International Journal of
Sustainable Energy Planning and Management

Participatory Process Protocol to Reinforce Energy Planning on Islands: A Knowledge Transfer in Spain

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ABSTRACT

EU islands face vast challenges to cope with climate targets while handling complex stakeholders' networks. This study aims to propose a Participatory Process Protocol to enhance the output of energy plans and projects through the effective engagement of local stakeholders. A knowledge transfer methodology is set to build on a successful experience of the Mediterranean port-cities of Málaga, Cádiz and Sète, now adapted into the case of European Union's islands advancing with energy developments. First, a clustering analysis is carried out for inhabited islands, resulting in 4 clusters that serve as the classification for the calculation of energy transition Key Performance Indicators according to information received from 70 islands. Based on this, the original Protocol is restructured as a complement for the Sustainable Energy and Climate Action Plan methodology, the one most adopted by European islands. Finally, how the Protocol might be implemented depending on the particularities of each cluster is discussed, as well as for the case of Spanish islands (Gran Canaria, Tenerife, and La Palma). Specific suggestions and key recommendations for the implementation of the Participatory Process Protocol are mentioned, as an instrument that could raise strategic suggestions from stakeholders to enhance the results of decision-making processes.

Keywords

Energy transition;
Sustainable island;
Energy planning;
Participation process;
Stakeholder's engagement;

http://doi.org/10.54337/ijsepm.7090

1. Introduction

Participation in decision-making processes is core to the concept of sustainable development [1,2] and has been strengthened since the adoption of the Sustainable Development Goals (SDGs) framework. 'Goal 11: Sustainable Cities and Communities' [3] states the need to enhance participatory capacity for the planning of inclusive human settlements. Additionally, the requirement for multi-stakeholder engagement as a complement to support the achievements of SDGs, allowing the share of knowledge, expertise and technologies, is key for 'Goal 17: Partnership for the Goals' [4]. The European Commission [5] has even identified the insufficient involvement of the relevant stakeholders as one of the weaknesses in the implementation of the Europe 2020 strategy.

High-expertise stakeholders, together with other less skilled ones, as citizens or consumers should be engaged in decision-making processes [6] by exploiting the available tools and methods on participation fostering [7], to achieve successful attainment of strategies, plans and projects. Evidence suggests benefits of involving a diverse range of actors through participation processes, such as mutual learning and ownership sense increase [8]. Other benefits are the achievement of a wider consensus over new strategies and priorities [9] and the facilitation of policymaking processes [10]. Nonetheless, the adoption of participation processes also raises a series of challenges, such as defining the most effective number and type of stakeholder to involve [11], selecting the most meaningful exchange

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Abbreviations

BEI:	Baseline Emission Inventory
CETA:	Clean Energy Transition Agenda
ET_KPI:	Energy Transition Key Performance Indicator
FG:	Focus Group
GIS:	Geographic Information System
LEC:	Local Energy Community
NESOI:	New Energy Solutions Optimized for Islands
NUTS:	Nomenclature of Territorial Units for Statistics
PIM:	Power-Interest Matrix
PPP:	Participatory Process Protocol
PV:	Photovoltaic
RES:	Renewable Energy Sources
RVA:	Risk and Vulnerability Assessment
SDG:	Sustainable Development Goals
SECAP:	Sustainable Energy and Climate Action Plan
SI:	Semi-structured Interviews
SWOT:	Strengths Weaknesses Opportunities and Threats
WS:	Workshops

mechanisms [12], or managing stakeholders participation within vertical power structures [13].

In the case of energy transition planning on islands, the effective implementation of low carbon solutions is likely to depend on the proper understanding of the governance processes occurring within limited spatial and political settings [14]. Instead of approaching islands from outside, as in "planning of islands" or "planning for islands", it is crucial to include perpectives such as "from islands" and "working with islands", so bottom-up governance, self-sufficiency and cross-border developments may be internilized both by planners and citizens [15]. The local ownership sense towards a proposed energy transition, as well as the different institutional structures, and the differing priorities of actors are also key to understanding the context in which such planning processes take place [16]. Public acceptance also plays a key role in the introduction of new technologies or systems. Addressing public acceptance may require dealing with divergent attitudes toward specific clean energy plans or projects [17]. This might vary in terms of (i) the political acceptance regarding the opinion of key stakeholders; (ii) the social acceptability, understood as the wider social opinion towards green energy solutions [18]; (iii) the community acceptance of those physically or spatially affected by new developments; and (iv) the market acceptance of big consumers and investors [19], as could be the tourism industry.

