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wimby
WIND IN MY BACKYARD

WIMBY

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SHORT ABSTRACT FOR DISSEMINATION PURPOSES

Abstract

This report presents the results of the WIMBY project activities conducted on the island of Pantelleria, aimed at studying the social perception and acceptance of potential wind power installations. Through a multi-method approach including workshops with an immersive 3D platform, Multi-Criteria Satisfaction Analysis (MUSA), mental models exercises, and semi-structured interviews, the study revealed a predominantly positive community attitude. The main drivers for acceptance are the expected economic and environmental benefits. The primary concerns relate to the landscape impact. Participants (41 adults and 13 pupils) actively identified suitable and unsuitable areas for development, demonstrating that early engagement and financial participation opportunities are crucial for building consensus.



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ABBREVIATIONS

Acronym	Description
DOP	Digital Orthophoto
DSM	Digital Surface Model
DTM	Digital Terrain Model
EMODNET	European Marine Observation and Data Network
GBIF	Global Biodiversity Information Facility
MCDA	Multi-Criteria Decision Aiding
MUSA	Multicriteria Satisfaction Analysis
nDSM	Normalized Digital Surface Model
OSM	Open Street Map
S.I.T.R.	Sistema Informativo Territoriale Regionale
SPSS	Statistical Product and Service Solutions
VR	Virtual Reality



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EXECUTIVE SUMMARY

This document reports the methods and results of the activities conducted in the pilot region of Pantelleria (IT) within the WIMBY (Wind in My Backyard) project. This section provides a synthesis of the main contents of the report.

- **Objectives of the deliverable:** The primary objective was to investigate the social perception and acceptance of wind energy in a complex context such as Pantelleria. Specific objectives included analysing the evolution of participants' perception after being empowered with information through interactive tools, mapping spatial variations in opinions, assessing stakeholder awareness, and collecting qualitative feedback to inform more inclusive development strategies.
- **Inputs:** The work is based on several inputs: contributions from numerous project partners, including POLITO, BOKU, KIE, UU, UNIPA, and others; geospatial data provided by local authorities such as the Pantelleria National Park and the Regional Territorial Information System (S.I.T.R.); and, most importantly, the direct engagement of a wide range of local stakeholders (farmers, students, public administrators, tourism operators, etc.) through workshops and interviews. The results also rely on methodologies and tools developed in other project deliverables, such as the immersive 3D platform (Schauppenlehner et al., 2024) and the satisfaction analysis framework (Huang et al., 2024).
- **Main results:** The results show a generally favourable attitude of the inhabitants of Pantelleria towards the development of wind energy, primarily motivated by potential economic and environmental benefits (decarbonisation of the island). However, significant concerns remain regarding the visual and landscape impact, given the island's strong tourist vocation and natural value. The participatory activities led to the identification of clear "go-zones" (e.g., the industrial area of Arenella) and "no-go zones" (e.g., Montagna Grande and the vicinity of Lago di Venere). The MUSA analysis revealed that landscape aesthetics is the most demanding criterion for residents. Interviews demonstrated that acceptance can





be significantly increased through financial participation mechanisms and early involvement in decision-making processes.

- **Possible links of results with other deliverables:** The results of this report provide essential feedback on the effectiveness of the immersive 3D platform described in D5.3 (Schauppenlehner et al., 2024). Furthermore, the preliminary data from the MUSA analysis will be further elaborated in D4.6 (in progress), while the interview methodologies are linked to the stakeholder mapping practices in D4.4 (Lowitzsch et al., 2024).
- **Attainment of the objectives and explanation of deviations:** All related task objectives have been successfully achieved. The engagement activities allowed for the collection of in-depth quantitative and qualitative data on local perception, mapping preferences, and identifying the main drivers of acceptance and resistance. No significant deviations from the plan occurred.

Note to readers: This report is part of a series of four pilot studies conducted as part of the WIMBY project. Each report focuses on the respective regional results. However, to ensure the readability of each individual report, there is some minor overlap in content (e.g. process descriptions, methods).



1 Introduction

1.1 Case Study Description

Pantelleria is a volcanic island located in the Strait of Sicily, approximately 110 km from the coast of Sicily (see Figure 1). It is defined by a unique combination of socio-economic, environmental, and, most critically, energy-related characteristics. The island is entirely disconnected from the national electricity grid, compelling it to rely on diesel generators to meet its energy demand. This reliance has significant consequences, both in terms of high energy costs for end-users and substantial pollutant emissions. Electricity generation alone accounts for nearly 54% of the island's total CO₂ emissions, with an additional, non-trivial share of approximately 25% attributable to the transportation of the diesel fuel itself (CE4EUI, 2020).

This fossil-fuel-based generation system operates within a territory of exceptional historical and scenic value. Pantelleria hosts a National Park covering 80% (Moscoloni et al., 2022) of its surface and is a recognized biodiversity hotspot, serving as a key stopover for migratory avifauna (Parco Nazionale, 2025). The island's landscape is deeply intertwined with its volcanic origins and centuries-old agricultural traditions, such as the UNESCO Intangible Cultural Heritage "vite ad alberello" (head-trained bush vines) (UNESCO, 2014) and the iconic "muretti a secco" (dry-stone walls) (UNESCO, 2018). The island's morphology is characterized by a mountainous and irregular terrain, sculpted by these distinctive artificial terraces that testify to the inextricable link between human activity and the natural environment. This landscape also features unique traditional buildings, the dammusi, which represent a singular architectural style in the Mediterranean.

The synergy between the natural, agricultural, and cultural matrices is further demonstrated by the coexistence of protected areas (Natura 2000 sites: SCI ITA010018, SCI ITA010020; SPA ITA010030) and numerous archaeological sites (Moscoloni et al., 2022).

These combined features make Pantelleria an island of outstanding value with a strong appeal to tourists. This results in highly impactful fluctuations in the resident population, causing energy demand to surge up to 350% in



the summer months (CE4EUI, 2020). Paradoxically, this high-carbon reality coexists with a vast availability of renewable energy resources. Pantelleria is one of the windiest locations in the Mediterranean, with peaks of 11 m/s of wind speed, and benefits from significant solar irradiation (approx. 1,800 kWh/m² annually) (Novo et al., 2022). Moreover, it possesses considerable wave energy potential.

Therefore, Pantelleria represents a unique mosaic: an energy system based on fossil fuels, a tourism-driven economy causing severe seasonal energy imbalances, a complex historical-cultural-environmental fabric with extensive protected areas, and abundant renewable resources. This creates a compelling need to decarbonize the energy system in a manner that is sustainable for the socio-environmental context.

Recognizing these peculiarities, Pantelleria has consistently served as fertile ground for the energy transition. This proactive stance was further consolidated by its pioneering participation in the Clean Energy for EU Islands Secretariat, culminating in the drafting of its "Clean Energy Transition Agenda" (CETA) in 2020. The island therefore represents an ideal case study by virtue of its intrinsic complexities.





Figure 1: Overview of the Pantelleria pilot region and its location in Southern Italy (Source: Open Street Map, Parco Nazionale Isola de Pantelleria, EMODnet Bathymetry consortium; Cartography: Thomas Schuppenlehner)

1.2 Objective

The Island of Pantelleria, shown in Figure 1, represents an ideal case study, in the sense that it is complex but small and isolated; therefore, it is relatively simpler to monitor and infer causality, with respect to wider regions with no clear spatial discontinuities. Building upon this premise, the project activities on the island were designed to investigate a critical aspect of its energy transition: the social perception and acceptance of wind energy. The overall goal was to move beyond a simplistic "for or against" debate and to capture the nuanced perspectives of a diverse and fragmented community.



To achieve this, the research was structured around a primary macro-objective, supported by several specific meso- and micro-objectives.

The primary objective was to investigate and quantify stakeholder perceptions regarding the potential multi-faceted impacts (e.g., environmental, landscape, socio-economic) of integrating wind turbines into the island's context.

The specific objectives were:

- To analyse the shift in perception patterns: assessing the shift from initial biases or prejudices to more informed judgments after participants were empowered with information and trade-off scenarios through a serious game.
- To map spatial differences in perception: understanding how opinions and concerns differ across the island's distinct communities, correlating them with local specificities.
- To assess stakeholder awareness: gauging the baseline level of knowledge among different groups regarding the technical, economic, and environmental implications of wind energy.
- To collect qualitative feedback: gathering actionable insights, concerns, and "takeaways" directly from residents to inform more inclusive and effective development strategies.

The methodology was tailored to Pantelleria's unique social and geographical structure. The island is not a monolithic entity but is comprised of at least three distinct centres—Pantelleria, Khamma/Tracino, and Scauri—each with its own economic vocation and social fabric, ranging from administrative and commercial activities to tourism and agriculture. Recognizing this, the stakeholder landscape was understood as a complex mosaic of actors, including hoteliers, farmers, public administrators, military personnel, fishermen, divers, and other citizens.

To ensure all these facets were captured, a series of comprehensive workshops was organized in each of the three main centres. These sessions were significantly enriched by the participation of key external and local actors, including representatives from the Italian Ministry of Environment

and Energy Security (MASE) and an entire class from the local high school, fostering a multi-level and multi-generational dialogue.

At the core of this engagement strategy was the use of a serious game approach. The underlying hypothesis was that perception is not static and can evolve when supported by balanced information. Crucially, this information was not delivered in a prescriptive or top-down manner. Instead, the game provided an inductive learning experience, allowing participants to explore different scenarios, understand consequences, and actively construct their own informed opinions. This approach was designed to reveal not just what people think, but how and why their judgments are formed and can change.

2 Material and Methods

2.1 Participant engagement

The methodology for participant engagement and recruitment was designed as a multi-pronged strategy, combining trusted, bottom-up approaches with formal, top-down communication to ensure a broad and representative sample of the island's population. The process was founded on three key components:

- **Leveraging Long-Standing Relationships:** The core of the engagement strategy was built upon a foundation of trust established through years of previous research and collaboration on the island. These personal, long-standing relationships with key community members were instrumental in facilitating initial contact and encouraging participation.
- **Preparatory Information Campaign:** In the week preceding the workshop cycle, informational materials (flyers, short brochures) were distributed across the island. This pre-engagement phase aimed to raise awareness about the upcoming events, introduce the project's objectives, and provide all potential participants with a common baseline of information, thereby fostering a more informed and productive discussion during the workshops.



- Formal Communication and Press Releases^{1, 2}: To maximize reach and lend official credibility to the initiative, a formal communication campaign was launched in partnership with key local authorities. The Municipality of Pantelleria and the Pantelleria National Park authorities issued official press releases and public announcements through their official channels, inviting the entire citizenry to participate.

The recruitment strategy specifically targeted a diverse range of stakeholders to capture the island's complex social fabric. The key target groups included:

- Agricultural Sector: Farmers and wine producers, with a particular focus on members of the "Consorzio Pantelleria Eroica," representing the island's unique tradition of heroic viticulture.
- Youth and Education: Students from the local high school, involved to bring a forward-looking, next-generation perspective.
- Tourism and Business Sector: Hoteliers, restaurateurs, and other business owners central to the island's primary economic driver.
- Marine Environment Stakeholders: Divers and professional fishermen, representing those whose livelihoods are directly connected to the marine ecosystem.
- Institutional and Public Actors: Representatives from the local administration (Municipality), from the National Park "Isola di Pantelleria", and resident personnel from the Italian Air Force (Aeronautica Militare), which has a significant presence on the island.
- Civil Society: Members of youth groups (such as the "La Mulattiera APS" association) and other social promotion associations, representing active and engaged citizens.

2.2 Locations

To adequately capture the local deviations and specialties of the island, workshops were held in three distinct locations: Pantelleria, Scauri, and Khamma/Tracino (see Figure 1). This selection was strategic, not arbitrary. It

¹ <https://www.ilgiornaledipantelleria.it/progetto-wimby-dal-16-al-20-settembre-a-pantelleria-i-workshop-sullo-sviluppo-dellenergia-eolica/>

² <https://www.parconazionalepantelleria.it/news-dettaglio.php?id=80087>

was designed to reflect the island's geographical and socio-economic fragmentation:

- Pantelleria Centro was chosen as the island's primary administrative, commercial, and logistical hub, two workshops were held in the local high school Istituto V.Almanza. Thanks to the cooperation of the local school authorities, it has been possible to involve an entire class of students and use the facilities to host delegates from the Italian Ministry of Environment and Energy Security.
- Scauri and Khamma/Tracino were selected as representative of communities with different vocations, including a stronger focus on agriculture, tourism, and distinct residential identities.
 - Scauri's workshop was held in spaces from a local cultural association.
 - Khamma/Tracino's workshop was held in a local bar, heart of the local social, entertaining and cultural life of the surrounding urban area.

Holding workshops in each of these centres allowed the research to investigate potential spatial variations in perception and to make the activity more accessible to residents across the entire island.

2.3 Pilot site activities

The activities at the pilot sites include the following (see Figure 2):

- **Immersive 3D planning game:** an interactive scenario planning tool with immersive 3D visualisation designed to engage people and promote discussion about trade-offs, fears and expectations regarding wind power development
- **MUSA Survey:** a structured survey to quantify how residents evaluate the entire range of wind farm impacts
- **Mental Models:** a method used to explore perceptions and understanding of the impacts of wind energy
- **Surveys and semi-structured interviews:** focused on project ramifications and acceptance
- **Other activities:** supplementary stakeholder engagement efforts aimed at collecting qualitative feedback on the WIMBY interactive map and the forum, see Deliverable D5.1 (Bakelants, L. et al., 2024), as well as broader insights into the projects overall approach and methodology.



Figure 2: Outline of activities for the pilot region Pantelleria (Graphic: Thomas Schauppenlehner)

The immersive 3D planning game was tailored to each specific pilot site and, together with the mental models, conducted during workshops with participants. Individuals were approached in public spaces, such as streets or local hotspots, for the MUSA Survey and the interviews on project impacts and acceptance. In some cases, interviews were also conducted with workshop participants after the sessions concluded. Other activities included a brief presentation of the WIMBY interactive map and forum, as well as semi-structured video interviews with selected stakeholders.

2.4 Immersive 3D Planning Game

2.4.1 Workshop Design and Data Collection

The planning game workshops aimed to explore potential wind energy developments through an interactive experience using immersive 3D visualisations and a planning game approach. For this purpose, the BOKU team developed an immersive 3D platform comprising three interacting components (see Figure 3).

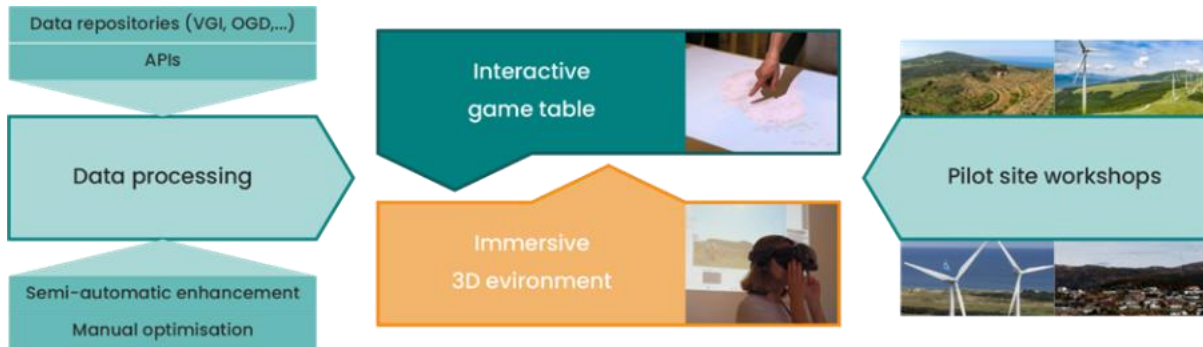


Figure 3: Core components of the immersive 3D platform developed for the four pilot sites within the WIMBY project (Schauppenlehner et al., 2024)

Data processing utilised free, open-source, site-specific data (see Table 1), which was enhanced through manual and semi-automatic optimisations and provided the foundation for the game board, the game logic and the development of immersive 3D environment. However, additional data was required for topographical information and land cover, as the freely available data was insufficient for this purpose in terms of accuracy and resolution. This data was provided by various Italian authorities for use in the project (see Table 1).

