sectors face difficulties in filling new professional profiles related to the green economy.
24	The current educational system in the Canary Islands is capable of supplying the professional profiles required for the ecological transition.
25	The transition to renewable energies guarantees net employment.
	BLOCK 5: Governance
26	Implementing inter-administrative collaboration dynamics is vital for the regular operations of public bodies.
27	Public–private partnerships hold greater importance than inter-administrative cooperation in advancing social justice in climate actions.
28	The Canary Islands Energy Observatory should oversee the economic and employment impacts of decarbonization and suggest redistributive measures.
29	The Ministry of Ecological Transition's climate actions are overly concentrated on individual self-consumption, neglecting other green economy activities (such as massive composting of organic waste or energy communities) that could enhance and diversify employment.
30	Administrative opacity in processing decarbonization projects deters private investment in the energy transition.
31	Excessive bureaucratic procedures in the Canary Islands hinder the execution of decarbonization initiatives.
32	Aligning the ecological transition with the 2023 Agenda is essential, highlighting decarbonization actions that positively impact other SDGs.
33	The ecological transition will only be equitable if it ensures employment opportunities are accessible to all, especially by fostering gender equality.
34	Accelerated decarbonization of the regional economy risks exacerbating poverty and social inequality.

Appendix B

Table B.1
P-set.

ID	Gender	Island	Field	Type of company/institution	Position
1	Female	TF	Labor union	Insular council	Occupational health secretary
2	Female	GC	Public sector	Insular council	Green funding advisor
3	Female	TF	Academia	University	Professor in sustainable transport and regional development
4	Female	LP	Non-profit	Community-driven green energy initiative	Stakeholder sustainable energy coordinator and energy poverty advocate
5	Female	TF	Public sector	Insular council	Politician (councilwoman for citizen security and mobility)
6	Female	GC	Labor union	Insular council	Occupational health secretary
7	Female	LZ	Public sector	Insular council	Politician (minister of energy and industry)
8	Female	EH	Public–private partnership	Wind-pumped hydropower station	Operations and maintenance engineer
9	Female	All	Public sector	Government	Politician (councilwoman for human resources, equality, and sexual affective diversity)
10	Female	All	Public sector	Government	Politician (head of NextGenerationEU funds monitoring)
11	Female	TF	Public sector	Insular council	Green funding advisor
12	Female	GC	Academia	Vocational training	Director of vocational training adaptation to dual training in connection with the energy transition
13	Male	TF	Public sector	Government	Politician (director of research and coordination of sustainable development)
14	Male	GC	Private sector	Construction	Sustainability and energy technical maintenance expert
15	Male	TF	Labor union	Insular council	General secretary of public services
16	Male	All	Private sector	Business consulting	Director
17	Male	GC	Public sector	Insular council	Environment, climate, energy, and knowledge counselor
18	Male	All	Private sector	Water supply	CEO
19	Male	All	Private sector	Technology and informatics	CEO
20	Male	All	Non-profit	Environmental organization	President associate for the energy transition
21	Male	All	Non-profit	Ecologists in Action	Member and spokesperson
22	Male	All	Public sector	Government	Politician (minister of ecological transition)
23	Male	All	Public sector	Government	Politician (vice-president)
24	Male	All	Public sector	Canary Islands Technological Institute	R&D&I director
25	Male	GC	Labor union	Insular council	Secretary for the environment
26	Male	GC	Public sector	Insular council	Politician (minister of the environment)
27	Male	TF	Private sector	Utility	Director of renewables
28	Male	All	Non-profit	Association of Renewable Energies	CEO
29	Male	TF	Academia	Dual vocational training	Teacher
30	Male	TF	Private sector	Renewable photovoltaic energy company	Technician
31	Male	GC	Academia	University	Professor in energy economics
32	Male	GC	Non-profit	Green energy consumer cooperative	Founder
33	Male	All	Public sector	Government	Politician (ex-president)
34	Male	All	Private sector	Water supply	Director of sustainable development
35	Male	TF	Academia	University	Professor in transport economics, sustainability and regional development
36	Male	TF	Academia	University	Professor in law

Note: TF refers to Tenerife, GC to Gran Canaria, LZ to Lanzarote, LP to La Palma, and EH to El Hierro. "All" indicates that the participant represents all islands due to their position or status, reflecting a broader regional perspective.

Appendix C

Table C.1
Factor matrix after varimax rotation.

