WENDY aims at unravelling the factors triggering social acceptance of wind farms through an in-depth analysis at three dimensions: social sciences and humanities, environmental sciences and technological engineering.

D2.1: Lighthouse wind farms across Europe: impact and best practice analysis

WP2, T2.1

Task 2.1 partners

Leading partner: Q-PLAN
Participants: WR, EGP, MEC, CBS

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Technical Preferences

Project Acronym	WENDY
Project Title	Lighthouse wind farms across Europe: impact and best practices
Project Coordinator	CIRCE FOUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS jperis@fcirce.es
Project Duration	Oct. 2022 – Sep. 2025 (36 months)

Deliverable No.	D2.1
Dissemination level*	PU
Work Package	WP2
Task	T2.1 – Lighthouse wind farms across Europe: impact and best practice analysis
Lead beneficiary	9 (Q-PLAN)
Contributing beneficiary/ies	2 (WR), 4 (EGP), 6 (MEC), 7 (CBS)
Due date of deliverable	30 June 2023
Actual submission date	30 June 2023

***Legend**:

- PU – Public, fully open
- SEN – Sensitive, limited under the conditions of the Grant Agreement
- Classified R-UE/EU-R – EU RESTRICTED under the Commission Decision No2015/444
- Classified C-UE/EU-C – EU CONFIDENTIAL under the Commission Decision No2015/444
- Classified S-UE/EU-S – EU SECRET under the Commission Decision No2015/444

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"This project has received funding from the Horizon Europe Framework Programme (HORIZON) under Grant Agreement No 101084137".

This document has been prepared by WENDY project partners as an account of work conducted within the framework of the EC-GA contract no 101084137.

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WENDY project's abstract

WENDY aims at unravelling the factors triggering social acceptance of wind farms through an in-depth analysis at three dimensions: social sciences and humanities, environmental sciences and technological engineering. For that, the project will implement a series of local actions promoting the wider adoption of the project solutions, including guidelines, reports and handbooks which will be created to boost the understanding of wind farms decision making processes and enhance energy citizenship. This will be supported by the spatial multi-criteria WENDY toolbox. A tool able to identify the optimal turbines' siting with the minimum environmental impact and highest social acceptance likelihood. All developed models, methods, guidelines and tools will be implemented within 10 wind projects spread across 4 countries. These have been selected considering: geography (north vs. south Europe), maturity stage (viability phase / planning phase / short-term operation phase / long-term operation phase); type of wind energy (onshore / offshore – floating, fixed-); and co-existence with other activities (agriculture, fisheries, energy communities). In these locations, outreach activities tailored to their specificities will be performed, creating the WENDY Knowledge Hubs which will incorporate citizens, local authorities, business owners and value chain actors of wind energy. WENDY Hubs will serve as a baseline for the WENDY Knowledge Exchange Platform, a forum that will be developed to facilitate the exchange of knowledge between decision makers and key stakeholders within wind farms planning processes. For a successful implementation of the project activities, all the value chain and the best-in-class expertise is involved in the project consortium including 9 partners from 6 European countries: 1 Large Company (EGP), 2 SMEs (WR, Q-PLAN), 1 University (CBS), 2 RTO (CIRCE, NINA), 1 Energy Community (MEC), 2 Non-profit organisations and associations (NOWC, APPA).

List of the WENDY's consortium partners

No	Full name	Short name
1	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS	CIRCE
2	WHITE RESEARCH SRL	WR
3	STIFTELSEN NORSK INSTITUTT FOR NATURFORSKNING NINA	NINA
4	ENEL GREEN POWER SPA	EGP
5	MARIN ENERGI TESTSENTER AS	NOWC
6	ENERGEIAKI KOINOTITA ANATOLIKIS KRITIS	MEC
7	COPENHAGEN BUSINESS SCHOOL	CBS
8	ASOCIACION DE EMPRESAS DE ENERGIAS RENOVABLES - APPA	APPA
9	Q-PLAN INTERNATIONAL ADVISORS PC	Q-PLAN

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Time-plan of Task 2.1 and its resulting deliverable 2.1

Action	Description	Planned time		Responsible
1	Templates & guidelines for selecting & reporting good practice cases: research, design, preparation	M1	M3	Q-PLAN
1.a	*Methodology approach of D2.1: research & elaboration*	*M1*	*M3*	*Q-PLAN*
1.b	*Final template for the initial identification and reporting of >40 best wind farm cases*	*M1*	*M3*	*Q-PLAN*
1.c	*Guidelines for selecting & reporting good practice wind farm cases*	*M1*	*M3*	*Q-PLAN*
2	Questionnaire form, guidelines for the interviews with stakeholders, and storyboard format for the in-depth reporting: research, design, preparation	M1	M4	Q-PLAN
3	Initial desk research to identify and select good practice wind farm cases across EU	M1	M4	Q-PLAN, All T2.1 partners
3.a	*Identify more than 40 "best" wind farm cases & preparation of brief reporting*	*M3*	*M3*	*Q-PLAN, All T2.1 partners*
3.b	*Guidelines for the rating of the farm cases*	*M1*	*M3*	*Q-PLAN*
3.c	*Rating of the full list of >40 wind farm cases*	*M3*	*M4*	*Q-PLAN, All T2.1 partners*
3.d	*Online workshop meeting to select 25 wind farm cases for in-depth analysis*	*M4*	*M4*	*Q-PLAN, All T2.1 partners*
4	Targeted interviews with key stakeholders from selected cases	M5	M6	All T2.1 partners
5	Individual consolidated reports based on desk research and targeted interviews	M4	M6	All T2.1 partners: Q-PLAN, WR, EGP, MEC, CBS
6	Synthesis of all cases' reports	M6	M8	Q-PLAN
7	Preparation of integrated deliverable (1st draft version of D2.1)	M6	M8	Q-PLAN
8	Quality review of D2.1	M9	M9	D2.1 Reviewers
9	Finalisation of "D2.1 Lighthouse wind farms across Europe: impact and best practice" with insights and lessons learnt	M9	M9	Q-PLAN

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**The order of the names of partners, excluding the Task leader (Q-Plan), follows the order mentioned in the description of Task 2.1 in the DoA: WR, EGP, MEC, CBS.*

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List of abbreviations

Abbreviation	Full name
CA	Consortium Agreement
CO_2	Carbon dioxide
Co KG	Limited partnership company (Compagnie Kommanditgesellschaft)
dB	decibel
DoA	Description of Action
EIA	Environmental Impact Assessment
GA	Grant Agreement
GmbH	Company with limited liability (Gesellschaft mit beschränkter Haftung)
GMO	Genetically Modified Organism
GWh	Gigawatt hours
km	kilometers
kW	kilowatt
kWh	kilowatt hours
km	kilometers
m	meters
MW	Megawatt
n.d.	no date
RES	Renewable Energy Sources
REI	Renewable Energy Island
s	second
SDO	Sitia Development Organisation
SCI	Site of Community Importance
t	tonnes
WE	Wind Energy
ZEPA	Special Protection Area for Birds

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Executive summary

The deliverable D2.1 was developed in the frame of Task 2.1, within the first technical Work Package 2 (WP2) of the WENDY project. WP2 is dedicated to conducting the necessary preparatory work in relation to the social acceptance and energy citizenship assessment, which will provide valuable input for future Work Packages. WP2 lays the foundation for a comprehensive understanding of social acceptance and energy citizenship within the context of WENDY.

This project aims to identify and retrieve lessons learnt from lighthouse wind farms that harmoniously coexist with- and encourage the participation of local communities. The key insights from this report will contribute to establishing the basis of the key conditions towards wind energy acceptance both at the European level and in the specific use cases of WENDY project. For this purpose, a comprehensive mapping exercise of both onshore and offshore lighthouse wind energy projects across the EU was conducted.

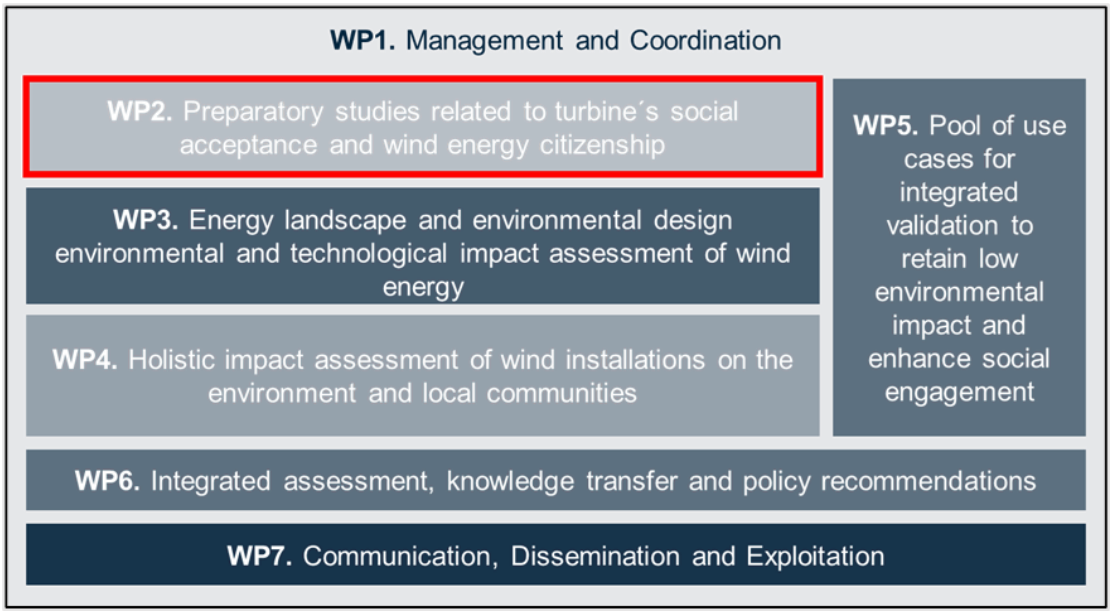

Figure 1: Work Package structure of WENDY project and the position of WP2 within it.

To begin with, an initial exploration of the basic and fundamental concepts regarding the social acceptance of wind energy was conducted with the aim of establishing a shared understanding and a solid foundation upon which we can build our work. This includes the provision of definitions of specific terms used throughout our research process. In line with the DoA and based on the literature, a wind farm can be considered as “good” (“lighthouse”) when it fosters sustainable development (society, economy, environment), while ensuring fair and equitable distribution of its benefits. These four (4) key criteria were chosen to serve as the fundamental principles for the identification of exemplary wind farm cases. Furthermore, these four criteria were further broken down and analysed across 13 dimensions (sub-criteria) that provide

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more specific details and context regarding their content and significance: *well-being aspects, local opposition, co-existence, employment, financial gains and benefits, local value enhancement, distributional justice, social ownership models, information level, local participation, transparency, ecosystem and wildlife, climate neutrality, land diversion.*

The impact and best practice analysis of the best wind farm cases followed a structured approach and consisted of four main stages: identification, evaluation, selection, in-depth analysis, and cross-fertilisation synthesis. Firstly, through preliminary identification and brief reporting, the involved partners identified 44 good practice examples of wind farm cases. Afterwards, an evaluation process was adopted and followed for the rating, ranking, and final shortlisting of the wind farm cases that have been initially identified by the partners. Based on the evaluation outcome, and by additionally taking into consideration other important parameters, the final selection/shortlisting of the best 25 wind farm cases to be analysed, was decided in the framework of a dedicated interactive workshop-meeting among the involved partners.

The best wind farm cases were analysed in-depth by conducting desk research, as well as field research in the form of targeted interviews with key stakeholders, whenever necessary. The desk research comprised the basic component of our research process that involved gathering data and obtaining information from various existing, available, and accessible sources. Whenever necessary, partners were encouraged to reach out individuals representing a key stakeholder of a wind farm case. The targeted interviews covered knowledge gaps, or supplemented and verified our findings and the already existing knowledge. They were conducted following a semi-structured approach, based on a recommended questionnaire structure that included predetermined thematic questions.

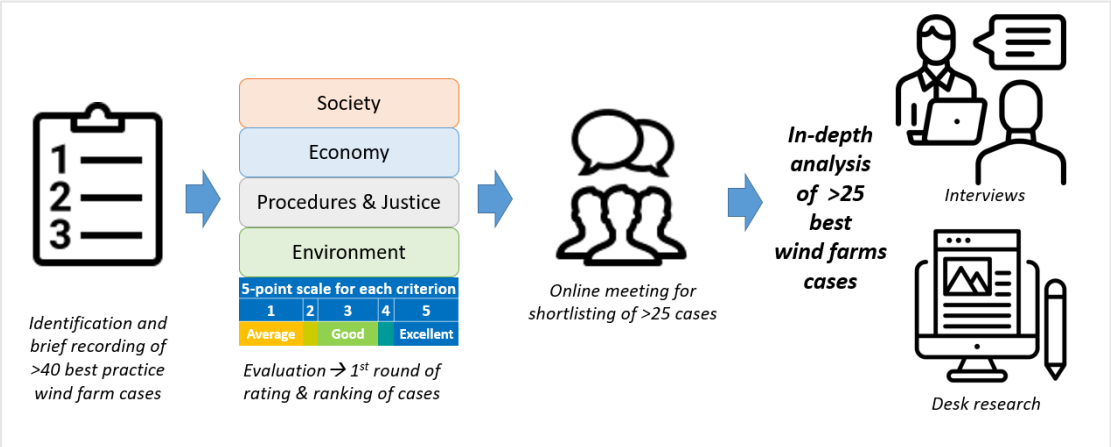

Figure 2: Methodology approach applied throughout Task 2.1

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The retrieved information established the knowledge baseline for the WENDY project in a story-board format with insights and lessons learnt. The analysis of the best wind farm cases included information regarding their background context and their impact on the local community, and was organised in the four (4) main aspects/criteria defined: i) environment, ii) society, iii) economy, and iv) procedures and justice. Based on this in-depth analysis, a summary of each best wind farm case was created, capturing key information. The summary was presented in the form of a graphic-style template (identity card), which included basic details, challenges and barriers, enablers, impact, a timeline, and a spider graph representing the evaluation ratings provided by the partners.

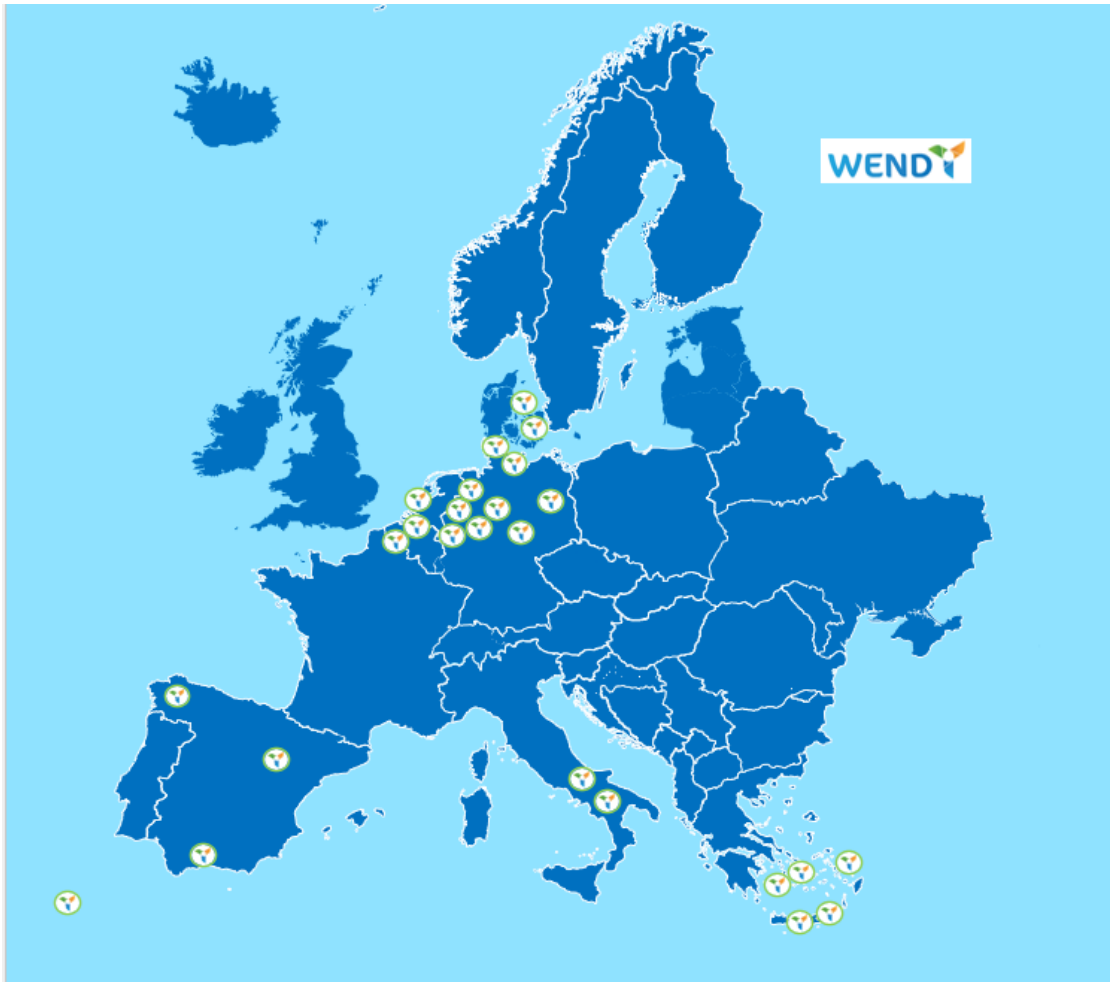

Figure 3: 4Map of the selected 25 best wind farm cases across the EU in Task 2.1

A cross-fertilisation synthesis was conducted to distil key insights and consolidate main findings from the comprehensive analysis of the selected best wind farm cases. This synthesis process informed the analysis of the main themes, which were defined as six key dimensions of analysis in the DoA. By thoroughly and systematically reviewing and revisiting the gathered data and information material for the wind farms cases, we identified meaningful patterns within each dimension/theme. As a result, specific “aspects of consideration” (sub-themes) emerged associated with each dimension.

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The findings were analysed and presented in textual form, capturing the key insights and observations from the analysis of the 25 best wind farm cases. In order to facilitate a comprehensive overview of the compliance and alignment of these cases with the identified indicative "aspects of consideration," tabular forms were utilised. These tables serve as filters to categorize and organise the information, enabling a structured overview of how each wind farm case aligned with these specific aspects of consideration. This approach enables a systematic evaluation and comparison of the cases based on the identified criteria.

Pre-defined Dimensions ("themes")	Aspects of consideration
Socio-economic impact	▪ Engagement and involvement ▪ Community benefits ▪ Local economic benefits ▪ Co-existence with other projects ▪ Health & social well-being
Environmental impact	▪ Site selection ▪ Environmental compensation ▪ Climate change ▪ Wildlife protection ▪ Noise mitigation measures
Business models and participatory processes established	▪ Social ownership model ▪ Hybrid ownership model ▪ Corporate ownership model
Co- benefits and financial gains at the community level	▪ Local economy impact ▪ Employment rate ▪ Social welfare
Employed practices used to increase community acceptance	▪ Local engagement and mobilisation ▪ Citizen ownership and participation ▪ Environmental protection measures ▪ Financial benefits to the municipality ▪ Supportive policies and legislation
Main challenges faced	▪ Social acceptance and opposition ▪ Regulatory and authorisation ▪ Environmental and health impacts ▪ Financing and investment

Deliverable 2.1 encompasses various aspects that should be considered for fostering the social acceptance of wind energy projects. The best wind farm cases selected have not only taken proactive measures to address potential challenges during the planning phase, but have also effectively resolved issues that may have arisen after the project was implemented.

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Through our research activity, several essential concluding remarks have been outlined, summarizing the key findings generated from the analysis of wind farm cases.

- ✓ The storytelling of our research sheds light on the challenges we encountered throughout our research process.
- ✓ Considering various types of ownership models enabled us to gain valuable insights for social acceptance in wind farm projects.
- ✓ The analysed wind farm cases exhibit significant differentiation from one another and in relation to the social acceptance practices they prioritise.
- ✓ The true strength of our research process lies in generating an informed "systemization" of the existing knowledge and understanding.
- ✓ Another unique point of our research was the active involvement of two wind farm developers in the implementation of the Task 2.1.
- ✓ Addressing at least one field of intervention is crucial for achieving social acceptance in a wind farm project.
- ✓ Multi-dimensionality of wind farm cases highlights the complexity of our research and its limitations.
- ✓ Proactively considering multiple factors and employing a bouquet of practices to foster social acceptance is important.
- ✓ A tailored approach based on a pool of alternative approaches is needed to meet the local needs of any unique wind farm case.
- ✓ Ongoing and long-term efforts to build and maintain social acceptance are essential from the very beginning.
- ✓ Various areas for potential future research related to and extending beyond our analysis can be suggested.
- ✓ Contrary to the inherent limitations of our research, the transferability potential of the identified good practices of social acceptance is unlimited.

These concluding remarks provide interesting insights and reflections on the research conducted and contribute to the broader understanding of social acceptance in the context of wind farm projects.

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1. Introduction

Deliverable 2.1 was developed in the frame of Task 2.1, within the first technical Work Package 2 (WP2) of the WENDY project. According to the Description of Action (DoA), the main exercise of Task 2.1 is to collect, analyse and highlight "lighthouse" wind farm cases, both onshore and offshore, across the EU. Task 2.1 aims to identify at least 40 lighthouse wind energy farm cases, out of which at least 25 best cases will be selected and analysed in more depth. Further emphasis is placed on the examination of wind farm cases across the European Union (EU) that have successfully integrated social ownership models and demonstrated enhanced value creation.

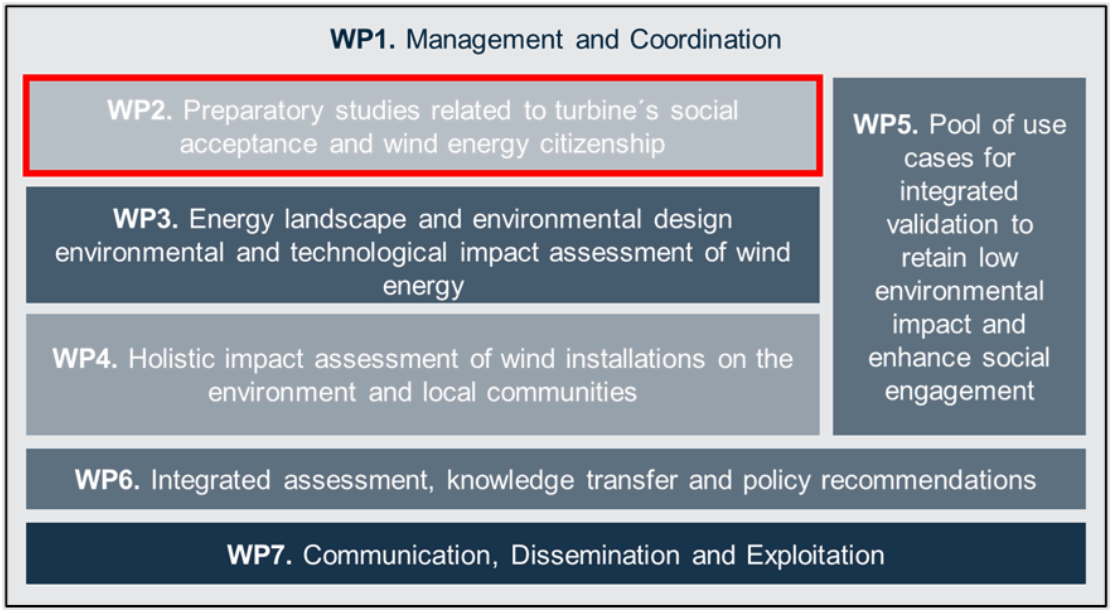

Figure 5: Work Package structure of WENDY project and the position of WP2 within it (2)

A total of 25 wind farm cases were carefully selected and analysed in depth, based on desk research and targeted interviews, whenever necessary.

The cross-fertilisation synthesis (analysis) of the wind farm cases conducted in the frame of this deliverable aimed at identifying and retrieving lessons learnt from lighthouse wind farms that successfully coexist with local communities and actively encourage their participation. This synthesis focused on various aspects, including:

- ✓ Socio-economic impact.
- ✓ Environmental impact.
- ✓ Business models and participatory processes.
- ✓ Co-benefits and financial gains experienced at the community level.
- ✓ Strategies and practices employed to enhance community acceptance.
- ✓ The primary challenges encountered throughout the projects.