The serious game approach relied on three types of visual output:

- The **game table output**, which served as a playing area for creating wind energy scenarios and working with maps during the workshops, using game bricks as input device;
- The **projector output**, to present a dashboard with 3D visuals, key data and environmental details; and
- The **immersive VR output**, which allowed users to explore realistic visualisations of the wind energy scenario they created on the game table through VR glasses.

For more information on the immersive 3D platform, see Deliverable D5.3 (Schauppenlehner et al., 2024).

The workshops in the case study regions were divided into five stages:

1. **Welcoming and introduction**, with a briefing on the objectives and procedure of the workshop
2. **Baseline survey**
3. **Planning game and interaction with the 3D visualization**, where participants engaged with the platform

4. **Interactive discussions and summary** of the workshop, to reflect on outcomes and insights
5. **Debrief/feedback survey**

Data collection during the workshop focused on participant engagement, learning outcomes, and decision-making. The baseline survey assessed participants' knowledge, attitudes toward wind energy, and prior experience with participatory processes. A debrief and feedback survey at the end evaluated the 3D game's usability, learning impact, the immersive experience, and the overall process.

The immersive 3D planning game consists of two game phases, whereas game phase 1 addresses the identification of inclusion and exclusion zones and game phase 2 focuses on the virtually planning of windfarms to achieve given regional targets.

During the planning game, participants' statements, reasoning, questions, and concerns regarding game decisions were documented, with time stamps added to link them to specific game actions, such as the placement of a wind farm or a change in wind turbine height. Separate notes were also taken to record general observations of group dynamics and interactions during the game.

2.4.2 Geospatial data sources

The immersive 3D workshop environment depends on high-resolution and up-to-date datasets for accurate and realistic visualisations. Table 1 summarizes all datasets used and processed to build the visuals and convey supplementary information.

Pantelleria – as an isolated island – imposed significant challenges with the open accessibility for the required data. Although the relevant authority of Sicily offers some of the required data, not all datasets cover Pantelleria, are at too low resolution or outdated. Consequently, the data acquisition process was guided by the specific platform requirements, cross-referencing needed datasets with available local sources, primarily the National Park and official regional databases.

Table 1: Datasets used for creating the 3D environment and game logic for the Pantelleria pilot region

Category	Dataset	Source	Licence	URI/Comment
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True Colour Composite	Digital Orthophoto (DOP)	Parco Nazionale Isola di Pantelleria	Restricted, permission granted for WIMBY	N/A
Topography	Digital Surface Model (DSM)	Parco Nazionale Isola di Pantelleria	Restricted, permission granted for WIMBY	N/A
	Digital Terrain Model (DTM)	Parco Nazionale Isola di Pantelleria	Restricted, permission granted for WIMBY	N/A
	Normalized Digital Surface Model (nDSM)	Derivate of [DSM, DTM]	Restricted	Created for internal use only, unpublished
	Offshore Bathymetry	EMODNET	CC BY 4.0 International	https://tiles.emodnet-bathymetry.eu/
Administrative	Administrative Borders	OSM	ODbL	https://wiki.openstreetmap.org/wiki/Tag%3aboundary=administrative
Land Cover	Forest & Vegetation Cover	S.I.T.R – Sistema Informativo Territoriale Regionale	CC BY 4.0 International	https://www.sitr.regione.sicilia.it/wp-content/uploads/CTR_AT_A_2012_2013_G_Vegetazione.zip
	Specific Land Use (Trees, Gardens)	S.I.T.R – Sistema Informativo Territoriale Regionale	CC BY 4.0 International	https://www.sitr.regione.sicilia.it/wp-content/uploads/CTR_AT_A_2012_2013_G_Vegetazione.zip
	Corine Land Cover	S.I.T.R – Sistema Informativo Territoriale Regionale	CC BY 4.0 International	https://www.sitr.regione.sicilia.it/wp-content/uploads/2022/09/cartausuolo_corinelandcover_CLC.zip
	Sicilian Habitat Chart – Corine Biotopes (HCB)	S.I.T.R – Sistema Informativo Territoriale Regionale	CC BY 4.0 International	https://www.sitr.regione.sicilia.it/wp-content/uploads/2022/09/cartahabitat_CorineBiotopes_HCB.zip
	Hydrography (Water Surfaces)	S.I.T.R – Sistema Informativo Territoriale Regionale	CC BY 4.0 International	https://www.sitr.regione.sicilia.it/wp-content/uploads/CTR_AT_A_2012_2013_C_Acque.zip
Infrastructure	Wind turbines	OSM	ODbL	https://www.openstreetmap.org
	Power lines	OSM	ODbL	https://www.openstreetmap.org

	Terraces	Derivate of [DOP, nDSM, DCM, Corine Landcover]	Restricted	Created for internal use only, unpublished
	Extra Objects	OSM	ODbL	https://www.openstreetmap.org
	Building Footprints	OSM	ODbL	https://www.openstreetmap.org
	Building Footprints	S.I.T.R – Sistema Informativo Territoriale Regionale	CC BY 4.0 International	https://www.sitr.regione.sicilia.it/wp-content/uploads/CTR_AT_A_2012_2013_B_Edificato.zip
	Roads	OSM	ODbL	https://wiki.openstreetmap.org/wiki/Key:highway
	Roads	S.I.T.R – Sistema Informativo Territoriale Regionale	CC BY 4.0 International	https://www.sitr.regione.sicilia.it/wp-content/uploads/CTR_AT_A_2012_2013_A_Communicazioni.zip
	Key Energy Infrastructure	S.I.T.R – Sistema Informativo Territoriale Regionale	CC BY 4.0 International	https://www.sitr.regione.sicilia.it/wp-content/uploads/CTR_AT_A_2012_2013_D_TraspProcedEnergia.zip
Environmental data	Occurrence of <i>Caretta caretta</i>	Global Biodiversity Information Facility (GBIF)	CC BY 4.0 International	https://doi.org/10.15468/dl.5965ec
	Occurrence of <i>Dermochelys coriacea</i>	Global Biodiversity Information Facility (GBIF)	CC BY 4.0 International	https://doi.org/10.15468/dl.ehy5qt
	Occurrence of <i>Stenella coeruleoalba</i>	Global Biodiversity Information Facility (GBIF)	CC BY 4.0 International	https://doi.org/10.15468/dl.r6f7vn
	Occurrence of <i>Tursiops truncatus</i>	Global Biodiversity Information Facility (GBIF)	CC BY 4.0 International	https://doi.org/10.15468/dl.6q6k7f

2.4.3 Ecological data

Species occurrence data of the reptiles (*Caretta caretta* and *Dermochelys coriacea*) and of the mammals *Stenella coeruleoalba* and *Tursiops truncatus* were downloaded from the Global Biodiversity Information Facility (GBIF) database (see Table 1).

2.5 Multi-Criteria Satisfaction Analysis (MUSA) framework



To capture a nuanced picture of how wind farms are affecting or will affect local communities, we designed a comprehensive satisfaction framework that runs in parallel with the 3D planning game workshops. Its primary aim is to quantify how residents judge the full spectrum of wind-farm impacts, from noise, landscape change, and biodiversity concerns to local employment, community contribution. Because these dimensions often pull in different directions, analysing them one by one would hide critical trade-offs. Instead, we applied a multi-criteria setting that evaluates all aspects simultaneously.

The core of this setting is Multicriteria Satisfaction Analysis (MUSA), a well-established method within the wider family of Multi-Criteria Decision Aiding (MCDA). MUSA was originally created for customer-satisfaction studies in the service sector (Grigoroudis & Siskos 2002). MUSA relies on preference disaggregation: participants rate each criterion on a tailored Likert scale, and the algorithm infers criterion weights, partial value functions, and global satisfaction indices via ordinal regression. By deriving these parameters directly from response patterns, rather than asking analysts or respondents to assign weights manually, MUSA avoids the subjective bias common in many MCDA approaches.

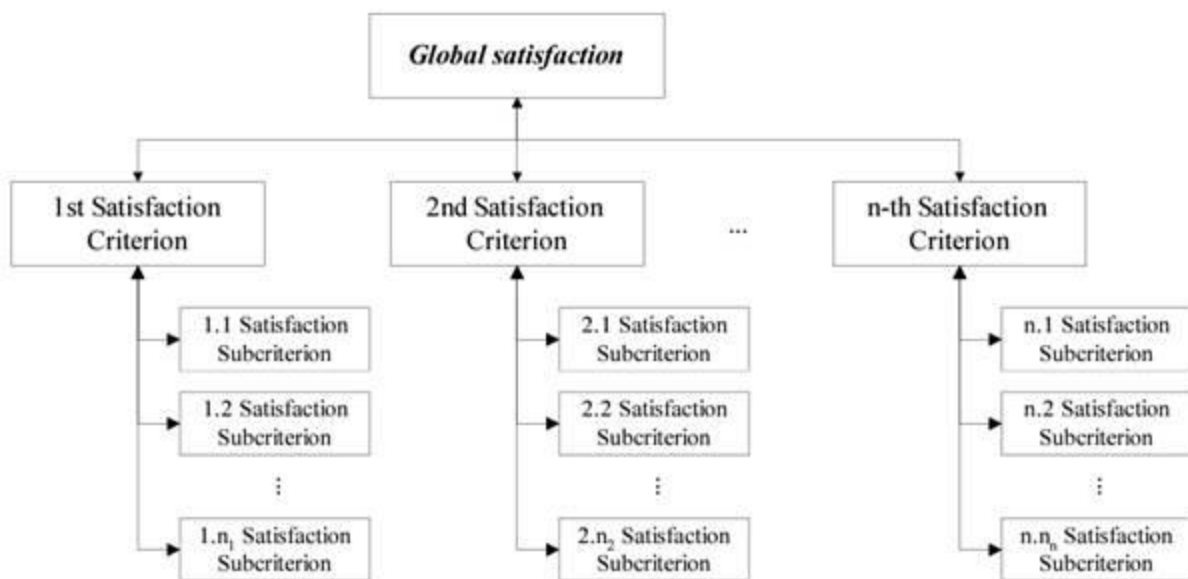


Figure 4: Structure of a MUSA problem (Huang et al., 2024)

As illustrated in Figure 4, MUSA deconstructs global satisfaction into criterion-level components, showing how each attribute contributes to the overall score. A questionnaire can be designed to ask participants the satisfaction on all levels: global satisfaction, criterion-level satisfaction, and sub-criteria. This enables the MUSA model to quantify how sub-criteria

aggregate into criteria and how these, in turn, drive the global assessment. This hierarchical view highlights both strengths and areas needing improvement, providing a transparent roadmap for raising public acceptance.

In practice, because Pantelleria has no wind turbines yet, we applied MUSA to measure residents’ acceptance of deployment of wind turbine rather than post-construction satisfaction. Participants rated their overall willingness to host wind turbines and scored each criterion on an ordered scale—for example, from “Lowest acceptance” to “Highest acceptance.” MUSA then used these ordinal responses to pinpoint which attributes matter most in shaping local acceptance.

We embed MUSA in our broader Multi-Criteria Satisfaction Analysis (MCSA) framework, which adds the practical guideline needed for field application (as shown in Figure 5). For detailed introduction of the MCSA framework, please refer to Deliverable D4.2 (Huang et al., 2024).

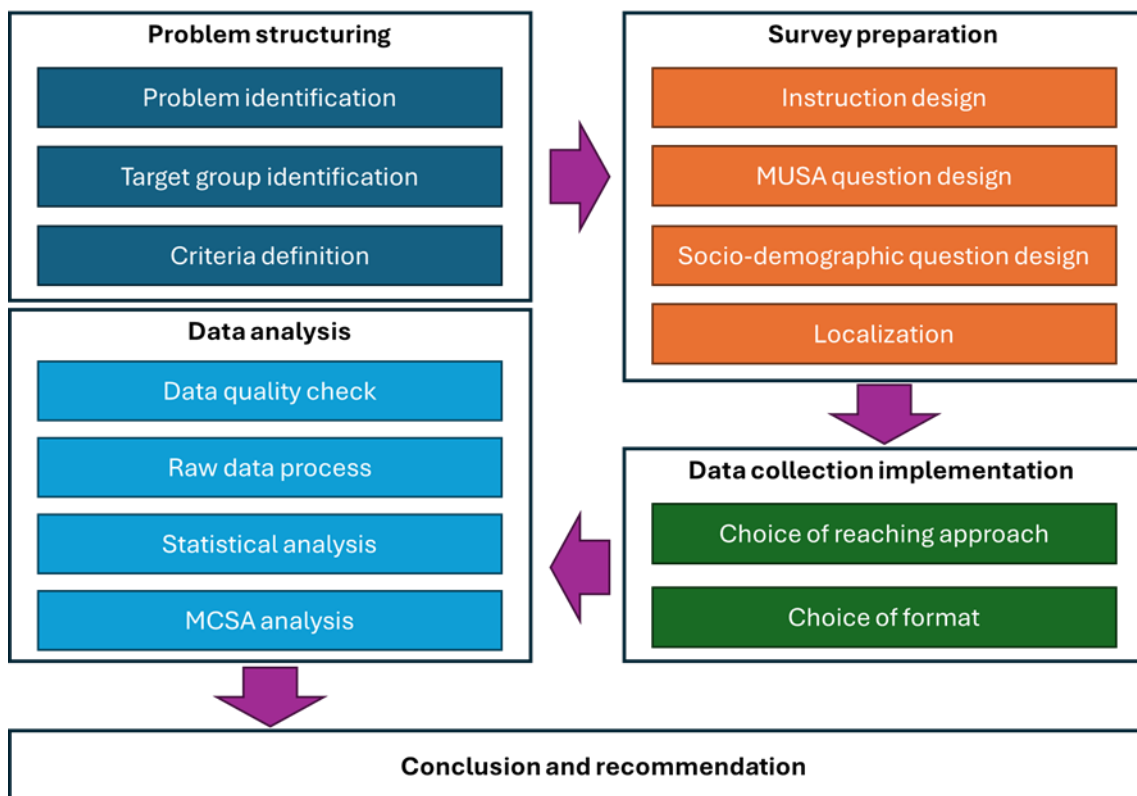


Figure 5: Satisfaction analysis workflow (Huang et al., 2024)

2.6 Mental Models

We investigated workshop participants' mental models of perceived wind energy impacts. Mental models explore individuals' cognitive representations of the external world, including perceptions of interrelations within a system and system components (Van Den Broek et al., 2025). To elicit these mental models, we apply a standardised mental model tool called M-Tool (Van Den Broek et al., 2021), which allows participants to create their mental model by mapping relevant concepts, in our case, the perceived impacts of wind farms, and the directional relations as an influence diagram (Van Den Broek et al., 2021). We applied a two-step approach:

- **Step 1: impact identification:** We compiled wind farm impacts from a literature review and from a survey with the target audience. In the survey participants were asked about the impacts of wind farms they could think of in all four pilot site countries to determine the most commonly perceived impacts. We analysed the open text responses where people described wind farm impacts following the guidelines on conducting thematic analysis by Braun and Clarke (2023). We applied a deductive or “theory-driven” approach, where produced codes are predefined through a theoretically informed interpretation by the researcher, in this case based on the impacts reported in relevant literature (Byrne, 2022). A selection of 20 impacts was made, comprising the most mentioned social, ecological, economic and energy production-related impacts (see Figure 6Figure 6).