Within this context, the main objective of this study is to propose a Participatory Process Protocol (PPP) for energy transition planning processes in islands by transferring the knowledge gathered from touristic port-cities dealing with sustainable planning. The rationale behind this approach is to cope with the Covenant of Mayors' (CoM) recommendations [20] so that the effective involvement of local and non-local key agents might secure a short-term implementation, ease financing mobilisation, and reduce risk mitigation of energy plans. Although the PPP is conceived as a tool for EU islands in general, the scope of this research focuses on the Mediterranean cities of Málaga, Cádiz and Sète, from the port-cities side, and the Canary Islands from the island side. This research expects to contribute to the understanding of the following interrogations:

- What is the most frequent approach islands are following in order to comply with the 2030 energy objectives?
- What might islands learn from peninsular cities facing similar challenges such as seasonality due to coastal tourism?
- How can energy planning methodologies be enhanced by structured participation approaches?

After the introduction, the following section describes the evidence about the importance of participatory approaches for energy transition planning in islands [15]. The previous experiences on participation in decision-making processes in the case of port-cities is also presented. The third section presents the methodology that includes the data collection, the revision of the status of energy transition in EU islands, and the layout of the PPP. Its implementation results in the identification of 4 clusters for EU inhabited islands, and the calculation of 4 Energy Transition KPI (ET_KPI) to compare the energy status of islands on each cluster. Based on this information, the PPP is later detailed and discussed by examining the experiences of the three study cases from the Mediterranean port-cities. Finally, the conclusions are presented according to the expected contribution from the authors.

2. Framework for energy planning

The following section establishes the framework in which islands are progressing with their energy plans and projects. Later, the case studies on which this research is based are showcased.

2.1. EU islands needs for an energy transition

The adoption of the European Green Deal [21], which raised the 2030 greenhouse gas emission's reduction target to at least 55% compared with 1990, requires

cities and regions to adopt actions towards climate mitigation and adaptation. This study focuses on islands with high touristic seasonality and their needs to effectively involve stakeholders, citizens and visitors in their energy transition and climate planning. This is done for the reasons exposed hereafter.

First, the European Union (EU) possess more than 2,200 inhabited islands that rely heavily on fossil fuel-based energy systems [22], even more so in remote islands [23]. However, their geographical location endows them with key attributes, such as high Renewable Energy Sources (RES) availability, mainly solar and wind, and isolated transport systems for electric mobility deployment [24]. Other unique challenges that energy systems on EU islands face are supply constraints due to lack of electricity and gas interconnections with the mainland, higher energy costs above average EU levels, increased difficulty to perform supply-demand balancing and, as mentioned, high seasonality of demand [22].

Second, the economy on islands tends to heavily rely on the tourism sector, a situation that imposes extra planning challenges. EU islands are destinations of mass coastal tourism, and, as they become complex multifunctional activity centres, their planning needs tend to go beyond traditional approaches [25, 26]. Urban expansion due to tourism [27] or significant increments in energy demand due to seasonality [22] requires the development of efficient and flexible planning methodologies. Besides this, tourism on islands is mainly developed around the quality of coastal and marine environmental services [28], so tourism might act as both an economic promotor and sustainability issues source. For example, in 2017, the cruise industry contributed more than €47 billion to the European economy, a 16% increase against 2015 data. Also, around 403,000 direct jobs are promoted by cruise and cruise-related activities in Europe [29]. However, according to residents, most of the profits are not only seized by nonlocal firms, but the focus on cruise tourism also produces a crowding-out effect on other relevant projects [30]. Furthermore, islands are sensitive areas, home to an estimated one-third of globally threatened species, including many endemic ones [31]. The overcrowding of sensible spaces multiplies the magnitude of immediate impacts. This might cause long-term degradation of the very same cultural heritage or environmental richness that attracted visitors in the first place [32]. Once this state is reached, visitors' and developers' response is often to relocate their activities to more attractive areas elsewhere [33], hence, leaving behind the affected communities and resources.

Therefore, for islands experiencing such scenarios, there seems to be an imperative need for effective planning. Well-defined participatory processes might improve energy transition plans and projects, by ensuring the involvement of all decision-making levels of individual island municipalities, multi-municipal islands, or archipelagos. In this sense, this study is enclosed within the New Energy Solutions Optimized for Islands (NESOI) project, that grants economic and technical assistance to accelerate the implementation of energy projects in islands. Despite NESOI's EU-wide approach, this research is constrained in terms of scope, focusing only on case-studies' Mediterranean cities and subtropical islands in which the authors are directly involved. Although results should be evaluated with this limitation in mind, literature suggests that approaches, like the proposed PPP, could also prove useful in other, non-tropical territories [15].

2.2. Case studies: touristic port-cities and Spanish islands

This knowledge transfer binds together two experiences in sustainable planning mainly in Spanish municipalities. The study builds on the experience of Mediterranean port-cities with increasing cruise activity developing sustainable mobility plans, to provide Spanish islands with an energy planning methodology with an emphasis on participation.