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By examining the practices of the analysed wind farm cases, the analysis provided valuable insights into challenges and gaps, while also highlighting the commonalities and differences among the analysed cases. This information could play a crucial role for informing the design, implementation, and impact of wind farm projects (including community-based schemes), ensuring their harmonious integration and meaningful engagement with local communities.

Apart from the introduction, the remaining document consists of five (5) sections (chapters):

- **Section 2** describes the basic concepts which our strategy was built upon to elaborate Task 2.1 and the deliverable, D2.1, associated with it.
- **Section 3** describes in detail the methodological approach that was followed for the identification, evaluation, and analysis of the best wind farm cases.
- **Section 4** presents the in-depth analysis for the chosen 25 best wind farm cases in a storyboard form, highlighting the key lessons learnt, including barriers, challenges, enablers, and overall impact.
- **Section 5** consolidates the obtained information and extracts the key insights from the analysis of the 25 best wind farm cases by conducting a cross-fertilisation synthesis.
- **Section 6** comprises the conclusions drawn from the whole research process and identifies potential areas for future research.

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2. Conceptual considerations

2.1. Interpreting the 'lighthouse' or best wind energy farm case

Based on the DoA and discussions among the partners involved in Task 2.1, a broad "definition" of "lighthouse", or "best" wind energy farm case was adopted. In the following table, the key aspects of such a best wind energy farm case are highlighted, providing an interpretation that formed a shared understanding and shaped the common ground within the task.

Table 1: Aspects of a best Wind Energy case

Aspects of a best wind farm energy case	Source
harmonious co-existence of local communities and wind turbines has been achieved	DoA
minor social opposition to the health and habitat issues that possibly occurred in the landscape (e.g. noise pollution, aesthetic degradation, shadow flicker, telecommunication interference)	DoA
in terms of environmental impact, practices that focus on climate neutrality, minimum biodiversity loss, and protection of the ecosystem (wildlife, plants, soil) are included	(Wang & Wang, 2015)
a good case occurs when all wind farm sites are constructed in a sustainable way which respects the surrounding environment and minimises environmental risks"	(Taylor, 2010)
a good case promotes energy citizenship and the active involvement of local stakeholders, which is accompanied by economic development and social welfare. It aims at procedural justice through the establishment of participatory regulation, social ownership models, and compensation strategies	(Dimitropoulos & Kontoleon, 2009; Langer et al., 2018; Wolsink, 2007)
…where wind power generation brings benefits and gains to local municipalities and local habitats (shares, community funds, compensation for land use, lower energy prices/taxes). This is also achieved by promoting the employment of local habitats in the initiative, as well as the enhancement of local value by the development of the infrastructure and other activities (tourism, landscape, sports, etc)	
…includes wind farms that acquire high social acceptance, engagement, and contribution within their local communities.	

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Aspects of a best wind farm energy case	Source
…transparency of the process and the mutual understanding and trust between the stakeholders	
…where technological advances and mitigation measures are implemented to tackle adverse environmental and social effects	

2.2. Conceptual framework

Empirical evidence has shown that local community opposition is one of the key barriers for the development of new wind energy farms. Therefore, the social acceptance of renewables, such as wind energy, has become a crux for Europe in both achieving and going beyond its renewable energy targets (Maleki-Dizaji et al., 2020a). Social acceptance of wind energy refers to the level of support or opposition that local communities and the general public have towards the development and implementation of wind farms. This research area holds great significance, not just due to the governments' emission-reduction goals (*EU Green Deal*) and the social opposition commonly encountered by local wind farms, but also because it addresses the ongoing discussions about achieving fair and just outcomes during the process of transitioning to renewable energy sources, including wind energy ones (Lundheim et al., 2022).

The academic and research interest in "social acceptance" emerged in the 1980s, when renewable energy developers observed that the implementation of wind farms was facing notable opposition in communities, although the surveys conducted had suggested high levels of support (Westerlund, 2020). Since then, many studies have been conducted to understand the factors that influence social acceptance and to develop strategies for its improvement.

It can be stated that social acceptance can be influenced by a very wide range of factors, including project characteristics, perception of the distribution of costs and benefits, degree of public participation, perceived impacts of projects on landscapes, property values, health and biodiversity (Ellis & Ferraro, 2016). This complexity means that acceptance cannot be addressed through simple fixes such as community benefit funds or just more consultation, but we need a far more fundamental reform of how energy systems engage with communities and citizens (Ellis & Ferraro, 2016).

The factors for the wind energy social acceptance are closely related to the principles of sustainability, as they encompass the environmental, economic and social dimensions of sustainable development. For instance, the environmental impact of wind energy projects is an important criterion in shaping community acceptance. If a project is perceived to have negative impacts on the environment or biodiversity, it

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will possibly face opposition from local communities. On the other hand, if a project is perceived to have positive environmental impacts, such as reducing greenhouse gas emissions and contributing to the fight against climate change, it may be more likely to gain community acceptance (Leiren et al., 2020). In addition, wind farms have several socio-economic impacts that could increase community acceptance. These include job creation, land lease payments, local tax revenue, wind energy tourism and reduction of the electricity rates for local residents (Glasson et al., 2022). As result, the wind energy plays a significant role in the transition to a low emission society and in achieving sustainability goals.

However, the social acceptance doesn't only depend on the environmental, social and economic impacts, but also on the contextual factors and individual characteristics of each community (Leiren et al., 2020). Procedural justice and distributional justice are two key drivers of social acceptance of wind energy projects (De Luca et al., 2020). Procedural justice refers to the fairness of the decision-making process, while distributional justice refers to the perceived fairness of the distribution of costs and benefits that arise from a wind energy project (Ellis & Ferraro, 2016). The degree of procedural justice that is perceived by local communities can influence their acceptance of wind energy projects. If the decision-making process is perceived to be fair, transparent, and inclusive, while its costs and benefits are distributed fairly within the community it is more likely to gain social acceptance (Ellis & Ferraro, 2016).

Based on the above considerations, our research for wind farm cases with high social acceptance focused on four broad, "umbrella" criteria: (a) *society*, (b) *economy*, (c) *environment*, and (d) *procedures & justice.*

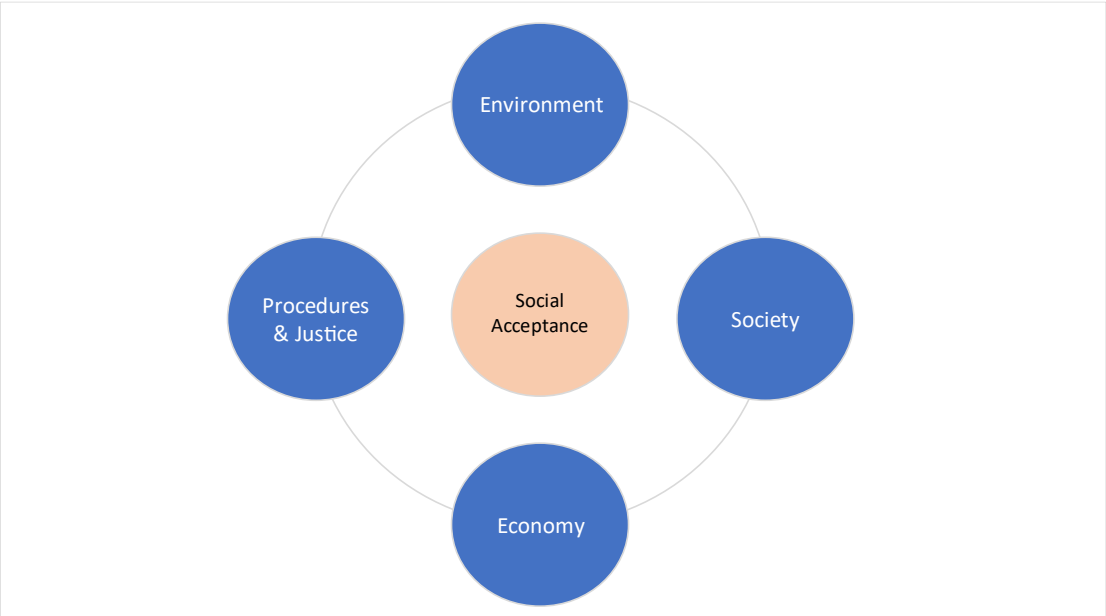

Figure 6: Criteria considered towards identification, review and analysis of lighthouse wind farm cases

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3. Approach

A structured methodology was established and implemented in Task 2.1. Initially, a template was developed and utilised for the preliminary identification and brief reporting of more than 40 good examples of wind farm cases, totaling 44 cases. Afterwards, guidelines were created and shared among the involved partners for the evaluation process that was adopted and followed to assess these cases. The process comprised three steps: rating (scoring), ranking, and final shortlisting of the wind farm cases identified and reported by the involved partners using the reporting template. Ultimately, 25 cases were chosen for further in-depth analysis through desk research, supplemented by field research activities whenever necessary, such as gathering information directly from key stakeholders through interviews. The gathered information supported the establishment of the knowledge baseline for the WENDY project, being presented in a story-board format with insights and lessons learnt.

3.1. Identification and brief reporting of lighthouse wind farm cases

3.1.1. Considerations, criteria and critical issues

In general, the key considerations that were taken into account for the process of the identification and brief reporting of the wind farm cases are listed below[1].

- ✓ Considering various aspects related to social acceptance (including social, environmental, and economic factors, etc.)
- ✓ In addition to academic literature, valuable information would be gathered from sources, such as newspapers, articles, websites, policy conferences, published interviews, etc.
- ✓ Emphasising the use of recent and updated sources.

The identification primarily focused on wind farms that have the following attributes:

- ✓ offered new knowledge and opportunities for innovation;
- ✓ had a sufficient duration to gather a significant number of lessons learnt;
- ✓ implemented either a social ownership model or a hybrid ownership model. Additionally, for corporate examples, they exhibited positive characteristics related to environmental factors, socio-economic factors, and other relevant aspects;
- ✓ provided accessible sources and information about their development and operational procedures for cross-checking purposes.

[1] A document containing comprehensive guidelines for the identification of the best wind farm cases was provided by Q-PLAN to all partners involved in Task 2.1.

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During the identification process, the following common critical issues were encountered:

- some information was only available in the language of the selected region.
- certain fields of the template were challenging to assess or fill in due to limited available information from desk research, such as local employment, biodiversity loss.

3.1.2. Procedure employed

All the partners involved in this task (namely, Q-Plan, WR, EGP, MEC, CBS) were requested to identify a minimum of eight (8) good wind farm cases. To avoid duplication of work, each partner selected distinct cases, and a template with the essential attributes of the wind farm cases was created by Q-Plan. The partners filled in the template online, using a shared online repository facility.

Below is a table presenting all the fields and their descriptions that were filled in by the partners in the reporting template.

Table 2: Identification reporting template fields and descriptions

Field (Attribute)	Description (clarifications, definitions)
Reporting identity	
Partner name	The name of the WENDY partner that is reporting the wind farm case.
Status	The status of the identification and reporting exercise. It should be filled in with one of the following options: ✓ "identified": when the case is identified but the reporting has not started yet ✓ "in progress": if the reporting exercise is in progress and not completed yet ✓ "completed": if any available source of secondary information was already considered for the reporting of this case.
General information	
Wind Farm	The official name of the selected wind farm.
Country	The European country where the selected wind farm is located.
Developer/ Operator	The name of the developer and/or the operator that is responsible for the construction and/or the operation of the wind farm.
Maturity Stage	This section describes the development phase of the wind farm. It should be filled with one of the following selections: ✓ "viability phase" ✓ "planning phase" ✓ "short-term operation phase" ✓ "long-term operation phase"
Year	This field indicates the year in which the wind farm started its operations.
Type of Wind Farm	This field specifies the type of wind farm based on its placement. It should be filled with one of the following selections:

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Field (Attribute)	Description (clarifications, definitions)
	✓ "onshore": refers to wind farms located on land. ✓ "offshore floating": indicates wind farms situated in bodies of water, usually at sea, utilizing floating platforms. ✓ "fixed floating": represents wind farms located in bodies of water, typically at sea, with fixed platforms.
Power: (MW)/ (No of Houses)	The size of the wind farm according to: i. Electric power generation (MW) ii. Number of houses that are supplied with electricity
No. of Turbines	The total number of turbines in the wind farm.
Procedural principles	
Owner(s)	The name of the owner(s) of the wind farm *(The percentage of the ownership may be indicated as well).*
Ownership model	This field indicates the type of ownership model for the wind farm. It should be filled with one of the following categories: 1. "Social": indicates that the total shares of the wind farm are owned by the local community. 2. "Hybrid" (joint ownership): refers to cases where the local communities own a portion of the wind farm shares. 3. "Corporate": represents situations where the total shares of the wind farm are owned by external companies or organisations.
Public Information/ Transparency	The developer provides information for the development and addresses the knowledge gaps in local communities (through various means such as public meetings, conferences, etc.). All legal aspects of the initiative are well-defined and certain regional policies/regulations on transparency are established to ensure compliance.
Participatory Process	Local stakeholders are actively engaged and participate in the planning process of the wind farm. Their input and feedback are requested and their consent is obtained for the development of the wind farm.
Economy	
Local value enhancement	The objective of "local value" that is achieved by improving the area's infrastructure (e.g. roads, community districts, etc.), and/or by promoting tourism activity in the location (e.g. which may include organising educational excursions, showcasing or shaping the landscape, supporting sports activities, etc.).
Local Employment	The wind farm project contributes to the local economy by creating job opportunities. The number (or percentage) of local employees working in the wind farm company, along with other relevant information, e.g. the number of jobs created, impact on the unemployment rate.
Financial Gains/Benefits	The financial gains or benefits that are provided to municipalities or local residents/inhabitants, such as community shares, compensation for land use, lower energy prices/taxes, etc.
Society	

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Field (Attribute)	Description (clarifications, definitions)
Co-existence with other activities	The harmonious co-existence of the wind farm with other activities, e.g.: ✓ Agriculture; ✓ Fisheries; ✓ Energy communities; ✓ Other relevant sectors.
Local opposition	The level of reported local opposition against the wind farm can be categorised as "negligible", "minor" or "major" according to the following definitions. a. Negligible: there is not any reported local opposition. b. Minor: there was reported local opposition, nevertheless it didn't cause any significant implications during the licensing, construction, or operation phase. c. Major: there was reported local opposition, and it caused significant implications during the licensing, construction, or operation phase.
Mitigation measures	A reported action or strategy that was conducted to tackle the **social** adverse impacts of wind farms (such as noise pollution, shadow flicker, aesthetic concerns, communication interference, etc.).
Environment	
Mitigation measures	An action or strategy that was conducted to address the adverse **environmental** impacts of wind farms, with the aim of protecting wildlife and the ecosystem (measures may include i.e. environmental monitoring, wind turbine design and operation considerations, landscape diversion, etc.)
Biodiversity loss	The severity of biodiversity loss in relation to the wind farm's impact on birds and bats, wildlife, plants, and other aspects of the local ecosystem. This information is categorized into three pre-selected values: **"**Negligible", "Minor", and "Major". The definitions for each category are as follows: a. Negligible: There are no reported environmental impacts on the biodiversity of the local ecosystem. b. Minor: There are some reported environmental impacts on the biodiversity of the local ecosystem. c. Major: There are reported environmental impacts on the biodiversity of natural heritage areas (such as Natura 2000 sites, landscapes, forests, low fragmentation zones). This information can typically be obtained from the Environmental Impact Assessment (EIA) report.
Additional Information	
Sources	✓ The Webpage URL of the wind farm or its developer or any other relevant source that contains supplementary information for the project. ✓ Any possible direct access to primary sources of information, for example through a professional network (or other sources), indicated as well.

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Field (Attribute)	Description (clarifications, definitions)
Interview	Here it is indicated whether an interview has already been conducted, or if it is considered that will be needed to be organised in the next phase of Task 2.1.
Comments	Additional information that needs to be considered and/or will support the selection process.

3.1.3. Overview of the identified and initially reported wind farm cases

A total number of 44 wind farm cases from all parts in Europe were identified by partners. These examples of successful wind farms were found in ten (10) different European countries, with Germany leading the way with the highest number of cases (13) (see bar chart figure).

Most of these cases have established hybrid (27%) or social (27%) ownership models, while 45% of these cases are owned by private companies, as presented in pie chart figure.

In map figure, all dots representing the WENDY project's logo indicate the identified 44 good practice wind farm cases across the EU. The dots with a green circular outline represent the finally selected 25 best wind farm cases, while the dots with an orange circular outline indicate the wind farm cases that were not further analysed in-depth.

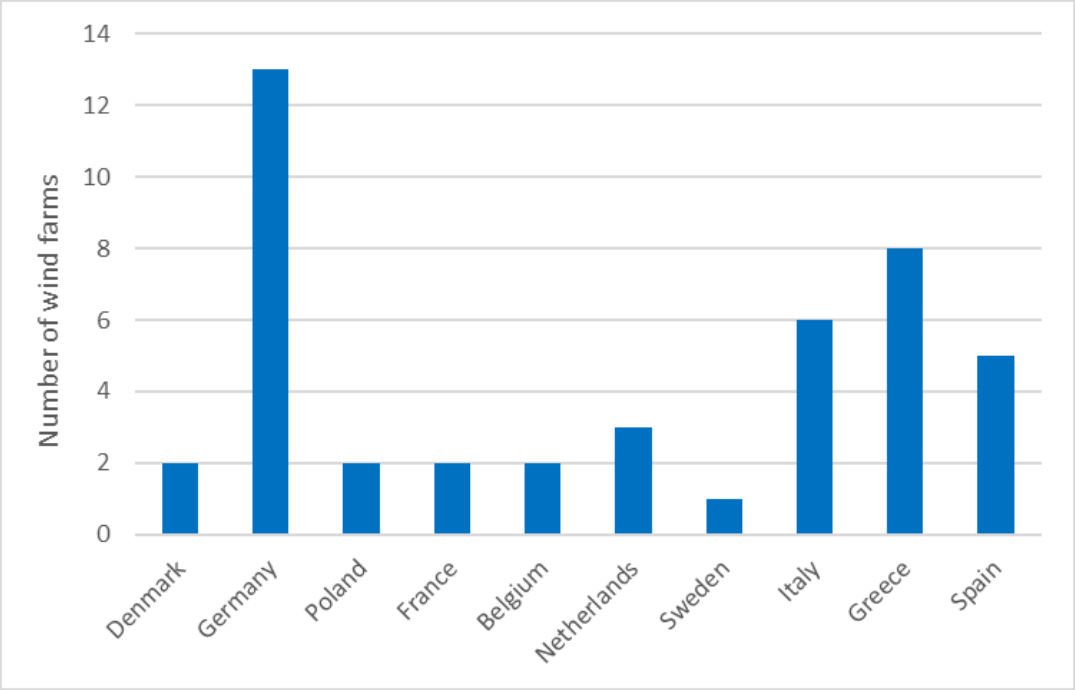

Figure 7: Numbers of wind farms identified per country

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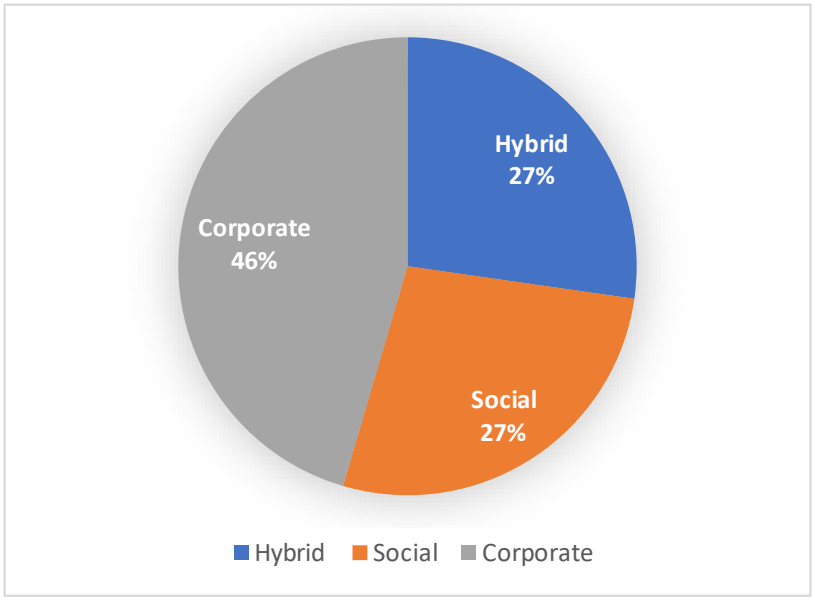

Figure 8: Ownership model (%) of the identified wind farms

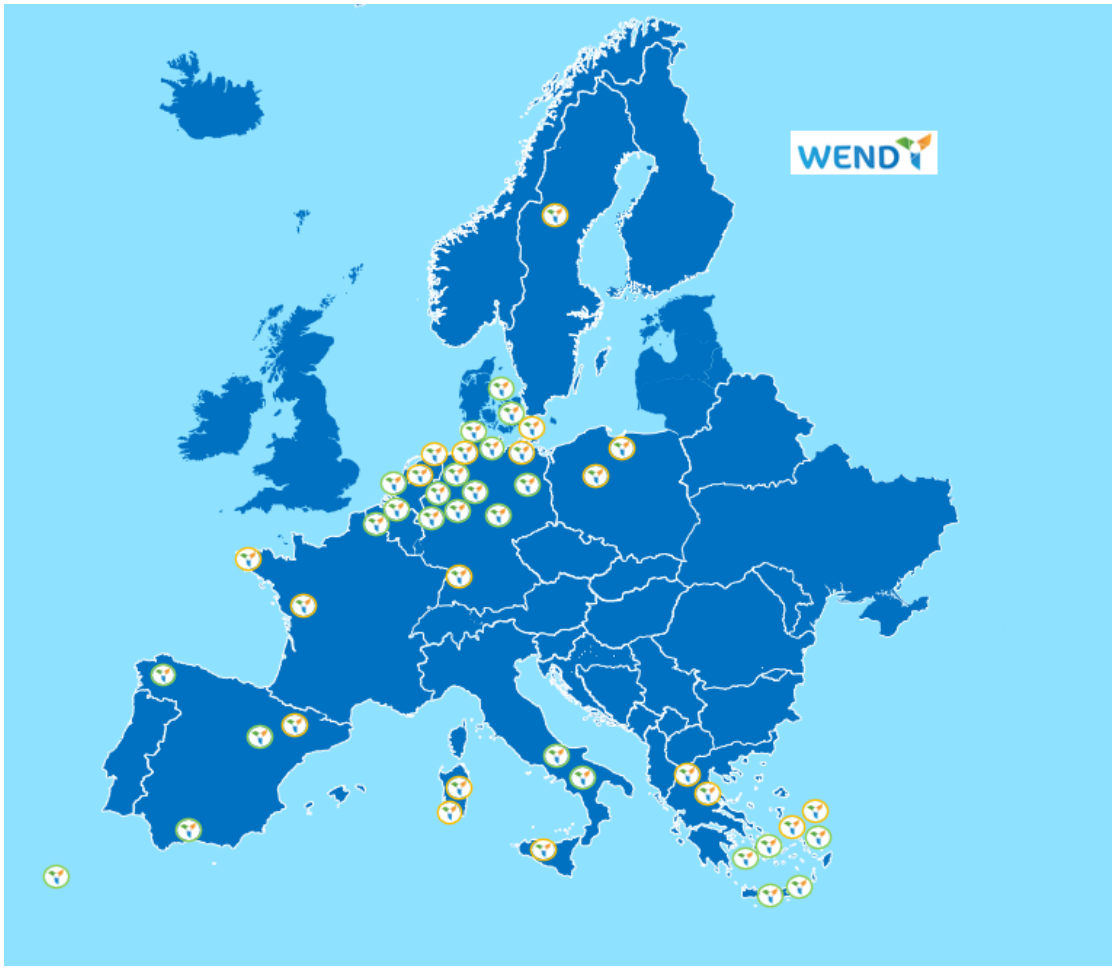

Figure 9: Map of the identified 44 good practice wind farm cases across the EU in Task 2.1

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3.2. Evaluation framework

The evaluation process involved a round of rating by all partners involved, who scored the identified cases in terms of the four (4) defined criteria using a 5-point scale. The ranking of the cases resulting from this exercise was discussed in a special dedicated workshop-meeting attended by all Task 2.1 partners. During this workshop, various practical criteria and considerations were also taken into account. Based on this discussion, the final selection-shortlisting of the 25 best cases for in-depth analysis was determined.

3.2.1. Introduction

Initially, the round of the rating of the list of cases was conducted. Subsequently, an online meeting was held on 24th of January 2023 to select a minimum of 25 best wind farm cases for further analysis. During this meeting, the allocation of the wind farm cases among the partners was determined, and the potential conducting interviews with key stakeholders was also discussed and decided upon.