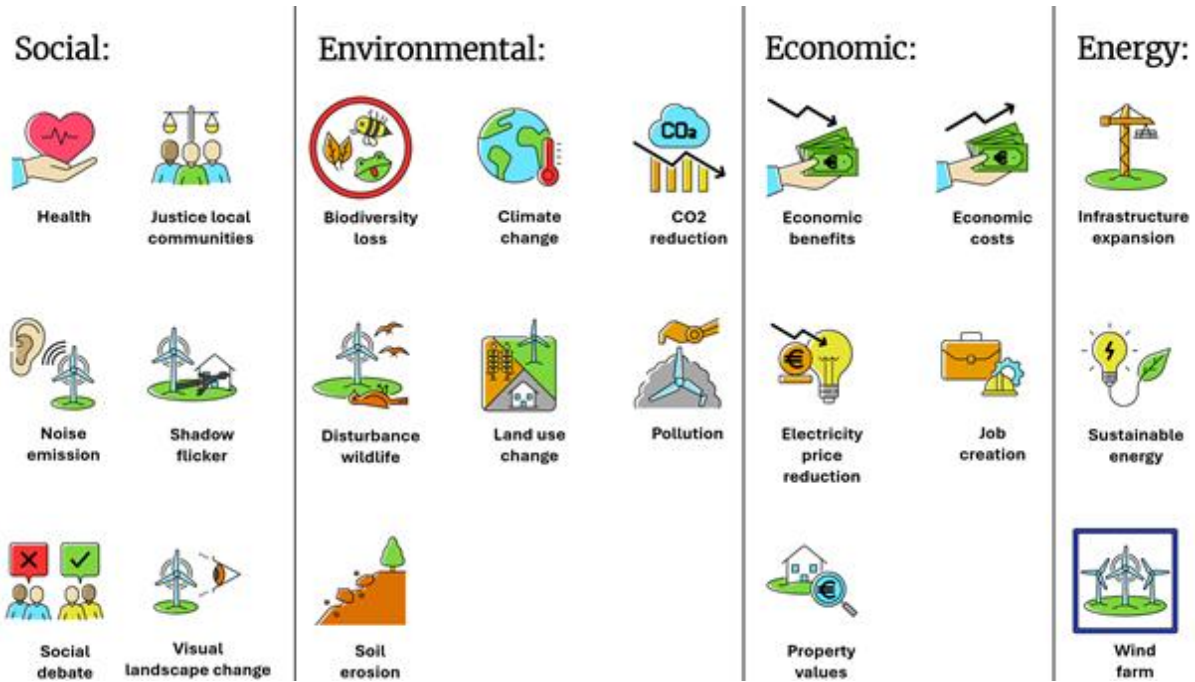


Figure 6: Selection of impacts and the target variable (wind farm) used for the mental model exercise (Graphic: Leanda Vedder)

- Step 2: Mental model elicitation.** participants could use these impacts to create their mental model by connecting them with each other or the target variable, the wind farm in operation, with three weighted arrows, where the weight represents the strength of the influence between images (see Figure 7). Participants were handed tablets with headphones where they were first presented with an instruction video that explained the concepts and instructions of how to create their model, then they were prompted to create their mental model about impacts they expect or have experienced from wind farms. Afterwards, they filled in a short survey on their general attitude towards wind farms (on a scale from 0 = I fully oppose wind farms, to 100 = I fully support wind farms), their perspective on the energy transition and renewable energy policies. We applied a network analysis approach to analyse the data, where the impacts serve as nodes and the arrows represent the edges of the network. In this way, we investigate the most used impacts, the most used direct connections between concepts and the most used indirect connections for each case study. This allows us to gain insights into participants' understanding of the system, especially the indirect connections provide us with an understanding of participants'

capability to conceptualise complex interrelations and systems thinking.

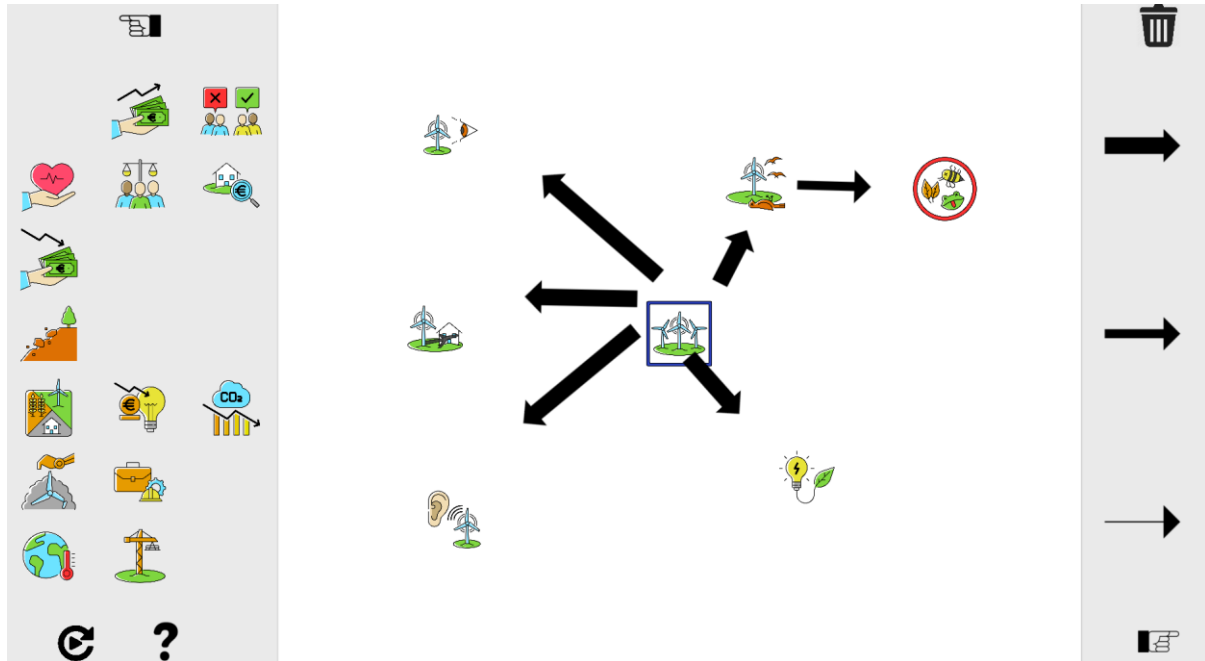


Figure 7: M-Tool mapping screen with a mental model created by a participant. (Graphic: Leanda Vedder).

The mental model exercise was implemented in conjunction with the 3D immersive environment during the workshops. To control for the potential influence of the 3D experience on participants' perceptions of wind farm impacts, efforts were made to achieve an even distribution of participants completing the mental model task either before or after engaging with the 3D environment. This allocation was determined based on the specific workshop arrangements in each pilot region. In Pantelleria, workshop participants completed the mental model exercise either entirely before (N=17) or after (N=7) the 3D experience, depending on the session. Additionally, interested people in the proximity of the workshop locations (N=36) were approached and could participate in the mental model study without visiting the workshops.

2.7 Interviews on Project Ramifications and Acceptance

The term NIMBY (Not In My Back Yard) is widely used to describe local opposition to nearby developments, particularly those involving energy infrastructure such as wind turbines or transmission lines (Devine-Wright, 2009). As Brennan and Van Rensburg (2016) argue, negative externalities

associated with wind energy projects (e.g., noise or visual intrusions) can foster NIMBYism. These localised externalities manifest in several ways. A concise review of the literature identifies four primary drivers of local resistance: (i) the environmental impacts of wind energy projects; (ii) their technical and physical characteristics; (iii) the distribution of costs and benefits related to the project; and (iv) the behaviour and practices of project developers.

With respect to **environmental impacts**, research highlights several key concerns: noise emissions (Langer et al., 2016, 2017); perceived levels of infrasound (Langer et al., 2018); the visual prominence of wind turbines (Langer et al., 2016, 2017) and their setback distances (Brennan & Van Rensburg, 2016); shadow flicker (Devine-Wright, 2005; Jensen et al., 2014); impacts on biodiversity (Ladenburg & Dubgaard, 2009) and property values (Jensen et al., 2014); grid expansion associated with projects (Langer et al., 2018); and the broader regional distribution of turbines (Bidwell, 2013).

Regarding **physical characteristics**, studies primarily focus on turbine height and the number of turbines. Brennan and Van Rensburg (2016), using a discrete choice experiment, found that higher turbines require greater compensation payments to ensure local acceptance. They also observed that residents demand increased compensation for each additional turbine within a wind farm. Similarly, Langer et al. (2016) confirmed that the steady expansion of turbines in Bavaria, Germany, has intensified conflicts with local communities.

Research on the **distribution of costs and benefits** underscores the importance of perceived distributive justice (Ciupuliga & Cuppen, 2013; Huijts et al., 2012). Community benefits and financial participation have been shown to positively influence local acceptance (Hyland & Bertsch, 2018; Langer et al., 2017; Walter, 2014). Research suggests that community benefits are better apt to increase wind energy project acceptance than individual benefits (Hyland & Bertsch, 2018; Walker et al., 2014; Walter, 2014). However, many studies also detected cheaper electricity for locals as convincing benefit (Brennan & Van Rensburg, 2016; Cass et al., 2010). It should be noted that some residents might perceive financial benefits as bribery (Cass et al., 2010; Macdonald et al., 2017).

Finally, the **behaviour of wind energy developers** plays a crucial role in acceptance. Studies highlight that perceived trustworthiness strongly influences public attitudes (Graham et al., 2009; Jobert et al., 2007). Trust can be fostered by enhancing procedural justice, particularly through transparent and high-quality information (Zoll & Ackermann, 2001). Citizen participation is equally significant, with residents represented by local community members showing greater support for projects (Brennan & Van Rensburg, 2016; Corscadden et al., 2012; Langer et al., 2017; McLaren Loring, 2007; Upham & García Perez, 2015).

Having the four aforementioned factors (i)–(iv) in mind, we addressed the following research question (RQ1): **Can certain project ramifications affect respondents' concrete attitudes toward a wind energy project in the region and if so, to what extent?** To answer this, we gathered quantitative data through surveys and semi-structured interviews, assessing whether elements such as smaller turbine designs or financial compensation schemes influence local attitudes positively or negatively. By examining a variety of factors within one survey, this report provides a holistic review of their impact on local attitudes across different regions.

In a second step, we integrated these findings with respondents' general attitudes toward wind energy and their views on projects in their region. Research indicates that community benefits and financial participation schemes can positively influence local acceptance, particularly among residents already favourably inclined toward wind energy (Hyland & Bertsch, 2018; Langer et al., 2017; Walter, 2014). Building on this assumption, we explore a second research question (RQ2): **Do project ramifications also affect the attitudes of respondents who are negatively inclined towards the project in the region?** This question directly follows from RQ1.

To analyse respondents' attitudes, we structured the questionnaire into three parts addressing their general attitude towards wind energy (Part I), their concrete attitude towards a wind energy project in the region, regardless of specific project characteristics (Part II), and their concrete attitude towards a wind energy project in the region, with defined project characteristics (Part III). This approach follows Walter (2014), who differentiates between public attitude toward wind energy (general perceptions at the national level), attitude toward local wind energy projects



(views on projects in one’s vicinity irrespective of specific features), and local acceptance of wind energy projects (opinions on a specific project, considering its characteristics). A complete list of the questions posed in Parts I–III is provided in Annex I, with additional details on the design process available in WIMBY Deliverable 4.4 (Lowitzsch et al., 2024). Figure 8 provides a visualisation of the methodology.

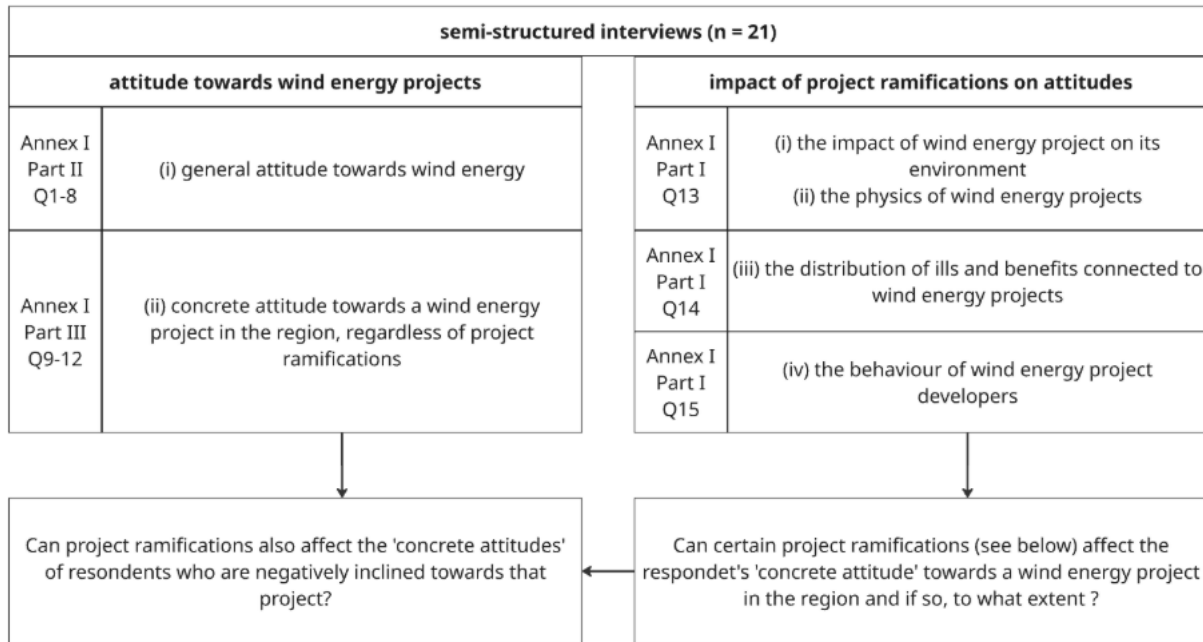


Figure 8: Overview of methodological approach (Elaboration: Monika Bucha)

2.8 Other Activities

Each workshop envisioned accompanying stakeholder engagement activities, to collect qualitative feedback on the Interactive map, the general forum and any further insight about the overall project approach and methodology. Such activities were organised as follows:

- A short presentation of the WIMBY interactive map and general forum including a real-time simulation
- Semi-structured interviews to selected stakeholders

The presentation of the interactive map and general forum was provided to workshop participants whenever possible: depending on the context and availability of time and space, the presentation took from 5 to 10 minutes, and it included a real-time simulation guided by the direct interaction with attendants. The majority of interactions were performed in Italian and led by

the Deep Blue and POLITO teams, whenever there was chance for showcasing the interactive map in English the UU team went through a full description of the exploratory and planning capabilities of the tool with participants. At the end of the simulation, each participant could provide his/her informal feedback on the experience and suggest enhancements. In Section 3.5 the feedback collected is summarised and main takeaways highlighted.

Semi-structured video interviews with selected stakeholders were collected with a two-fold ambition: i) collecting opinions and views related to wind-power energy and the local context that could feed results of quantitative surveys with qualitative insights ii) ensuring local voices would be heard and published at the local level, leveraging participation and opinion exchanges across the local community. To maximise visibility, when published, all links to video interviews have been shared with the belonging organisations and interviewees and of course published and promoted through all WIMBY public communication channels, after explicit consent.

To run interviews, the Deep Blue team

- prepared a standard list of guiding questions (see Annex II), common to all pilot sites.
- identified potential candidates in advance by liaising with pilot site leaders.
- collected signed consent forms from interviewees, authorising both the recording and the publication of the videos on WIMBY communication channels.
- planned 20-minute video-recording sessions.

Thanks to the informal setting and the set of open questions, interviewees were given time and opportunity to freely express their views and opinions. As a result, the team was able to capture the local nuances and perceptions of wind-energy projects and renewable energy systems at large. After recording, a preliminary version of edited interviews was sent to participants and pilot sites leader for approval before publication. In Section 3.5 highlights and key takeaways from interviews are summarised.



3 Results and Discussion

As part of the CE4EU Islands Forum, the first workshops took place on Pantelleria in May 2024. Although these workshops were not part of the original plan, they provided an opportunity to test the 3D platform and workshop format under real-life conditions. Further details can be found in Deliverable D5.3: Immersive 3D platform for wind-power awareness raising (Schauppenlehner et al. 2024).