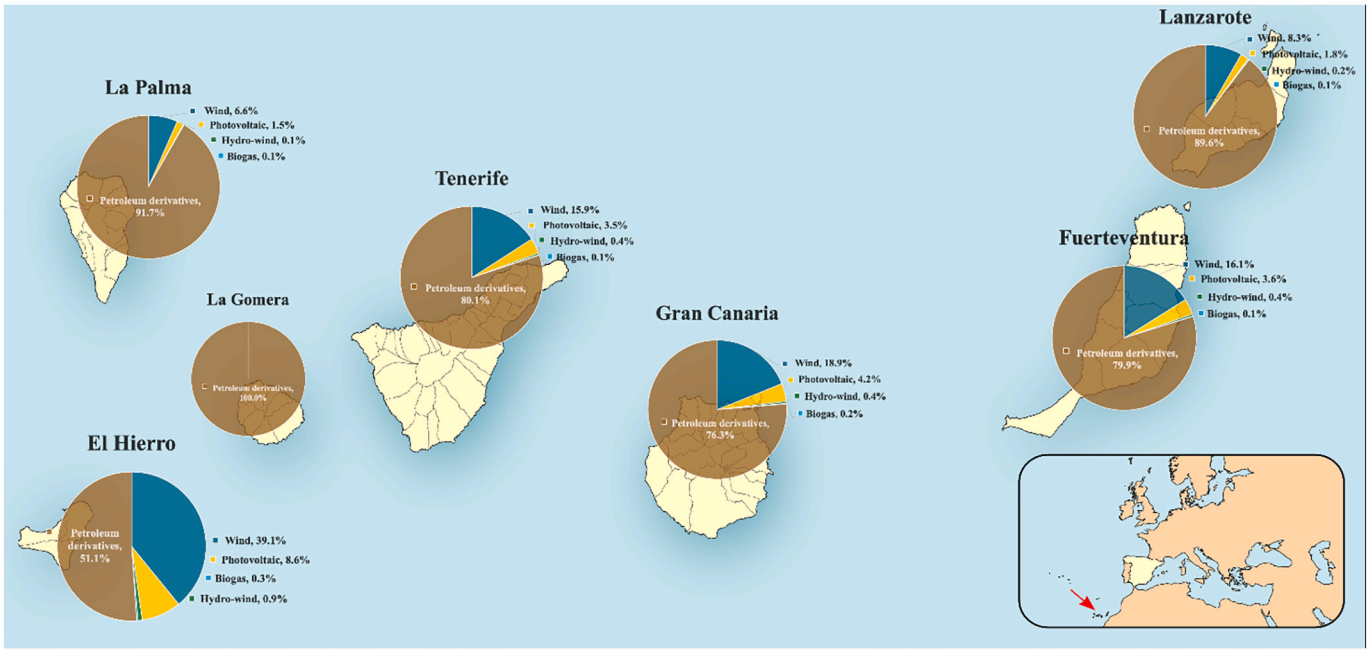
ID	Field	Factor 1	flag	Factor 2	flag	Factor 3.1	flag	Factor 3.2	flag	Factor 4	flag	Factor 5	flag
3	Academia	0.81749	☑	-0.18512		0.00795		-0.00795		0.14623		0.09503	
18	Private sector	0.74327	☑	0.20633		0.17484		-0.17484		0.02037		0.38261	
19	Private sector	0.63835	☑	-0.04003		-0.01491		0.01491		-0.08016		0.03703	
4	Non-profit	0.58251	☑	0.23251		-0.17232		0.14232		0.26107		0.21324	
20	Non-profit	0.57422	☑	0.34403		-0.0593		0.0593		-0.07876		0.11958	
5	Public sector	0.5713	☑	0.11765		0.07605		-0.07605		0.04776		0.18736	
1*	Labor union	0.56862		0.43845		0.16842		-0.16842		0.31446		0.11334	
21	Non-profit	-0.02729		0.768	☑	-0.14987		0.14987		0.36612		0.1142	
22	Public sector	0.19018		0.74765	☑	-0.00779		0.00779		-0.01301		0.22353	
23	Public sector	-0.10185		0.74813	☑	0.24251		-0.24251		0.04826		0.27968	
24	Public sector	0.04661		0.66674	☑	-0.17548		0.17548		-0.16515		0.22452	
6	Labor union	0.13701		0.59632	☑	-0.0987		0.0987		0.38177		0.06007	
13*	Public sector	0.47359		0.5192		-0.23663		0.23663		0.13234		0.00138	
25	Public sector	-0.03253		0.51196	☑	0.03694		-0.03694		-0.21141		-0.31509	
14*	Private sector	0.50551		0.5115		0.26779		-0.26779		0.29297		-0.07533	
17*	Public sector	0.38686		0.46242		-0.17595		0.17595		0.298		0.23256	
26	Public sector	0.1761		0.36793	☑	0.11714		-0.11714		0.04233		0.04591	
27	Private sector	0.10839		-0.11587		0.76364	☑	-0.76364		0.03579		0.0991	
7	Public sector	0.01796		0.07367		-0.7327		0.7327	☑	0.38527		0.28841	
12*	Academia	0.53678		0.04245		0.56781		-0.56781		0.21359		0.4144	
8	Public–private partnership	0.40322		0.06158		-0.55326		0.55326	☑	0.20699		0.28273	
28	Non-profit	0.04261		0.14585		0.51322	☑	-0.51322		0.22779		0.14504	
9	Public sector	0.17245		-0.09897		-0.06398		0.06398		0.74844	☑	0.09724	
29	Academia	-0.12843		0.11244		-0.2326		0.2326		0.64997	☑	-0.05552	
30	Academia	0.36965		0.08024		0.30802		-0.30802		0.61288	☑	0.15429	
31	Academia	-0.14298		0.19719		0.2473		-0.2473		0.57927	☑	0.06431	
2*	Public sector	0.4375		-0.04552		0.01672		-0.01672		0.47582		0.25701	
15*	Labor union	0.39897		0.17194		0.04767		-0.04767		0.47534		0.35094	
32	Non-profit	0.16393		0.14048		-0.06534		0.06534		0.20986		0.71223	☑
10	Public sector	0.13151		0.10481		-0.08276		0.08276		0.0284		0.67624	☑
33	Public sector	0.52515		0.12305		0.11221		-0.11224		0.01237		0.61135	☑
34	Private sector	0.28073		0.3949		0.02774		-0.02774		-0.0184		0.5918	☑
11	Public sector	-0.20168		0.45719		-0.01667		0.01667		0.03606		0.57245	☑
35	Academia	0.25964		-0.07843		0.08713		-0.08713		0.37401		0.56914	☑
16*	Private sector	0.49577		0.20221		0.12348		-0.12348		0.02557		0.51415	
36	Academia	0.35938		-0.00293		0.32739		-0.32739		0.06214		0.4993	☑