3.2.2. Evaluation criteria and their interpretation

A framework was developed for the evaluation of the wind farm cases considering various assessment criteria. The evaluation of wind farms was based on four broad, overarching, "umbrella" criteria: (a) society, (b) economy, (c) environment (that together form the "pillars" of "sustainability"), and (d) procedures & justice. These broad categories of criteria can be further de-constructed and de-composed in 13 "dimensions" (or sub-criteria). These dimensions provide a deeper and better understanding of how the broad criteria are interpreted within the context of the evaluation process.

The table below presents the dimensions (sub-criteria) examined for each wind farm case along with a brief description of wind farm practices or actions addressing them, as well as the literature sources upon which they are based.

Table 3: Wind farm criteria for examination

Broad criteria	Dimensions (Sub-criteria)	Short description of wind farm practices/actions addressing each dimension	Literature Sources
Society	Well-being aspects	Practices that promote social welfare by supporting good health and habitat conditions. It includes actions for the mitigation of social disturbance issues (*e.g., noise pollution, shadow flicker, aesthetic, communication interference*).	(Shepherd et al., 2011)

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Broad criteria	Dimensions (Sub-criteria)	Short description of wind farm practices/actions addressing each dimension	Literature Sources
	Local opposition	Practices that prevented or efficiently managed conflicts between developers and local communities (e.g. in sites of social heritage, in the case of sites being in a short distance from the community).	(Baxter et al., 2013)
	Co-existence	Practices where the harmonious co-existence with other activities is achieved (e.g. tourism, agriculture, fisheries, energy communities, etc.)	(Kaffine, 2019)
Economy	Employment	Practices that lead to job openings and promote local employment.	(Blanco & Rodrigues, 2009)
	Financial gains and benefits	Practices that bring financial profits to municipalities or/and communities, either directly (e.g. community funds, compensation for land use), or indirectly by providing lower energy prices and taxes for local inhabitants.	(Blanco & Rodrigues, 2009; Glasson et al., 2022)
	Local value enhancement	Practices that enhance "local value", by e.g. improving the area's infrastructure; promoting tourism in the location (educational excursions, landscape, sports activities, etc); etc.	(Leiren et al., 2020)
Procedures & Justice	Distributional justice	Practices based on which the costs and benefits are equally allocated among society, local communities, and private actors (companies).	(Ferreira et al., 2019; Frantál & Kunc, 2011)
	Social ownership models	Practices based on which shares of the wind farm initiative are offered to local inhabitants (e.g. "Community shares").	(Langer et al., 2018; Leer Jørgensen et al., 2020)
	Information level	Practices that provide information for the wind farm development and address knowledge gaps in local communities (e.g. public meetings, conferences, etc.)	(Jobert et al., 2007; Lienhoop, 2018; Warren & McFadyen, 2010)

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Broad criteria	Dimensions (Sub-criteria)	Short description of wind farm practices/actions addressing each dimension	Literature Sources
	Local Participation	Practices that include the involvement of local stakeholders and individuals. In these cases, the locals actively participate and take decisions for the development of the wind farm (e.g. participatory planning, consenting process).	(Enevoldsen & Sovacool, 2016; Jobert et al., 2007)
	Transparency	Practices that promote and ensure mutual understanding and trust between stakeholders. This could be achieved for example by the establishment of certain regional policies.	(Devine-Wright, 2011; Jobert et al., 2007; Khan, 2003)
Environment	Ecosystem and Wildlife	Practices that mitigate environmental impacts for the protection of wildlife and ecosystem (addressing e.g. noise pollution, biodiversity loss, microclimate changes, etc.).	(Kati et al., 2021; Straka et al., 2020)
	Climate neutrality	Practices that promote climate neutrality. They include cases that reduce Greenhouse gas emissions (GHGs) along the whole supply chain and life cycle of the wind farm development, e.g. during raw material extraction, manufacturing, installation, operation, and maintenance.	(Adeyeye et al., 2020; Gawande & Chaudhry, 2019; Kati et al., 2021; Straka et al., 2020; Wang & Wang, 2015)
	Land diversion	Practices that encompass a clear environmental strategy for the wind farm development site, mitigating the land diversion effects (e.g. soil erosion, vegetation loss, deforestation, etc.).	(Leung & Yang, 2012; Saidur et al., 2011)

3.2.3. Rating approach and interpretation of evaluation scores

A five-point scale rating approach was utilised in the evaluation process. The wind farm cases were rated on a scale from [1] (representing “average” practices) to [5] (representing “excellent” practices) for each of the four criteria. Qualitative text descriptions were prepared and provided to help interpret the ratings of “average” [1], “good” [3], and “excellent” [5].

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Respondents rated the wind farm cases based on the four (4) broad criteria, in particular: (a) society, (b) economy, (c) environment, and (d) procedures and justice, by considering their brief description report provided in the template. They qualitatively judged and evaluated how well each case aligned with the predefined interpretations of the "average" [1], "good" [3] and "excellent" [5] scores. Before beginning the rating process, respondents had the opportunity to read the qualitative text descriptions and refer to them throughout the exercise. They also took into account all dimensions (sub-criteria) of the broad criteria to ensure a clear and shared understanding of their meaning within the context.

Whenever a case fell between the average and good rating, a score of [2] was assigned. Similarly, if it fell between the good and excellent rating, a score of [4] was assigned.

To facilitate the evaluation process, a structured guide was provided.

- ***Average***: Average or none practices/actions related to the criterion were or are applied in the wind farm case.
- ***Good***: Good practices/actions related to the criterion were or are applied in the wind farm case.
- ***Excellent***: Excellent practices/actions related to the criterion were or are applied in the wind farm case.

This guide (see Annex 8.3 for the predefined interpretations of the "average" [1], "good" [3] and "excellent" [5] scores for the four criteria) helped evaluators make straightforward assessments and assign appropriate ratings to the wind farm cases. The guide was supplemented by an example of the rating of a best wind farm case (see Annex 8.4).

3.2.4. Methodological considerations

Each wind farm case was evaluated and assigned a rating score for each criterion. This resulted in four distinct rates/scores for each case. At the beginning of the evaluation, the importance and potential of each criterion towards the social acceptability of a wind farm case were assessed and rated.

The overall rate of each case per respondent was calculated as the weighted average of the four ratings, taking into account the assigned importance to each criterion.

An evaluation sheet in Excel format was created and distributed to each respondent for the evaluation of the list of 44 best wind energy (WE) cases. All Task 2.1 partners actively participated in this evaluation exercise, with a minimum of two individuals from each partner/organisation taking part. The input and expertise from partners with experience in the wind farm industry were particularly valued and encouraged during the evaluation process.

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After the individual evaluation of the wind energy (WE) farm cases, the completed evaluation sheets were collected, and the mean values for each case were calculated. Subsequently, the cases were ranked based on their total score, which was determined by calculating the mean of the weighted average ratings from all evaluators. This ranking served as the basis of the discussion in a special meeting (workshop) held in January. During the workshop, partners revisited the ranked list of best cases and considered additional parameters, including practical issues and the importance o fbalanced representativeness across different contexts. The objective of this process was to narrow down the list and select the best cases for further in-depth analysis.

The evaluation process followed the guidelines provided and utilised the created "template for the identification and reporting of best wind farm cases". Evaluators had the opportunity to gather additional information through desk research or consult with the partner who identified the selected case for any available additional sources.

Table 4: The 5-point rating scale: rating scores (values) and corresponding rating label

5-point rating scale					
Rating score	1	2	3	4	5
Rating Label	Average		Good		Excellent
Sum score range	4		12		20

3.3. Selection and shortlisting process

3.3.1. Balanced representation of wind farm cases and practical issues

In the DoA, it is mentioned that wind energy farms with social ownership models and high social acceptance would be given special emphasis. The chosen wind farms are intended to serve as examples and should have developed indicative practices and valuable lessons that can be adopted by future wind farms.

Ideally, the selected wind farm cases should represent a balanced sample of the wind energy sector in the EU. This includes considering for example the presence of both onshore and offshore wind turbines including floating or fixed installations. It would be also beneficial to analyse cases in different regulatory and business contexts, taking into account various countries or locations with cultural differences. This broader analysis allows for valuable conclusions to be drawn. In general, wind farm cases that possess the following attributes were favoured for selection:

- Considered a "lighthouse" model that provides new knowledge and serves as a basis for innovation.
- Have been a long-term operation to gather an adequate number of lessons learnt.
- Establishment of social ownership models.
- Demonstrated high social acceptance and active local participation.

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- Have available sources and information about development and operational procedures, allowing for cross-checking and validation.

Therefore, during the shortlisting procedure, the identification and selection of wind farm cases aimed to achieve a balanced representation of various aspects and contexts across the European Union (EU) and address practical issues that were encountered. Several issues (e.g. countries, regulatory frameworks, etc.) were considered to ensure this balance. As a result, the final selection may have differed from the initial evaluation ranking, which was solely based only on the cases' ratings.

Some of the key considerations included:

- *Same evaluation ratings for wind farm cases*: in situations where multiple wind farm cases had the same total rating, additional criteria and factors were considered to differentiate and prioritise among them.
- *Feasibility of stakeholder engagement*: : wind farm cases in which the involved stakeholders would be feasible and easily engaged and participate in an interview if needed were given priority during the selection process.
- *Data availability, accessibility and completeness*: wind farm cases with availability of comprehensive, adequate and reliable data and information gathered through desk research or through potential interviews, were prioritised, ensuring the completeness of the information and the existence of sufficient data for the analysis and documentation.
- *Social acceptance and local participation*: preference was given to wind farm cases that demonstrated high levels of social acceptance and active participation from local communities.
- *Range of practices' topics*: The selected cases covered a range of practice topics within the wind energy farm development, operation, and community engagement (e.g. social acceptance strategies, environmental impact mitigation measures).
- *Long-term operation*: cases with a longer operational history were prioritised, as they provided a sufficient timeframe to assess the performance, challenges, and lessons learnt over time. However, a diverse group of cases in terms of maturity was considered.
- *Transferability of case's practices*: wind farm cases were chosen considering among others the potential transferability and replicability of their good practices to other similar contexts in Europe, allowing for broader scalability.
- *Thematic range, diversity and representativity*: the relevance of the wind farm cases to specific topics, themes or aspects, in terms of:
  - ✓ *Ownership models*: The selected cases aimed to cover a range of ownership models such as social, corporate, or hybrid ownership, enabling a comprehensive understanding of different approaches and their outcome.

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- ✓ *Technical/technological variety*: the selection considered a core technical aspect of the wind farms cases, in particular whether or not they comprise onshore or offshore installations/projects, including as much as possible varying capacity size, technological advancement, and project scale.
- ✓ *Geographical and/or cultural contexts*: the selection process aimed to include cases from different geographical regions and countries within the EU.
- ✓ *Regulatory and/or business contextual diversity*: The cases were chosen to encompass a variety of regulatory and business models within the wind energy sector. They cases were selected from different EU countries, taking into account the possible variations in regulatory frameworks, policies, or other business conditions and peculiarities at local level.

By considering these factors and addressing practical issues, the final selection of the 25 wind farm cases for analysis aimed to provide a robust and representative sample that captures the diversity of the wind energy sector in the EU, being able in parallel to offer interesting insights.

3.3.2. Final selection of the best cases

The final shortlisting and selection of at least 25 best wind farm cases resulted from a special online workshop-meeting in the frame of Task 2.1 that was held on 24th of January 2023. This meeting served as a platform to allocate the wind farm cases among the partners, considering factors such as the facilitation of the process and individual partner preferences. An equal distribution of five (5) wind farm cases per involved partner was decided for the in-depth analysis during the workshop-meeting. Each partner was encouraged to conduct interviews whenever necessary for their assigned wind farm cases. The partners were responsible for identifying and contacting the potential and prospective participants for the interviews.

Table 5: The final list of wind farm cases chosen for the in-depth analysis

	Best Wind Farm Cases	Location	Year	Ownership Model	Identified by	In-depth Analysis Report
1	Asterousia	Greece	planning	Social	MEC	MEC
2	Barile Venosa	Italy	2016	Corporate	EGP	EGP
3	Brebek	Germany	2009	Social	CBS	CBS
4	Carretera Arinaga	Spain	2014	Hybrid	CBS	CBS
5	Castelmauro	Italy	2022	Corporate	EGP	EGP
6	Duikeldam	Belgium	2012	Social	Q-PLAN	Q-PLAN
7	Eeklo Wind Farm	Belgium	2002	Hybrid	WR	WR
8	Ellhöft	Germany	2000	Social	CBS	Q-PLAN
9	Feldheim	Germany	1995	Hybrid	Q-PLAN	Q-PLAN
10	Hilchenbach community wind farm	Germany	2008	Social	WR	WR

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	Best Wind Farm Cases	Location	Year	Ownership Model	Identified by	In-depth Analysis Report
11	Hollich GmbH & Co. KG	Germany	2001	Hybrid	WR	WR
12	Königshovener Höhe wind farm	Germany	2016	Hybrid	WR	WR
13	KrammerWind	Netherlands	2019	Hybrid	WR	WR
14	Lichtenau	Germany	2014	Social	CBS	CBS
15	Los Arcos	Spain	2020	Corporate	EGP	EGP
16	Middelgrunden	Denmark	2000	Hybrid	Q-PLAN	CBS
17	Neuenkirchen	Germany	2017	Social	Q-PLAN	Q-PLAN
18	Samsø	Denmark	2003	Hybrid	Q-PLAN	CBS
19	Santo Domingo de Luna	Spain	2020	Corporate	EGP	EGP
20	Serra das Penas	Spain	2018	Corporate	EGP	EGP
21	Sifnos hybrid power plant	Greece	planning	Social	MEC	MEC
22	Sitia	Greece	1993 & 2021	Hybrid	MEC	MEC
23	Tilos	Greece	2018	Corporate	MEC	MEC
24	Tragoudistis, Sifnos	Greece	2019	Corporate	MEC	MEC
25	Uthleben	Germany	2011	Social	CBS	Q-PLAN

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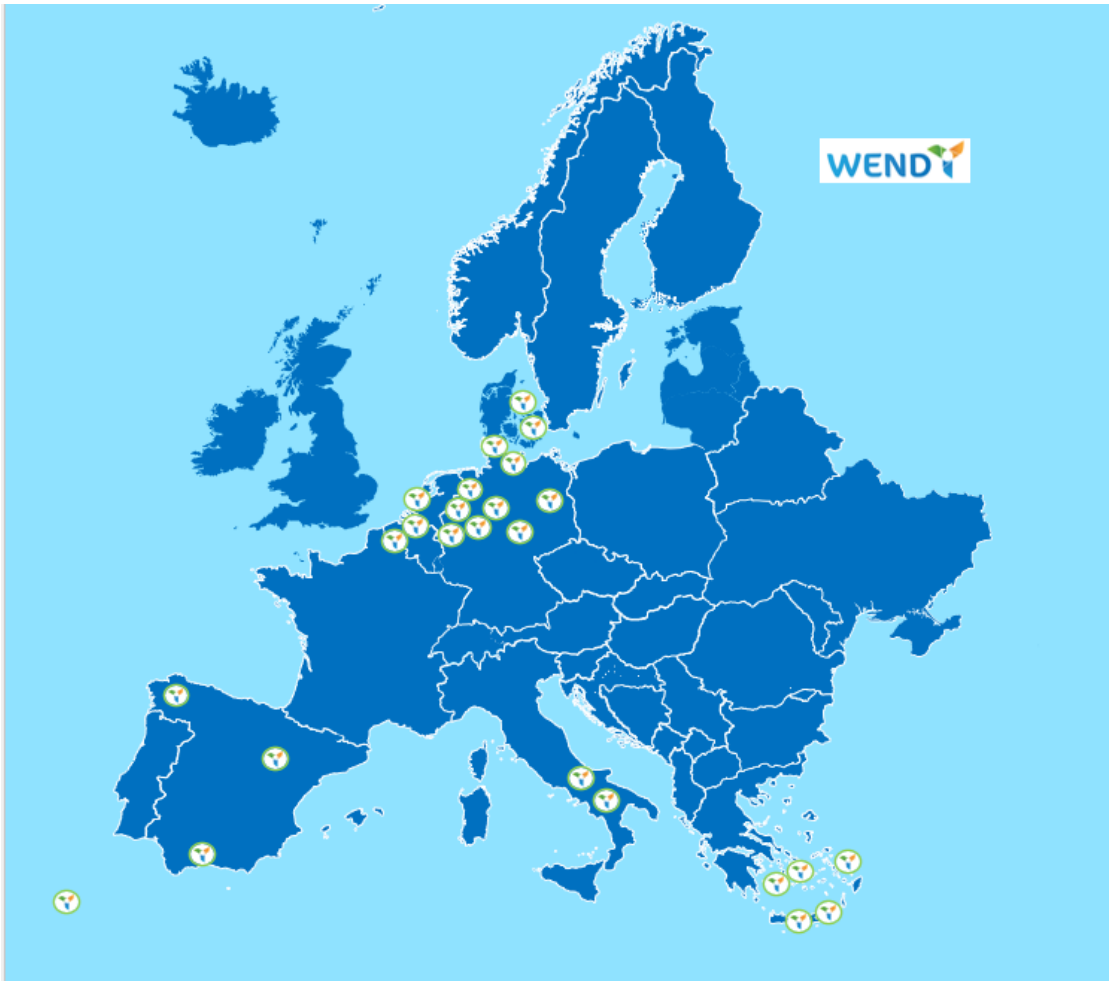

Figure 10: Map of the selected 25 best wind farm cases across the EU in Task 2.1

3.4. In-depth analysis

3.4.1. Desk Research

Desk research comprised the basic component of our research process that involved gathering information from various existing, available, and accessible sources such as studies, reports, articles, websites, etc., for the analysis of the wind farm cases. It served the acquisition of knowledge and supported the in-depth understanding of the wind farm cases under investigation.

During desk research, the involved partners were engaged in a thorough analysis and synthesis of existing information and data related to the chosen wind farm cases. The primary objective was to understand the underlying factors contributing to the social acceptance of these best practice wind farm cases and to identify any gaps in knowledge. Through this process, a solid knowledge baseline was established, providing a comprehensive understanding of the background and context of each wind farm case. Desk research allowed gaining valuable insights into the experiences and practices of the analysed wind farm cases, enabling the further analysis and cross-

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fertilisation synthesis towards the identification of the factors that contribute to the social acceptance of the explored wind farms.

3.4.2. Interviews

3.4.2.1. Objectives

The main purpose of the interviews was to enhance the in-depth analysis of the selected 25 best cases, which were chosen during the online workshop with all T2.1 partners, considering the ranking resulting through the evaluation process adopted.

The interviews' objectives were as follows:

1. Extract insights to validate, complete or correct the desk research and literature review (iterative process), in particular:
   a) shed light on various aspects of wind farm development and operation;
   b) facilitate the completion of certain fields in the story-board template, if the information collected from secondary sources is inadequate, or/and missing;
   c) validate any ambiguous information already gathered through desk research (literature review, and other open sources);
   d) enable partners to identify, highlight, and cite interesting quotes for inclusion in the story-board analysis;
2. Provide a neutral, thorough, more balanced and standardised analysis of a wind farm case;
3. Enhance the real field "research" dimension of the task, increasing its overall added value.

By achieving these objectives, the interviews contribute to a more comprehensive understanding of the wind farm cases and improve the quality of the analysis.

3.4.2.2. Implementation process

The semi-structured interviewing approach was employed, following the suggested questionnaire structure with the predetermined thematic questions. It is important to mention that the order and wording of the questions were flexible. Interviewers had the flexibility to ask additional questions, if deemed necessary, to ensure more accurate data collection. This methodology facilitates the establishment of a comprehensive knowledge baseline that will inform future tasks.

The questionnaire served as a reference tool to gather findings and capture the lessons learnt from the best wind farm cases. It consisted of more than ten (10) questions designed to initiate an open and comprehensive discussion. The questions were grouped into six (6) sections, facilitating a clear understanding of their thematic relevance and focus. Supporting remarks and explanatory notes were included as

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necessary, offering additional supportive sub-questions, prompts, clarifications, or examples helping interviewers in stimulating and guiding the dialogue.

According to the DoA, the interviews aimed to include *"key stakeholders from the identified wind farm cases"*. The selection of interviewees was based on their stakeholder role, level of engagement, and geographic location, and was carried out by the involved partners. The interviews targeted stakeholders who had a significant impact on the wind farm. Here are some typical examples of stakeholders interviewed in the wind energy sector: Local communities; Individuals; Investors/Co-owners; Developers; Operators; Local Governance/ Authorities; Civil Society. The following table presents in a random order the type of stakeholders that were finally interviewed.

Table 6: Type of stakeholders that were interviewed

No	Type of Stakeholder
1	Energy Community
2	Civil Society/ Local Governance
3	Municipality Authority
4	Local Governance/ Authority
5	Energy Community
6	Researcher/Operator/Shareholder
7	Industry/Energy sector
8	Development Organisation
9	Co-owner/ Local Governance
10	Municipal Authority

In addition, it should be noted that – apart from the ten aforementioned interviews – six (6) wind farm cases that were initiated by the developers who participate in WENDY project as partners, namely, EGP and MEC, were analysed by consulting internally documents, whenever necessary, as well as individuals of the respective organisations (e.g. of the personnel) that were involved in their planning and/or implementation of these particular wind farm cases. In this sense, the analysis reports of these wind farm cases constitute and comprise, by definition, an outcome of primary information. They directly encompass the insights derived from personal interview-style discussions and communications, and thus, they are based on field research activities, albeit somewhat less structured than the conducted interviews.

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3.4.2.3. Outcome

The conduct of interviews was anticipated to assist in filling in the details of certain fields in the story-board template, especially in cases where the information collected from secondary sources was insufficient, inadequate, or/and missing.

The interviews played a crucial role in gathering valuable information, particularly in addressing the knowledge gaps and ensuring the accuracy of the data that were obtained through the desk research. In addition, during the interviews, partners identified and highlighted noteworthy quotes that could be incorporated into the story-board analysis, and validated any ambiguous information that had been gathered through desk research, such as literature reviews, and other open sources.

Moreover, the interviews played a significant role in addressing the following main questions:

1) Why is the wind energy farm under investigation considered a "lighthouse" model?
2) What challenges did the wind farm face and overcome?
3) In what ways can the wind farm be used as a best practice example?

By conducting interviews, valuable **insights** and **lessons learnt** were extracted from the analysis of wind farm cases in Europe. These insights demonstrated good practices for increasing the likelihood of local community acceptance for a wind farm.

3.4.3. Storyboard form template

A storyboard form template was designed. This was filled in based on desk research, which involves consolidating secondary sources of information. Additionally, when necessary and feasible, it also incorporates material from interviews as primary sources of information.

The storyboard includes an "identity" section with the following aspects:

Basic details: This section provides essential information about the wind farm, derived from the analysis of each case. Numeric data is presented, including the the *number of the wind turbines*, the *nominal power* of the wind farm, and the *number of households* that cover their electricity needs from the project. The numbers provided have been derived from a comprehensive analysis of relevant literature and interviews conducted. It should be noted that the data may have been modified since its retrieval. The number of households covered is based on an electricity estimated consumption threshold that varies depending on the geographical area.

Other parameters discussed in this section include the wind farm's*: type* (onshore/offshore), *location* (area, country), *ownership model* (social/hybrid/corporate), and *operator*. Technical information such as *rotor diameter,*

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hub height, total height is provided. It should be highlighted that the characteristics of wind turbines may vary. The data presented correspond to the highest or most impactful turbine(s) and serve as indicative examples of the installation. The purpose of providing technical data is to offer a comprehensive overview of the case and its impact on the local community.

Key insights & lessons learnt: This section includes the major challenges, barriers and enablers encountered during the project implementation, along with the impact that the wind farm has had on the local communities.

Evaluation score: A spider-graph is provided, illustrating the average ratings assigned by the partners during the evaluation process. The graph displays the ratings for the four (4) broad criteria (environment, society, procedures and justice, economy), as well as an overall average score.

Timeline: A timeline is presented, showcasing the most important milestones, actions or accomplishments throughout the years for the wind farm's development.

3.5. Cross-fertilisation synthesis

In the section of the cross-fertilisation analysis and synthesis, we exploit the knowledge that has been produced, consolidated and systemised in chapter 4, which was about four broad aspects of wind farm cases, namely society, economy, environment, and procedures and justice.

In practice we applied a form of mixed approach towards the cross-fertilisation synthesis, both "top-down" (deductive approach), based on certain six (6) dimensions cited in the specifications of the DoA (as they were defined by the initial exploration of the state-of-the-art), and "bottom-up" (abductive approach), based on the findings of our desk and field research.