From September 16 to 20, 2024, eight workshops were held on Pantelleria. The sessions took place in different villages—Pantelleria Centro (two workshops), Scauri (three workshops), and Tracino/Khamma (three workshops)—each lasting three hours. A total of 41 adults and 13 pupils took part in the workshops on the island.

3.1 Immersive 3D Planning Game

This chapter presents the results of the two game phases, the analysis of the baseline survey and the workshop evaluation. At the beginning of each workshop, a common objective was presented to all participants: to decarbonise Pantelleria's energy system and eliminate its dependence on fossil fuels. This narrative framed the quantitative 'goal' for the planning phase (Game phase 2), which was to develop scenarios capable of achieving the island's energy self-sufficiency.

3.1.1 Game phase 1: Go and No-Go zones for Windfarm development

A total of 100 locations were marked across all 8 workshops, which, when summarised, released a very homogeneous and coherent picture (see Figure 8).

In principle, the participants identified a larger suitability zone in the north (mainly addressing the industrial area and the zone in front of the harbour of the city of Pantelleria – region 1 and 2) and two main exclusion areas (the region around 'Montagna Grande' and 'Lago di Venere' –region 4 and 5). The areas in the south and east (region 6 and 7) did receive some mentions, but the opinions were rather unspecific and diverse. These assessments are



largely in line with the suitable areas compliant with the already existing technical and regulatory conditions—such as National Park zoning, Important Bird Areas (IBA) restrictions, and favourable wind resource availability (see Introduction), even though these have not been communicated in detail at this stage of the game.

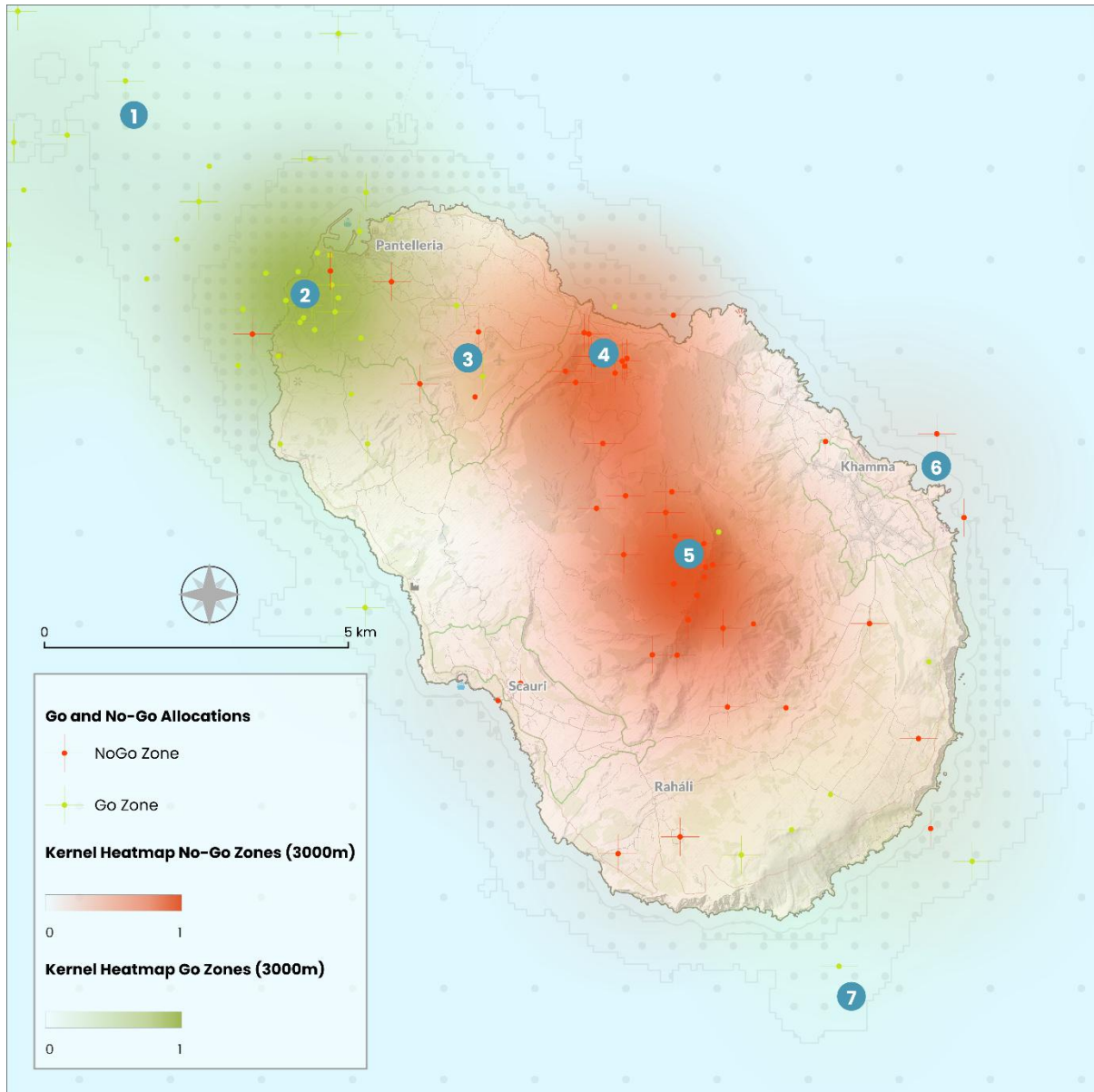


Figure 9: Distribution and density of Go and No-Go zones (Source: Open Street Map, Parco Nazionale Isola de Pantelleria, EMODnet Bathymetry consortium; Cartography: Thomas Schauppenlehner)

This classification process was accompanied by a discussion about the reasons behind these decisions. The main arguments are presented in the following table (see Table 2).

Table 2: Key arguments (Pros and Cons) for the considered regions in the Pantelleria pilot site

Region	Pros and cons
1	Pantelleria Harbour region: Close to industry/harbour and efficient large offshore turbines, less visibility due to distance from the coast but potentially interfering with ferry routes
2	Arenella industrial zone: Unattractive industrial area and local energy demand but also important stepping stone for migrating birds
3	Airport of Pantelleria: Barley visible but unsuitable because of aviation security and regulations
4	Lago di Venere: Attractive scenic lake and surrounding landscape with touristic value
5	Montagna Grande/Pantelleria National Park: High visibility and protected area
6	Khamma: Swimming area and iconic rock formations
7	South coast: Remote and without visual impact on settlements but natural landscapes and a very unique Dammusi architecture ³

3.1.2 Game phase 2: Virtual Windfarm development

The aim of game phase 2 was to develop specific wind farms based on the previously identified Go zones. By placing individual wind turbines or entire wind farms on the interactive game board, the effects on the landscape can be experienced in real time in the 3D environment. In addition, indicators provide information about the effects on ecological factors at the selected location and the contribution of the wind turbines to the game objectives explained in Section 1.2 (based on turbine sizes and local wind conditions). With the help of VR glasses, immersive visualizations are also possible to better perceive realistic perspectives and proportions. Below, three wind farm scenarios that were the focus of several workshops are explained in more detail in the form of fact sheets.

Scenario 1: “Where the energy is needed”

One of the main interests was the expansion of wind energy in the industrial area west of the town of Pantelleria in the north of the island (see Figure 10).

³ Dammusi are traditional stone dwellings characteristic of Pantelleria, featuring thick volcanic-rock walls and distinctive domed roofs.

This area is also home to the diesel generator that currently supplies most of the island's electricity. Due to its proximity to a hotel complex and the largest town, there are other large electricity consumers in the immediate vicinity in addition to industry. Nevertheless, there was concern that the visual impact could have a negative effect on tourism, which is why scenarios with small 0.7 MW turbines were initially developed (A). However, it quickly became apparent that this would require a very large number of turbines, which would not be feasible in terms of resources. Furthermore, the necessary space on the island is not available. With four larger 5 MW turbines (B), however, the self-sufficiency goal to renewable electricity (including e-mobility) could be achieved relatively easily. However, the turbines are correspondingly larger and therefore visible from viewing points and the centre of the town of Pantelleria.



Arenella Industrial zone

Onshore wind farm in the north of Pantelleria

A
4 turbines
Capacity: 0,7 MW/turbine

B
4 turbines
Capacity: 5 MW/turbine

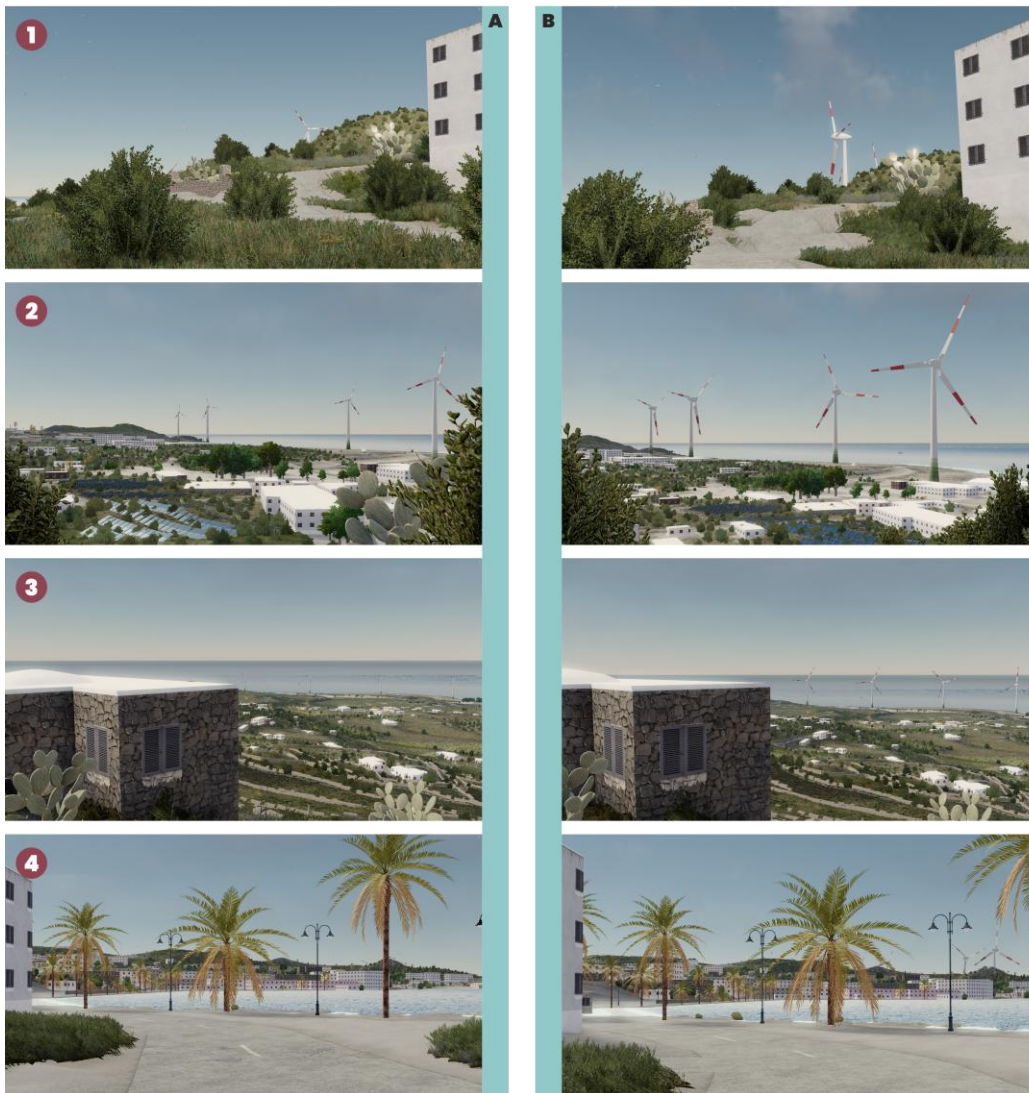
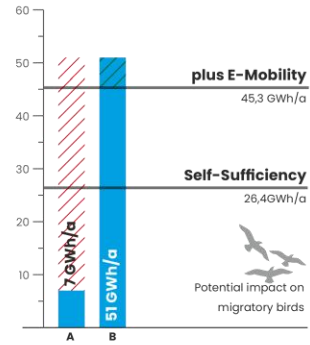


Figure 10: Factsheet Scenario 1: “Where the energy is needed” (Source: Open Street Map, Parco Nazionale Isola de Pantelleria, EMODnet Bathymetry consortium, WIMBY; Cartography and Layout: Thomas Schauppenlehner)



Scenario 2: “In front of the harbour”

Another scenario was the approach to place offshore turbines in front of the harbour (see Figure 11). Due to the good wind conditions there, three turbines with 7MW could be sufficient to provide clean energy for Pantelleria including e-mobility. A problem here is that the seabed drops rapidly to great depths, which would require more technically complex floating structures. The layout must also take shipping routes into account, as larger ships and ferries also pass through this area. Regarding the visual impact of the windfarm, the visualizations clearly show that this depends heavily on the position of the sun, but this was not perceived as particularly disruptive in the workshops. It was also noted that this location is also suitable as landmark for sending a widely visible signal about the island's commitment to renewable energy.



Pantelleria Harbour

Offshore wind farm in front of Pantelleria harbour

3 turbines
Capacity: 7 MW/turbine
Floating system

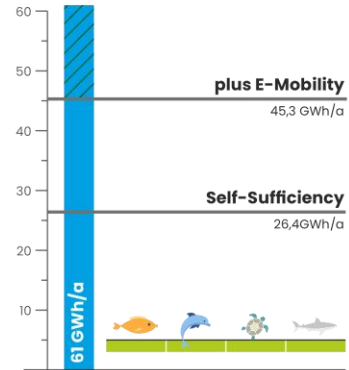
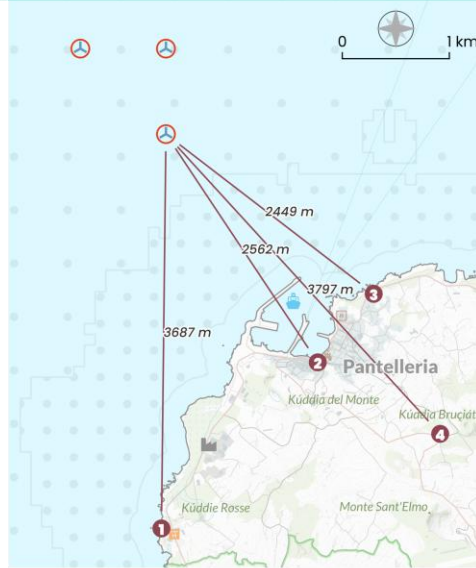


Figure 11: Factsheet Scenario 2: “In front of the harbour” (Source: Open Street Map, Parco Nazionale Isola de Pantelleria, EMODnet Bathymetry consortium, WIMBY; Cartography and Layout: Thomas Schauppenlehner)

Scenario 3: “Not in my backyard”

The third wind farm scenario addresses the desire of some participants to remove them from their living environment (see Figure 12Figure 12). There are no significant residential areas in the south of the island, which is why an offshore wind farm was also planned virtually here. In comparison to the harbour as a location, it can be seen here that although the targets can also be achieved with three turbines, the yield is much lower due to poorer wind conditions, which raised questions about economic viability. In addition, a correspondingly long and complex cable infrastructure would be necessary to transport the electricity to consumers.

Apart from that, this location is also more sensitive from a marine ecological point of view. After considering these factors, the participants therefore concluded that both the economic and ecological costs are disproportionate to the desire to remove the turbines from everyday views.