Table C.2
General statistics of rotated factors.

	Factor 1	Factor 2	Factor 3.1	Factor 3.2	Factor 4	Factor 5
Explained variance (%)	15	13	4	4	9	11
Number of defining variables	6	7	2	2	4	7
Average relative coefficient	0.800	0.800	0.800	0.800	0.800	0.800
Composite reliability	0.960	0.966	0.889	0.889	0.941	0.966
Standard error of factor *Z*-scores	0.200	0.184	0.333	0.333	0.243	0.184

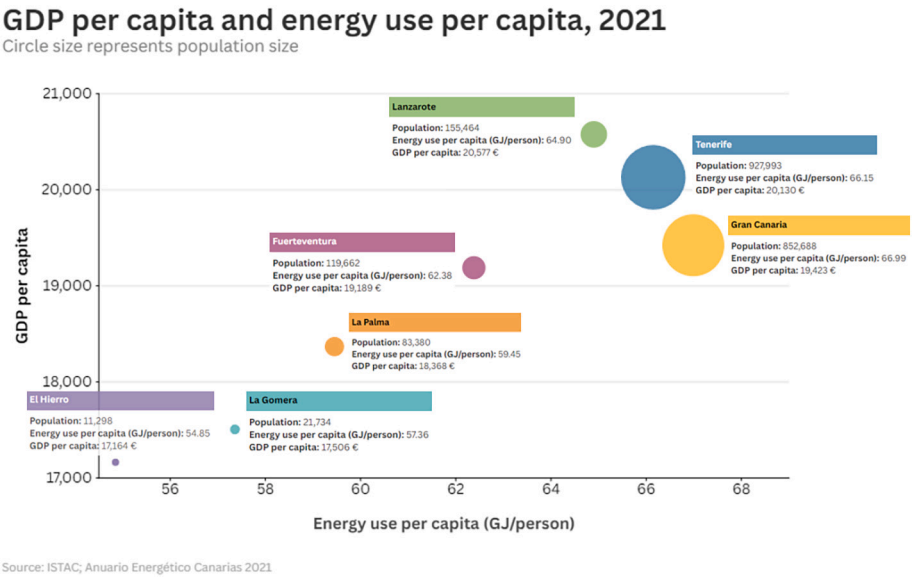
Appendix D

Fig. D.1
Canary Islands energy mix.



Source: Own elaboration, ISTAC; Anuario Energético Canarias 2021.

Fig. D.2
GDP per capita and energy use per capita, 2021.



Data availability

Data will be made available on request.

References

[1] S. Aswani, I. Vaccaro, K. Abernethy, S. Albert, J.F.-L. De Pablo, Can perceptions of environmental and climate change in island communities assist in adaptation planning locally? Environ. Manag. 56 (6) (2015) 1487, https://doi.org/10.1007/s00267-015-0572-3.