The predefined themes enabled us to shape a preliminary structure of the cross-fertilisation analysis, which was used as a framework towards identifying more aspects of consideration related to them, by looking carefully for patterns in the meaning of the available content of wind farm cases.

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4. Analysis of lighthouse wind farm cases

4.1. Asterousia Wind Farm[2]

4.1.1. Background context

Picture 1: Meteorological station at the site in Asterousia mountains (personal photo archive of Minadakis I.)

Minoan Energy Community (MEC) is the largest energy community in Greece. The primary objective of the Community is to assume a prominent and indispensable role in the implementation of energy transition in Crete. This will be achieved by undertaking numerous projects and maximizing the social, developmental, and economic benefits for the island's citizens. The Community emphasises the primary RES found on the island, namely wind potential, solar radiation, and biomass resources. Having successfully implemented two photovoltaic parks with capacities of 405 kW and 1 MW, which currently operate as net-metering projects to compensate for the annual electricity consumption of the participating members, the Community has now initiated the design and licensing process for its first wind park. The wind park project is embodied as a major component in the overall effort for the implementation of rational and effective energy projects in Crete. It will be the community's first large-scale project, through which they aim to demonstrate their technical and funding capacity to successfully implement projects of this scale. The project, through its appropriate siting and design, will also serve as a live demonstration of harmonious integration of wind parks in the natural environment, aiming to contribute to changing the currently strong local opposition against the installation of new wind parks in Crete (Katsaprakakis et al 2022).

[2] Unless otherwise stated all information is taken from the Stakeholders Interview.

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4.1.2. Environment

> *"All requested measures by the licensing authority in charge for the protection of bird wildlife in the Asterousia Mountains will be implemented."* (Interviewee)

The wind park has been located outside the boundaries of any NATURA 2000 region. However, its distance from the boundaries of the Birds Directive Site (SPA) with the code number GR4310013 and the title "Asterousia Mountains" is only 200 m (Natura 2000 viewer, 2023). All requested measures will be implemented by the licensing authority in charge of the protection of bird wildlife in the Asterousia Mountains. Indicatively, potential measures that are likely to be requested include: the installation of a sonic radar, which will emit noises to deter approaching birds; the positioning of a bird feeder far away from the park to attract carnivorous birds, keeping them away from the wind turbines; and the regular removal of any deceased animals from the wind park's area to discourage scavenger birds) (Katsaprakakis et al 2012). Furthermore, no other effects are expected on the natural environment.

4.1.3. Society

Picture 2: Asterousia mountains (Mullon, 2010). CC BY-SA 3.0

As of now, the Community has not yet officially informed the local residents about the development of the wind park, as the entire project is still in its early stages of development. This will be done after obtaining the official approvals from the Antiquities Authority and the Forestry Authority. The Community hopes that by actively involving and engaging the local residents, giving them the opportunity to participate and invest in the project, they will be highly satisfied with the outcome. To achieve this objective, the careful design and placement of the project will also play a vital role. The proposal includes only four (4) turbines, strategically located outside any NATURA 2000 region and areas of cultural interest (e.g. archaeological sites). The wind park is at a significant distance from any nearby settlements, ensuring that no noise disturbances will be caused. Moreover, the land morphology in the area prevents any visual contact between the wind park and neighbouring settlements.

The primary activities carried out in the broader neighbouring area of the wind park's installation site are stock farming and hunting, which serves as a recreation activity for

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amateur hunters. It is well-known that wind parks do not cover any significant portion of land beyond the wind turbines' installation plateau, which requires roughly 2000 m^2 of space per turbine (for a wind turbine at the range of 3 MW). These plateaus have to be flattened and kept clear, without any type of vegetation or irregularities, for the installation and maintenance, during their normal operation phase. For the four (4) wind turbines of the wind park, a total of 8000 m^2 of land will be occupied. Given that this area represents a very small percentage of the overall wider area, it is conceivable that the occupation of this land will not significantly affect the existing human activities in the overall mountainous area.

4.1.4. Economy

The wind park will sell the generated electricity to the grid utility at a pre-defined contractual price. A percentage of the net profits, which will be decided by the Management of the Board at a later time, will be distributed back to the Community's members, based on their respective shares in the Community's shareholders registry. The remaining profits will be reinvested in new energy transition projects, creating opportunities for more citizens in Crete to join the community and invest in its projects, aiming to achieve an improved standard of living. The Community has already implemented practical steps towards addressing energy poverty in Crete. In particular, in the second implemented photovoltaic plant, 50 low-income families receive electricity free of charge. With the profits from the wind park, the Community will manage to develop more similar projects and actions combating energy poverty.

The broader area surrounding the wind park's installation site is primarily dedicated to stock-farming and agriculture. It is located far from the existing tourist areas of the island, without any involvement in the tourism industry of Crete. Hence, the primary income of the local inhabitants derives from olive oil production and sheep-related products. Thus, their well-being is strongly related to weather, annual rainfall level, and the effective production of their olive trees crops. Given the strong connection of the local inhabitants to the land, it is understandable that they are concerned about climate change, to the extent that it can impact on the land's productivity. The opportunity for them to secure additional economic income from the energy sector will certainly make an important contribution towards the improvement of their standard of living, and will reduce their concerns, enhancing the sense of security and the comfort in their lives.

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4.1.5. Procedures and Justice

The owner of the wind park will be the Minoan Energy Community. For the funding of the project, the Community will launch an open call for its members to participate based on their interest and financial capacity. The maximum participation percentage for a single member (individual or legal entity) in all the Community's projects is set by the law at 20%. However, the Community intends to reduce this percentage, potentially to 10% or even 5%, to enable more members to participate in the investment. Priority will be given to members based on the time of application. All members will be accepted until the required equities are fulfilled. If there are remaining members who are unable to participate in the current project, they will have the opportunity to participate in another forthcoming project. If the required equities cannot be fulfilled by the Community's interested members, the Community may consider alternative funding options, such as crowd funding model, potentially increasing the maximum participation percentage at 20%, or inviting some local firms from Crete to participate. The aforementioned approach comprises a fair and sensible model to be adopted, ensuring energy democracy for all involved members.

> *"The maximum participation percentage of a single member in the project will be, potentially, set at 10% or even 5%, to enable more members to participate in the investment..."* (Interviewee)

4.1.6. Additional Information

The wind park of Minoan Energy Community can be an example to follow for the whole Europe, because:

- It will be fully designed by the Community's consulting team.
- It will maximize the added value for the local community.
- It will be developed with active involvement from local authorities starting from the planning phase.
- The project will be comprehensively presented, and all aspects of it will be explained to the residents of all nearby settlements. In addition, the residents will be invited to participate and invest in this project.
- It will be open to the participation of all interested members of the Community, being aligned with the fundamental principles of energy democracy.
- All profits and benefits generated will be fully reinvested in the island.
- It comprises a project carefully designed by the Community's engineers, at a site with an annual average wind velocity higher than 8 m/s. Therefore, wind turbines, being located outside the boundaries of any environmentally or culturally important region, can achieve maximum efficiency.

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4.1.7. Identity

Asterousia Wind Farm

Basic details

4 Wind Turbines | **12 MW Power** | **10500 Houses**

Wind farm type: Onshore

Location: Crete, Greece

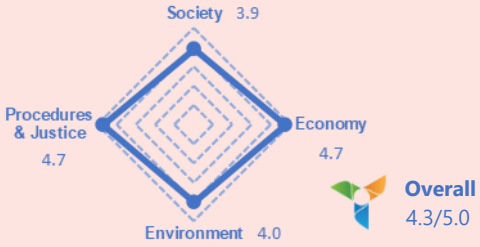
Ownership model: Social

Operator: Minoan Energy Community

Rotor diameter: 82 m

Hub height: 78 m

Total height: 119 m



Key insights & lessons learnt

a) Challenges & barriers

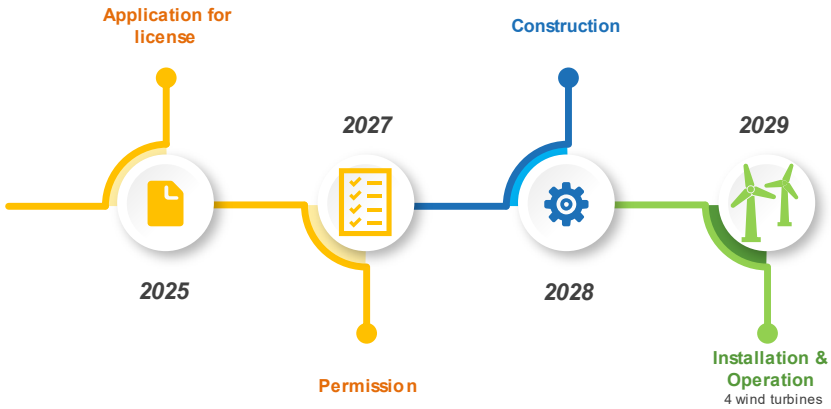
- ✓ Convincing the licensing authorities about the necessity and the minimal impacts (if any) of the project.
- ✓ Convincing local citizens to accept the wind park and participate in it.
- ✓ Raising funds from involved members to participate in the investment.

b) Enablers

- ✓ The presence of high wind potential at the installation site.
- ✓ The location of the site is outside of any region of environmental or cultural importance.
- ✓ The engagement and mobilisation of the local society towards the project.

c) Impact

- ✓ Demonstration of the capacity of energy communities in Greece to install large scale energy transition projects.
- ✓ Potentially contributing to shifting negative attitudes towards wind parks in Crete.
- ✓ Comprising an example of good practice paving the way for the utilisation of wind energy in Greece.



**See section 3.4.3 for details.*

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4.2. Barile Venosa Wind Farm

4.2.1. Background context

The Barile Venosa onshore wind farm in Basilicata Region is located in the municipalities of Barile and Venosa, near Potenza in the South of Italy. Having a total installed capacity of 8 MW, the Barile Venosa plant can generate more than 22 GWh per year, which is equivalent to the energy needs of around 1,800 Italian households preventing the release of nearly 9,000 t of CO_2 into the atmosphere per year. The plant is in operation since 2016 and has contributed to the growth of wind energy in Italy, reducing its reliance on fossil fuels and addressing the challenges of climate change and energy crisis. The Basilicata area, where the plant is located, has particularly favourable natural conditions for harnessing wind energy. Therefore, many wind farms have been developed in this region. However, despite the encouraging prospects of wind energy projects, the regional economic context faces challenges that increase the level of material and social vulnerability, which include a low level of employment, high outmigration of young people, poor infrastructure, and limited connectivity that render the area unattractive for investments.

4.2.2. Environment

This plant is facilitating the supply of renewable energy to approximately 1,800 Italian households, thereby avoiding the emission of about 9,000 t of CO_2 into the atmosphere per year. This contribution to Italy's energy transition is important, as it helps reduce Italian reliance on fossil fuels and brings environmental benefits. A series of technical improvements have been implemented to boost the plant's overall energy efficiency. Modifications have been made to the turbine blades to prevent them from ceasing operation during sudden gusts of wind, while also reducing the noise produced during rotation. Due to these improvements and the significant distance between the wind farm and the built-up areas, noise and visual pollution are not considered critical. The area affected by the plant is approximately 6 km from the urban area of Venosa, as the crow flies, about 4.3 km from Barile, and about 1.1 km from Ginestra. The surrounding area is classified as agricultural, with herbaceous vegetation,

Picture 3: Landscape of Barile Venosa Wind Farm in Basilicata region (Enel Green Power, n.d.)

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primarily cereals, and natural pastures. The construction of the plant didn't result in any loss of vegetation or deforestation.

In addition, an upgrade of the oil filter system used to lubricate the moving parts of the transformers was recently conducted, resulting in significant oil savings. The impact caused by construction activities was mitigated by restoring the original agricultural cover, immediately after the end of the work in all the territory not occupied physically by the wind farm structures.

With regard to natural ecosystems, the plant is located outside of protected areas and affects agricultural areas. Moreover, the site is situated in a peripheral zone with respect to significant bird habitats, present in other considerably distant areas. The plant does not fall within suitable bird migration corridors or nesting sites, indicating that the impact on avifauna is minimal. The only expected impact is the possibility of some accidental passage outside of their usual migratory routes. In order to decrease this possibility, the wind turbines are equipped with devices that increase the bird's perception of the risk by presenting a different colouring at the end of the blade compared to the initial section. The increased contrast makes wind turbines more visible to birds, allowing them to change their flight path accordingly. With regard to public health aspects, it should be noted that the absence of pollutant emissions can only have beneficial effects.

4.2.3. Society

The wind farm is located far from the nearest built-up area, resulting in minimal visual and shading pollution for the local population. Periodic monitoring has confirmed that the noise levels are in compliance with current legal limits, ensuring the protection of public health.

The nearby population benefits from the wind farm's electricity production, which is free of water and air pollution, leading to reduced smog, acid rain, and greenhouse gas emissions. As a clean energy source, wind energy reduces healthcare and environmental costs associated with air pollution. Furthermore, wind power also helps achieving energy self-sufficiency and aligns with the principles of sustainable development.

Due to the proliferation of wind farms in the Basilicata Region, without proper coordination in the past years, local administrations became very resistant to further development. To mitigate this initial mistrust of locals, initiatives of shared value were identified through a social-economic analysis and various discussions with local administrations, and then were implemented in the territory.

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The wind farm is located in a rural area where wheat is primarily cultivated. Because of the small footprint of the turbines, crops can be grown and livestock can be grazed even in a short distance from the bases of the turbines, offering rural landowners a new source of income.

During the construction phase, the project developer organised information sessions at municipal public schools about the benefits of renewable energy and energy conservation.

Picture 4: Landscape of Barile Venosa Wind Farm in Basilicata Region (Enel Green Power, n.d.)

4.2.4. Economy

The main economic benefit of this Wind energy project to the neighbouring communities is the provision of a new source of revenue for farmers and ranchers in the form of land lease payments, regulated by an agreement between the project developer and the landowners. In addition, the local economy, which is predominantly rural, was fostered by involving local companies both during the construction work, including civil works and services, and the ongoing maintenance activities.

Compensatory measures offered by the project developer in an agreement with the Barile municipality, include: a) the reset of the roads where cables pass, along with soil stabilization works; b) the creation of urban green spaces; c) the re-naturalisation of

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streets and squares in the Barile town; and d) the rehabilitation of a city route along the historic *Via Crucis*. During the operation phase of the project, the developer took care of the restoration of historical rural roads in the vicinity of the project area, in particular the so-called 'Tratturi' roads, known for their great cultural landscape value. This restoration effort was received very positively by the local population.

4.2.5. Procedures and Justice

The ownership model of this facility is corporate. Its owner, developer and operator is Enel Green Power SpA, a large company operating in the national and international markets. The project for the Barile Venosa wind farm has been authorised in compliance with current national regulations. In this authorisation process several local, regional, and state entities and authorities, responsible for approvals, were involved.

According to national legislation, in the frame of the authorisation process, the environmental impact assessment (EIA) for the project was conducted by specialists on behalf of the developer. The results of assessment were evaluated by the national environmental authorities and other local and regional authorities, who had the opportunity to provide comments and request specific actions to be implemented.

In addition, the developer conducted a study to analyse and understand the context from an institutional, social, cultural and environmental point of view. The aim was to identify relevant plans and projects, and strategic issues and assets that could contribute to the creation of shared value within the territory, by scaling possible solutions across the area.

The project developer and local administrations engaged in several meetings and discussions to reach an agreement on a satisfactory economic fee for the landowners in the area. Additionally, compensatory measures were discussed and planned to improve infrastructure, increase green spaces, and restore ancient buildings and other landscape elements of high cultural value in the territory.

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4.2.6. Identity

Barile Venosa Wind Farm

Basic details

4 Wind Turbines

8 MW Power

1800 Houses

Wind farm type: Onshore

Location: Venosa, Italy

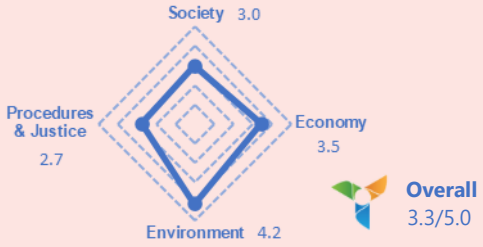
Ownership model: Corporate

Operator: Enel Green Power SpA

Rotor diameter: 92 m

Hub height: 100 m

Total height: 147 m



Key insights & lessons learnt

a) Challenges & barriers

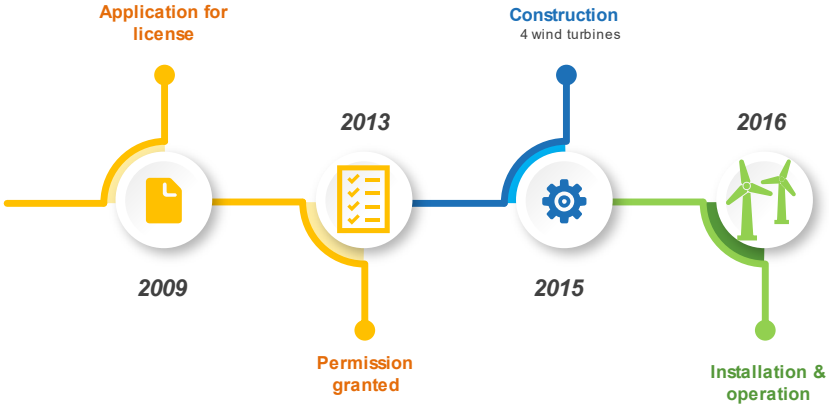
- ✓ Long authorisation process.
- ✓ Demonstrating safety for human and animal health.

b) Enablers

- ✓ Implementation of environmental compensatory measures.
- ✓ Meetings and discussions to provide a satisfactory economic fee to the landowners of the area.

c) Impact

- ✓ Provision of a new source of revenue for farmers and ranchers in the form of land lease payments.
- ✓ Barile municipality rehabilitation and local value enhancement.
- ✓ Fostering local economy by involving local companies during construction work.
- ✓ Greenhouse gas emissions reduction by approx. 9,000 t of CO_2 emissions per year.



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4.3. Brebek Wind Farm

4.3.1. Background content

The citizen's wind energy park Brebek is located in Schleswig-Holstein, the northern part of Germany, only a few kilometres (km) away from Denmark. The Bürgerwindpark Brebek is a regional citizen's energy project in the adjacent municipalities of Bramstedtlund (200 citizens), Ladelund (1400 citizens), and Karlum (200 citizens) (Kerres et al., 2020). It is based in Ladelund and it is fully owned and operated by local citizens. The Bürgerwindpark Brebek GmbH & Co. KG cooperative was established in 2007, but the wind farm was commissioned in 2015 & 2017 (COME RES, 2022; Creditreform.de, n.d.).

The project was initiated by local farmers and landowners who were looking for additional revenue. They contacted a local project developer who assumed responsibility for the planning and construction. According to the developer, one of the key success factors was the team at the project developer's office. All of them have been living in the area for many years, are well-respected in their communities, and enjoy a certain sense of trust, as previous projects completed by them were well-received (Kerres et al., 2020).

However, the original plan for a wind park with 18 wind turbines could not be implemented due to numerous adaptations caused by an objection raised by the German Armed Forces listening station in Ladelund. As a result, the project was eventually implemented in two phases, with a total of 12 turbines (3MW each). Besides a lawsuit filed by two local families, which was rejected in 2017, there were only a few personal objections to the project. As a result, the wind farm was able to open in 2017 with significant approval from the adjacent communities.

4.3.2. Environment

Ladelund municipality is located close to the Danish-German border in the Schleswig region. The state of Schleswig-Holstein is considered the cradle of community wind energy in Germany. According to the impact regulation of German nature conservation law, wind farm project developers are obliged to avoid impairments to nature and the environment as far as possible. If it is not feasible to avoid the impact,

Picture 5: Schleswig-Holstein (Kosinsky, 2017). CC BY-SA 3.0-de.

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measures must be taken to adequately compensate for the impact with compensatory or replacement measures. The difference is that compensation measures must be implemented in the same way (e.g. grassland for grassland) and at the site of the intervention itself. Replacement measures, on the other hand, are equivalent (e.g. orchard meadow for grassland) and must be implemented in the affected natural area (in the immediate vicinity) (Kerres et al., 2020).

If such measures are not possible, monetary compensation is envisaged. The operators of the wind farm reached an agreement with the nature protection authority, ensuring that the payments meant to offset the negative impact on the landscape will be allocated towards local nature protection measures within the community. A non-profit nature conservation association (NBN e.V.) was founded by the managers of the wind farm focusing on the maintenance and management of the areas. Ecological compensation payments have been utlised to acquire an additional 80 hectares of land designated as protected areas for amphibians and meadow birds. These areas are then leased to farmers who implement nature-oriented management (COME RES, 2022).

4.3.3. Society

The wind farm operator committed to dedicating a certain share of the revenue generated by the wind farm towards social projects in the region, as not all citizens had the opportunity to benefit directly from the wind farm through share ownership. Therefore, a canoe was bought for a local club, a van was bought for the local food bank “Tafel”, a volunteer organisation distributing food to people in need, and high-speed Wi-Fi for public use was established in collaboration with other wind farm operators in the region. The wind farm operator itself demonstrated a strong commitment to community engagement and support. While the three municipalities contribute the additional tax revenue to the general budget, the wind park operator has tried to ensure that all citizens benefit indirectly, beyond just the shareholders. This has been achieved through supporting social clubs and investing in broadband internet infrastructure for the region.

4.3.4. Economy

The trade tax generated by the wind park, which amounts to approximately 300,000 euros per year, is divided among the three municipalities based on the installed capacity of the wind turbines in each municipality. The tax revenue is not specifically designated for any particular purpose but becomes part of the general budget of the municipalities. Furthermore, approximately one-third of the required investment remained in the region, providing support to local construction and planning companies. The project also generated employment opportunities at the local planning office, as well as 40

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jobs during the construction phase. This is a noteworthy figure, particularly when considering that the three municipalities involved in the project have a combined population of fewer than 2000 people (Kerres et al., 2020).

4.3.5. Procedures and Justice

If the community does not experience any negative economic impacts, wind farms generally tend to enjoy greater social acceptance. In the Brebek wind farm case, any citizen registered in the municipalities and showing interest, or any individual owning land in one of the municipalities, had the opportunity to acquire a share in the citizen wind farm. Regardless of the size of their individual investment, every shareholder held an equal decision-making weight. It was important to the management to ensure that no individuals had shares large enough to veto decisions.

In order to inform citizens about the opportunity to actively participate in the wind farm, a letter was sent to every household. Interested parties could then request more information on the process. Every adult citizen of the adjacent municipalities, as well as landowners and tradespeople based in one of the municipalities, were able to participate in the wind farm by investing a share of 1,000 euros at the time of its foundation (Kerres et al., 2020). The company is fully owned by the citizens of the region, with the profits flowing directly to locally anchored limited partners. The local municipalities hosting the wind farm also benefit from annual business tax payments, which are divided fairly between them according to the respective share of installed capacity (COME RES, 2022).

In Bürgerwindpark Brebek, Ladelund municipality organised a general assembly, inviting all residents to attend. During this gathering, they presented the project details and provided an opportunity for residents to ask questions. Afterwards, the municipality held a referendum on the wind farm project. Due to an overwhelming show of support, the project had the political and civil backing necessary to advance. Similar information assembly events were also held in the other two municipalities. Thus, citizens had the opportunity to familiarize themselves with the wind farm plans through discussions and answers to their questions. The intensive public participation proved valuable, as an overwhelming majority of citizens voted in favour of the plans.

Bürgerwindpark Brebek GmbH & Co KG was registered as a company in 2007 and started with 288 people and 354 shares (Reinhard Christiansen, n.d.). As of now, there are 30 shareholders (29 limited partners, 1 general partner).