On one hand, the case studies from the port-cities side are composed by Málaga, Cádiz and Sète. Together with other 15 Mediterranean port-cities from 10 European countries, these cities were subject to a decision-making process with a high rate of stakeholder participation for the adoption of innovative transport solutions [34,35]. On the other hand, three Spanish islands selected as beneficiaries of NESOI complete the rest of the case studies. Located in the islands of La Palma, Tenerife, and Gran Canaria, all from the Canary Islands archipelago, these islands were selected together with other 25 EU islands (28 beneficiaries out of more than 100 applicants) to receive technical assistance and economic support to develop energy transition projects. These three island case studies aim to establish Local Energy Communities (LEC) based on Photovoltaic (PV), in public buildings for La Palma and Tenerife and within an industrial park for Gran Canaria. As a summary, Table 1 presents the location, demography, and touristic indicators for both types of case studies.

Table 1. Case Study from Mediterranean port-cities

Case Study (type)	NUTS2 region*	Population	Annual cruise passengers, 2018	Annual nights per 1,000 inhabitants at NUTS2, 2017
Málaga (port-city)	ES61- Andalusia	596,000	510,000	8,172
Cádiz (port-city)		117,000	430,000	
Sète (port-city)	FR81 Languedoc-Roussillon	43,620	50,000	12,289
Gran Canaria (island)	ES70 -Canary Islands	894,636	676,000	48,437
Tenerife (island)		843,158	660,000	
La Palma (island)		81,350	256,000	

* Nomenclature of Territorial Units for Statistics level 2 (NUTS2).

Within this framework, the experience on Málaga, Cádiz and Sète serves as a precedent for islands due to seasonality-related challenges and the complex stakeholder network they share as coastal tourism destinations. Although tourism is a key feature tool for local destination development - e.g. around 30% of Canary Islands' GDP, seasonality might be the source of energy demand forecasting errors usually covered by fossil fuel-based power plants [36] or might provoke economic competitivity risks for energy projects [37]. Furthermore, touristic destinations display a complex network of stakeholders with divergent and unbalanced power relationships that need to be channelled to gather consensus. Tourism industry's stakeholders, for instance, seem to have the ultimate expression of power [38], but they are constantly counteracted by local authorities managing local services and attractions [39]. Another example are residents, who could act as risk generators or even as funding sources, depending on how their attitudes towards new developments are correctly acknowledged [40,41]. Participation opens a positive path towards public acceptability for innovative energy developments, such as marine RES [42], and towards better-informed consumers supporting long-term investments in energy efficiency [43].

3. PPP transferring methodology

As commented in Table 2, the following section describes the 3-stage methodology performed to transfer the PPP between case studies, from port-cities to islands.

3.1. Data Collection

To assess the status of islands regarding energy transition, two datasets are constructed. The first one includes available macro indicators for a total of 1,138 EU islands, such as population, area, annual tourism nights, climate zone, and electrical interconnection with the mainland [22,44,45]. Variables' merging is done via Geographical Information Systems (GIS) when joining based on NUTS2 code is not feasible. The second database corresponds to Energy Transition Key Performance Indicators (ET_KPIs) calculated over the responses from over 70 islands through an online survey launched by NESOI [46,47]. This information is organised, prepared, and processed to generate the mentioned ET_KPIs. Although the survey covers several topics, for purposes of this study, only those directly connected to the status quo of energy planning of islands are selected.

Table 2. Summary of the PPP transferring methodology

Stage	Description
Data collection	• Database construction for the segmentation of EU islands based on demography, tourism, and energy indicators (1,150 islands). • Energy transition Key performance indicator calculation for 70 islands collaborating within NESOI.
Island energy transition revision	• Island segmentation based on a K-means clustering. • Assessment of energy transition status of Spanish islands based on resulting clusters. • Comparison of case studies with the resulting island clusters.
Participatory process protocol layout	• Transferring of the source protocol into energy transition planning at insular context. • Recommendations and insights from the PPP implementation at cluster level, focusing on case studies of islands.

3.2. Island energy transition revision

With the first database, the segmentation of islands is done by applying a K-means clustering. This data mining technique splits a group of *n* objects – EU islands - into *k* classes, such that the intraclass similarity is high and the interclass similarity is low. This iterative process first randomly groups the objects in k classes. From this point, it calculates the average value for each class, and rearranges the objects according to their distance from this value, always seeking the most similar class [48–50]. With the result, the ET_KPIs are calculated to perform a comparative assessment among clusters. This is done to understand the different starting points of Spanish islands to plan their energy roadmaps and comply with EU climate targets. The topics revised through the selected ET_KPIs are the distribution of islands according to the status of energy planning (adopted, in development, or none); the level of development of projects related to energy transition fields as RES generation or sustainable transport; the existence of supporting energy agencies; and the key drivers behind the adoption of energy transition plans. With these insights, a comparative assessment between case studies, port-cities and islands, is done to identify common points towards the transferring of the PPP.