[2] H. Carlsen, K.H. Dreborg, P. Wikman-Svahn, Tailor-made scenario planning for local adaptation to climate change, Mitig. Adapt. Strat. Glob. Chang. 18 (8) (2012) 1239, https://doi.org/10.1007/s11027-012-9419-x.

[3] S. Escamilla-Fraile, F.J. Ramos-Real, F.J. Calero-García, B. González-Díaz, A review of the energy policy and energy transition objectives for 2040 in the Canary Islands (Spain), Energies 16 (3) (2023) 1321, https://doi.org/10.3390/en16031321.

[4] A. Lorente de las Casas, I. Mirkova, F.J. Ramos-Real, Stakeholders' perceptions of the possible energy sustainability solutions in the Hotels of the Canary Islands, Sustainability 13 (12) (2021) 6943, https://doi.org/10.3390/su13126943.
[5] B.K. Sovacool, Who are the victims of low-carbon transitions? Towards a political ecology of climate change mitigation, Energy Res. Soc. Sci. 73 (2021) 101916, https://doi.org/10.1016/j.erss.2021.101916.
[6] S.R. Brown, A primer on Q methodology, Operant Subjectivity 16 (1993) 91138, https://doi.org/10.15133/j.os.1993.002.
[7] D. McCauley, R. Heffron, Just transition: integrating climate, energy and environmental justice, Energy Policy 119 (Journal Article) (2018) 1–7, https://doi.org/10.1016/j.enpol.2018.04.014.
[8] P. Newell, D. Mulvaney, The political economy of the 'just transition', Geogr. J. 179 (2) (2013) 132, https://doi.org/10.1111/geoj.12008.
[9] R.J. Heffron, The Just Framework. Achieving a Just Transition to a Low-carbon Economy, 2021, https://doi.org/10.1007/978-3-030-89460-3_3.
[10] D. Stevis, E. Morena, Krause Dunja, Just Transitions. Social Justice in the Shift Towards a Low-carbon World, 2020.
[11] S. Dekker, Designing and Implementing Policy for a Just Transition. A Working Paper Commissioned by the Climate Change Advisory Council, Ireland, 2020.
[12] D. Mccauley, R.J. Heffron, H. Stephan, K. Jenkins, Advancing energy justice: the triumvirate of tenets, Int. Energy Law Rev. 3 (32) (2013) 107–110.
[13] R.J. Heffron, Energy justice – the triumvirate of tenets revisited and revised, J. Energy Nat. Resour. Law 1 (2023), https://doi.org/10.1080/02646811.2023.2256593.
[14] A. Crespy, M. Munta, Lost in transition? Social justice and the politics of the EU green transition, Transfer Eur. Rev. Labour Res. 29 (2) (2023) 235–251, https://doi.org/10.1177/10242589231173072.
[15] A.N. Ullman, N. Kittner, Are global efforts coordinated for a just transition? A review of civil society, financial, government, and academic just transition frameworks, Energy Res. Soc. Sci. 108 (2023), https://doi.org/10.1016/j.erss.2023.103371.
[16] A.H. Mulia, S. Wukirasih, W.H. Suryadinata, Whither just transition? A case study of energy transition mechanism (ETM) country platform in Indonesia, Glob. South Rev. 5 (1) (2023) 31–46, https://doi.org/10.22146/globalsouth.81111.
[17] L. Nurse, R. Mclean, J. Agard, L. Briguglio, V. Duvat-Magnan, N. Pelesikoti, E. Tompkins, A. Webb, Al Small Islands Barros, C. Field, D. Dokken, K. Mach, T. Bilir, M. Chatterjee, K. Ebi, Y. Estrada, R. Genova, B. Girma, E. Kissel, A. Levy, S. MacCracken, P. Mastrandrea, Small Islands, 2014, pp. 1613–1654.
[18] Intergovernmental Panel on Climate Change (IPCC), Technical Summary. The Ocean and Cryosphere in a Changing Climate, 2022, pp. 39–70, https://doi.org/10.1017/9781009157964.002.
[19] F. Chen, N. Duic, L. Manuel Alves, M. Da Graça Carvalho, Renewislands—renewable energy solutions for islands, Renew. Sustain. Energy Rev. 11 (8) (2007) 1888–1902, https://doi.org/10.1016/j.rser.2005.12.009.
[20] B.K. Sovacool, Rejecting renewables: the socio-technical impediments to renewable electricity in the United States, Energy Policy 37 (11) (2009), https://doi.org/10.1016/j.enpol.2009.05.073.
[21] X. Garcia-Casals, R. Ferroukhi, B. Parajuli, Measuring the socio-economic footprint of the energy transition, Energy Transit. 3 (1–2) (2019) 105–118, https://doi.org/10.1007/s41825-019-00018-6.