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4.3.6. Identity

Brebek Wind Farm

Basic details

12 Wind Turbines

36 MW Power

20000 Houses

Wind farm type: Onshore

Location: Ladelund, Germany

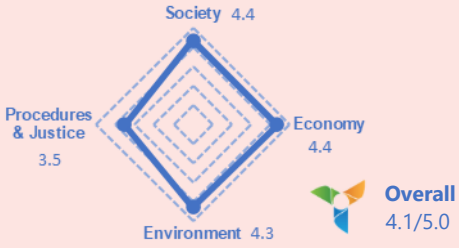
Ownership model: Social

Operator: Bürgerwindpark Brebek GmbH & Co. KG

Rotor diameter: 113 m

Hub height: 115 m

Total height: 171 m



Key insights & lessons learnt

a) *Challenges & barriers*

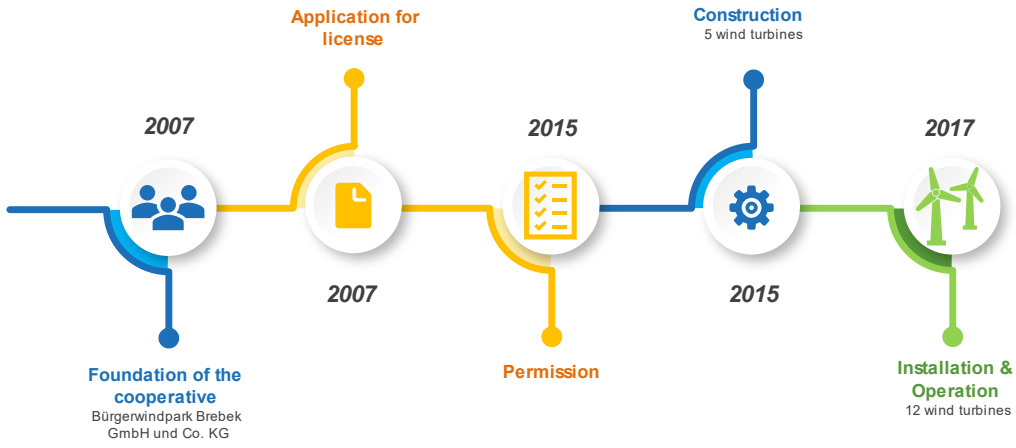
- ✓ Compliance with the environmental regulations in Germany.
- ✓ Strong opposition from nature conservation groups.

b) *Enablers*

- ✓ Feed-in priority for renewable energy, providing the needed capital to small investors.
- ✓ Trustworthiness for the local developer and involvement of the local municipality.
- ✓ Information on the local landowners from other wind projects in the region.

c) *Impact*

- ✓ Social economic benefits from the wind farm.
- ✓ Local development of Bramstedtlund, Ladelund and Karlum municipalities.
- ✓ Creation of job positions during the construction work.
- ✓ Supporting local organisations and social activities.



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4.4. Carretera Arinaga Wind Farm

4.4.1. Background content

The Carretera Arinaga wind farm is located in Agüimes, Las Palmas (Canarias), Spain. It was established in 2001, with the joint participation of the Endesa group and the Agüimes City Council. "Parque Eólico Carretera de Arinaga" became one of the pioneering wind energy production centres in the Canary Islands. It began operations with the aim of promoting, building and operating a renewable energy production centre in the Arinaga Industrial Zone. Another objective was to share the value created with local institutions. It currently has 8.7 MW of installed power, occupying a total area of approximately 40,000 m^2 of municipally owned land (Canariasahora, 2023).

In 2023, more than two decades after its installation, the reinforcement of the renewable energies of the area and the improvement of public-private collaboration will take place. Through a comprehensive repowering effort, this renewable energy site in the municipality of Agüimes will undergo a transformation, emerging as the Canary Islands' state-of-the-art facility and setting a national standard for excellence. With an investment of 9.6 million euros, the park will replace six out of its nine wind turbines, enhancing its production capacity and extending the facility's lifespan by another 20 years (Agüimes Town Hall, 2023). The modernization project involves the acquisition, installation and commissioning of six (6) new 0.9 MW Enercon E-44 wind turbines. They will replace five (5) pieces of equipment that have reached the end of their lifecycle and a sixth that has been already out of operation. These turbines will be added to the other three (3) wind turbines in the park, which have been already replaced in 2012. As a result, the park will increase its installed power by 16.5%, from 7.25 to 8.7 MW) (Canariasahora, 2023)

4.4.2. Environment

The Carretera Arinaga wind farm is located in a windy area near the coast of Gran Canaria, which makes it suitable for harnessing wind energy. However, the wind can also pose a challenge for the installation and operation of the wind turbines, as excessive wind speeds may require workers to halt hoisting operations or lead to the shutdown of turbines (Endesa, 2023). As mentioned above, the wind farm has reduced the area's greenhouse gas emissions and contributed to the mitigation of water scarcity issues. However, the installation and operation of the wind turbines may cause noise, vibration, electromagnetic fields, habitat loss or fragmentation, collision risk, and visual impact. The repowering project of the wind farm aimed to minimise these impacts by replacing old and inefficient wind turbines with new ones that are more advanced, efficient and smaller in size (Edensa, 2023). The repowering project will also involve the recycling of the dismantled wind turbines and the restoration of the land.

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4.4.3. Society

On a further note, due to the enhanced well-being of the region, the local authorities' social welfare budgets, which had previously been allocated for water and energy expenses resulting from the wind farms' land rents, could now be utilised to address other social issues. The wind farm is also compatible with other renewable energy projects in the area, such as the planned floating offshore wind farm by Greenalia, which will be located near the port of Arinaga (REVE, 2021).

4.4.4. Economy

The Carretera Arinaga wind contributes to the reduction of greenhouse gas emissions and fossil fuel dependence of the Islands, as well as to the promotion of local employment and economic development (Endesa, 2023). The installation of wind energy has played a crucial role in ensuring the availability of affordable energy and water for the local population, contributing significantly to social acceptance. The increased supply of energy and water has revitalized and fostered growth within the agricultural industry. Furthermore, the community's dedication to each wind farm has created opportunities for local entrepreneurs to collectively invest in and own a portion of these farms. The energy sector has not only generated electricity but has also created numerous employment opportunities, spanning manufacturing, installation, assembly, and the ongoing maintenance of the farms.

Picture 6 The Carretera de Arinaga wind farm (Agüimes Town Hall, 2020)

4.4.5. Procedures and Justice

With regard to land rents, the investors utilise publicly owned land for the installation of wind farms. In exchange, the municipalities acquired a substantial share of the installations, specifically 20%. The town holds a 20% stake, while Enel Green Power España holds the remaining 80%. The wind farm procedures involved local meetings where all public opinions were taken into consideration.

In 2019, the energy sales by Parque Eólico Carretera de Arinaga amounted to 1.45 million euros, of which 1.23 million euros corresponded to sales to the market. The remaining amount of 224,000 euros was allocated as fixed remuneration for clean energy production, as stipulated by Royal Decree 413/2014, which governs the activity

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of electricity generation from renewable sources. Excluding the operating costs of the activity, the company recorded a profit of 518,000 euros. On account of these results, the company decided to distribute a dividend of 392,000 euros. Additionally, charged to the accumulated voluntary reserves of previous years, it also agreed to distribute another 870,000 euros, adding both amounts to a total of 1.26 million euros in dividends, out of which 80% went to Endesa and 20% to the Agüimes City Council, in direct proportion to the percentage of participation of each party, resulting in an income of 252,400 euros for the City Council.

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4.4.6. Identity

Carretera Arinaga Wind Farm

Basic details

9 Wind Turbines

8.7 MW Power

7000 Houses

Wind farm type: Onshore

Location: Las Palmas, Spain

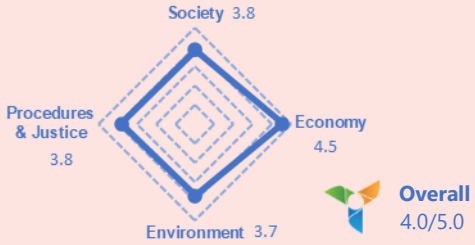
Ownership model: Hybrid

Operator: Parque Eolico Ctra. De Arinaga

Rotor diameter: 44 m

Hub height: 45 m

Total height: 67 m



Key insights & lessons learnt

a) *Challenges & barriers*

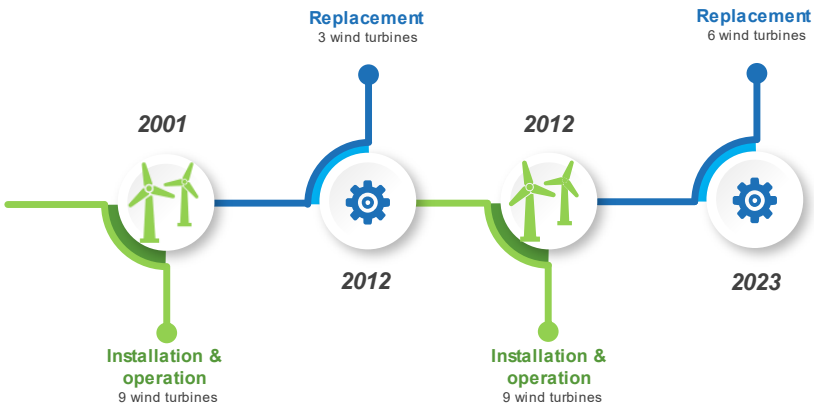
- ✓ Replacement of the old wind turbines with more efficient ones.
- ✓ Social acceptance of the project.

b) *Enablers*

- ✓ Lower energy and water prices for local habitats.
- ✓ Acquisition of 20% wind farm's stakes by the municipality.

c) *Impact*

- ✓ Investment opportunities for local entrepreneurs.
- ✓ Creation of job opportunities related to the manufacturing, installation, assembling, and maintenance of the farms.
- ✓ Improvement of regional social welfare.



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4.5. Castelmauro Wind Farm

4.5.1. Background context

Picture 7: Castelmauro wind farm (Enel Green Power, n.d.)

The Castelmauro wind farm, situated in the Molise Region, spans across the Municipalities of Castelmauro and Roccavivara in the province of Campobasso. It consists of seven (7) onshore wind turbines, each with a capacity of 4.2 MW, resulting in a total capacity of 29.4 MW. The wind turbines at the Castelmauro wind farm reach a height of 105 m and are equipped with internal lifts, taking approximately 6 minutes to reach the top. This newly inaugurated plant, established in 2022, makes a tangible contribution to the country's decarbonization objectives by accelerating the transition to low-carbon energy production and reducing reliance on fossil fuels. The electricity produced by the wind farm will prevent the consumption of 15 million m^3 of gas every year, which can serve a quarter of the families in Molise. The construction of this park aims to harness wind energy in a remote area, far from the town centre, using a completely sustainable plant. The wind farm project was launched and then implemented by a private company.

4.5.2. Environment

The most important environmental benefit is that the plant will enable the supply of renewable energy to about 29.000 homes, avoiding the emission into the atmosphere of about 36.000 t of CO_2 per year. In this sense, the wind farm significantly contributes to Italy's energy transition efforts. In addition, thanks to the utilisation of the new type of wind turbine and the fact that the nearest blade to the closest sensitive receptor is at a distance of 1039 m, the noise impact is negligible for the population. Consequently, the environmental authorities have excluded the noise component from the environmental monitoring plan.

> *"This, along with the other new renewable plants we intend to build in Italy, will help accelerate the energy transition and reduce our dependence on fossil fuels, benefiting the environment, people, and the economy."* (Salvatore Bernabei, CEO of Enel Green Power)

As the surrounding areas are prone to erosive phenomena, nature-based solutions have been implemented. This innovative green technology, which utilises specific seeds of herbaceous perennials known for their by deep-rooting capabilities, not only helps control erosion but also enhances CO_2 sequestration through their extensive

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root systems (GMO free). To enhance environmental compliance, bird and bat monitoring and protection systems have been implemented on the wind turbines. These systems utilise cameras and ultrasound microphones to effectively monitor and protect avian and bat species. As part of the construction work, soil from the excavations was almost completely reused, applying lime stabilization technology, which had a positive environmental impact. Furthermore, no vegetation loss or deforestation occurred during the construction.

4.5.3. Society

Since the wind farm is located far from the first built-up area, the visual, noise and shading pollution on the population is negligible. The population in the vicinity of the wind farm benefits from the reduction of greenhouse gas emissions (GHGs) resulting from the use of wind as an energy source. Before the start of construction work, some citizens' associations opposed the development of the plant because they were concerned about the negative environmental impacts on the area characterised by forests and a naturalistic landscape. To mitigate the social opposition, several environmental mitigation actions were implemented. These actions aimed to reduce the potential risks of soil erosion and bird collisions. Additionally, a decision was made to install wind turbine blades equipped with advanced technology to minimise noise pollution.

4.5.4. Economy

The area where the plant was constructed is predominantly mountainous and forested, with some portions allocated for wheat cultivation and owned by the municipality and private citizens. An agreement between the system operator and landowners stipulates the economic fees for leasing the areas. The local economy was stimulated by involving local companies in various stages, including construction work involving civil works and services, as well as ongoing maintenance work. Compensatory measures provided by the project developer and agreed upon between the municipality of Castelmauro and the developer include implementation of energy efficiency initiatives. These measures consist of:

a. Upgrading the public lighting system.
b. Constructing of 4 photovoltaic plants in public areas.
c. Enhancing the 2 playgrounds in Castelmauro.
d. Installing one electric car charging station in a public area.

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4.5.5. Procedures and Justice

The ownership model of this facility is corporate, with Enel Green Power SpA (EGP) being the owner, developer and operator. EGP is a large company operating in both the national and international markets. The project for this wind farm has been authorised in compliance with current national regulations, which entail an authorisation process involving various local, regional, and state entities and authorities.

> *"In this historical period in which energy has become a central topic of the news with impacts on the lives of citizens, we are particularly proud to have this new plant from renewable sources in our area, and therefore complete sustainable."*
> (Flavio Boccardo, the Mayor of Castelmauro)

According to national legislation, the environmental impact assessment (EIA) for the project was carried out by specialists appointed by the developer. The assessment report was then evaluated by the national environmental authorities, as well as other local and regional authorities, who had the opportunity to provide comments and request specific actions to be implemented in the project. The project developer and the Mayor of Castelmauro held multiple meetings and successfully reached an agreement on the economic compensation for landowners in the affected areas. Additionally, they agreed upon compensatory measures aimed at enhancing energy efficiency within the territory.

Picture 8: Landscape of Castelmauro wind farm in Molise (Enel Green Power, n.d.)

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4.5.6. Identity

Castelmauro Wind Farm

Basic details

7 Wind Turbines

29.4 MW Power

29000 Houses

Wind farm type: Onshore

Location: Castelmauro, Italy

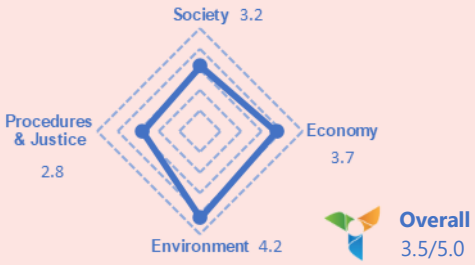
Ownership model: Corporate

Operator: Enel Green Power SpA

Rotor diameter: 149 m

Hub height: 105 m

Total height: 179 m



Key insights & lessons learnt

a) Challenges & barriers

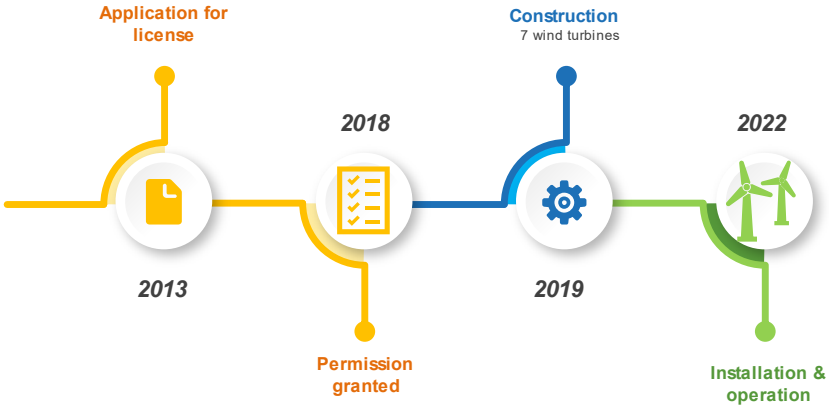
- ✓ Long authorisation procedure until permission was granted.
- ✓ Local population opposition.
- ✓ Demonstrating that the plant was safe for human and animal health.

b) Enablers

- ✓ Meetings between the project developer and the local mayor.
- ✓ Implementation of environmental compensatory measures.
- ✓ Provision of satisfactory economic fees to landowners of the areas.

c) Impact

- ✓ Avoiding the emission into the atmosphere of around 30,000 t of CO_2 per year.
- ✓ Development of projects for higher energy efficiency in Castelmauro municipality.
- ✓ Involvement of local companies for the construction and ongoing maintenance work.



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4.6. Duikeldam Wind Farm

4.6.1. Background content

The Duikeldam (Sint-Gillis-Waas) wind farm, is located in East Flanders, in Belgium near the Dutch border. The Duikeldam wind farm is an example of Belgium's commitment to developing RES and reducing its dependence on fossil fuels. The project encompasses four (4) wind turbines, each boasting a capacity of 2.05 MW, resulting in a combined installed capacity of 8.2 MW. Three (3) turbines are situated within the municipality of Beveren, specifically in Vrasene, while the fourth is located in Sint-Gillis-Waas. The wind farm is owned by Wasewind cooperative, established by a community of individuals enthusiastic about promoting renewable energy in the region (Wase Wind, n.d.). Fortech Windenergie undertook the development of the wind farm, commencing construction in 2012. The turbines were subsequently erected and grid-connected in 2016. Since their installation, the turbines have consistently generated renewable energy harnessed from the wind. Specifically, the Duikeldam wind farm features Senvion MM92 turbines, boasting a hub height of 100 m and a rotor diameter of 92 m (Fortech, n.d.).

4.6.2. Environment

Wasewind, the company that owns and operates the wind farm, is committed to contributing to the transition to a more sustainable energy system in Belgium. The choice of the implementation site was made with careful consideration, ensuring the exclusion of Birds Directive areas, Habitats Directive areas, or other nature conservation areas. The selected sites do not encroach upon agricultural areas of landscape value. The wind farm was developed to minimise its impact on the environment and the local community. To achieve this, several measures were taken into account, such as carefully placing the turbines to avoid bird migration paths, enhancing the surrounding ecosystem through landscaping and creating a suitable habitat for the local flora and fauna (Wase Wind, n.d.).

4.6.3. Society

The wind farm is located near the E34 motorway, which connects the cities of Antwerp and Zelzate. The wind turbines are situated at a minimum distance of 250 m away from any residential buildings. Noise assessments have indicated that the local population is unlikely to experience disturbance from the turbine noise, even during nighttime. This is attributed to the fact that the noise generated by the wind turbines is typically lower than the ambient noise produced by the nearby traffic on the highway. In addition, the wind farm's turbines are equipped with advanced technology, including pitch control

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and variable speed control, which optimize their performance and further reduce noise levels (Fortech, n.d.).

In situations where the wind and sun coincide or oppose each other, and the turbine blades rotate in front of the sun, it can create an irritating flickering or shadow effect that affects living or workspaces. This annoyance is particularly noticeable in the early morning and late evening during spring or autumn when the sun is at a lower angle. However, due to the meticulous selection of wind turbine locations, the potential disturbance to the locals caused by these shadow effects has been minimised.

The Working Group, in collaboration with the Regional Landscape Scheldt-Durme, has created a welcoming environment for butterflies, bees, and other insects. The area is maintained through a unique mowing technique that provides continuous nourishment and shelter for these insects, ensuring a haven for them. This approach not only supports biodiversity but also enhances the scenic view, which is enjoyed by cyclists and pedestrians throughout most of the year. The surrounding land remains designated for agricultural use. Furthermore, Wasewind organises weekly visits and lessons to primary and secondary schools, as well as guided tours to interested associations (Wase Wind, n.d.).

4.6.4. Economy

The wind energy sector is experiencing growth in employment opportunities, with a rising number of people directly employed in this industry. Current estimates indicate that over 6,000 individuals in Belgium are already working in wind energy, with a particular focus on the production of wind turbine components. In an average year, the 4 turbines can meet the needs for electricity for the 6,000 families from the surrounding villages of Vrasene, Verrebroek, Meerdonk and Sint-Gillis-Waas. The selection of implantation sites was done strategically to optimize the utilisation of existing roads for accessing these sites. The foundation plinth for the wind turbine only takes up 300 m², and an access road of approximately 130 m has been constructed from the road to the base of the wind turbines (Wase Wind, n.d.).

4.6.5. Procedures and Justice

The Duikeldam wind farm is owned and operated by Wasewind, a Belgian renewable energy cooperative that specialises in developing and operating wind energy projects in Flanders. Wase Wind is a member of the Flemish federation of renewable energy cooperatives “REScoop Vlaanderen”. The wind farm generates clean, renewable energy that is fed into the local power grid to supply electricity to homes and businesses in the area between Antwerp and Ghent (Waasland region).

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Every resident in this area who becomes a customer and purchases “Wase Windstroom” automatically becomes a cooperative member or shareholder. All shareholders or co-operators are co-owners of the entity “Wase Wind”. They have the right to vote and participate in decision-making processes during the General Assembly, where the future of Wase Wind is discussed and determined. Each cooperative member is entitled to one vote, regardless of the number of shares owned. The shareholders of the Wase Wind cooperative enjoy the advantage of purchasing electricity at favourable rates and terms. Furthermore, they are kept constantly informed about the cooperative’s activities. The company’s profits are distributed to the shareholders in the form of dividends (Wase Wind, n.d.).

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4.6.6. Identity

Duikeldam Wind Farm

Basic details

4 Wind Turbines

8.2 MW Power

6000 Houses

Type: Onshore

Location: Waasland, Belgium

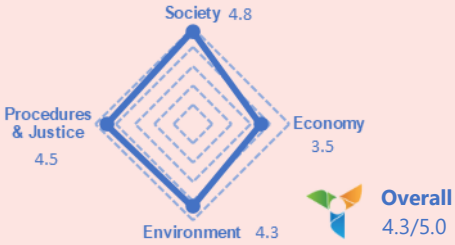
Ownership model: Social

Operator: Wase Wind energy cooperative

Rotor diameter: 92.5 m

Hub height: 100 m

Total height: 147 m



Key insights & lessons learnt

a) *Challenges & barriers*

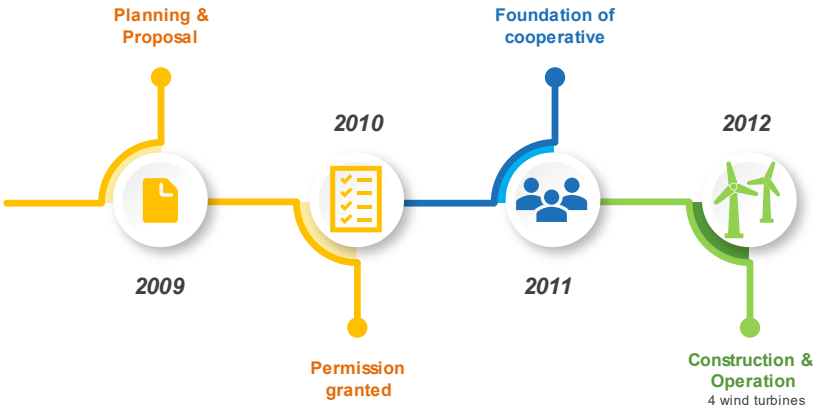
- ✓ Noise impact on the local habitats' and animals' health.
- ✓ Disturbance of residents by shadow effects.

b) *Enablers*

- ✓ Advantageous rates and prices for local stakeholders.
- ✓ Optimal location and environmental design to minimise impacts.
- ✓ Informative and participatory processes for shareholders.

c) *Impact*

- ✓ Creation of added value to regional landscape.
- ✓ Provision of lower electricity prices for local habitats.
- ✓ Promotion of environmental awareness through local activities.



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4.7. Eeklo Wind Farm

4.7.1. Background context

Eeklo is a small city located in Flanders, Belgium. In 1999, the city developed a comprehensive Sustainable Energy Action Plan (SEAP), which included the development of a wind farm (Citynvest.eu, n.d.). As part of this plan, the city selected Ecopower to develop two wind turbines. Ecopower is a Belgian renewable energy cooperative with nearly 50,000 members. In 2001, Ecopower won a public tender to build the wind turbines on municipal land, with direct participation from local citizens to keep money in the local economy (REScoop.eu & Energy Cities, 2022). Over the years, Eeklo has continued its investments in wind energy. In 2001 and 2002, the city constructed another three (3) wind turbines, further solidifying its commitment to renewable energy. In 2011, Eeklo again chose Ecopower to develop two (2) additional cooperative wind turbines. To support these efforts, the city has also employed a part-time energy expert who works on behalf of the municipality. This expert assists in coordinating efforts between the city and its citizens, fostering collaboration towards a shared objective. The energy expert employed by the city collaborates with citizens and the municipality to execute the SEAP and discover new opportunities. Presently, there are 22 wind turbines in Eeklo, covering 100% of the local electricity demand, although not all of them are operated by cooperatives (Seymortier, 2020). Moreover, the city has implemented energy efficiency measures in public buildings and is assessing the viability of a local district heating network. In summary, Eeklo has demonstrated that with careful planning and community involvement, a small city can accomplish significant milestones in renewable energy.