Pantelleria South

Offshore wind farm in the remote south of Pantelleria

3 turbines
Capacity: 7 MW/turbine
Floating system

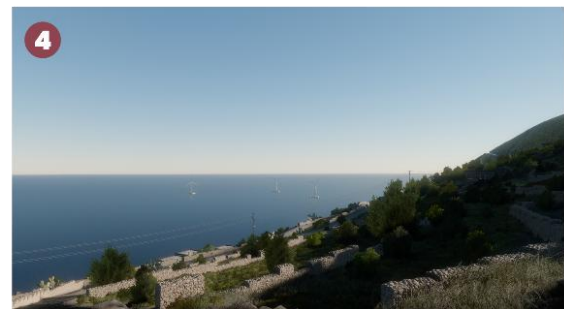
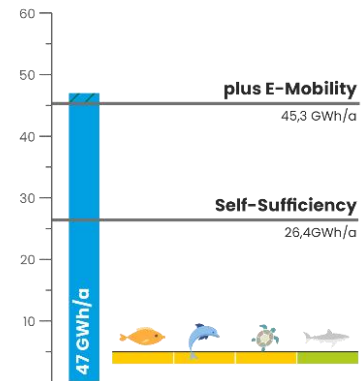


Figure 12: Factsheet Scenario 3: “Not in my backyard” (Source: Open Street Map, Parco Nazionale Isola de Pantelleria, EMODnet Bathymetry consortium, WIMBY; Cartography and Layout: Thomas Schauppenlehner)

3.1.3 Analysis of questionnaires

The collected questionnaires were entered into an Excel spreadsheet and analysed using SPSS. This section summarises the results of the baseline survey of adults, the baseline survey of pupils and the results of the debrief questionnaires completed by both groups.

Baseline Survey Adults

More than half of the 41 adult participants were between 46 and 64 years old, 78% were male and 50% of the respondents had a Master's degree or PhD as their highest level of education. Most were in full-time employment, and more than half of the participants (56.1%) lived on Pantelleria, with a mix of rural and urban residents. 42.5% of the workshop participants had previous experience with renewable energy initiatives, and many of them (46.3%) had professional backgrounds in the field. Most people sought information about renewable energy through the internet and social media.

Support for wind energy was notably high (see Figure 13a), with many (71.1%) recognizing its potential to contribute to the island's sustainable energy future and nearly half believe wind energy can effectively meet the island's energy needs (see Figure 14c). Despite this, a majority (73.7%) felt excluded from the decision-making processes related to wind energy projects (see Figure 13b). While there is considerable interest in participating in activities to support wind energy initiatives, yet only 15% consider the incentives and opportunities for expanding wind energy to be high. Past participation in wind energy projects was low but concerns about them were also minimal.

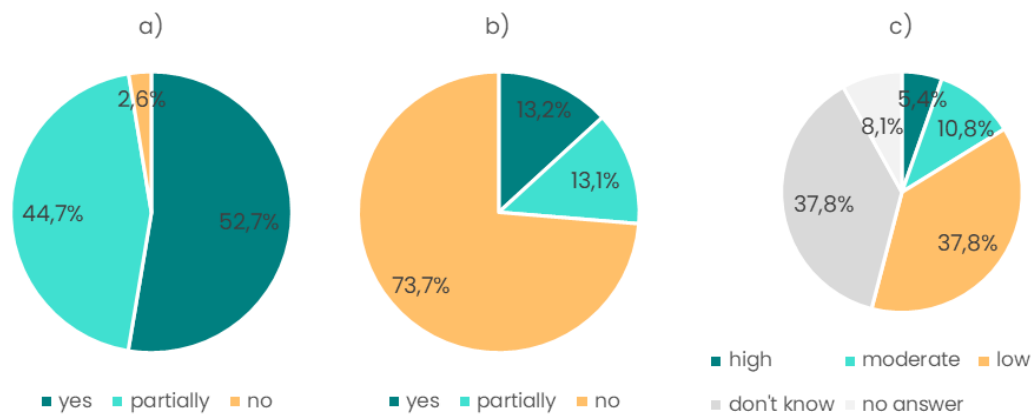


Figure 13: a) Do you generally support the expansion of wind energy? (n=38); b) Do you feel involved in the decision-making processes related to wind energy projects in your region? (n=38); c) How do you rate the level of public support for wind energy projects in your community? (n=37)

The environmental and economic benefits of wind energy were widely recognized, with many participants agreeing that wind projects could positively impact the local community. Although only 23.1% of respondents perceived significant risks to biodiversity and aesthetics (see Figure 14a), environmental impact assessments and mitigation measures were

considered essential by the majority (see Figure 14b). Furthermore, research on wind energy—particularly regarding its landscape impact, offshore development, and wildlife protection—received strong support (78.9%). According to the adults surveyed, investment incentives and the simplification of approval procedures are among the most important political measures or regulations for promoting the development of wind energy projects in the region.

Public support (see Figure 13c) and social acceptance of wind energy projects were rated as relatively low. It is therefore not surprising that 72.2% consider stakeholder involvement to be crucial to the success of wind energy projects.

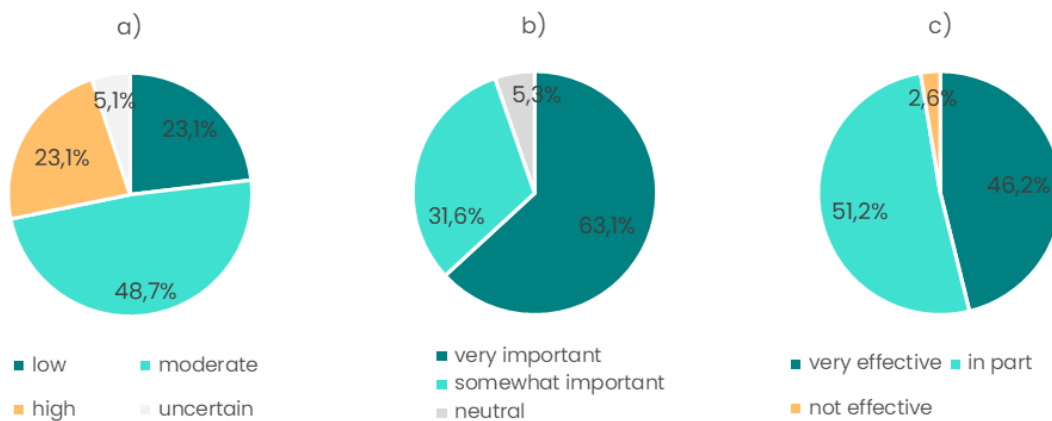


Figure 14: a) How do you assess the potential environmental impacts of wind power, particularly regarding biodiversity and landscape aesthetics? (n=39) b) How important is it to conduct environmental impact assessments and implement mitigation measures for wind energy projects? (n=38) c) In your opinion, how effectively could wind energy meet the energy demand on Pantelleria? (n=39)

Despite the challenges, the respondents see the biggest advantages of wind energy in the reduction of greenhouse gas emissions and an improvement in the quality of life. It is particularly important to them that the population has a say in siting decisions to minimise the impact on the environment, especially regarding the preservation of habitats. So, the workshop participants see the main incentive for switching to regionally generated renewable energies in the ecological benefits and the better management of energy crises. Lower energy costs are seen as particularly convincing, while public participation plays an important role for many.

Baseline Survey Students

The 13 students surveyed were primarily aged 14 to 16, with a larger proportion of boys (76,9%) than girls. Most lived in rural areas, with a smaller portion living in urban areas or on the outskirts of towns. Most students never or rarely discussed renewable energy with their friends or family, and only nearly a third had received wind energy education at school (see Figure 15a). As with the adults surveyed, the internet and social media are the main sources of information.

Despite having little knowledge about wind energy, most students believe that wind energy is important for the future of the energy supply (see Figure 15b). Therefore 53.8% of the pupils surveyed support its expansion (see Figure 15c) and 69.2% believe wind farms would benefit local businesses. Nevertheless, more than half are also partially concerned about possible negative social and ecological effects (see Figure 15d). On the flip side, over a third believe that wind energy results in lower energy costs and can contribute to the reduction of greenhouse gases. Public support for wind energy projects is rated as low by 53.8%, and acceptance is rated as moderate by 46.2%. Hence many students also consider involving local communities essential for the success of wind energy projects.

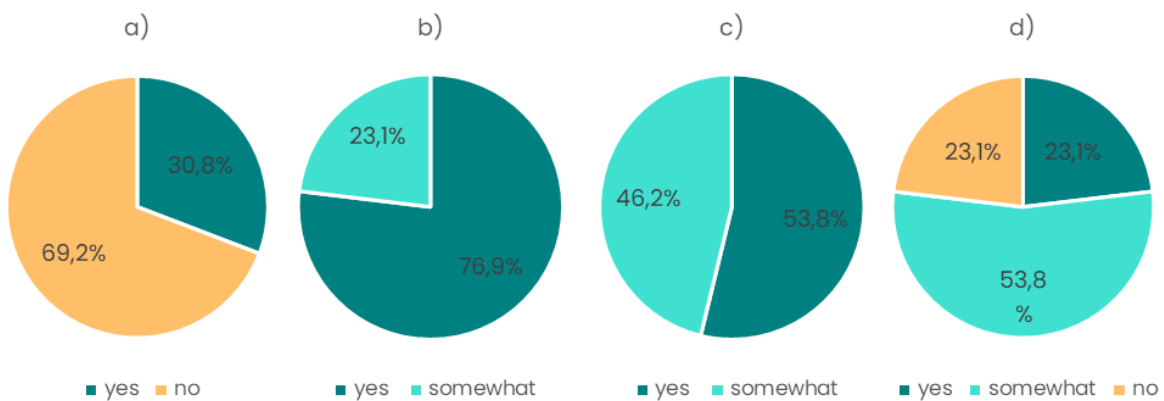


Figure 15: a) Have you already learned something about renewable energy in school or through other activities? (n=13) b) Do you believe wind energy is important for our energy future? (n=13) c) Do you support the development of wind energy? (n=13) d) Are you concerned about potential social and environmental impacts of wind energy projects? (n=13)

Workshop Feedback

The workshops on Pantelleria were well-received by both adults and students. On Pantelleria, while a significant portion of students were familiar with video games, serious games and virtual reality (VR), there was less familiarity with videogames and serious games among adult participants. 56.1 % of adults surveyed have used VR glasses at least once. However, the feedback on the wind energy game was overwhelmingly positive (see Figure 16a and Figure 17a). Most participants found the game exciting and engaging, with many believing it effectively illustrated the impact of wind energy projects. The virtual reality experience was particularly appreciated; with many adult participants feeling it helped them understand the potential effects of wind energy on their community (see Figure 16b).

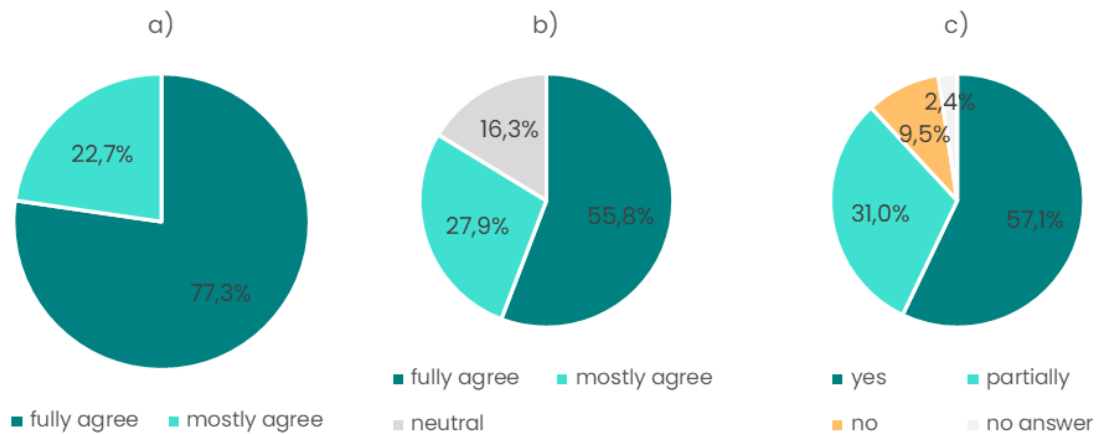


Figure 16: Feedback adults a) Overall, the experience of participating in a wind energy game was positive (n=44) b) The Game helped me to visualise possible regional wind energy scenarios (n=43) c) Did the workshop increase your confidence in supporting wind energy initiatives? (n=42)

The workshops also had a positive impact on participants' understanding and attitudes toward renewable energy (see Figure 16c and Figure 17b). More than 60% of the students (see Figure 17c) and more than half of the adults reported that the workshop influenced their views on renewable energy and increased their willingness to support wind energy initiatives. Group discussions and expert insights were valuable learning tools, and many participants expressed interest in future workshops and community involvement opportunities.

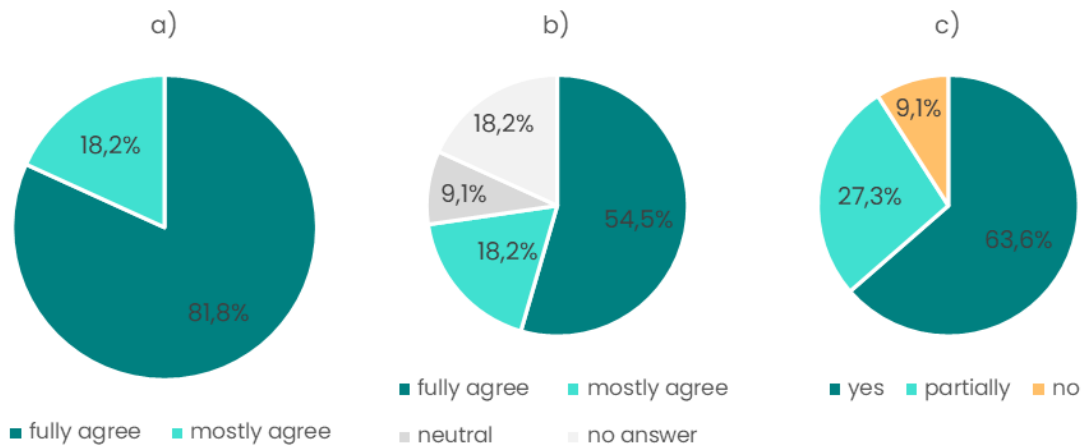


Figure 17: Feedback students a) The role-play combined with a learning game was enjoyable and interesting. (n=11) b) The game helped me better understand wind energy concepts and initiatives, as well as their potential impact on my community. (n=11) c) Did the workshop influence your knowledge and perceptions of renewable energy? (n=11)

3.2 MUSA

This section summarises preliminary results from Pantelleria. A full technical analysis appears in Deliverable D4.6 (in progress). All pilot sites employed the same set of evaluation criteria: three overarching dimensions: environmental, community, and individual. They are subdivided into 12 specific sub-criteria (see Table 3).

Each sub-criterion was measured on a scale suited to its nature: for instance, “Undesired land-use changes” used a four-point Likert scale, because this is a unidirectional question with options “To a large extent”, “To a moderate extent”, “To a lesser extent”, “Not at all”.

Whereas “Economic impact on the community” was assessed on a five-point scale, because this is a bidirectional question. The range of options extends from negative to positive, with a neutral option in between: “Rather negative”, “Slightly negative”, “No effect”, “Slightly positive”, “Rather positive”.

Table 3: Set of satisfaction criteria

Dimension (Criterion)	Sub-criterion
Environmental	Undesired land use changes
	Impact on biodiversity
	Reduce Greenhouse gas emissions (GHG)
Community	Economic impact on the community

	Negative effect on community lifestyle
	Safety risks to people and infrastructures
	Raise social awareness and political engagement
	Long term maintenance and decommissioning plans
Individual	Impact on personal finances
	Negative effect on the landscape's aesthetics
	Disturbance from noise pollution
	Disturbance from shadow flicker

In Pantelleria, 79 residents completed the MCSA survey. By feeding the survey result into MUSA model, Figure 18 illustrates the satisfaction value functions for each sub-criterion obtained.