3.3. Participatory Process Protocol Layout

Based on the results of the previous stages, the PPP successfully tested in port-cities is transferred into the context of the Sustainable Energy and Climate Action Plan (SECAP) Methodology [51]. The development of an energy transition plan implies a continuous decision-making process, in which the level of stakeholder's engagement could impact its future acceptance and implementation. According to Bertoldi et al. [51], the mobilization of all municipal departments and the engagement of citizens and stakeholders are crucial elements for successful SECAP, the international standard from the Covenant of Mayors. Since the initial steps of the planning process [52], it is necessary to ensure, on one hand, strong horizontal cooperation among policy sectors that usually comply only with their sectoral agenda. On the other hand, the recommendation is to create participatory spaces to incorporate local specificities and problems, meet end-user expectations, and prepare the road for a full uptake of the main outcomes.

Although all the original structure of the PPP is maintained [53,54], its intermediate and final outcomes are revised to better correspond to the SECAP methodology. Finally, the application of the PPP on Málaga, Cádiz and Sète is discussed to exemplify the differences and challenges that each cluster of islands might face during their SECAP elaboration. The case studies are once again compared to generate recommendations and insights from the PPP implementation.

4. PPP proposal for energy transition planning

In the following section, the results from the execution of the methodology are presented. The main outcome is the alignment of the PPP with the SECAP methodology. Possible implementation scenarios for islands are discussed later in section 5.

4.1. Island segmentation and energy planning status

The variables selected for the segmentation of the islands are population, electrical interconnection with the mainland (a dummy variable), and seasonality. The latter is measured as the annual nights spent by tourists per thousand inhabitants in the region. From the 1,142 islands in evaluation, Sardinia (IT), Sicily (IT) and Sjaelland (DK) are signalled as outliers since their population is statistically too high, as well for 691 islands with less than 100 habitants. The database is finally composed of 448 EU islands. The classification technique considers 1 to 10 clusters and then computes the average distortion score (the sum of square distances from each point to its assigned centre) for each of them. The ten distortion scores are plotted as a function of the number of clusters. As shown in Figure 1, the optimal number of clusters is between 4 and 6 according to the elbow of the curve.

Afterwards, the optimal number of 4 is selected based on the differences among clusters. Large-sized islands and medium-sized islands are grouped in two clusters (C1 and C2 respectively). All these islands present high seasonality. Small islands are divided into two clusters. One for those with high seasonality (C3) and another for small islands with low seasonality (C4). A summary is presented in Table 3. Despite C2 and C4 showing a similar seasonality level, C2 is indeed composed of touristic islands. The difference relies on the normalization per population at the regional level (NUTS2). In this classification, Tenerife and Gran Canaria case studies are part of C1, whereas La Palma is included at cluster C3.

A total of four ET_KPIs are assessed for each cluster based on the responses from over 70 islands. Insights about the availability of strategic plans, the type of proj-