Picture 9: Wind Turbines Eeklo construction (Vanden Avenne, 2020). CC BY-4.0

4.7.2. Environment

Every year, Ecopower allocates 5000 euros per wind turbine to an environmental fund that supports green energy and energy efficiency projects (Van de Velde, 2021). The fund serves multiple purposes, such as providing subsidies to homeowners who implement energy-efficient upgrades in their houses. Additionally, it has financed a solar roof for a bike station where electric bikes can be charged for free and purchased a biogas turbine to connect

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the city's heating with the gas network. By supporting several smaller initiatives rather than a single large project, the environmental fund embraces a sustainable and holistic approach that aligns with long-term thinking, particularly for ecological projects requiring comprehensive solutions (REScoop.eu & Energy Cities, 2022).

4.7.3. Society

One of the main advantages of Eeklo's approach to wind energy is the remarkable social acceptance it has garnered (Citynvest.eu, n.d.). Through citizen involvement in the development and ownership of wind turbines, Eeklo has successfully integrated wind energy into the community's identity. The Eeklo wind farm goes beyond energy production and encompasses social aspects as well. For instance, an on-site second-hand goods store has been established, providing employment opportunities to local individuals facing challenges in finding work elsewhere. In addition, investments were made in the city's infrastructure, including the construction of new public sports fields and schools.

4.7.4. Economy

For the local municipality, the advantages are numerous (REScoop.eu & Energy Cities, 2022). The wind turbines generate substantial profits that stay within the community, actively contributing to the support of local businesses and services. Each wind turbine generates about 250,000 euros in profit per year, which is used to fund social projects in the community. Citizens also benefit from a share in the profits generated by the wind turbines and access to clean energy from local sources. This fosters a strong sense of community support and engagement towards the cooperative (Provincie Oost vlaanderen, 2021).

4.7.5. Procedures and Justice

Concerns of the population were given serious consideration, including issues related to construction site and engine noise, and shadow flickering caused by the wind turbines. From the initial stages, locals who initially had uncertainties about wind turbines were actively engaged in the decision-making process. They now play a role in determining the location and number of wind turbines, as well as how the generated profits are utilised. Eeklo has also removed barriers to citizen ownership of a wind farm, providing 750 people with a pre-funded share in the citizen energy cooperative Ecopower, based on the local authority's 25% share in a wind turbine. These shares are specifically allocated to people in energy poverty, particularly those facing high electricity costs. They receive the benefits of full membership in the cooperative, which enables them to use electricity at cost price, reduce their electricity bills and pay off their energy debts.

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4.7.6. Identity

Eeklo Wind Farm

Basic details

23
Wind

45 MW
Power

13000
Houses

Basic details

Wind farm type: Onshore

Location: Eeklo, Belgium

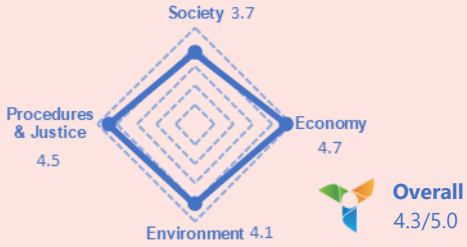
Ownership model: Hybrid

Operator: Ecopower*

Rotor diameter: 82 m

Hub height: -

Total height: -



Key insights & lessons learnt

a) Challenges & barriers

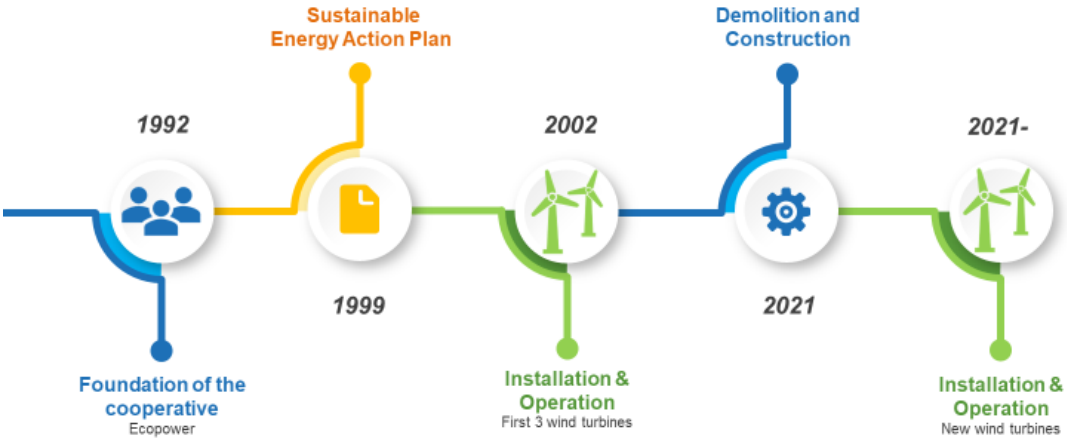
- ✓ Struggling with rising material costs, making it difficult to maintain financial stability.

b) Enablers

- ✓ Usage of tender criteria to encourage collaboration between the city and citizen cooperatives.
- ✓ Encouraging citizen participation to reduce resistance and increase benefits for the community.
- ✓ Improvement of local infrstructure

c) Impact

- ✓ Shareholders receive the benefits of full membership in the cooperative Ecopower, which enables them to use electricity at cost price, reduce their electricity bills and pay off their energy debts.



**Ecopower operates some parts of the Eeklo wind farm*

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4.8. Ellhöft Wind Farm

4.8.1. Background content

Picture 10: Ellhöft wind park and H_2 electrolysis station (H-TEC Systems GmbH, n.d)

In the summer of 1994, members of the municipal council initiated the creation of a citizens' wind farm, which led to the formation of an interest group. The primary objective at that time was to allow every citizen and landowner in the municipality of Ellhöft to become a member of the society, with the condition that the company's headquarters be located within the municipality. Subsequently, on January 25, 1995, the GmbH was established with the participation of 29 individuals at the community centre in Ellhöft. Later, on March 2, 1999, the limited partnership was established in Westre Waldkrug with the involvement of 50 people (Windpark Ellhöft, n.d.).

4.8.2. Environment

Ellhöft is a small municipality located in the northern part of Germany, near the border with Denmark. The area is known for its windy conditions, making it an ideal location for wind farms. The Ellhöft wind farm has implemented a repowering initiative aimed at reducing its impact on the surrounding landscape. This activity involves replacing the existing wind turbine components with modern and more efficient ones that have a lesser environmental footprint. The success of this endeavour has contributed significantly to increasing community acceptance of the wind farm. Additionally, the development of outdoor recreational areas such as walking and cycling paths in the vicinity of the wind turbines has been carried out, as part of the effort to minimise the impact on the environment (Windpark Ellhöft, n.d.).

4.8.3. Society

The municipality of Ellhöft, with its population of 135 residents, receives support from the wind farm company in the form of donations. Initially, the district administrator of North Friesland was completely against wind power. Thus, it took five years for all the environmental regulations and reports to be approved and the six (6) wind turbines could go into operation (Hydrogeit, 2018). During the construction year, the company spent a total

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of 10,737 euros to renovate all municipal paths, and in 2001, a slide worth 2,250 euros was donated to the children's playground. Moreover, the wind farm company occasionally hosts an open day that includes a tour of the mill, often coinciding with Schleswig-Holstein Mill Day. These initiatives demonstrate the company's commitment to engaging with the local community and fostering a sense of connection (Windpark Ellhöft, n.d.).

4.8.4. Economy

The economic benefits of the project for the local residents include their financial participation through shareholding, which provides them with annual returns on investment ranging from 12 to 16 % (Schmidt, 2018). Additionally, the landowners receive payments for the use of their land through a pool model. The municipality also benefits from increased business taxes, as well as the support of social projects and activities such as foundations and donations. The wind project has stimulated strong economic activity in the region and has contributed to the development of the area, by road construction and broadband infrastructure. The municipality's reputation has also been influenced by the wind project. Local citizens and visitors have the opportunity to visit the wind turbines by making an appointment and learn about wind energy production(Maleki-Dizaji et al., 2020b).

After 20 years, the EEG funding for Ellhöft came to an end. The energy cooperative Greenpeace Energy and Windpark Ellhöft GmbH & Co. KG have concluded the first contract in Germany for the direct supply of private customers with electricity from wind turbines, called Power Purchase Agreement (PPA). This agreement ensures that the Ellhöft community wind farm can sell its electricity directly to Greenpeace Energy at a fixed price per kWh, ensuring its economic viability (Ecoreporter, 2018). Furthermore, a portion of the electricity generated at Ellhöft community wind farm is converted to green hydrogen through an electrolyzer (100/350 PEM) and sold to the transport sector (Schmidt, 2018).

4.8.5. Procedures and Justice

The operators of the citizens' wind farm in Ellhöft followed a consistent strategy of engaging local contractors, not only for the construction of the wind farm, but also for planning, financing, maintenance, and other related activities. This approach involved the participation of 51 individuals, who were based in the community centre located in Ellhöft (COME RES, 2022).

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4.8.6. Identity

Ellhöft Wind Farm

Basic details

6 Wind Turbines

7.8 MW Power

4000 Houses

Type: Onshore

Location: Schleswig-Holstein, Germany

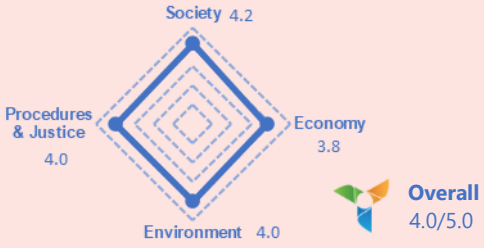
Ownership model: Social

Operator: Windpark Ellhöft GmbH & Co.KG

Rotor diameter: 93 m

Hub height: 68 m

Total height: 100 m



Key insights & lessons learnt

a) *Challenges & barriers*

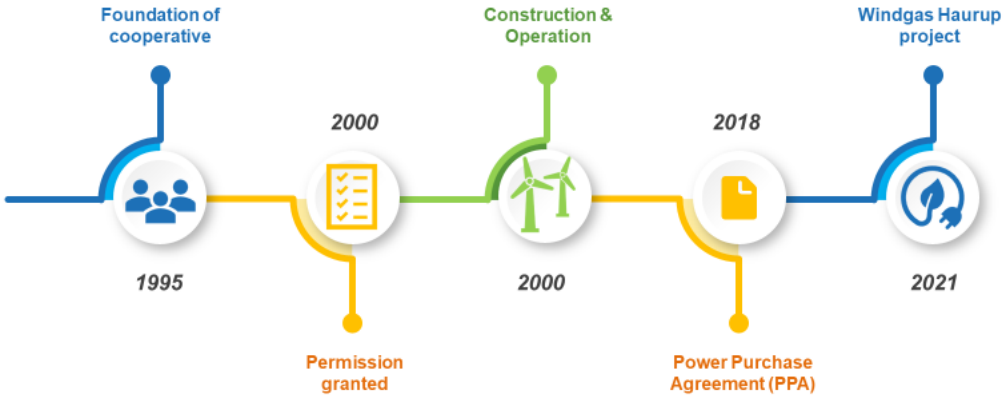
- ✓ Investment costs for the initiative of the project.
- ✓ Administrative issues during authorisation process.
- ✓ Local opposition against wind energy in North Friesland.
- ✓ The end of EEG subsidies (after 20 years).

b) *Enablers*

- ✓ Involvement of local shareholders.
- ✓ Support from the local municipality.
- ✓ Direct supply of private customers with electricity from wind turbines.

c) *Impact*

- ✓ Financial benefits for the local residents through financial participation and land lease models.
- ✓ Local municipality benefits through business taxes, social projects and activities.
- ✓ Strong economic activity in the region and development of local infrastructure.



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4.9. Feldheim Wind Farm

4.9.1. Background content

Feldheim is a small village in Germany which belongs to Treuenbrietzen municipality, a town in Brandenburg. Feldheim is a unique local renewable energy case, as it is the first energy self-sufficient and climate neutral village in Germany. In 1993, a civil-engineering student named Michael Rashemann proposed it as a suitable location for wind power generation (Morris, 2019). The wind farm development was formed by the collaboration of a local energy company, Energiequelle GmbH with the local municipality (Islar & Busch, 2016). The construction of the first four (4) wind turbines lasted from winter 1994 to spring 1995, while their installation was completed in 1996. After three different phases of construction in the Feldheim area, Energiequelle had installed 39 wind turbines by 2006 (Grosse et al., 2019). In 2008, the community installed a biogas plant to further reduce their energy costs for heating. The biogas thermal power station exceeds the village's total heating demand, with the surplus heat being utilised for electricity generation. In the meantime, a solar park was added to the energy system, generating electricity for 600 households. As part of a sustainable approach, Feldheim decided to build its own electricity and district heating grid (Mundaca et al., 2018). Almost all the households and companies are supplied with energy through the local grid which is connected to the wind farm and photovoltaic installations. Biogas plants are linked to a separate local heating and power grid. This strategic decision allowed Feldheim to achieve complete energy self-sufficiency by 2010. In 2015, the installation of Europe's largest battery system connected to the grid was built in Feldheim (Morris, 2019). The local battery system comprises 3,360 lithium-ion modules and has a capacity to store up to 10,700 kWh of energy. By 2015, the number of wind turbines in Feldheim had increased to 47, with a combined capacity of 74 MW.

Currently, the wind farm consists of 55 wind turbines with a total installed electrical capacity of 122.6 MW, supplying 65,403 households in Germany (Neue Energien Forum Feldheim, 2022). Moreover, 9844 solar modules have been installed on 248 trackers providing a power capacity of 2.25 MW (Letz, 2022). The local biogas plant co-generates 526 kW of electricity and 400 kW of heat (Neue Energien Forum Feldheim, 2022). Furthermore, there is a backup heat accumulator that can release up to 120 kW of heat, as well as a backup wood pellet system. Overall, the wind turbines alone produce approximately 96% of the total electricity demand in Feldheim on an annual basis, while the remaining 4% is fulfilled by the power capacity generated from the solar park and biogas plant (Kang, 2014).

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4.9.2. Environment

There was not any crucial environmental issue developed in the process of setting up this renewable energy project (Islar & Busch, 2016). The location of Feldheim and its surrounding areas is highly recommended for wind energy projects due to favourable geological conditions, ample farmland, and suitable topography (Grosse et al., 2019). The project's impact on wildlife and forested areas has been deemed insignificant, with no adverse effects reported. Furthermore, the project did not encounter opposition regarding land diversion, as it did not affect any natural heritage sites. The renewable energy system consisting of wind turbines, a biogas plant and solar panels, has enabled the village to achieve complete carbon neutrality, making a positive contribution to the EU's efforts to reduce greenhouse gas emissions (Busch & McCormick, 2014).

4.9.3. Society

In 2022, the village had a population of approximately 150 residents (Letz, 2022). The main structures in Feldheim include farms, some light industries and communal buildings (Busch & McCormick, 2014). It is considered that none of the residents have any concerns about the noise or the aesthetics of the wind turbines. While there was some minor opposition from neighbouring towns regarding the noise generated by the wind farm, this issue was addressed by offering them lower electricity prices (Damian, 2012; Guevara-Stone, 2014). The wind farm harmoniously co-exists with other energy projects (biogas, PVs) and agriculture activities. Unlike some cases, where communities are opposing wind farm development, the residents of Feldheim openly decided that they want RES in their community (Grosse et al., 2019). Energiequelle, the company behind the wind farm, supported the project by financing various social events and ceremonies at significant stages of its development in the village (Busch & McCormick, 2014). Additionally, Energiequelle organised opportunities for citizens to observe the wind turbines and their surroundings from above using cranes (Grosse et al., 2019).

4.9.4. Economy

The renewable energy projects in Feldheim have had a positive impact on the local economy and employment. The maintenance of local installations has created permanent jobs for Feldheim residents. Additionally, long-term contracts have been established between Feldheim Energie and local agricultural businesses to provide substrate for the biogas plant. As a result, the village has achieved a 0% unemployment rate (Busch & McCormick, 2014). The main economic benefits of the wind farm include the generation of local tax income and income from the feed-in of energy technologies owned by the village (Mundaca et al., 2018). As a result of these projects, residents

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now enjoy a 31% reduction in electricity costs and a 10% reduction in heating costs (Guevara-Stone, 2014). Energiequelle spokesman Werner Frohwitter claimed, *"Our aim is to let as many people as possible directly benefit from our turbines, thus encouraging social acceptance for renewable energies."*

In addition, Feldheim has become a popular destination for visitors mainly from Germany, Europe, Japan, South Africa, and New Zealand who are inspired by the new renewable energy technologies. Touristic activities in Feldheim account for more than 4000 visitors per year, who come for energy training, to experience the beautiful landscape, and engage in various activities (Morris, 2019). The association between the energy company and the municipality has further enhanced regional value creation, ensuring that funds and economic benefits remain within the local community. Infrastructure improvements were made by Enrgiequelle in the village, such as the construction of the sanitation system of streets and sidewalks, and the lighting for the local football pitch (Busch & McCormick, 2014).

4.9.5. Procedures and Justice

The wind farm development was undertaken by a local renewable energy company, Energiequelle GmbH. The close connection between Raschemann (Energiequelle's CEO) and local citizens was essential for the project implementation (Grosse et al., 2019). The town of Feldheim and Energiequelle have established a local joint venture "Feldheim Energie GmbH & Co" which owns the wind park, including the grid and the energy production units (Kang, 2014). The joint venture consists of 49 limited partners, including 36 of the existing 37 households, businesses, the city council, and *Energiequelle GmbH*. Residents had the opportunity to purchase a stake in the company for 3,000 euros and were represented by five deputies (Letz, 2022). Each ownership participant holds a share value of 1500€, for every heat and power connection (Behrendt, 2014). The social ownership model established for the wind farm strengthens the sense of shared responsibility, which has had positive impacts on social cohesion and local identity (Busch & McCormick, 2014).

There is a high level of trust and cooperation among local stakeholders (von Bock et al., 2015). The local community actively participates in decision-making processes, including discussions on electrical prices during community meetings. The local community is considered a strong actor, as the decision-making processes of this wind farm mostly take place in institutionalized ways (local parliaments, elected community representatives). The key actors that are involved in this wind farm include:

- The village council of Feldheim
- The directors of Energiequelle
- The responsible regional planning authority

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- Local mayors and public representatives (ministries),
- The residents of Feldheim

Overall, the development in Feldheim was supported by regional and national policies (e.g. a feed-in-tariff system, direct subsidies for new technologies, tailor-made legislation) (Mundaca et al., 2018). The ownership structure and technological advancements in Feldheim have compelled the Federal Government to issue new directives and provide a legal framework, as this case stands out as unique in Germany (Busch & McCormick, 2014).

Picture 11: Aerial view of Feldheim wind farm in Treuenbrietzen, Brandenburg, Germany (Krapf, 2011).CC BY-SA-3.0

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4.9.6. Identity

Feldheim Wind Farm

Basic details

55 Wind Turbines

123 MW Power

65403 Houses

Type: Onshore

Location: Brandenburg, Germany

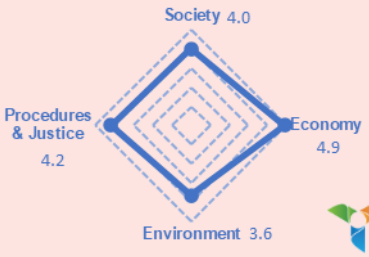
Ownership model: Social

Operator: Energiequelle GmbH

Rotor diameter: 40 m (1995)

Hub height: 65 m (1995)

Total height: 85 m



Overall 4.2/5.0

Key insights & lessons learnt

a) *Challenges & barriers*

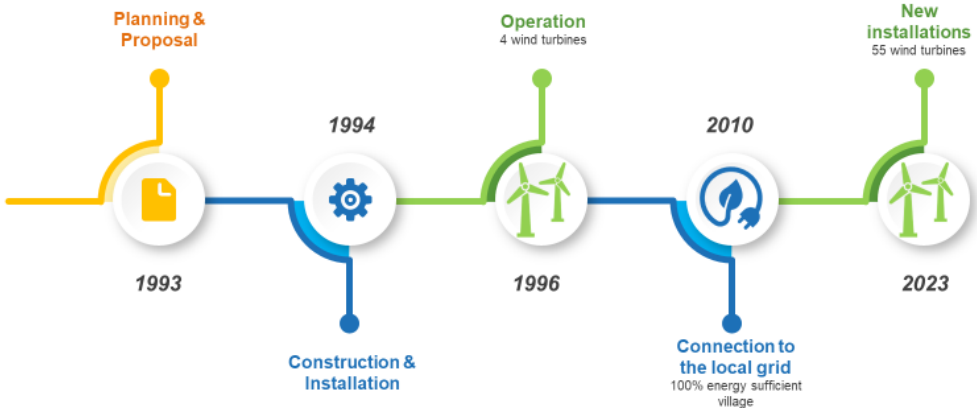
- ✓ Ensuring the social welfare of the village.
- ✓ Achieving high reduction on residents' bills.
- ✓ Investment costs for the project's development.

b) *Enablers*

- ✓ Distributional justice among shareholders following a social ownership model.
- ✓ Communication and trust between local stakeholders.
- ✓ Establishment of new directive and legal framework for wind farms.

c) *Impact*

- ✓ Creation of job positions leading to 0% unemployment rate.
- ✓ Enhancement of regional value and tourism.
- ✓ Reduced energy and heat bills for residents.
- ✓ Development of RES projects leading to the self-efficiency and climate neutrality of the village.



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4.10. Hilchenbach Citizen's Wind Farm

4.10.1. Background context

The Hilchenbach citizen's wind farm is located near the Rothaarsteig Hiking Trail in a wooded area near Hilchenbach. It consists of five (5) wind turbines, each with a hub height of 138 m and a capacity of 2 MW (Energieagentur.NRW GmbH, 2016). The project underwent a lengthy planning phase that lasted six (6) years (REScoop.eu, 2014), partly due to its location in a landscape conservation area and its proximity to the Rothaarsteig. However, the city of Hilchenbach supported the project and even invested in the operating company. The operating company is structured as a GmbH & Co. KG, with 89 citizens and the city of Hilchenbach holding shares in the wind farm. The total investment cost for the project was 15.5 million euros. In 2007, following over six years of planning, Germany accomplished a significant milestone by successfully installing five E-82 turbines on precast concrete towers, standing at a towering height of 138 m (Enercon GmbH, 2008). Each wind turbine generates about 4.5 million kWh of electricity annually, enough to supply over 1,000 4-person households for a year. As a result, the city of Hilchenbach now reduces its CO_2 emissions by approximately 21,000 t per year.

Picture 12: Aerial photo of Hilchenbach wind farm (RothaarWind, n.d.)

4.10.2. Environment

The wind farm in Hilchenbach placed a strong emphasis on preserving the forest, which is highly valued by the residents. Special assembly processes were employed to install the rotors of the five wind turbines, minimising the space required. Consequently, only 15000 m^2 of forest needed to be cleared, which is less than half the usual amount for wind farms. To compensate for this, over twelve acres of mixed beech forest were planted, providing environmental benefits (KlimaExpo.NRW, 2022).

> *"Just as the forests in the Siegerland have been managed in common for centuries, our wind is being used by the community at the citizens' wind farm. The wind over Hilchenbach belongs to the people of Hilchenbach."* (KlimaExpo.NRW, 2022)

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4.10.3. Society

The town council of Hilchenbach took an early initiative to ensure that the town's windy areas would benefit its residents. They actively supported the creation of a citizens' wind farm, leading to the founding of RothaarWind GmbH & Co KG. The Hilchenbach Wind Trail is also a collaborative effort between the town and RothaarWind GmbH. This 4.7 km trail loop enables visitors to experience a potential future energy supply that is environmentally friendly and carbon-neutral, without the guide's assistance. Informational boards positioned along the trail demonstrate how wind energy is used efficiently and profitably in Hilchenbach, highlighting how the advanced technology can benefit both the region and the environment (KlimaExpo.NRW, 2022).

4.10.4. Economy

Today, 89 citizens from Hilchenbach and the surrounding region have invested in the wind farm, and their profits depend on the wind yields. Additionally, the wind farm provides benefits to forest owners. Two cooperatives, managed by around 200 Hilchenbach families, receive an annual income of about 75000 euros through leasing the wind farm site, which is financed by the wind yields (KlimaExpo.NRW, 2022). Local hotels and restaurants also benefit from the increased tourism associated with the wind farm.