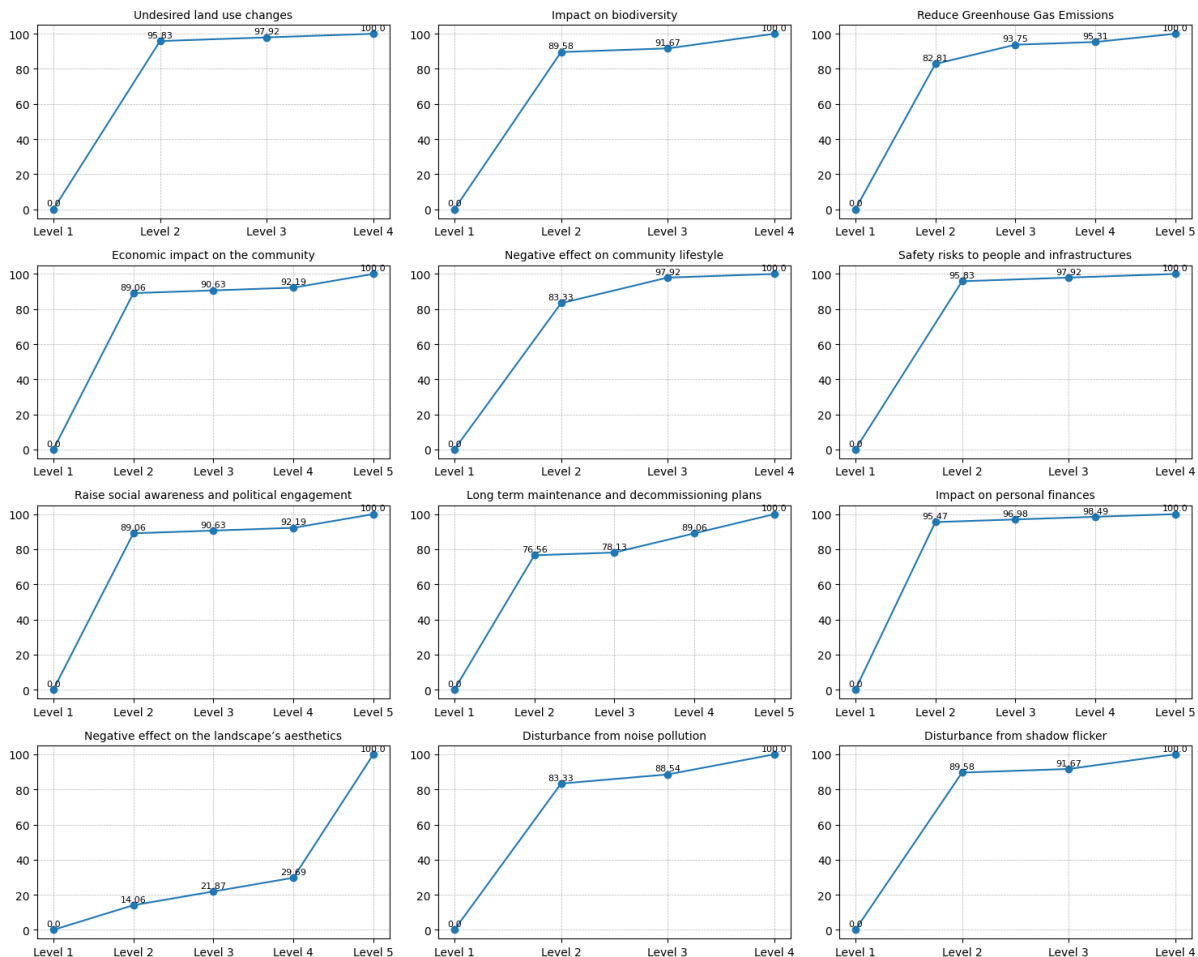


Figure 18: Sub-criteria satisfaction functions of Pantelleria responses

Satisfaction functions map respondents' verbal assessments (e.g., "moderately satisfied") to quantitative scores on a 0–100 scale using



piecewise-linear curves. This mapping converts ordinal survey responses into cardinal values, enabling meaningful comparison and aggregation across criteria and groups. The specific shape of such mapping sub-criteria satisfaction functions is obtained by solving an optimization problem fed with participant responses, which minimizes the discrepancy between stated overall acceptance and the acceptance aggregated from sub-criteria evaluations, with the notional objective to preserve the actual overall satisfaction of the respondents and avoid distortion effects; further details are found in D4.1–D4.3. Every value function begins at a satisfaction value of 0 for the lowest response level and rises to 100 at the highest, allowing us to read exactly how much satisfaction a given response implies. Take the sub-criterion “Undesired land-use changes,” posed as: “Do you believe that the construction of wind turbines will lead to undesirable land-use changes?” Respondents chose from four options: “To a large extent” (level 1), “To a moderate extent” (level 2), “To a lesser extent” (level 3), and “Not at all” (level 4). If someone selects “To a lesser extent” (level 3), the value functions assign that response a satisfaction score of 97.9, indicating a very high level of comfort with the potential land-use impact, even if it is not the highest level of satisfaction on this criterion. The shape of each satisfaction function also reveals how demanding participants are. For the sub-criterion “Negative effect on the landscape’s aesthetics”, the curve climbs slowly: every response except the highest level yields a satisfaction score below 50. This indicates that residents require near-perfect performance before they feel content, making it the most demanding attribute. By contrast, the curves for all other sub-criteria rise much more quickly, showing that participants are generally easy to satisfy on those issues.

3.3 Mental Models

In Pantelleria, participants (N=60) constructed mental models using an average of 9.95 concepts (SD = 4.04), connected by an average of 9.90 arrows (SD = 5.22). The models predominantly emphasised renewable energy generation and its linkage to economic benefits. The most frequently used concepts were CO₂ Reduction, Sustainable Energy, and Economic Benefits. Correspondingly, the most common direct connections were between Wind Farm and Sustainable Energy, followed by links to CO₂ Reduction and Visual Landscape Change (see Figure 19). A shared



expectation of economic benefits from wind energy was evident among participants. The most prevalent indirect connection was between Sustainable Energy and Electricity Price Reduction, followed by connections between Electricity Price Reduction and Economic Benefits, and between Sustainable Energy and CO₂ Reduction. Participants in Pantelleria demonstrated a generally high level of support for wind energy, with a mean support score of 75.51 (SD = 19.60). Overall, the mental models reflect a strong awareness of the interrelationships between wind energy, environmental benefits, and economic outcomes. Compared to the other pilot sites, participants in Pantelleria placed greater emphasis on economic impacts, while social or individual-level impacts were less frequently represented. This focus may be influenced by the island’s unique context, particularly its reliance on imported fossil fuels, which likely shapes more favourable perceptions of wind energy and its anticipated economic advantages.

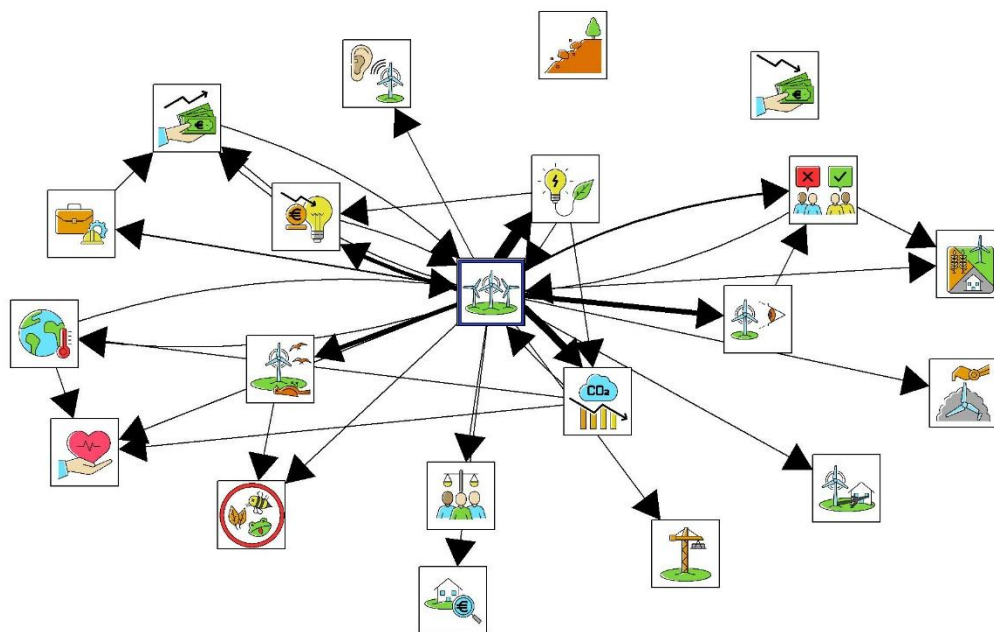


Figure 19: Aggregated mental model of wind farm impacts among participants from Pantelleria. The thickness of the arrows represents the total weight of the connections across individual mental models, with thicker arrows indicating stronger connections. Note: Only connections with an above-average aggregated weight are shown (Source: Mental model data, Graphic: Leanda Vedder)

3.4 Interviews on Project Ramifications and Acceptance



In total, 21 interviews (43% female, 57% male) were conducted in Pantelleria, both during workshops (see Section 2.3) and in public spaces such as streets, churches, and municipal buildings. Some participants were contacted in advance via email and via phone to arrange a meeting, and interviews lasted between 15 – 60 minutes. Most interviews were in person; two were conducted online via MS Teams with cameras on.

These interviews provided a small snapshot of local attitudes toward wind energy projects. Based on question (in the following: Q) 1–8, only one respondent opposed wind energy, eight were neutral, and twelve were supportive (see Figure 20a). When asked directly about their feelings toward the construction of a hypothetical wind energy project in their vicinity (Q11), three respondents expressed negative or very negative feelings (see pie to the left in Figure 20b). Interestingly, all of them still considered project participation to be important or very important (Q12; see Figure 20b, right pie). This suggests that even individuals initially opposed to such projects may become more accepting if provided with meaningful opportunities for participation. This hypothesis will be examined further in the following paragraphs.

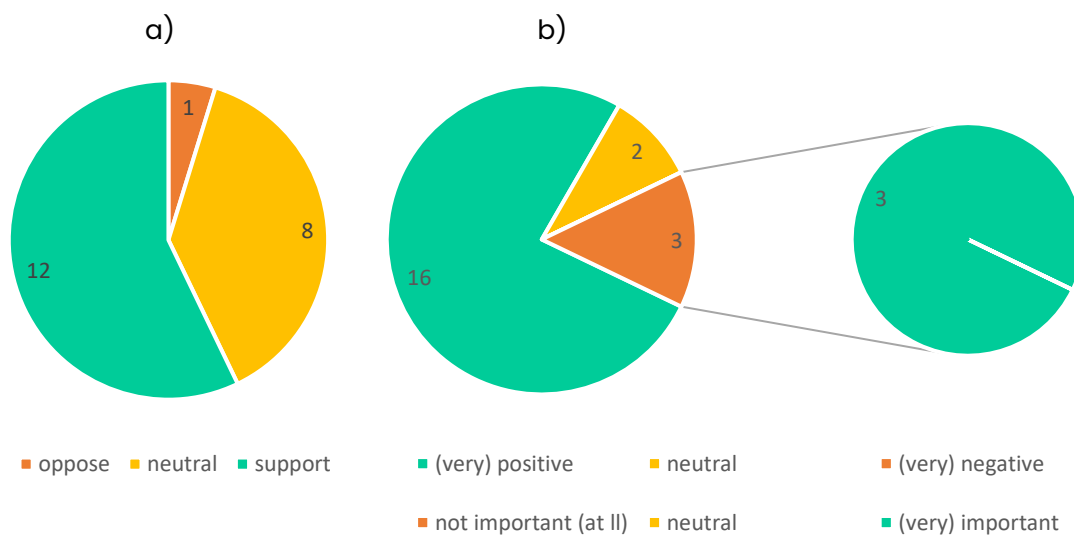


Figure 20: a) General attitude towards wind energy (n = 21) b) Feelings towards wind energy projects and the importance to participate (n = 21)

The analysis of Q13 (*Which of the following technical changes would increase your willingness to support wind energy projects in your region?*) revealed that twelve respondents supported changes to setback distances, nine supported altering turbine height, eight supported technical measures

to avoid bird strikes and six supported altering the number of turbines (see Figure 21, left pies). In other words, our study shows that about 29–57% of respondents indicated increased support when technical adaptations addressed either (i) environmental impacts or (ii) the physical characteristics of wind energy projects.

Of respondents who indicated increased support when technical adaptations were offered in **Q11** reported neutral or negative attitudes towards wind energy projects in their region. This suggests that while some measures primarily strengthen support among those already convinced, certain adaptations can also influence these sceptical respondents. Among the four technical measures in **Q13**, preventing bird strikes was the most effective, with 80% of neutral or negative respondents indicating increased acceptance, followed by adjusting turbine height (80%), modifying setback distances (60%), and reducing the number of turbines (40%) (see Figure 21, right pies).



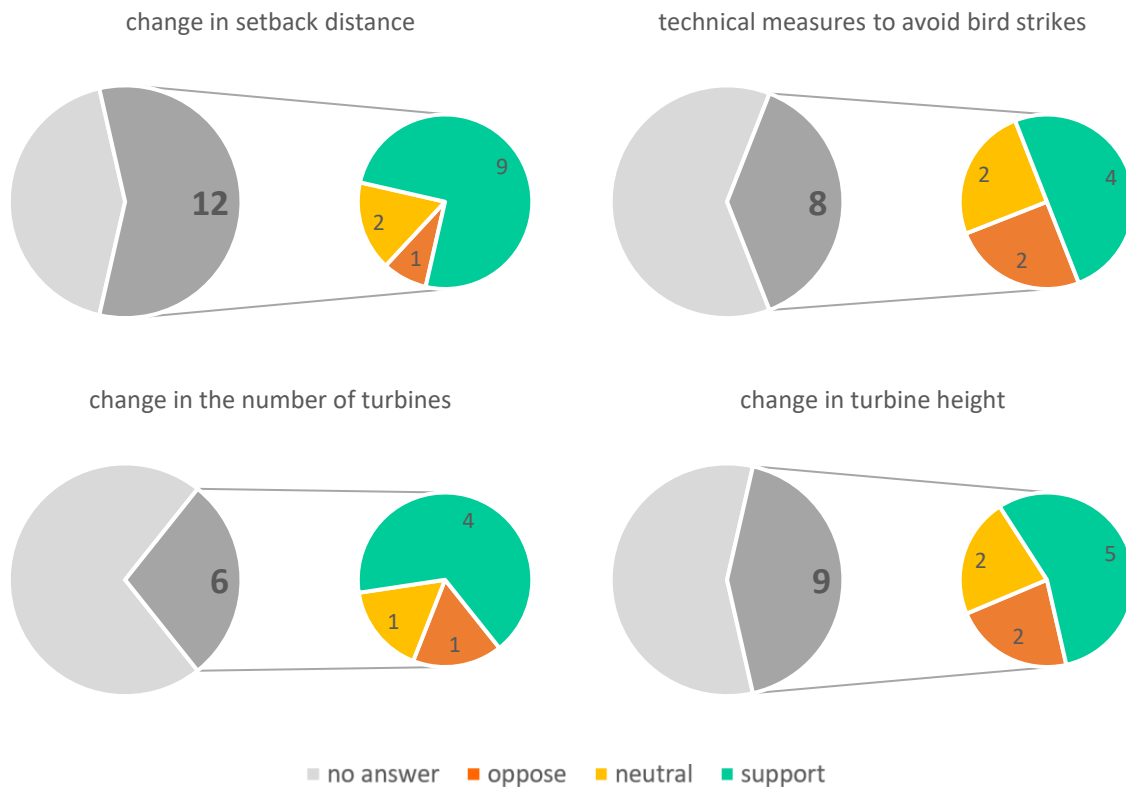


Figure 21: Technical changes which would increase one’s willingness to support regional wind energy projects (n = 21)

Q14 (*Which of the following financial participation mechanisms would increase your willingness to support wind energy projects in your region?*) showed that financial participation was indeed appealing to certain respondents: 15 supported discounted electricity, 14 preferred acquiring shares with personal funds, eleven supported financial participation for their municipality, and ten supported acquiring shares through external financing (see Figure 22, left pies). In total, 29–57% of respondents were more willing to support a project when offered financial participation schemes; this directly addresses (iii) the distribution of ills and benefits.