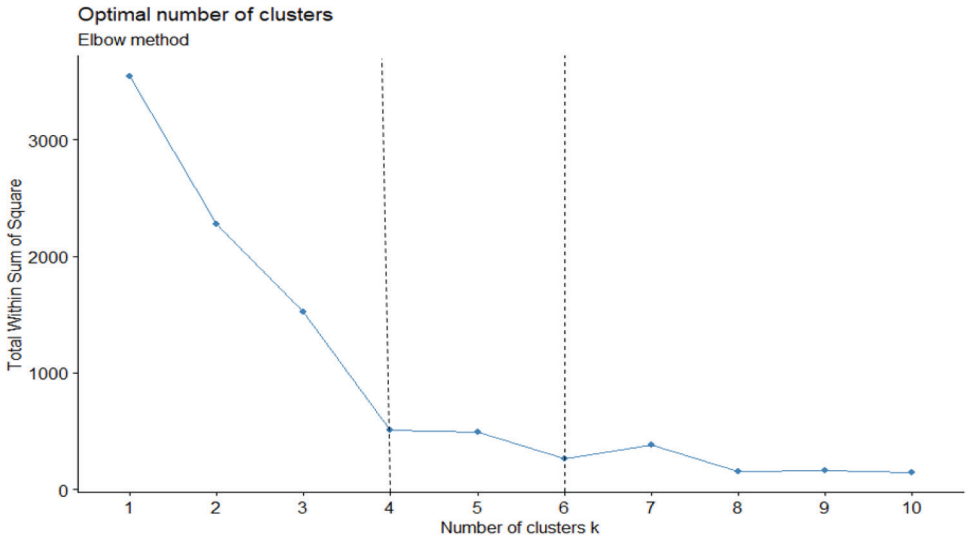

Figure 1. Optimal number of clusters

Table 3. EU islands clusters

Cluster	Description	Nº of islands	Population range	Annual nights per 1,000 inhabitants at NUTS2, 2017
C1	Large islands.	5	597,823 – 894,636	48,437– 77,691
C2	Medium-sized islands.	12	149,942 – 467,352	1,617 – 33,085
C3	Small islands with high seasonality	97	102 – 147,023	42,659 – 77,691
C4	Small islands with low seasonality	333	137 – 137,699	0 – 31,196

ects implemented, the drivers and support agencies behind energy planning are shown in Table 4. Results demonstrate how more than half of EU islands are still developing their energy plans, except for C1. For the rest, the percentage of islands with adopted plans decreases from 45% (C2) to 27% (C4). The development of SECAP is the most selected approach by islands, as is the case of many municipalities from Gran Canaria and Tenerife, whereas La Palma would be on the 13% of C3 with a Clean Energy Transition Agenda (CETA) in force.

Regarding the type of projects implemented, public-dependent assets, such as public buildings and lighting and RES installations are the most common. Although the latter would be the base for the establishment of energy communities, special attention should be given to the involvement of citizens to generate a positive planning environment, integrate equity and justice factors, and increase public acceptability [42]. In medium and small islands (C2, C3 and C4) other multi-stakeholder fields such as mobility and transport seem to be slightly behind.

In terms of institutional support, islands seem to depend more on regional and national energy agencies. So, besides a horizontal approach that brings together local stakeholders from diverse fields related to energy planning, public administration's vertical power structure needs to also be considered. For those with no support at all, as in C2 and C4, the requirement is also reaching the support of entities at regional or national level, or demand more commitment from non-public local actors, as a solution to acquire expert knowledge in the energy transition.

4.2. Participatory process protocol layout

Based on the ET_KPI1 results, the PPP is aligned with the SECAP methodology. This highly recommends the involvement of municipal departments and stakeholders to enrich the result of the technical activities, such as the

Table 4. Energy transition KPIs per cluster

	C1	C2	C3	C4
ET_KPI1. Island's planning process on energy transition and decarbonization				
No plan or strategy developed	20%	20%	26%	37%
An energy strategy in development	0%	35%	33%	36%
Sustainable Energy and Climate Action Plan (SECAP)	**80%**	40%	27%	27%
Clean Energy Transition Agenda (CETA)	0%	5%	13%	0%
ET_KP2. Status of energy transition projects implemented*				
Electric mobility and charging infrastructure	**46%**	21%	31%	12%
Energy Efficiency in public building	20%	**25%**	**33%**	**27%**
Energy Efficiency in public lighting	40%	**30%**	**41%**	**32%**
Storage systems on carbon fuel driven power plants	20%	0%	3%	2%
Storage systems on renewable energy power plants	40%	12%	9%	8%
Renewable energy power plants	**53%**	**45%**	**42%**	**34%**
ET_KP3. Existence of an energy agency or similar institution to support the energy transition				
None	0%	**41%**	**19%**	21%
Local agency, part of Local Authority	20%	12%	**46%**	11%
Local agency, independent of Local Authority	0%	6%	10%	12%
Regional agency	**60%**	0%	18%	13%
National agency	20%	**41%**	**7%**	**43%**
ET_KP4. Main drivers to implement energy programs/plans/projects (average of level of importance between 1 to 3)				
Comply with regulation/national objectives	**0.8**	0.1	**0.65**	0.12
Economy competitivity	0.6	0.3	0.29	0.13
Energy production cost reduction	0.25	**0.75**	**0.76**	**0.56**
Environment benefits	**1.2**	**0.85**	**0.78**	**1.18**
Improve island image	**0.75**	0.25	0.33	**0.41**
Improve the quality of energy supply	**0.75**	0.1	0.31	0.23
Job creation	0.25	0.4	0.44	**0.53**
Living cost reduction	0	0.05	0.20	0.29

* Breakdown per cluster considering a scale between 33% as marginally implemented, 66% as significantly implemented and 100% as Completed.

emission inventory, the assessment of risks and vulnerabilities, and the design of the action plan. As implemented in Málaga, Cádiz and Sète, the PPP is composed of three main phases. First, the identification and analysis of stakeholders and their interests, including the selection of the appropriate participatory techniques. Second, the first round of stakeholder's gathering for the elaboration of a participatory diagnosis. Third, the second round for the final validation of the plan measures [53]. These phases are, then, organized to complement the SECAP core recommended steps [51] as depicted in Figure 2.