[22] T. Van Gevelt, T. Zaman, F. George, M.M. Bennett, S.D. Fam, J.E. Kim, End-user perceptions of success and failure: narratives from a natural laboratory of rural electrification projects in Malaysian Borneo, Energy Sustain. Dev. 59 (2020) 189–198, https://doi.org/10.1016/j.esd.2020.10.008.
[23] A. Pacheco, J. Monteiro, J. Santos, C. Sequeira, J. Nunes, Energy transition process and community engagement on geographic islands: the case of Culatra Island (Ria Formosa, Portugal), Renew. Energy 184 (2022) 700–711, https://doi.org/10.1016/j.renene.2021.11.115.
[24] J. Jantzen, M. Kristensen, T.H. Christensen, Sociotechnical transition to smart energy: the case of Samso 1997–2030, Energy 162 (2018) 20–34, https://doi.org/10.1016/j.energy.2018.07.174.
[25] L.L. Delina, J. Ocon, E. Esparcia, What makes energy systems in climate-vulnerable islands resilient? Insights from the Philippines and Thailand, Energy Res. Soc. Sci. 69 (2020) 101703, https://doi.org/10.1016/j.erss.2020.101703.
[26] S. Karampela, C. Papazoglou, T. Kizos, I. Spilanis, Sustainable local development on Aegean Islands: a meta-analysis of the literature, ISJ 12 (1) (2017) 71–94, https://doi.org/10.24043/isj.6.
[27] G. Winter-Althaus, A. Pulido-Alonso, L. Trujillo, E. Rosales-Asensio, EU Islands and the Clean Energy Transition, 2023, https://doi.org/10.1007/978-3-031-23066-0.
[28] M. Juanpera, B. Domenech, L. Ferrer-Martí, A. Garzón, R. Pastor, Renewable-based electrification for remote locations. Does short-term success endure over time? A case study in Peru, Renew. Sustain. Energy Rev. 146 (2021) 111177, https://doi.org/10.1016/j.rser.2021.111177.
[29] G.W. Hong, N. Abe, Sustainability assessment of renewable energy projects for off-grid rural electrification: the Pangan-an Island case in the Philippines, Renew. Sustain. Energy Rev. 16 (1) (2012) 54–64, https://doi.org/10.1016/j.rser.2011.07.136.
[30] L. Lozano, E.B. Taboada, Elucidating the challenges and risks of rural island electrification from the end-users' perspective: a case study in the Philippines, Energy Policy 150 (2021) 112143, https://doi.org/10.1016/j.enpol.2021.112143.
[31] E. Heaslip, F. Fahy, Developing transdisciplinary approaches to community energy transitions: an island case study, Energy Res. Soc. Sci. 45 (2018) 153–163, https://doi.org/10.1016/j.erss.2018.07.013.
[32] H. Meschede, P. Bertheau, S. Khalili, C. Breyer, A review of 100% renewable energy scenarios on islands, WIREs Energy Environ. 11 (6) (2022) e450, https://doi.org/10.1002/wene.450.
[33] S. Gössling, P. Peeters, C.M. Hall, J.-P. Ceron, G. Dubois, L.V. Lehmann, D. Scott, Tourism and water use: supply, demand, and security. An international review, Tour. Manag. 33 (1) (2012) 1–15, https://doi.org/10.1016/j.tourman.2011.03.015.
[34] B. Bramwell, B. Lane, Critical research on the governance of tourism and sustainability, J. Sustain. Tour. 19 (4–5) (2011) 411–421, https://doi.org/10.1080/09669582.2011.580586.
[35] A. Rizzo, Managing the energy transition in a tourism-driven economy: the case of Malta, Sustain. Cities Soc. 33 (2017) 126–133, https://doi.org/10.1016/j.scs.2016.12.005.
[36] O. Erdinc, N.G. Paterakis, J.P.S. Catalão, Overview of insular power systems under increasing penetration of renewable energy sources: opportunities and challenges, Renew. Sustain. Energy Rev. 52 (2015) 333–346, https://doi.org/10.1016/j.rser.2015.07.104.
[37] . B. M. Warmburg. Sustainable Energy for Islands: Opportunities versus Constraints of a 100%Renewable Electricity Systems.
[38] T.M. Skjølsvold, M. Ryghaug, W. Throndsen, European island imaginaries: examining the actors, innovations, and renewable energy transitions of 8 islands, Energy Res. Soc. Sci. 65 (2020) 101491, https://doi.org/10.1016/j.erss.2020.101491.
[39] Ellis Geraint, Ferraro Gianluca, The social acceptance of wind energy: where we stand and the path ahead 72 (2016).
[40] L. Topaloglu, L. Ioannidis, From transition management towards just transition and place-based governance. The case of Western Macedonia in Greece, J. Entrep. Manag. Innov. 3 (2022) 37–74.