Of respondents who indicated increased support when financial participation was offered, up to 100% were sceptics. Again, while some mechanisms appeal mainly to supporters, others also appeal to these sceptics: Having the possibility to acquire shares in the project with own money proved most effective (100%), followed by discounted electricity (80%), financial participation of the municipality (60%), and the possibility to acquire project shares with foreign money (see Figure 22, right pies).

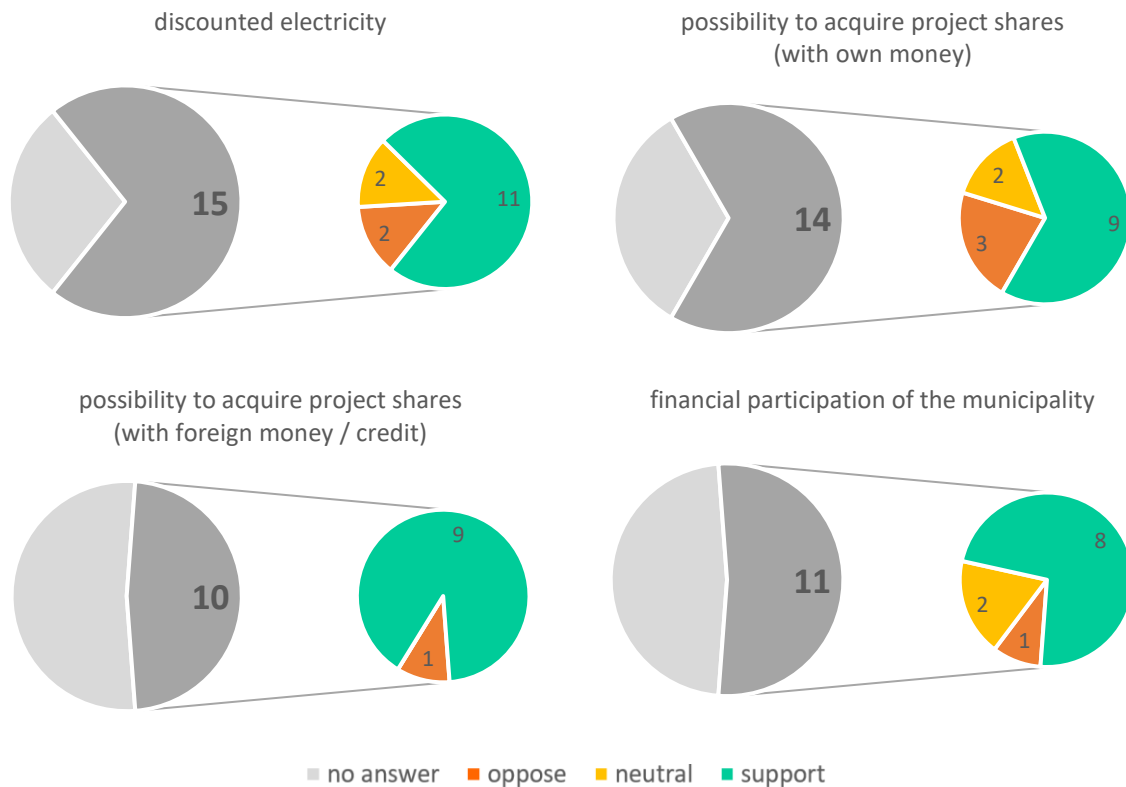


Figure 22: Financial participation mechanisms which would increase one's willingness to support regional wind energy projects (n = 21)

For **Q15** (*Which of the following options for engagement in the decision-making processes would increase your willingness to support wind energy projects in your region?*), 17 respondents supported early involvement, 16 preferred regular written updates, and nine each favoured involvement in project implementation and having a municipal representative on the board of directors (see Figure 23, left pies). Overall, 43–81% of respondents showed increased willingness to support a project when given opportunities for active engagement in decision-making, indirectly depending on (iv) the behaviour of wind energy project developers.

Of respondents who indicated increased support when early engagement was offered, up to 100% were sceptics. Among the four measures, the most effective one to convince these types of sceptics is the early involvement in the project planning and siting processes (100%), followed by regular written updates (60%), participation in project implementation, and being granting an elected municipal representative a seat on the project's board of directors (20% each) (see Figure 23, right pies).

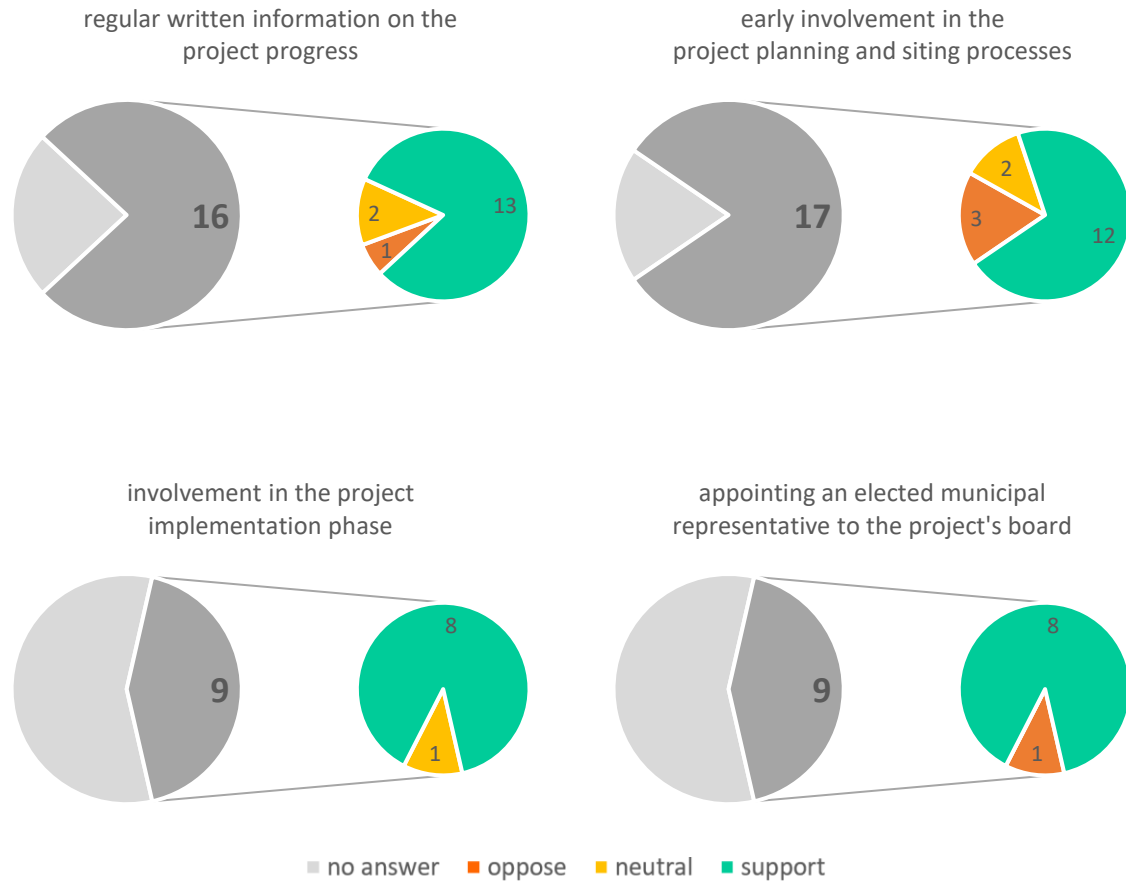


Figure 23: Options for engagement in the decision-making processes which would increase one's willingness to support regional wind energy projects (n = 21)

3.5 Other Activities

WIMBY interactive map and forum interactive session

In Pantelleria we collected the following comments (see Table 4) related to the WIMBY interactive Platform and forum:

- Workshop (WS) 01, 02, 03: Scauri
- Workshop (WS) 04, 05, 06: Tracino
- Workshop (WS) 07: Pantelleria (Pupils)
- Workshop (WS) 08: Pantelleria (Government representatives)

Table 4: Comments on the WIMBY Interactive Platform and forum

Scauri	[target group – aviation expert]	“With this tool anyone on the island could easily verify the areas where winds blow more often and from which direction. We know very well how they distribute on the island, of course we need to ensure flights are landing safely. But not everyone is aware of what a
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		complex topic this is. I would show it to everyone to explain such dynamics.”
Scauri	[target group – architect, resident]	“There are a lot of similar tools, I do not like too much such digital and complex tools, they are not for everyone to use. Nevertheless, I admit your platform is very appealing and user friendly, and I like the fact that I can run simulations also near to my own house and see what happens.”
Tracino	[target group – local resident in a rural and remote area]	“I really appreciate your work, thanks to these tools one can really see how much wind energy we have here and as I see, there are not so many rare species on land on this [eastern] side of the island. It’s inside the national park, but I can tell you no one really comes here, and you could not even see turbines from the seashore. Why don’t we talk about it? The Forum can be the ideal place where to discuss.”
Pantelleria	[target group – school teacher]	“The simulations that can be done here and the discussion forum could be used during lessons to let younger generations realize the complexity but also the fascinating role of planned development, especially in an island where space is limited.”
Pantelleria	[target group – MASE representative]	“A tool such as the WIMBY Platform shall be on the table of every policy maker who needs to study and take decisions on wind-energy planning policies. At the national level, but also and even more at the European level. Being able to make quick evaluations and comparison among impacts – the environmental, the health and safety, the regulatory – is so important especially because it can really support informed discussions and decision making.”

Video Interviews

Overall, in Pantelleria eight video interviews were collected, plus an additional interview to the pilot site leader POLITICO. All interviews can be found on the WIMBY YouTube channel ⁴ here. Key statements are summarised in Table 5 below.

⁴ <https://youtube.com/playlist?list=PLna5U7-OPgOtnOyUQbQhSDyjtFc8yE--p&si=vED0egy6ddPw1Va3>

Table 5: Summary of stakeholder interviews

Giuseppe Giorgi and Claudio Moscoloni	Pantelleria pilot site leader and researcher at Polytechnic University of Turin	“A technology that is not so well known and neither its impact, cannot be correctly evaluated by citizens. Thanks to WIMBY solutions such knowledge gap can be covered. In Pantelleria the interests at stake are complex, but they all live and operate in a small territory. All of them shall be able to express their concerns and correctly evaluate all positive and negative impacts. Since 2019 Pantelleria is part of Clean Energy for EU Islands and is open to work on the energy transition.”
Sonia Anelli	Director of the Pantelleria National Park	“We need to put around the same table the local community, the local institutions, the experts and let them find their own “receipt” for a just energy transition in this island. It is essential being open to discuss, agree to sit around that table and create a shared vision. It’s important to be part of the change, instead of accepting it when it comes top-down. Oftentimes the scientific community is criticised because we use technical language and jargons. Through WIMBY we can transform a conflicting dialogue into a real engagement and a mutual learning process. Not only this is important in Pantelleria but could be an example for other protected areas in the country.”
Gaspare Inglese	Environmental Engineer	“Living on an island with limited resources makes sustainability a tangible challenge. Over the past 20 years, I’ve explored renewable energy solutions here, from small-scale wind projects to community energy initiatives. The key is balancing technical potential with landscape, environmental, and social impacts. Tools like virtual reality visualizations help both decision-makers and the community understand and plan projects, making renewable energy more concrete, socially acceptable, and sustainable for Pantelleria.”
Carmine Vitale	Geologist	“Pantelleria has a unique opportunity for renewable energy, from wind and solar to geothermal and wave power. A rational mapping of the island’s land use, combined with small-scale pilot projects and community engagement, can allow energy solutions that are integrated

Matteo Piceni	Hiking and nature guide	<p>with the landscape and culturally accepted. The goal is not only energy independence but also creating socio-economic benefits, training opportunities, and a model of sustainable development that could inspire other territories.”</p> <p>“The island always had to deal with scarcity: water scarcity, food scarcity, energy scarcity. Nowadays we still use gasoline, but people are now understanding that they can install solar panels and use cleaner sources. We have wind, sun, waves. Also, tourists are surprised that we still use gasoline. They would expect a bit more.”</p>
Francesca Marrucci	President of the Università Popolare di Pantelleria	<p>“At UniPan, we’ve seen first-hand the strong interest of Pantelleria’s community in sustainable energy. Through seminars and workshops, we aim to share knowledge about renewable options and how they can be applied locally, while respecting the landscape and laws. Sustainable energy is not only a tool for environmental responsibility but also an opportunity to boost local development and even tourism, taking inspiration from other islands that have successfully integrated renewables.”</p>
Stefano Scaltriti	Arborist and Farmer	<p>“Pantelleria has enormous renewable energy potential, from solar to wind and geothermal. The challenge isn’t the technology—it’s bureaucracy. Small-scale, community-based solutions like micro- and mini-wind systems can democratize energy, making residents more independent and reducing reliance on centralized, fossil-fuel power. The community is ready for change; what’s needed is support and clear pathways to implement these innovative, locally adapted solutions.”</p>
Angelo Parisi	Environmental engineer from the local municipality office	<p>“I help citizens install domestic renewable energy systems and we are now implementing electric buses. The national park and the municipality need to work in synergy; there is no other way to progress. We could always find ways here to find solutions that work in harmony with the nature and beauty of this place. We have so much wind, also waves, geothermal energy, biomass: there are all the resources needed, and wind is definitely the more relevant. Regulations are now harshly limiting wind-farm deployments, and this is slowing down our decarbonisation. We are</p>

seeking for a better dialogue to find viable solutions for wind parks outside the perimeter of the natural reserve.”

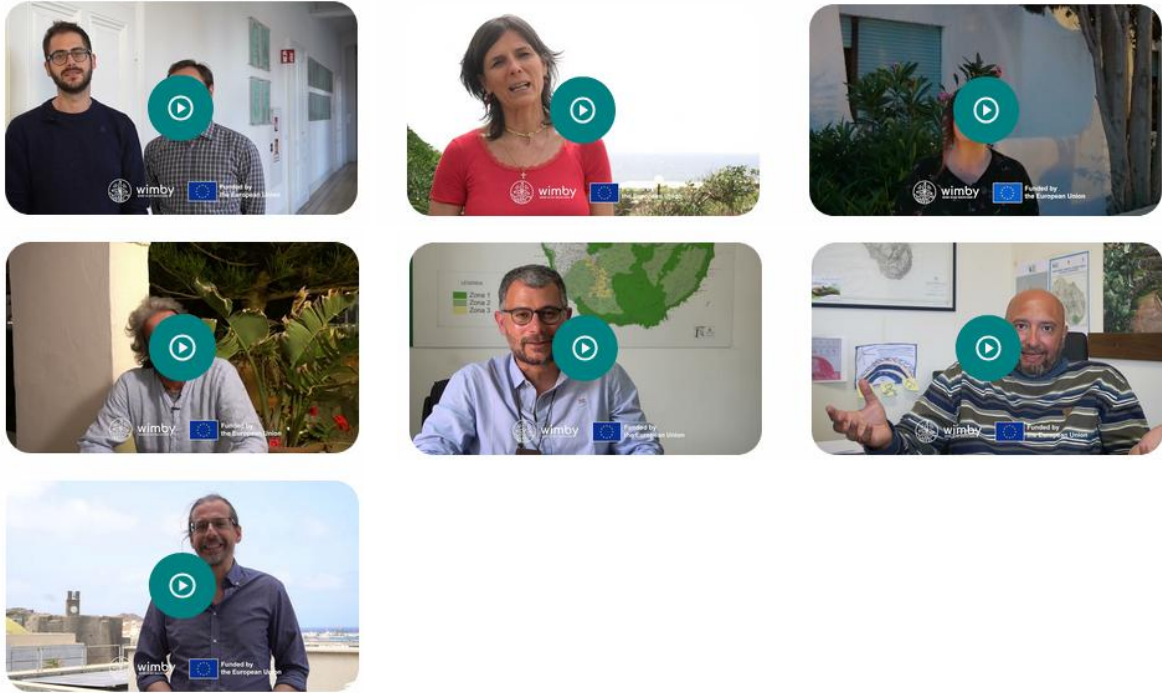


Figure 24: Video snapshots from the interviews

4 Conclusion and recommendations

All the engagement activities, particularly the workshops that employed the immersive 3D platform, highlight that the inhabitants of Pantelleria are, for the most part, in favour of the development of renewable energy production from wind power on the island. This support is based on precise and well-defined motivations. As evidenced by the interviews and the results of the Mental Model activities, the main driver for this acceptance lies in the perception of possible economic benefits, both at a personal level and for the local socio-economic fabric.