4.10.5. Procedures and Justice

> *"Our goal of getting citizens from the local community and the surrounding area involved in the project was attained."*
> (Hentschel, 2012)

The Hilchenbach wind farm holds a special place of interest for many individuals and organisations. It is located in a forest in the Rothaar Mountains and the community of Hilchenbach played a significant role in its establishment. Over the years, almost 400 groups of people have visited the wind farm to learn about the technical challenges of building it on a steep, wooded site. The community in Hilchenbach successfully implemented the concept of community ownership (Hentschel, 2012), which sets it apart as a community-friendly alternative to conventional investor-owned wind farms. The project was a collaboration between the people of Hilchenbach, the municipality, planners, and operators. The active engagement of locals in the process significantly increased acceptance and support for the project. The Hilchenbach wind farm is designed to balance the local benefits for citizens and the global benefits for climate protection, while considering the impact on the immediate surroundings. Additionally, the project emphasises the importance of regionalising economic profits generated by wind farms to benefit the local economy.

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4.10.6. Identity

Hilchenbach Wind Farm

Basic details

5 Wind Turbines | **10 MW Power** | **6700 Houses**

Basic details

Wind farm type: Onshore

Location: Hilchenbach, Germany

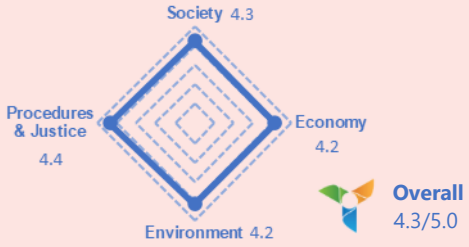
Ownership model: Hybrid

Operator: Rothaarwind GmbH & Co.KG

Rotor diameter: 82 m

Hub height: 138 m

Total height: 179 m



Key insights & lessons learnt

a) Challenges & barriers

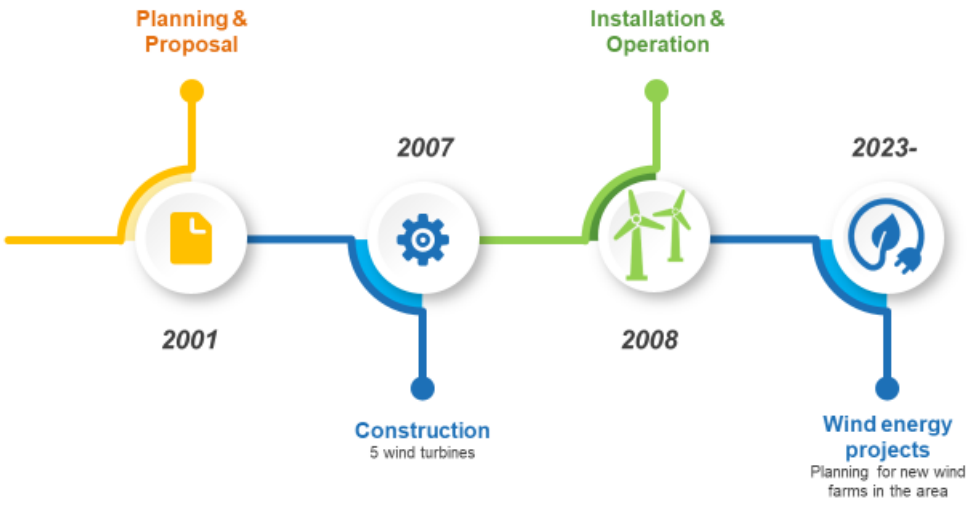
- ✓ The lengthy duration of the planning phase until construction (6 years).
- ✓ Minimise the environmental impact (landscape conservation area).

b) Enablers

- ✓ Support of the project by the city of Hilchenbach.
- ✓ Investment of the citizens in the operating company.
- ✓ Informational boards on how advanced technology benefits both the region and the environment.

c) Impact

- ✓ Balancing the local benefits for citizens and the global benefits for climate protection.
- ✓ Serve as an example wooded site for visitors due to its technical challenges.
- ✓ Economic benefits for more than 200 Hilchenbach families.
- ✓ Planting over 12 acres of mixed beech forest with higher ecological value plants.



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4.11. Hollich Wind Farm

4.11.1. Background context

The Windpark Hollich GmbH & Co. KG is a great example of how a community-owned wind farm can generate profits while also strengthening solidarity. In the year 2000, the Burgsteinfurt local agricultural association-initiated discussions about operating a wind farm independently (Hicks, J., 2020). To realise this vision, they constructed 19 wind turbines with a total capacity of 29.5 MW, over several stages of development between 2001 and 2011. These turbines generate nearly twice the power consumed by all households in Steinfurt. In particular, the wind farm generates 54 million kWh of clean energy annually, preventing the release of 44000 t of carbon dioxide into the atmosphere. The project required an investment of 33 million euros and involves 8 shareholders, 217 limited partners, and 55 landlords (Baumann, F.-M., 2016). The 217 limited partners contributed 25% of the investment, while the remaining 75% was financed through low-interest loans.

Picture 13: Nordex N131 in Bürgerwindpark Hollich (Bro L., 2020). CC BY-SA-4.0

4.11.2. Environment

In 2000, the local agricultural association introduced a proposal for a community-owned wind farm called the Windpark Hollich (Hicks J., 2020). The primary objectives of this wind farm included limiting the environmental impact of electricity production, increasing local sources of income, and minimising the impact on agricultural land.

4.11.3. Society

The main goal of the Windpark Hollich was to benefit as many people as possible, strengthen the community, and avoid any envy or resentment (Energieagentur.NRW GmbH, 2016). To achieve this, the lease payments were allocated among property owners in the wind priority area according to a “land lease system.” All lease payments were pooled, and the site owners received a higher percentage than the less affected property owners. All owners agreed to this system before the final decision about the sites of the

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turbines was made. Additionally, they all mutually agreed not to submit any competing building applications.

4.11.4. Economy

The Windpark Hollich also emphasised the involvement of all its residents. They were encouraged to participate in the project financially as limited partners, and in certain cases the company even pre-financed their shares. The residents also receive a regular bonus payment totalling 10% of all lease payments (Energieagentur.NRW GmbH, 2016), staggered based on the effects of the wind turbines' noise emissions at their places of residence, which is a unique feature of the Hollich wind farm.

4.11.5. Procedures and Justice

One of the most important aspects of the project is the involvement of the local community. Windpark Hollich GmbH & Co. KG prioritises limited partners from the area, ensuring that the capital remains within the municipality. The residents are also provided with the opportunity to participate financially in the project and receive a voluntary regular bonus. Moreover, all landowners in the turbine area, including unused land, are eligible for rent. The project also includes events such as a "Wind party", donations, or non-interest-bearing loans for associations (Baumann F.-M., 2016). These initiatives not only support the local community but also contribute to increasing acceptance of the project. Overall, Windpark Hollich GmbH & Co. KG has brought high added value to the local community.

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4.11.6. Identity

Hollich Wind Farm

Basic details

19 Wind Turbines

29.5 MW Power

20000 Houses

Wind farm type: Onshore

Location: Steinfurt, Germany

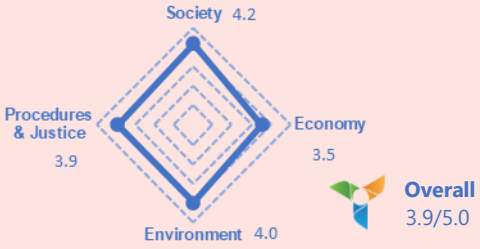
Ownership model: Hybrid

Operator: Windpark Hollich GmbH&Co

Rotor diameter: 92.5 m

Hub height: 100 m

Total height: 146 m



Key insights & lessons learnt

a) Challenges & barriers

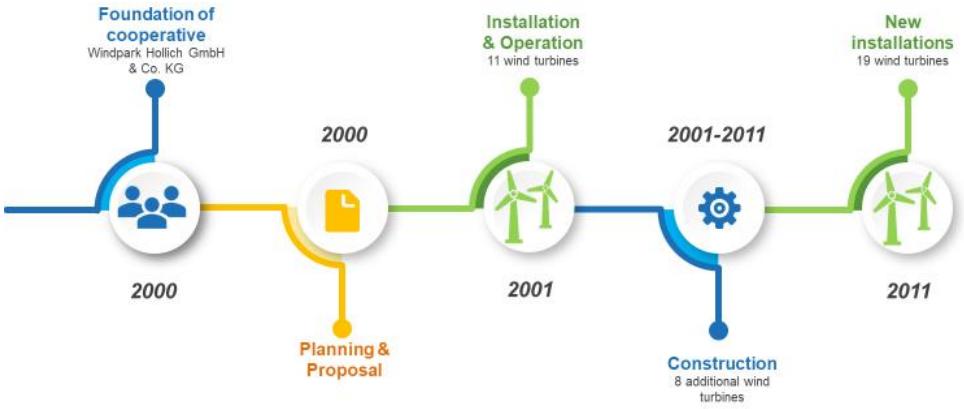
- ✓ High start-up costs, administrative burdens, and few tax breaks.
- ✓ Resolve potential conflicts over land use.

b) Enablers

- ✓ The structure allows for larger community-owned wind farms and prevents debt from being a liability to the shareholders.
- ✓ The project's proposal was well received because it was initiated and established by the local community.
- ✓ The involvement of the local agricultural association helped get farmers on board.

c) Impact

- ✓ Higher social acceptance of wind projects in the region.
- ✓ The community co-owns and benefits from the project.
- ✓ Increased added value on a local level.



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4.12. Königshovener Höhe Wind Farm

4.12.1. Background context

The Königshovener Höhe Wind Farm is an onshore wind farm located in Bedburg, North Rhine-Westphalia, Germany. The wind farm has been operational since 2016 and is situated on a reclaimed site of approximately 345 hectares, that was formerly the Garzweiler open-cast lignite mine. The site has been designated as a wind concentration zone in the zoning plan of the city of Bedburg. This joint venture project is owned by the city of Bedburg (49%) and RWE (51%) (RWE, n.d.). The wind farm has a total capacity of 67 MW, which can generate enough green electricity to meet the annual demand of up to 58000 households. The wind farm consists of 21 turbines manufactured by Senvion a German manufacturer that supplies and installs wind power systems. The 21 Senvion M114 wind turbines have a hub height of 143 m and a total height of 200 m, with a rated capacity of 3.2 MW each (Power Technology, 2016). The Königshovener Höhe Wind Farm was inaugurated in 2014 with a total construction cost estimated to be approximately 110 million euros. In 2021, RWE completed the construction of the Bedburg A 44n onshore wind farm. The project, located on the former open-cast mining site in Garzweiler, has a capacity of 28 MW and has been connected to the grid (reNews, 2022). This increased the total capacity of the wind farms within the city to 95 MW.

4.12.2. Environment

The Königshovener Höhe Wind Farm is a unique case, as it is located on a reclaimed site adjacent to an open-cast mine (Energy-xprt, 2014). It serves as an example of the partnership between conventional and RES, while also reflecting the structural change occurring in the Rhenish lignite mining region. Additionally, the wind farm's installation has a positive impact on the environment in the recultivated area of the mine.

> *"The Königshovener Höhe wind farm is special because of its location on a reclaimed site right next to the opencast mine."* (Power Technology, 2016)

4.12.3. Society

The city of Bedburg and RWE collaborated on a communication plan aimed at informing and educating the public about wind energy during the planning stage. There was a strong focus on fostering community identification with the wind farm. Local media were also invited to important project events. The official opening was attended by North Rhine-Westphalia's Environment Minister and Bedburg's mayor. RWE documented the project's progress digitally, and the city of Bedburg organised an information event for

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residents. RWE, along with the local community, also coordinated the "Bedburg Wind Farm," a wind festival aimed at celebrating the wind farm and attracting public attention. The festival has been particularly popular for school visits on Global Wind Day.

4.12.4. Economy

The city of Bedburg owns 49% of the shares in the Königshovener Höhe wind farm. The revenue generated by the wind farm directly contributes to the city's budget, benefiting its citizens. This also fosters a sense of ownership among local stakeholders, increasing their support and acceptance of future projects.

Picture 15: The Königshovener Höhe wind farm site near the city of Bedburg (RWE, n.d.)

4.12.5. Procedures and Justice

In order to help Bedburg residents learn more about renewable energy, RWE and the local administration have set up an online section where data from wind turbines is displayed. This information can be found on the official website of the City of Bedburg. The website is updated every five minutes with six key pieces of information about the wind turbines: 1) Average power output in the last ten minutes (MW), 2) Average wind speed (m/s), 3) Total electricity production this year (MWh), 4) Total electricity production overall (MWh), 5) CO_2 emissions saved this year (t), and 6) CO_2 emissions saved since installation (t) (RWE, n.d.).

> *"We will continue to support the expansion of renewables, invest in climate protection and set a good example as an energy municipality."* (reNews,2022)

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4.12.6. Identity

Königshovener Höhe Wind

Basic details

21 Wind Turbines

67 MW Power

58000 Houses

Wind farm type: Onshore

Location: Bedburg, Germany

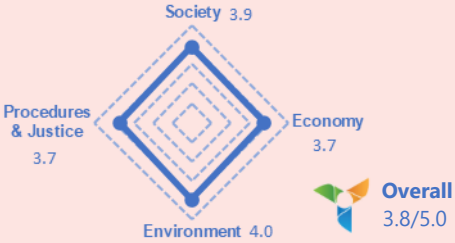
Ownership model: Hybrid

Operator: RWE

Rotor diameter: 114 m

Hub height: 143 m

Total height: 200 m



Key insights & lessons learnt

a) Challenges & barriers

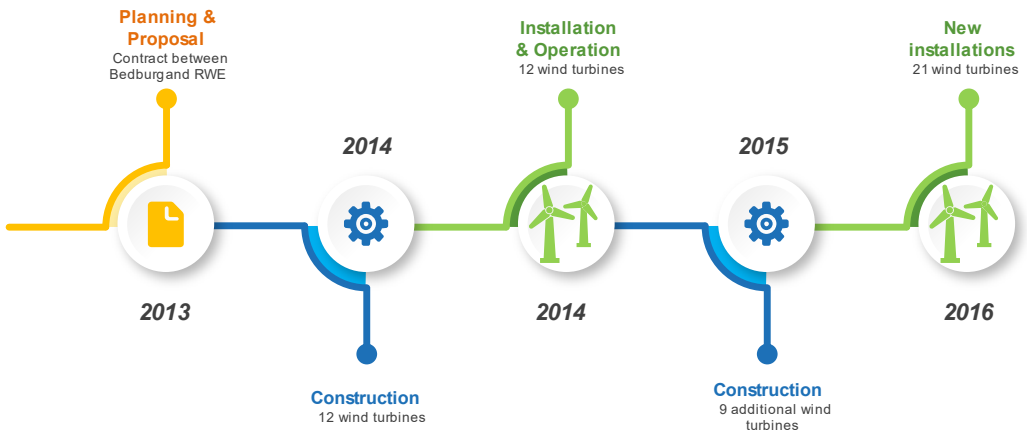
- ✓ Social acceptance of the wind farm.

b) Enablers

- ✓ Involvement of Bedburg city for project's development.
- ✓ Communication plan to inform and educate the public about wind energy during the planning stage.
- ✓ Organisation of the "Bedburg wind farm" festival by the RWE and the local community.

c) Impact

- ✓ Direct contribution to the city's budget through revenues.
- ✓ Fostering a sense of ownership among local stakeholders, increasing their support and acceptance for future projects.
- ✓ Positive impact on the environment in the recultivated area of the mine.



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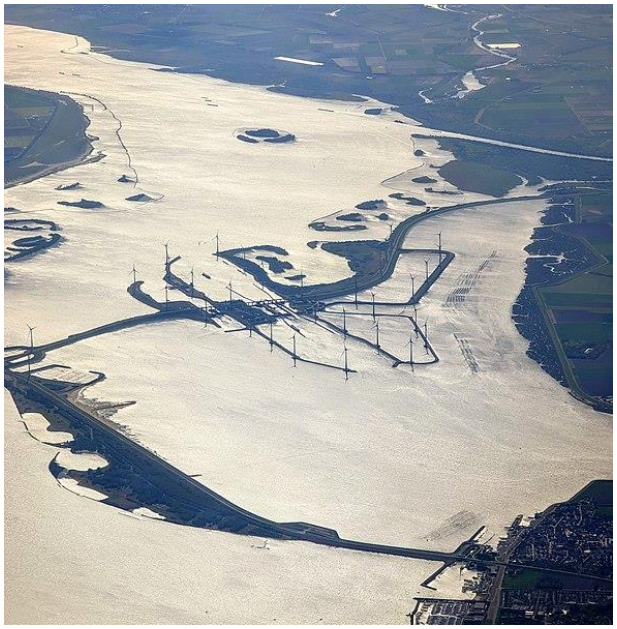
4.13. Krammer Wind Farm

4.13.1. Background context

Windpark Krammer is an onshore wind farm in Zeeland in the Netherlands. The construction of the wind farm started in 2017, and it became fully operational in March 2019. The project was initiated by two citizen cooperatives, uniting local citizens, who also initiated the development and construction. The wind farm is still 60% owned by those two citizen cooperatives, Deltawind and Zeeuwind. It is the largest citizens' initiative in the Netherlands (Wind Park Krammer, n.d.). The remaining 40% of the wind farm is currently owned by Kallista Energies Renouvelables (admin_kallista, 2021), a French independent renewable energy producer. The project consists of 34 turbines generating an average annual electricity output of 365 GWh, which is sufficient to power approximately 100,000 households with clean energy. (Windpark Krammer, Netherlands, n.d.). The total project cost is estimated at 200 million euros (Krammer Wind Park, the Netherlands | Case Studies | IJGlobal, n.d.). Enercon was selected to provide engineering, procurement and construction services for the wind energy project. Enercon was also selected as the turbine supplier of the development. The company supplied 34 E-115 turbines, each with a rated power of 3 MW and a tower height of 122 m. The electricity generated by the wind farm is sold to Nouryon, Google Netherlands, Koninklijke Philips and Royal DSM through power purchase agreements (Brouwers, 2019).



Picture 16: Aerial view of Windpark Krammer, Netherlands (Dicklyon, 2022)

4.13.2. Environment

The construction and development of the Windpark Krammer has been challenging as it is located in the middle of three Natura 2000 protected areas. The movements of birds in the area were carefully considered during the planning of the wind farm, including the positioning

> *"Windpark Krammer was the first wind farm in the Netherlands to install a bat and bird protection system that shuts down a wind turbine when large birds are nearby." (Interviewee)*

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of the wind turbines. In the interview conducted as part of the WENDY project, the interviewee stated: *"Many measures have been taken to protect the environment and to ensure social acceptance by locals. Windpark Krammer was the first wind farm in the Netherlands to install a bat and bird protection system that shuts down a wind turbine when large birds are nearby (interview)."*

A number of the wind farm's 34 turbines have been equipped with cameras and microphones to cover the entire wind farm. In the surroundings of the wind farm, amongst others, the rare sea eagle hunts and breeds (hanneke, 2020). When the camera detects a sea eagle approaching, even from a distance of 600 m, the turbine is automatically shut down. Additionally, the detection system is designed to deactivate the power when other larger bird species, such as cranes, spoonbills, and egrets, are detected. The interviewee also explained how important it is for the Windpark Krammer to protect local biodiversity: *"Every year, we lose production because the wind turbines are switched off to protect bats and birds. On top of that there are also the installation and maintenance costs, but protecting nature is important for our wind farm (interview)."*

4.13.3. Society

In the same interview in the frame of the WENDY project, it is mentioned that *"Many people, in the beginning, were concerned regarding the construction of a wind farm on this site. Due to the height of the turbines, it is obligatory to have red lights installed in the wind turbines for flight safety, which makes the wind farm visible from afar during the night. There were also concerns about the nature surrounding the wind farm. The wind farm has taken people's concerns seriously. Windpark Krammer was the first wind farm in the Netherlands to want to install a new system that allows to turn off the lights when there are no airplanes close by. We were waiting for the government to change the regulations for allowing this kind of system, which took a long time and a lot of effort from the Windpark. It does show the commitment of the wind farm to take people's concerns into account".* The interviewee added: *"Furthermore, the wind farm is built on the Krammer locks. These locks are used by ships to go to the harbor and are also part of the primary flood defense system of the Netherlands. It was therefore a difficult decision for the government to allow for the construction of wind turbines on top of them (interview)."*

4.13.4. Economy

The aim was for as many people as possible to benefit from the wind farm. Amongst others, the wind farm has issued two bond loans at different moments, where anyone could subscribe, but the priority was given to cooperatives' members and residents.

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The first round of bond loans is repaid within 11.5 years, with an interest rate ranging from 6.0 - 8.0 %, depending on the energy yield of the wind farm. On the other hand, the second bond loan has a fixed interest rate of 4 %, since it was issued after the termination of the construction phase, with a more limited risk profile. The interviewee added: "*We have also established the Krammer Wind Fund, from which residents can apply for funding of community initiatives. Furthermore, there is an ecology fund with 'Zeeuwse Landschap' for nature-improving measures (interview).*"

4.13.5. Procedures and Justice

Regarding the ownership model of the wind farm, the interviewee explains, *"60% of the wind farm belongs to Deltawind and Zeeuwind, while the remaining 40% belonged until recently to Enercon, which exited in 2021 and whose share was bought by Kallista Energies Renouvelables. The wind farm has also offered some other benefits, such as the free installation of solar panels for citizens living within a certain radius of the park. In the planning phase of the wind farm, citizens were actively involved in the process, by ensuring multiple dialogues with different groups to get a good understanding of the concerns and how to address them. In the design of the wind farm, a number of these concerns were taken into consideration, for example by deciding to install the DT Bird and Bat system. From the construction phase until today, people are well informed about the activities of the wind farm. The wind farm organises open days and other activities to inform people (interview)."*

> *"From the construction phase until today, people are well informed about the activities of the wind farm." (Interviewee)*

A lot of emphasis is placed on transparency within the wind farm project. The wind farm provides its website and mobile application where almost every detail can be found. This includes information about the history of the planning and construction, financial data, technical specifications regarding the turbines and operational aspects of the wind farm. The wind farm provides a mobile application called "Windpark Krammer," available for free download on Google Play. This app allows users to access real-time information about the operating status of the wind turbines and the electricity generated. It is designed to be easily accessible to everyone interested in the project.

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4.13.6. Identity

Krammer Wind Farm

Basic details

34 Wind Turbines

102 MW Power

93134 Houses

Basic details

Wind farm type: Onshore

Location: Zeeland, Netherlands

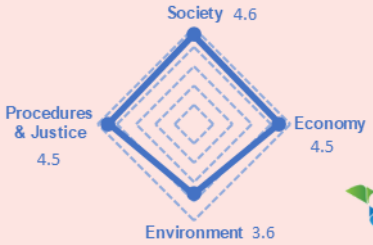
Ownership model: Hybrid

Operator: Deltawind

Rotor diameter: 115.7 m

Hub height: 122 m

Total height: 180 m



Overall 4.3/5.0

Key insights & lessons learnt

a) *Challenges & barriers*

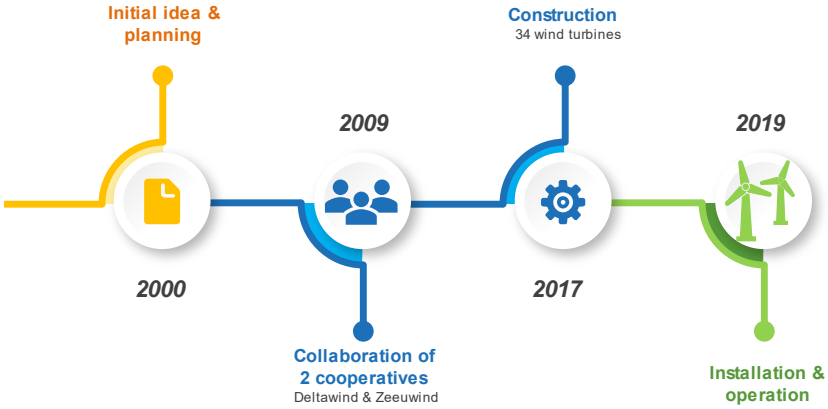
- ✓ The 12-year long duration of the project's development.
- ✓ Dealing with legislation to obtain the necessary licenses and permits.
- ✓ The location of the Windpark, as it is in the middle of three Natura 2000 protected areas.

b) *Enablers*

- ✓ Active involvement of citizens in the planning phase of the wind farm.
- ✓ Informative meetings for the wind farms' procedures.
- ✓ Technologically innovative solutions for the mitigation of social and environmental issues.

c) Impact

- ✓ The largest citizens' initiative in the Netherlands.
- ✓ Financial benefits for cooperative members and local residents.
- ✓ Free installation of solar panels for citizens near the park.