[41] A.H. Sorman, X. García-Muros, C. Pizarro-Irizar, M. González-Eguino, Lost (and found) in Transition: expert stakeholder insights on low-carbon energy transitions in Spain, Energy Res. Soc. Sci. 64 (2020), https://doi.org/10.1016/j.erss.2019.101414.
[42] Official Gazette of the Canary Islands No. 112, Canary Islands Climate Change and Energy Transition Law, 2022.
[43] S.B. Friend, A windswept archipelago: stories of perception, time and landscape in the Orkney Islands, The Unfamiliar 5 (2015) 1–2, https://doi.org/10.2218/unfamiliar.v5i1-2.1189.
[44] L. Topaloglou, Just transition governance via self-sufficiency regional development, Self-Sufficiency Sustain. Cities Reg. 36–56 (2024), https://doi.org/10.4324/9781003498216-5.
[45] H.C. Gils, S. Simon, Carbon neutral archipelago – 100% renewable energy supply for the Canary Islands, Appl. Energy 188 (2017) 342–355, https://doi.org/10.1016/j.apenergy.2016.12.023.
[46] J.C. Lozano Medina, V. Henríquez Concepción, F.A. León Zerpa, C.A. Mendieta Pino, Gran Canaria energy system: Integration of the chira-soria pumped hydroelectric power plant and analysis of weekly daily demand patterns for the year 2023, Renew. Energy 232 (2024), https://doi.org/10.1016/j.renene.2024.121128.
[47] I. Nuez, J. Osorio, Calculation of tourist sector electricity consumption and its cost in subsidised insular electrical systems: the case of the Canary Islands, Spain, Energy Policy 132 (2019) 839–853, https://doi.org/10.1016/j.enpol.2019.06.032.
[48] Bárbara Anna Willaarts, Maria Helena Novais, Victor Javier Corral, Antonio Hurtado, Manuela Morais, Erik Zilliox, Ana Musicki Savic, Juan Antonio de la Fuente Bencomo, Baltasar Peñate Suárez, Narratives of the Water-energy Nexus in the European Atlantic Area: Quantitative Storytelling of the Water-energy Nexus, 2022.
[49] J. Carrillo, A. González, J.C. Pérez, F.J. Expósito, J.P. Díaz, Projected impacts of climate change on tourism in the Canary Islands, Reg. Environ. Chang. 22 (2) (2022), https://doi.org/10.1007/s10113-022-01880-9.
[50] I. Medina-Jiménez, F.J. Ramos Real, J.E. León-Vielma, F. Calero-García, Decarbonizing the Tourism Sector in the Canary Islands Through the Introduction of Electric Vehicles: An Empirical Analysis of Stakeholder Perspectives, 2024, https://doi.org/10.2139/ssrn.4837712.
[51] F. Inchausti-Sintes, U. Pérez-Granja, J.J. Morales-Mohamed, Analysing labour productivity and its economic consequences in the two Spanish tourist archipelagos, Tour. Econ. 27 (5) (2021) 1039–1059, https://doi.org/10.1177/1354816620917865.
[52] F. Celata, A. Romano, Overtourism and online short-term rental platforms in Italian cities, J. Sustain. Tour. 30 (5) (2022) 1020–1039, https://doi.org/10.1080/09669582.2020.1788568.
[53] E. Diaz-Farina, J.J. Díaz-Hernández, N. Padrón-Fumero, The contribution of tourism to municipal solid waste generation: a mixed demand-supply approach on the island of Tenerife, Waste Management (Elmsford) 102 (2020) 587–597, https://doi.org/10.1016/j.wasman.2019.11.023.
[54] S.E. Bell, C. Daggett, C. Labuski, Toward feminist energy systems: why adding women and solar panels is not enough☆, Energy Res. Soc. Sci. 68 (2020) 101557 https://doi.org/10.1016/j.erss.2020.101557.
[55] A.N. Kimbu, M.Z. Ngoasong, A. De Jong, Gender, entrepreneurship and social policy in tourism: tying the knot, J. Sustain. Tour. 32 (3) (2024) 421–437, https://doi.org/10.1080/09669582.2024.2309216.
[56] W. Veenendaal, Islands of democracy, Area 52 (1) (2020) 30–37, https://doi.org/10.1111/area.12462.
[57] J. Corbett, "Everybody knows everybody": practising politics in the Pacific Islands, Democratization 22 (1) (2015) 51–72, https://doi.org/10.1080/13510347.2013.811233.
[58] C. Figueroa, C. Brannstrom, L. Seghezzo, K. Lee, W. Jepson, Social perspectives on the sustainability challenges within the desalination sector: a Q-method study, Sustainability Sci. Pract. Policy 20 (1) (2024), https://doi.org/10.1080/15487733.2024.2400761.