In this sense, the identification of three kinds of stakeholders is recommended: (1) institutional field experts, public bodies with knowledge about regulation, barriers and financing instruments; (2) non-institutional field experts: entities with high skills and interest at the territorial level who can often suggest concrete solutions; and (3) residents and floating population, final users who might perceive system flaws in a practical way and from a territorial perception (i.e. neighbourhood associations). Special attention should be granted to achieving the engagement from municipal departments and the main energy actors for the collection of primary data for the Baseline Emission Inventory (BEI). Concerning the Risk and Vulnerability Assessment (RVA), the involvement of emergency bodies and the local population is required to identify the most relevant climate hazards and the current exposition level. Then, the identified stakeholders should be located into a Power-Interest Matrix (PIM) to classify

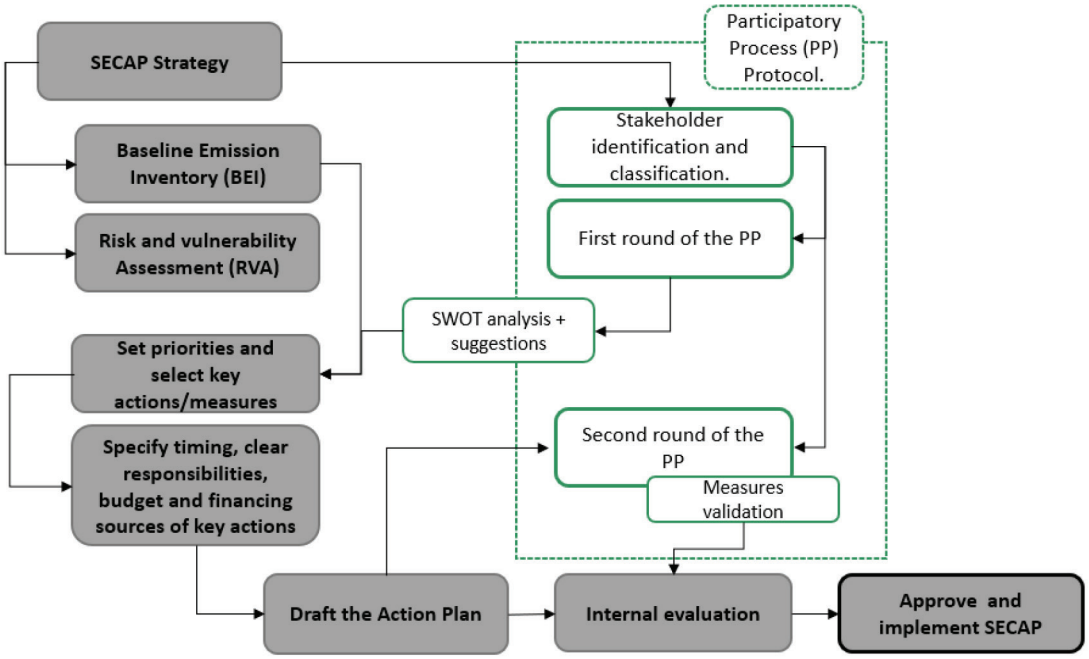

Figure 2. Participatory process protocol for SECAP elaboration.

them as key players, potential supporters, potential objectors, and secondary players.

For the first round of the PPP, two main contributions are expected from stakeholders. First, a qualitative participatory diagnosis in the form of a Strength-Weakness-Opportunity-Treat (SWOT) analysis. The SWOT would complement the BEI and the RVA, regarding issues such as willingness towards lifestyles modification, socioeconomic barriers, energy poverty, vulnerability towards climate, and the perspective of dominant economic sectors such as tourism. Second, preliminary suggestions towards the co-creation of the action plan and to start balancing the perspective between key players and potential supporters and objectors. For the former, it is recommended to perform Semi-structured Interviews (SI) to get specific insights and deeper understanding from field experts, whereas the latter might be involved through Focus Groups (FG) to learn from the interaction and dialogue among different entities with common or contrasting challenges and solutions.

Once the draft of the SECAP is shared, the PPP's second round starts with the twofold aim of giving feedback to stakeholders and receiving their validation on the proposed measures. The former to demonstrate that their contributions are valued during the decision-making process, the latter to increase public acceptance and ownership sense towards the plan. This last part could involve improvements, changes, eliminations, or further development of each measure. The target is to fine-tune the technical aspects with the most updated knowledge from relevant agents, so the execution of Workshops (WS) is suggested as they allow the performance of interactive activities like voting and mapping.