A clear awareness of the evident positive effects emerges on the environment, linked to the decarbonisation of an island currently dependent on fossil fuels. However, a degree of scepticism remains, stemming from the possible environmental impacts, especially of a visual nature. These fears

arise from a deep awareness of the territory's value and the island's strong appeal to tourists as a pearl of the Mediterranean, hosting panoramic and naturalistic landscapes of uncommon beauty.

These concerns were systematically gathered and analysed by both the MUSA survey and the 3D workshops, where the high density of "no-go zones" is predictably concentrated in the most valuable areas, such as Montagna Grande and the vicinity of Lago di Venere. Alongside these legitimate exclusion zones, a clear hotspot of "go-zones" constructively emerges, located near the Arenella area on the island's North-Western coast, which already hosts an industrial zone and the local power plant. This finding shows that the community has not only shown openness to wind energy but has also expressed a clear direction regarding a plausible and pragmatic location. The surveys and semi-structured interviews indicate that certain project ramifications can significantly influence local attitudes towards a wind energy project, including among those initially opposed. The most effective measures in convincing respondents with negative views were the possibility to acquire project shares with own money, an early involvement in the project planning and siting processes, a change in turbine height, and offering discounted electricity.

While the study offers only a snapshot of local attitudes within a relatively small population, and broad generalisations should therefore be avoided, the findings indicate which factors can strengthen project acceptance. The results from the interviews (Section 3.4) and the feedback from the interactive workshops (Section 3.1.3) show that specific project ramifications and engagement strategies are key to building consensus.

Policymakers are advised to adopt methods that directly address these findings. Specifically, the data suggests that i) offering financial participation schemes (such as the ability to acquire project shares and providing discounted electricity), ii) ensuring early consultation in the planning and siting processes , and iii) using VR simulations to help visualize impacts (an approach valued by both residents and institutional stakeholders) are crucial strategies to strengthen local trust and enhance project acceptance.

5 REFERENCES

- Bakelants, L., Bauwens, I, Hueting, R., Camargo Ramirez, L. (2024), Web-GIS Interactive forum (a) (WIMBY Deliverable No. 5.1) <https://wimby.eu/resource/d5-1-web-gis-interactive-forum/>
- Bidwell, D. (2013). The role of values in public beliefs and attitudes towards commercial wind energy. *Energy Policy*, 58, 189–199. <https://doi.org/10.1016/j.enpol.2013.03.010>
- Braun, V., & Clarke, V. (2023). Toward good practice in thematic analysis: Avoiding common problems and be(com)ing a knowing researcher. *International Journal of Transgender Health*, 24(1), 1–6. <https://doi.org/10.1080/26895269.2022.2129597>
- Brennan, N., & Van Rensburg, T. M. (2016). Wind farm externalities and public preferences for community consultation in Ireland: A discrete choice experiments approach. *Energy Policy*, 94, 355–365. <https://doi.org/10.1016/j.enpol.2016.04.031>
- Byrne, D. (2022). A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Quality & Quantity*, 56(3), 1391–1412. <https://doi.org/10.1007/s11135-021-01182-y>
- Cass, N., Walker, G., & Devine-Wright, P. (2010). Good Neighbours, Public Relations and Bribes: The Politics and Perceptions of Community Benefit Provision in Renewable Energy Development in the UK. *Journal of Environmental Policy & Planning*, 12(3), 255–275. <https://doi.org/10.1080/1523908X.2010.509558>
- Clean energy for EU islands - CE4EUI (2020). Clean Energy Transition Agenda of Pantelleria Islands.
- Ciupuliga, A. R., & Cuppen, E. (2013). The role of dialogue in fostering acceptance of transmission lines: The case of a France–Spain interconnection project. *Energy Policy*, 60, 224–233. <https://doi.org/10.1016/j.enpol.2013.05.028>
- Corscadden, K., Wile, A., & Yiridoe, E. (2012). Social license and consultation criteria for community wind projects. *Renewable Energy*, 44, 392–397. <https://doi.org/10.1016/j.renene.2012.02.009>
- Devine-Wright, P. (2005). Beyond NIMBYism: Towards an integrated framework for understanding public perceptions of wind energy. *Wind Energy*, 8(2), 125–139. <https://doi.org/10.1002/we.124>
- Devine-Wright, P. (2009). Rethinking NIMBYism: The role of place attachment and place identity in explaining place-protective action. *Journal of Community & Applied Social Psychology*, 19(6), 426–441. <https://doi.org/10.1002/casp.1004>
- Graham, J. B., Stephenson, J. R., & Smith, I. J. (2009). Public perceptions of wind energy developments: Case studies from New Zealand. *Energy Policy*, 37(9), 3348–3357. <https://doi.org/10.1016/j.enpol.2008.12.035>



- Grigoroudis, E., & Siskos, Y. (2002). Preference disaggregation for measuring and analysing customer satisfaction: The MUSA method. *European Journal of Operational Research*, 143(1), 148–170. doi:10.1016/S0377-2217(01)00332-0
- Huang, H., Catoja, M., Burgherr, P., Siskos, E. (2024). Draft guidelines on the MCSA application (WIMBY Deliverable No. D4.2). <https://wimby.eu/resource/d4-2-multi-criteria-satisfaction-analysis-a/>
- Huijts, N. M. A., Molin, E. J. E., & Steg, L. (2012). Psychological factors influencing sustainable energy technology acceptance: A review-based comprehensive framework. *Renewable and Sustainable Energy Reviews*, 16(1), 525–531. <https://doi.org/10.1016/j.rser.2011.08.018>
- Hyland, M., & Bertsch, V. (2018). The Role of Community Involvement Mechanisms in Reducing Resistance to Energy Infrastructure Development. *Ecological Economics*, 146, 447–474. <https://doi.org/10.1016/j.ecolecon.2017.11.016>
- Jensen, C. U., Panduro, T. E., & Lundhede, T. H. (2014). The Vindication of Don Quixote: The Impact of Noise and Visual Pollution from Wind Turbines. *Land Economics*, 90(4), 668–682. <https://doi.org/10.3368/le.90.4.668>
- Jobert, A., Laborgne, P., & Mimler, S. (2007). Local acceptance of wind energy: Factors of success identified in French and German case studies. *Energy Policy*, 35(5), 2751–2760. <https://doi.org/10.1016/j.enpol.2006.12.005>
- Ladenburg, J., & Dubgaard, A. (2009). Preferences of coastal zone user groups regarding the siting of offshore wind farms. *Ocean & Coastal Management*, 52(5), 233–242. <https://doi.org/10.1016/j.ocecoaman.2009.02.002>
- Langer, K., Decker, T., & Menrad, K. (2017). Public participation in wind energy projects located in Germany: Which form of participation is the key to acceptance? *Renewable Energy*, 112, 63–73. <https://doi.org/10.1016/j.renene.2017.05.021>
- Langer, K., Decker, T., Roosen, J., & Menrad, K. (2016). A qualitative analysis to understand the acceptance of wind energy in Bavaria. *Renewable and Sustainable Energy Reviews*, 64, 248–259. <https://doi.org/10.1016/j.rser.2016.05.084>
- Langer, K., Decker, T., Roosen, J., & Menrad, K. (2018). Factors influencing citizens' acceptance and non-acceptance of wind energy in Germany. *Journal of Cleaner Production*, 175, 133–144. <https://doi.org/10.1016/j.jclepro.2017.11.221>
- Lowitzsch, J., Chinchkar, H., Naracci, F., & Bucha, M. (2024). Report on stakeholder mapping and best practices for project implementation (WIMBY Deliverable No. D4.4). <https://wimby.eu/resource/d4-4-report-on-stakeholder-mapping-and-best-practices-for-project-implementation/>
- Macdonald, C., Glass, J., & Creamer, E. (2017). What Is the Benefit of Community Benefits? Exploring Local Perceptions of the Provision of Community Benefits from a

- Commercial Wind Energy Project. *Scottish Geographical Journal*, 133(3–4), 172–191. <https://doi.org/10.1080/14702541.2017.1406132>
- McLaren Loring, J. (2007). Wind energy planning in England, Wales and Denmark: Factors influencing project success. *Energy Policy*, 35(4), 2648–2660. <https://doi.org/10.1016/j.enpol.2006.10.008>
- Moscoloni, C., Zarra, F., Novo, R., Giglio, E., Vargiu, A., Mutani, G., Bracco, G., & Mattiazzo, G. (2022). Wind Turbines and Rooftop Photovoltaic Technical Potential Assessment: Application to Sicilian Minor Islands. *Energies*, 15(15), 5548. <https://doi.org/10.3390/en15155548>
- Novo, R., Minuto, F. D., Bracco, G., Mattiazzo, G., Borchiellini, R., & Lanzini, A. (2022). Supporting Decarbonization Strategies of Local Energy Systems by De-Risking Investments in Renewables: A Case Study on Pantelleria Island. *Energies*, 15(3), 1103. <https://doi.org/10.3390/en15031103>
- Parco Nazionale “Isola di Pantelleria.” (2025). *La Fauna Pantasca*. <https://www.parconazionalepantelleria.it/pagina.php?id=7>
- Schauppenlehner, T., Bittner, K., Konrad, E. M., & Buchbauer, M. (2024). Immersive 3D platform for wind-power awareness raising (WIMBY Deliverable No. D5.3). <https://wimby.eu/resource/d5-3-immersive-3d-platform-for-wind-power-awareness-raising/>
- UNESCO (2014). Traditional agricultural practice of cultivating the 'vite ad alberello' (head-trained bush vines) of the community of Pantelleria. Intangible Cultural Heritage. <https://ich.unesco.org/en/RL/traditional-agricultural-practice-of-cultivating-the-vite-ad-alberello-head-trained-bush-vines-of-the-community-of-pantelleria-00720>
- UNESCO (2018). Art of dry-stone walling, knowledge and techniques. Intangible Cultural Heritage. <https://ich.unesco.org/en/RL/art-of-dry-stone-walling-knowledge-and-techniques-01393>
- Upham, P., & García Pérez, J. (2015). A cognitive mapping approach to understanding public objection to energy infrastructure: The case of wind power in Galicia, Spain. *Renewable Energy*, 83, 587–596. <https://doi.org/10.1016/j.renene.2015.05.009>
- Van Den Broek, K. L., Klein, S. A., Luomba, J., & Fischer, H. (2021). Introducing M-TOOL: A standardised and inclusive mental model mapping tool. *System Dynamics Review*, 37(4), 353–362. <https://doi.org/10.1002/sdr.1698>
- Van Den Broek, K. L., De Jager, L., Doran, R., & Böhm, G. (2025). Expert and citizen perceptions of the drivers of the energy transition: A mental model approach. *Journal of Cleaner Production*, 494, 144949. <https://doi.org/10.1016/j.jclepro.2025.144949>



- Walker, B. J. A., Wiersma, B., & Bailey, E. (2014). Community benefits, framing and the social acceptance of offshore wind farms: An experimental study in England. *Energy Research & Social Science*, 3, 46–54. <https://doi.org/10.1016/j.erss.2014.07.003>
- Walter, G. (2014). Determining the local acceptance of wind energy projects in Switzerland: The importance of general attitudes and project characteristics. *Energy Research & Social Science*, 4, 78–88. <https://doi.org/10.1016/j.erss.2014.09.003>
- Zoll, R., & Ackermann, H. (2001). *Energiekonflikte: Problemübersicht und empirische Analysen zur Akzeptanz von Windkraftanlagen; Bericht eines interdisziplinären Forschungsvorhabens*. Lit.



6 ANNEX

Annex I: Survey and semi-structured interview conducted to assess the impact of project ramifications on respondent's concrete attitude towards wind energy projects

	Question	Answer
PART I General attitude towards wind energy	1_Do you believe climate change is human-induced and that it is one of the biggest problems of our times?	1 (strongly disagree) 2 (disagree) 3 (neutral) 4 (agree) 5 (strongly agree)
	2_ Regarding the environment do you agree that the protection of global biodiversity may require to accept worse conditions for local species?	
	3_Do you believe that our actions at the local level can make a difference to solving global problems?	
	4_Do you agree that everyone in your local society has a common responsibility to care for each other in challenging times?	
	5_ When faced with a project challenge, do you prioritize finding the most effective solution regardless of cost?	
	6_When new technological innovations are introduced, do you think that debt should be taken on (with the associated risk) to explore and implement them?	
	7_Do feel that the problems relating to solving climate change issues are of too complex and that we lack the resources (time, training, etc.) to understand them?	
	8_Do you believe that radical changes, incl. technological advancements, (as opposed to traditional methods) are necessary to preserve our habitat and wellbeing?	

PART II Concrete attitude towards wind energy	9_How much do you know about Energy Transition in general?	1 (not informed at all) 2 (not well informed) 3 (moderately) 4 (well informed) 5 (very well informed)
	10_Do you feel well-informed about the (hypothetical) wind energy project in your region?	1 (not at all) 2 (slightly) 3 (moderately) 4 (well) 5 (very well)
	11_How do you feel about the (hypothetical) wind energy project in your region?	1 (very negative) 2 (negative) 3 (neutral) 4 (positive) 5 (very positive)
	12_How important do you see your participation in the wind project?	1 (not important at all) 2 (not important) 3 (neutral) 4 (important) 5 (very important)

PART III Project ramifications	13_Which of the following technical changes would increase your willingness to support wind energy projects in your region?	A_change in setback distance	(i)
		B_technical measures to avoid bird strikes	
		C_change in turbine height	
	14_Which of the following financial participation mechanisms would increase your willingness to support wind energy projects in your region?	D_change in number of wind turbines	(ii)
		_other	
		A_discounted electricity / lower energy prices	(iii)
B_possibility to acquire shares in the project with own money (dividends / appreciation of shares)			
	C_possibility to acquire shares in the project with credit from project (dividends / appreciation of shares)		

		D_financial participation of the municipality	
	E_other		
	15_Which of the following options for engagement in the decision-making processes would increase your willingness to support wind energy projects in your region?	A_regular written information on the project progress	(iv)
		B_early involvement in the project planning and siting processes (once per month / quarterly)	
		C_involvement in the project implementation phase possibly also during construction (once per month / quarterly)	
		D_being granted elected representative of the municipality on the board of directors of the project (actual operation of wind park)	
		E_other	

Annex II: Guiding questions for interviews with workshop participants

1. **General perception** – What is your personal opinion on wind energy in general and its development in Europe?
2. **Local context** – How do you think wind energy could impact your community or region?
3. **Opportunities** – What benefits or opportunities do you see in the development of wind farms locally?
4. **Concerns** – Are there any aspects that worry you or that you think should be addressed more carefully (e.g. landscape, noise, biodiversity, tourism, health)?
5. **Social acceptance** – In your view, what factors could increase or decrease public acceptance of wind energy projects?
6. **Stakeholder involvement** – How do you think citizens and stakeholders should be involved in the decision-making processes?
7. **Support tools** – How useful do you find tools such as interactive maps or online forums to facilitate participation and understanding of projects?
8. **Fairness & benefits** – Do you think measures like financial compensation or community participation schemes could help build greater support?
9. **Personal experiences** – Have you had any direct or indirect experiences with wind projects? If yes, what worked well and what didn't?
10. **Future vision** – What role do you see for wind energy (and renewables in general) in the energy transition of your territory?