[59] F. Fuso Nerini, B. Sovacool, N. Hughes, L. Cozzi, E. Cosgrave, M. Howells, M. Tavoni, J. Tomei, H. Zerriffi, B. Milligan, Connecting climate action with other sustainable development goals, Nat. Sustain. 2 (8) (2019) 674, https://doi.org/10.1038/s41893-019-0334-y.
[60] A. Banerjee, G. Schuitema, How just are just transition plans? Perceptions of decarbonisation and low-carbon energy transitions among peat workers in Ireland, Energy Res. Soc. Sci. 88 (2022), https://doi.org/10.1016/j.erss.2022.102616.
[61] L. Topaloglou, A. Kouskoura, O. Janikowska, R. Grozeva, K. Nikolaidou, I. Karagiannis, J. Kulczycka, Stakeholder Involvement in Just Transition Process: Myth or Reality?, 2023.
[62] I. Beauchampet, B. Walsh, Energy citizenship in the Netherlands: the complexities of public engagement in a large-scale energy transition, Energy Res. Soc. Sci. 76 (2021), https://doi.org/10.1016/j.erss.2021.102056.
[63] M. Aitken, Wind power and community benefits: challenges and opportunities, Energy Policy 38 (10) (2010) 6066–6075, https://doi.org/10.1016/j.enpol.2010.05.062.
[64] X. Wang, K. Lo, Just transition: a conceptual review, Energy Res. Soc. Sci. 82 (2021) 102291, https://doi.org/10.1016/j.erss.2021.102291.
[65] S.Y. Pan, M. Gao, H. Kim, K.J. Shah, S.L. Pei, P.C. Chiang, Advances and challenges in sustainable tourism toward a green economy, Sci. Total Environ. 635 (2018) 452–469, https://doi.org/10.1016/j.scitotenv.2018.04.134.
[66] R. Mohideen, J. Kolantharaj, Managing gender-inclusive, just energy transitions in South Asia, Oxford Open Energy 3 (2024) oiae006, https://doi.org/10.1093/ooenergy/oiae006.
[67] D. Lee, M. Hampton, J. Jeyacheya, The political economy of precarious work in the tourism industry in small island developing states, Rev. Int. Polit. Econ. 22 (1) (2015) 194–223, https://doi.org/10.1080/09692290.2014.887590.
[68] W. Stephenson, Technique of factor analysis, Nature 136 (1935) 297, https://doi.org/10.1038/136297b0.
[69] C. Brannstrom, W. Jepson, N. Persons, Social perspectives on wind-power development in West Texas. The new geographies of energy 13 (2012).
[70] M. Cotton, P. Devine-Wright, Discourses of energy infrastructure development: a Q-method study of electricity transmission line siting in the UK, Environ Plan A 43 (4) (2011) 942–960, https://doi.org/10.1068/a43401.
[71] E. Cuppen, S. Breukers, M. Hisschemöller, E. Bergsma, Q methodology to select participants for a stakeholder dialogue on energy options from biomass in the Netherlands, Ecol. Econ. 69 (3) (2010) 579–591, https://doi.org/10.1016/j.ecolecon.2009.09.005.
[72] R.C. Spijkerboer, C. Tuhan, Assemblages Out of Steam: The Discourses Surrounding Geothermal Energy as Part of Energy Transition in Turkey, 2023, pp. 46–48.
[73] P. Díaz, C. Adler, A. Patt, Do stakeholders' perspectives on renewable energy infrastructure pose a risk to energy policy implementation? A case of a hydropower plant in Switzerland, Energy Policy 108 (2017) 21–28, https://doi.org/10.1016/j.enpol.2017.05.033.
[74] D. Pagnussatt, M. Petrini, A.C.M.Z. dos Santos, L.M. da Silveira, What do local stakeholders think about the impacts of small hydroelectric plants? Using Q methodology to understand different perspectives, Energy Policy 112 (2018) 372–380, https://doi.org/10.1016/j.enpol.2017.10.029.
[75] M.N. Matinga, I. Pinedo-Pascua, J. Vervaeke, F. Monforti-Ferrario, S. Szabó, Do African and European energy stakeholders agree on key energy drivers in Africa? Using Q methodology to understand perceptions on energy access debates, Energy Policy 69 (2014) 154–164, https://doi.org/10.1016/j.enpol.2013.12.041.
[76] I. Kougias, A. Nikitas, C. Thiel, S. Szabó, Clean energy and transport pathways for islands: a stakeholder analysis using Q method, Transp. Res. Part D: Transp. Environ. 78 (2020) 102180, https://doi.org/10.1016/j.trd.2019.11.009.