5. Learnings for future PPP implementations

As a knowledge transfer process, it is worth describing the result of the PPP implementation on the port-cities cases, to extract useful lessons learnt for islands developing energy plans or projects. Although the same PPP structure is implemented in Málaga, Cádiz and Sète, the size of involved stakeholders, and the number of participatory activities vary according to the complexity of each case. Málaga is the 6th largest city in Spain, second to Sevilla in the Andalusian Region. Its metropolitan area accounts for over 1 million inhabitants and possesses a direct road and rail infrastructure connecting with other capitals such as Sevilla, Granada and Cordoba. This level of complexity might be the case of C1 islands that are composed of several municipalities with one capital city: Santa Cruz de Tenerife in Tenerife and Las Palmas in Gran Canaria. Besides population, the surrounding geography of Cádiz and Sète set a physical constraint that also reduces their complexity. Cádiz is located in a narrow

peninsula with only three communication roads: two bridges and one avenue over a tombolo to the mainland. Other transport connections are available by sea to close municipalities. Still, Cádiz is a province capital and an important touristic destination, so its case might be useful to C2 islands. Sète is a small city also geographically constrained due to its location between the Thau Lagoon and the Mediterranean Sea. Its case might be similar to C3 and C4 islands like La Palma.

During the stakeholders' identification, the same type of interested agents is singled out in all cases: related policy sectors for horizontal cooperation and interested agents for a wider participatory process. The first group is composed of city managers with deep knowledge of the local status. Their initial involvement through SI is the most effective approach to learn about the current situation in fields like energy, mobility, buildings, tourism, industry, and the environment. These insights are the foundation for the participated diagnosis, given that municipal technicians focus more on objective information and tend to avoid conveying personal preferences.

On the contrary, the involvement of the second group would depend on the elaboration of the interest power matrix, to evaluate their pro-or-con positions towards the planning process. As experienced in Séte, C3 and C4 islands might expect to involve around a dozen stakeholders in total, all with high interest and constructive motivations. All parts might consider clean energy developments as opportunities to improve the image and branding of the island. This is coherent with the results of KPI_ET4, as C4 islands seem to consider environmental improvements as a strategy to boost the local economy, create more jobs, improve the image and, perhaps, consolidate their tourism industry or create new ones around renewable energy. So, all stakeholders should be treated as Key Players and be involved through SI for the first round. For the second round, a unique workshop open to all the interested agents is recommended, given the expected convergence of their opinions and expectations.

In the case of Málaga and Cádiz, a more diverse stakeholder network is found, identifying both Potential Objectors and Supporters. C1 and C2 islands might deal with agents whose motivation may restrict the access to relevant data, the smooth adoption of measures, or even the plan's approval from the political parties. The recommended approach is to divide these stakeholders into several FG, gathering those agents with similar interests. This strategy allows the reduction of biased discussions among opposite counterparts and encourages the contribution of all participants by generating safe spaces for debate. All FG should be informed about other meetings planned, as a motivation for all stakeholders to communicate their perspectives and suggestions as clearly as possible, and, in this way, construct the most inclusive and balanced diagnosis possible.

Although no secondary players are identified for the port-cities, the non-engaged residents and floating population should be informed and monitored. During the first round, the suggestion is to launch online surveys as was done in Málaga to convey straightforward information about the decision-making process and to gather some statistical information about population awareness and willingness towards new scenarios.

Regarding the second round, C1 and C2 islands might implement one or more workshops. The number of events will depend on the expected number of participants and the level of consensus achieved during the first round. Although workshops could vary in their design, the general idea is to revise each proposed measure and end with a voting exercise. The aim is to ratify (high consensus and no adjustment required), improve (well-conceived proposal, but minor changes required), modify (major changes should be taken), or eliminate (total removal) each measure. In case of a reduced number of attendees, one session with an open debate of the measures should be enough. The voting results should be delivered at the end. If more than one workshop is required, a standardised activity should be put into work. In Málaga, for example, participants are asked first to classify the measures between public- or private-driven and between strategic or infrastructure measures. This allows stakeholders to revise the measures and prepare the voting portion. Finally, an extra informative session should be also considered to give feedback to all participants.

5.1. Final recommendations for islands

Despite differences, the decision-making processes of Málaga, Cádiz and Séte end with the adoption of a local plan by the involved municipalities. Given that the PPP successfully involved a diverse spectrum of stakeholders since the beginning, more than half of the measures in the drafts are ratified and no measure is eliminated. The proposed PPP seems to be a constructive instrument for other similar processes in diverse contexts. Based on the described experiences on port-cities, Table 5 presents a specific suggestion to implement the PPP in each cluster.