[77] E. Cuppen, M.G.C. Bosch-Rekveldt, E. Pikaar, D.C. Mehos, Stakeholder engagement in large-scale energy infrastructure projects: revealing perspectives using Q methodology, Int. J. Proj. Manag. 34 (7) (2016) 1347–1359, https://doi.org/10.1016/j.ijproman.2016.01.003.
[78] L.M. Carr, D.Y. Liu, Measuring stakeholder perspectives on environmental and community stability in a tourism-dependent economy, J. Tour. Res. 18 (6) (2016) 620–632, https://doi.org/10.1002/jtr.2084.
[79] K. Maczka, A. Lis-Plesińska, K. Iwińska, Epistemic justice impossible? Expert perceptions of the participatory monitoring of geo-energy projects in Poland, Energy Res. Soc. Sci. 102 (2023) 103154, https://doi.org/10.1016/j.erss.2023.103154.
[80] D.J. Salazar, Saving nature and seeking justice: environmental activists in the Pacific northwest, Organ. Environ. 22 (2) (2009) 230–254, https://doi.org/10.1177/1086026608326076.
[81] G. Sneegas, S. Beckner, C. Brannstrom, W. Jepson, K. Lee, L. Seghezzo, Using Q-methodology in environmental sustainability research: a bibliometric analysis and systematic review, Ecol. Econ. 180 (2021) 106864, https://doi.org/10.1016/j.ecolecon.2020.106864.
[82] B.B. Davies, I.D. Hodge, Shifting environmental perspectives in agriculture: repeated Q analysis and the stability of preference structures, Ecol. Econ. 83 (2012) 51, https://doi.org/10.1016/j.ecolecon.2012.08.013.
[83] C. Parker, S. Scott, A. Geddes, Snowball Sampling, SAGE Research Methods Foundations, 2019.
[84] E. Allen, H. Lyons, J.C. Stephens, Women's leadership in renewable transformation, energy justice and energy democracy: redistributing power, Energy Res. Soc. Sci. 57 (2019), https://doi.org/10.1016/j.erss.2019.101233.
[85] A. Kronsell, Gender and transition in climate governance, Environ. Innov. Soc. Trans. 7 (2013) 1, https://doi.org/10.1016/j.eist.2012.12.003.
[86] J. Van Exel, G. De Graaf, Q methodology: a sneak preview, 2005, pp. 1–25. https://sites.nd.edu/lapseylab/files/2014/10/vanExel.pdf.
[87] L. Rieber, Building a software tool to explore subjectivity in the classroom: a design case, Int. J. Des. Learn. 11 (1) (2020) 140–150, https://doi.org/10.14434/ijdl.v11i1.26471.
[88] S. Ramlo, Non-statistical, substantive generalization: lessons from Q methodology, Int. J. Res. Method Educ. 47 (1) (2023) 65, https://doi.org/10.1080/1743727x.2023.2173735.
[89] D.D. Thomas, L.R. Baas, The issue of generalization in Q-methodology: "reliable schematics" revisited, Operant Subjectivity 16 (1993) 18–36. https://ojs.library.okstate.edu/osu/index.php/osub/article/view/9025.
[90] K.E. Dennis, Commentary: looking at reliability and validity through Q-colored glasses, Operant Subjectivity 37–44 (1992). https://ojs.library.okstate.edu/osu/index.php/osub/article/view/9026.
[91] S. Banasick, KADE: a desktop application for Q methodology, J. Open Source Softw. 4 (36) (2019), https://doi.org/10.21105/joss.01360.
[92] S. Watts, P. Stenner, Doing Q methodology: theory, method and interpretation, Qual. Res. Psychol. 2 (1) (2005) 67–91, https://doi.org/10.1191/1478088705qp022oa.
[93] N. Akhtar-Danesh, A comparison between major factor extraction and factor rotation techniques in Q-methodology, Open J. Appl. Sci. 07 (04) (2017), https://doi.org/10.4236/ojapps.2017.74013.
[94] T. Webler, S. Danielson, S.T. February, Using Q Method to Reveal Social Perspectives in Environmental Research, Social and Environmental Research Institute, Greenfield MA, 2009.
[95] M. Uche-Soria, C. Rodríguez-Monroy, Special regulation of isolated power systems: the Canary Islands, Spain, Sustainability 10 (7) (2018), https://doi.org/10.3390/su10072572.
[96] S. Batel, Research on the social acceptance of renewable energy technologies: past, present and future, Energy Res. Soc. Sci. 68 (2020) 101544, https://doi.org/10.1016/j.erss.2020.101544.
[97] R. Ginanjar, Community empowerment in tourism development: concepts and implications, Eastasouth Manag. Bus. 01 (03) 111–119, doi:10.58812/esmb.v1.i03.