As experienced in port-cities, another key element is the identification and appointment of a leader from the

Table 5. Suggested PPP implementation for clusters

Clusters	**Large islands (C1)**	**Medium-sized islands (C2)**	**Small islands (C3 y C4)**
Based on	Málaga	Cádiz	Sète
Suggested to	Gran Canaria, Tenerife	-	La Palma
Stakeholder identification and classification	- Key players: local/regional/national field experts of CoM key sectors (energy, housing, tertiary sector and transport), private and public. - Potential supporters/objectors: representatives from other sectors (industry, waste, tourism, agriculture, etc.); local associations (neighbourhoods, commerce, education, etc.); labour unions; universities; transport operators. - Secondary players: non-engaged residents.		
Expected number of stakeholders	**Between 15 and 25**	**Between 10 and 20**	**Around 10**
Informative session	Inform stakeholders and citizens of the decision-making process. Start engagement towards next round.		
	PPP first round		
Activities for Key players	Semi structured interviews: collect first-hand information to feed the BEI and the RVA		Semi structured interviews: collect first-hand information to feed the BEI and the RVA
Activities for Potential Objectors/Supporters	1 or 3 focus group: divide stakeholders based on their location in the PIM		
Activities for Secondary players	Survey for residents	Survey for residents (optional)	
	PPP second round		
Workshops	2 or 3 sessions	1 or 2 sessions	1 session open to all
Structure of the session	- Classification of measures and debate - Voting	- Open debate on measures - Voting	
Measures validation	Might require an extra session to provide feedback on the voting process.		Results to be presented during the workshop

local government, whose role is to support the technical team behind the plan elaboration. This is also recommended for the case of islands, as these leaders, besides reaching out to strategic stakeholders, might also serve as advisors to ensure the resulting plan is aligned with local policies and national climate targets.

Achieving such success should be the aim of islands planning their energy transition as frameworks, like the SECAP, are intended for long-term horizons (2030 and 2050). They require the assessment of multiple sectors (buildings, transport, energy generation, industry, waste and agriculture) and the establishment of a monitoring system based on baseline revision and measures progress reporting every two years. Feedback from stakeholders involved in port-cities emphasize the high level of acknowledgement that the final version of measures shows regarding their inputs, as well as the consensus achieved about the opportuneness from the plans and the consequent increase in terms of social acceptance, that could ease the path for further measure implementation.

6. Conclusion

From a lessons learned perspective, the most advantageous result from adopting the PPP is the quality improvement of the decision-making process on energy planning, caused by the effective involvement of the citizens and local stakeholders. The PPP should not be understood as an independent method, but as a complement to international standards for energy transition planning, such as the SECAP methodology, or as a supportive tool for community-related developments like the Canary Island's projects. The PPP allows enough flexibility to adjust its implementation for different socio-political contexts.

In this sense, the PPP could serve as a starting point for a decision-making process requiring the engagement of

numerous and diverse stakeholders. In the framework of this research, this is identified both as a challenge and an opportunity. The revision of the port-cities cases suggests that the PPP approach might provide agents with a forum to approach a common challenge and raise questions for the sustainable development of their sector. The early identification, analysis and classification of local stakeholders seem to be an effective way to select the most appropriate participatory technique, improving the chances of involvement of stakeholders with divergent interests, an adequate strategy to balance the opinions and insights of stakeholders, despite their power and influence [15].

Similarly, establishing what is expected from each kind of stakeholder before each stage of the decision-making process might help to equilibrate their involvement. If the requirement is expertise-related insights, higher-profile stakeholders could be engaged earlier than others through individual approaches like semi-structured interviews. If the objective is to achieve consensus, giving the same level of opinion to each stakeholder, through participative workshops, might conduct better results.

Further research lines could deepen these points by working together with islands from each of the 4 clusters. Not only for the development of SECAPs but also other decision-making processes such as electric mobility planning or offshore wind or marine energy plants design. Also, the effective coordination between public authorities and technical experts, based on the figure of an energy transition leader, could be examined to get more evidence on its influence for a final plan or project tailored to local expectations.

Finally, it is worth highlighting the great potential of EU islands to become pioneers in achieving climate targets, as well as the opportunity that projects, such as NESOI, might be to accelerate this process. The support from NESOI technical experts, together with the implementation of the proposed PPP, could have a catalyst effect for islands that currently lack an energy transition plan, as is the case of more than half of the surveyed islands. Their geographical constraints and the availability of RES should be exploited to go beyond European climate targets, and even to be the first territories to achieve carbon neutrality before 2030.

Acknowledgments

This contribution has been developed in the framework of the H2020 NESOI project “New Energy Solutions Optimised for Island”. This project has received funding from the European Union’s Horizon 2020 Framework Programme for Research and Innovation under grant agreement no 864266.

An early version of this study was presented in the 16th Conference on Sustaninable Development on Energy, Water and Environment Systems – SDEWES, on 14th of october 2021 in Dubrovnik, Croatia.

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