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4.14. Lichtenau Wind Farm

4.14.1. Background context

The Lichtenau-Asseln wind farm is located on the Paderborn plateau near the village of Asseln (Lichtenau) in the district of Paderborn (North Rhine-Westphalia). It was inaugurated in 1997 and held the distinction of being Europe's largest inland wind farm at that time, consisting of 66 wind turbines and a total capacity of 36.55 MW. Following the establishment of the initial wind farm, an additional five wind priority zones were designated to facilitate the expansion of wind farms (an increased number of turbines ranging from 11 to 33). From the outset, the city placed great significance on achieving a high level of citizen participation. The decision to develop the wind farm stemmed from the city of Lichtenau's endeavour in the 1990s to establish itself through renewable energies and promote the energy transition. The objective was to establish Lichtenau as an energy city, reliant entirely on renewable energies. This can be supported by the fact that the region boasts one of the most favourable wind potentials in Germany.

4.14.2. Environment

There have been no negative impacts, as solutions have been implemented to address concerns over bird deaths, noise pollution, and light pollution. Moreover, the municipality's land-use plan ensures that wind turbines are deployed away from forest and nature reserves. For the protection of birds (red kites, black storks), turbines are deactivated during specific times of the year, such as harvest season and breeding season. Light pollution, which could be shadow flicker, is mitigated by automatically turning off turbines located near residential areas during daylight hours when sunlight is detected by the sensors within the turbines. Light pollution could also encompass the use of obstruction lights at night. In response to this, it has been proposed to use 'demand-based lighting'. However, this was not approved by German aviation safety. For noise concerns, the turbines are equipped with 'trailing edge serration' devices which help to reduce air turbulence and make the rotor blades significantly quieter. The annual CO_2 emissions are reduced by approximately 50,000 t.

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Picture 17: LSG Nature Park Eggegebirge and Teutoburg Forest east of Lichtenau-Asseln (Tsungam, 2017). CC BY-SA 4.0

4.14.3. Society

Overall, the community of Lichtenau has benefited from the wind farms. There was a clear, concrete plan for climate protection with the involvement of multiple stakeholders at different levels. The implementation of the above measures has led to a significant level of social acceptance, despite the presence of a large number of turbines in the landscape. Importantly, there have been no reported impacts on human health related to noise or visual disturbance, while all citizen concerns have been addressed appropriately. Lichtenau is seen as an 'exemplary' community and has also been selected by RWTH Aachen University as a role model, to elaborate on how communities can achieve similar levels of social acceptance.

4.14.4. Economy

The city of Lichtenau has experienced an increase in business tax due to the wind turbines. The business tax revenue from wind power is currently around 25-30%. In addition, the city generates income from the lease of site space, the lease of cableways, concessions, or the expansion of commercial roads. Land or site owners have seen their financial capabilities enhanced as a result of the revenue generated from wind energy.

The citizens were able to participate in companies/cooperatives and they are now making profits. In Lichtenau, the "Bürger- und Energiestiftung Lichtenau Westfalen"

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(citizens and energy foundation) has been established to improve the living conditions in the city, since wind turbines in Lichtenau have profoundly changed the visual landscape of the community and the region. This foundation receives voluntary payments from investors/operators of wind turbines. Associations may submit applications to the Civic Foundation for funding projects (e. g. purchase of musical instruments, renovation of roofs, renewal of windows, financial support for outings with young people, equipment of club rooms with media technology, etc.). The concept behind the foundation is to ensure that both the citizens and the city indirectly benefit from the revenue generated by the wind turbines. The foundation is represented by a cross-section of the population who receive the applications and distribute the money to projects for "art and culture", schools, and kindergartens, among other projects. Many other community projects are supported by the utility company. Through WestfalenWind Strom, citizens also benefit from a low electricity price. The municipal utilities also provided lower drinking water prices to the citizens, supported by the profits generated from their renewable energy plants.

Although the operators did not directly contribute to tourism or visitor facilities, the extensive development of wind turbines in Lichtenau has garnered recognition for the city, with more people visiting the area. In 2020, the "Energie-Erlebnistour" (energy experience tour) was introduced as a guided tour for different interest groups (e.g., political, scientific, touristic), increasing the community budget as well as the level of awareness of the city. It can be stated that the local value was also enhanced through the use of locally manufactured materials and local contractors for construction, operation, and maintenance; land rental income to landowners and any royalties; and local business rates and/or taxes.

4.14.5. Procedures and Justice

Local citizen participation schemes like the German 'Bürgerwindparks' (citizen wind farms) have been an important driver for the early development of wind energy in Germany. The types of citizen participation models available for the residents of Lichtenau are planning consortiums for wind parks, participation in cooperatives, limited partnership participation, or indirectly through the citizens' energy foundation. The participation in wind turbines in Lichtenau is found to be a mix of different ownership models (private ownership, small investors in local cooperatives, small investors in a wind project of a professional developer), mainly comprised of local citizens. Approximately 25% of the works have been contracted out to local companies and 66% of the facilities are owned by local residents.

There were initial concerns about potential bribery, as it was perceived that financial incentives were offered to certain citizens to reduce opposition. However, these concerns were addressed when citizens witnessed and understood the overall

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benefits brought to the entire community. The city of Lichtenau handled this issue appropriately, and the citizens now perceive the benefits as fair and equitable.

The people involved in the project were the mayor, who had strong local connections and personal familiarity with the community; a local climate manager who was widely accepted in the city; a local operator, well known to all farmers in the region; the CEO of the municipal utility company who had grown up in the region and was aware of the needs of the community. Additionally, there were numerous interest groups, representatives of the city administration, and private individuals.

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4.14.6. Identity

Lichtenau Wind Farm

Basic details

78 Wind Turbines

87 MW Power

50000 Houses

Wind farm type: Onshore

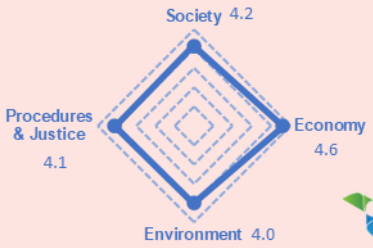
Location: Lichtenau (North Rhine-Westphalia), Germany

Ownership model: Hybrid

Rotor diameter: 115.7 m

Hub height: 135 m

Total height: 206 m



Overall 4.2/5.0

Key insights & lessons learnt

a) *Challenges & barriers*

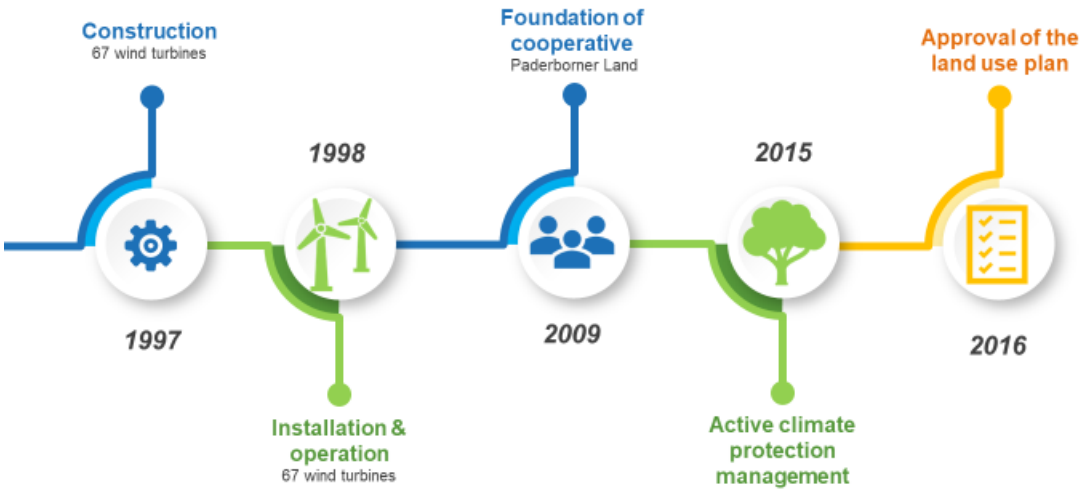
- ✓ Misbelief that some citizens were bribed to reduce their opposition.
- ✓ The lack of space due to the high number of wind turbines in the region.
- ✓ Environmental concerns regarding bird protection.

b) *Enablers*

- ✓ Transparency and involvement of multiple stakeholders at different levels.
- ✓ Environmental mitigation measures for shadow flickering and noise pollution.

c) *Impact*

- ✓ Lower electricity and drinking water prices for the citizens.
- ✓ Financial benefits for Lichtenau municipality and local shareholders.
- ✓ Improvement of touristic activity in the city of Lichtenau.



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4.15. Los Arcos Wind Farm

4.15.1. Background context

Los Arcos wind farm is an onshore wind power project located in Andalusia, Spain. It consists of 10 turbines, each with a nominal capacity of 3.47 MW. The project annually generates 100 GWh of electricity and supplies enough clean energy to power 50,000 households. The wind farm is owned by Enel Green Power Spain. The project was developed in a single phase and is currently in operation. After the completion of construction, the project got commissioned in December 2019, and connected to the network. It's located in Malaga province, specifically between the municipalities of Almargen, Teba, and Campillos. Since 2019, this plan has contributed to the growth of wind energy in the region and the country. By reducing the region's dependence on fossil fuels, it countered the climate crisis and energy crisis. The Malaga area, where the plant is located, benefits from highly favourable natural conditions for harnessing wind energy. As a result, numerous wind farms have been developed in this region. The regional economic context is characterised by several criticalities that contribute to an increase in the index of material and social vulnerability: low level of employment, high depopulation of young people, poor infrastructure, and difficult connections that make the area unattractive for investments.

Picture 18: Landscape of Los Arcos wind farm (Enel Green Power, n.d)

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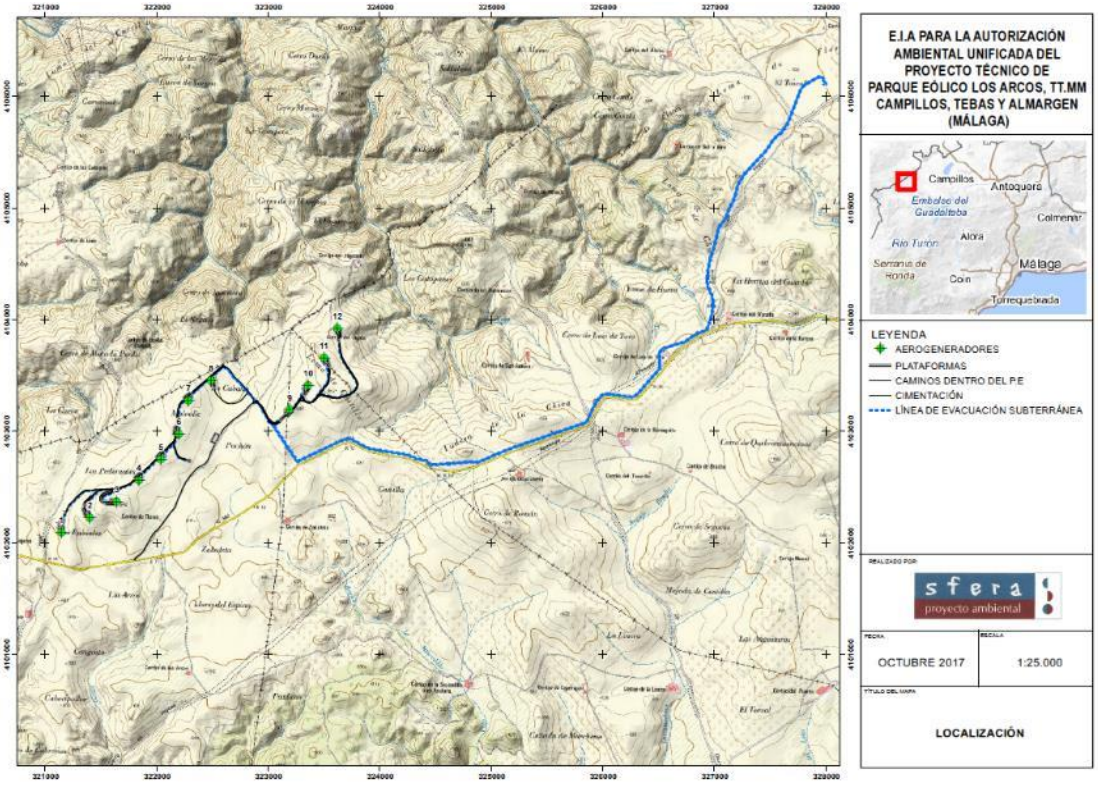
4.15.2. Environment

This plant is reducing the emission into the atmosphere of about 67,000 t of CO_2 per year, contributing to Spanish's energy transition and reducing Spanish dependence on fossil fuels. There are no protected areas in the location of the wind farm, although there are three Nature Reserves and a Special Conservation Area in the immediate vicinity, belonging to the Natura 2000 European Ecological Network.

Among the fauna, the avifauna is notable with the presence of species that are typically found in open spaces and cereal pseudo-steppes, including necrophagous birds and steppe birds. In terms of the wind farm's visual impact, the perceptual environment and visual analysis indicate that the visual basin is relatively small. However, due to the flat and slightly undulating orography of the study area, the wind farm infrastructure is visible from a significant portion of the surface.



Picture 19: Location of wind turbines in the Los Arcos wind farm (the construction of wind turbines 11 and 12 was denied) (Enel Green Power, n.d.)

In order to protect avifauna, a series of corrective, mitigation and compensatory measures were established: ongoing specialised environmental monitoring; installation of bird detection and deterrence systems, which can trigger a shutdown of the wind turbines if the system detects a bird that is at risk of colliding with the turbines; expansion and enhancement of habitat areas for steppe birds through the implementation of agri-environmental measures.

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4.15.3. Society

The towns impacted by Los Arcos wind farm are sparsely populated municipalities in terms of size, resulting in low population densities compared to other areas of the province, particularly the coastal region. None of the three municipalities' population exceeds 10,000 inhabitants. Their demographic dynamics are also regressive as they have experienced a decline in population between 2006 and 2016. The wind farm will have a visual impact on localities that are already surrounded by wind turbines, further contributing to the saturation of wind farms in the area. As a result, the wind farm expands the area of "high" and "very high" visibility, particularly towards the east-southeast direction from its location. In addition, in this specific location no archaeological heritage was identified during the initial assessment of the project. However, a follow-up plan was established during the earthmoving phase to address any potential discoveries of archaeological heritage.

The population living near the wind farm benefits from the electricity production that is environmentally friendly and does not contribute to water or air pollution. Wind energy helps to reduce smog, minimise acid rain, and lower greenhouse gas emissions, resulting in improved air quality. As a clean energy source, wind energy reduces healthcare expenses and the overall environmental costs associated with air pollution. Furthermore, wind power contributes to the goal of self-sufficiency and represents a significant step towards sustainable development.

4.15.4. Economy

The three municipalities primarily rely on a weak tertiary sector with limited specialisation, complemented by primary and secondary sectors that hold little economic importance. Only Campillos represents a slightly stronger tertiary sector with a modest level of specialisation. Unemployment is a pressing issue, exacerbated by the profound impact of the economic crisis. This impact is not exclusive to these municipalities but is shared by other regions in Andalusia as well. The effects are evident in the fluctuation of the unemployment rate and the number of unemployed individuals.

The wind energy project brings significant economic benefits to the neighbouring communities, particularly through a new source of revenue for farmers in the form of land lease payments. These payments are regulated by an agreement between the project developer and landowners, ensuring a fair and mutually beneficial arrangement. Furthermore, in order to support the local economy, which is primarily rural, local companies were actively engaged in various aspects of the project, including construction, civil works, services, and ongoing maintenance. By involving local companies, the project not only contributed to the development of the

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renewable energy sector but also fostered the growth of the local economy, providing opportunities for employment and economic benefits within the region.

Within the company's CSV (Creating Shared Value) plan, several initiatives were carried out in the municipalities of the project's area:

- Direct employment and employability for the local population. Training courses for wind farm supervisors were given, targeting at local populations with technical experience. A list of job offers was created together with the contractor to be published on the Town Council website.
- Indirect employment for local companies. The contractor was provided with a list of local establishments (restaurants, accommodation etc.) to encourage the use of local services.
- Donation of 4kW of solar panels for the Town Hall building and 4 water tanks for the municipal hunting ground.
- A campaign was carried out in the primary and secondary schools of the three municipalities in the area of the wind farm (Almargen, Teba, and Campillos), including the preparation of educational material about the importance of conserving necrophagous and steppe bird species, bats as well as information related to the operation of wind technology.
- Innovation labs in the three municipalities.

4.15.5. Procedures and Justice

The wind farm is owned by Enel Green Power Spain, S.L. The project was authorised in accordance with current national regulations, which involve a thorough authorisation process that includes participation from various local and regional entities and authorities. Since the wind farm capacity is less than 50 MW, all the procedures and authorisations are managed by regional administrations.

The environmental impact assessment (EIA) for the project was conducted by specialists on behalf of the developer. The report of the assessment's results was evaluated by regional authorities, who were able to make comments and request actions to be implemented in the project.

The Enel Green Power "Sustainable Construction Site" model was applied in the construction of this wind farm, which includes the installation of photovoltaic solar panels to cover part of the energy needs during construction. In addition, water-saving measures have been adopted through the installation of deposits and rain collection systems. After the completion of the project, both the photovoltaic panels and the water saving equipment were donated for public use. Furthermore, the construction

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of this wind farm has contributed to partially financing an Industrial Development Plan in the local area.

The developer also conducted a study to analyse and understand the context from an institutional, social, cultural, and environmental point of view. This study aimed to identify relevant plans and projects that could create shared value by addressing strategic issues and leveraging existing assets. The goal was to scale and implement viable solutions across the entire territory. The project developer and local administrations had several meetings and discussions to reach a consensus on an economically satisfactory feed-in tariff for landowners in the areas. They also negotiated compensatory measures aimed at enhancing infrastructure, expanding green spaces, and restoring ancient buildings and other landscape elements with significant cultural value within the territory.

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4.15.6. Identity

Los Arcos Wind Farm

Basic details

10 Wind Turbines

34.7 MW Power

50000 Houses

Wind farm type: Onshore

Location: Malaga, Spain

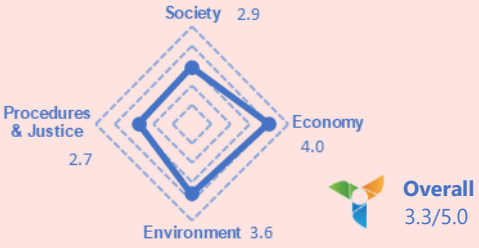
Ownership model: Corporate

Operator: Enel Green Power

Rotor diameter: 132 m

Hub height: 84 m

Total height: 150 m



Key insights & lessons learnt

a) Challenges & barriers

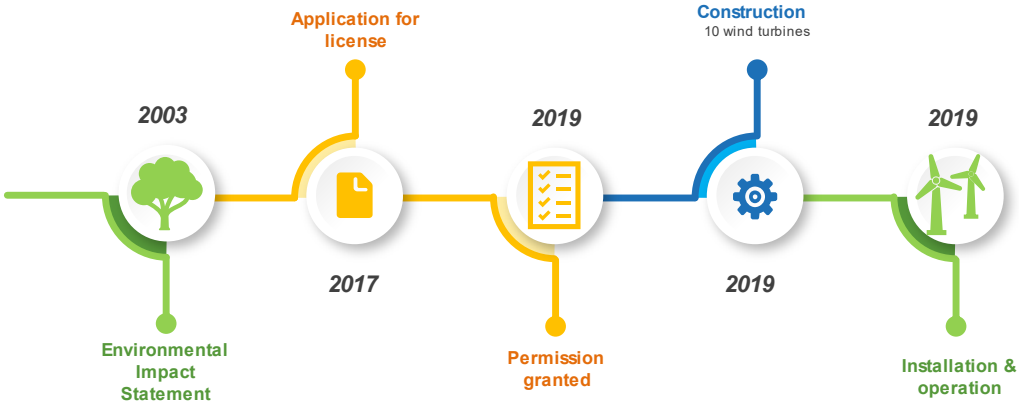
- ✓ The long authorisation process for the project implementation.
- ✓ The synergistic effect caused by the proliferation of wind farms in the area.
- ✓ Demonstrating that the plant was safe for human and animal health.

b) Enablers

- ✓ Energy transition policies at national and regional level.
- ✓ Implementation of social and economic compensatory measures.
- ✓ Development and implementation of proactive measures and environmental monitoring.

c) Impact

- ✓ Economic benefits for the landowners of the area.
- ✓ CO_2 emissions avoided: 67,000 t per year.
- ✓ Increase employment for the local population.



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4.16. Middelgrunden Wind Farm

4.16.1. Background context

The idea of the Middelgrunden wind project originated from a group of visionary people in Copenhagen back in 1993. In 1996, the local association Copenhagen Environment and Energy Office (CEEO) took the initiative of forming a working group for placing turbines on the Middelgrunden shoal and a proposal with 27 turbines was presented to the public. The project received initial funding from the government and garnered strong public support, with 1000 members joining the newly established cooperative. Collaboration with the local utility helped launch the project. From 1997 to 1999, two visualizations and an Environmental Impact Assessment study were carried out, sparking a significant public debate that coincided with the public hearings on the project. Following the first public hearing, the original proposal of 27 turbines in three rows was changed. Instead, it was decided to place 20 turbines in a slightly curved line.

A comprehensive information work took place, involving relevant authorities, NGOs and many future shareholders of the cooperative. During the process, 50,000-100,000 people were in contact, while 10,000 local people pre-subscribed for shares. This provided strong local support and helped in the approval phase. In December 1999, the final approval was given and, in 2000, the wind farm was operational (Larsen, 2001).

4.16.2. Environment

In 2003, three years after the commissioning of the wind farm, the key parameters from the environmental surveys and investigations carried out before and during construction, were analysed. The two main indicators for the aquatic environment on the site are eelgrass and shellfish. The report concludes that the construction of the wind farm did not have any significant influence on the marine vegetation in the area. During the installation of the turbines, an initial recovery of the eelgrass was already observed. The follow up investigation showed an almost 100% recovery. A good indicator was that the fishermen had returned to the site (Larsen et al., 2005).

> *"It's a lot of psychology and that's what I have learnt from the wind activity working in the cooperatives." (Interviewee)*

The establishment of the wind farm would reduce the water flow in the sea between Denmark and Sweden by 0.0012%. It was necessary to investigate this matter, as the change in flow could influence the breeding of codfish in the Baltic Sea. To compensate for the decrease of water flow in the sea caused by the foundations, it was discussed

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to remove 4,000 m^3 of deposits from an optimal place on the ocean floor. There are no sensitive bird species in the area, and the existing ones, like swans, ducks, eiders and gullets were expected to use the area as before (Larsen, 2001).

Intensive netting takes place in the area, primarily for eel, cod and flatfish. Compensation was settled with the local fishermen, as fishing was prohibited during construction. Fishing has resumed as before after construction, but no tools scraping the bottom may be used, as it is prohibited to anchor within 200 m from the sea-cable. It was considered that in the future, the foundations would likely serve as a reef and create a habitat for bottom animals and thus food for more fish in the area (Larsen, 2001).

4.16.3. Society

Locals were worried about the potential noise impact from the farm, but after a demonstration tour of a modern onshore wind turbine, they were convinced that there would be no noise impact from the Middelgrunden turbines (Larsen et al., 2005). Noise propagation was calculated, but it was not supposed to cause any problems, as the distance to populated areas is more than 2 km (Larsen, 2001).Because of resistance from authorities and interest groups, especially regarding the visual impact of the project, the size of the farm had to be downgraded from the originally proposed 27 turbines placed in three rows to 20 turbines. During and after the construction, there was surprisingly little resistance to the project, considering the visual impact from the large turbines, located just 2 km away from a very popular beach near Copenhagen. The reason for this lack of protest is believed to be the strong public involvement in the planning phase (Larsen, 2001).

> *"Don't surprise people, get them involved and be honest, and accept that some may don't like it. I mean, you can still do it." (Interviewee)*

4.16.4. Economy

The local community benefited through cooperative ownership of the wind farm. The cooperative's part consisted of 40,500 shares. One share

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represented a production of 1,000 kWh/year and was sold for 4,250 DKK (567 EUR). All shares were paid upfront in order to follow the constitution of the cooperative. Most shareholders are people living in Greater Copenhagen, but also some companies, organisations, unions, and foundations saw the importance of participating in a highly visible and visionary project (Larsen, 2001). The income generated from the project is tax-free for individuals who purchase up to five shares. If a person owns more shares, then 40% of his/her income is still tax-free. Some Danish banks are offering loans to finance buying shares for those who do not have the immediate financial means to invest in buying shares. The whole project was developed in cooperation between Middelgrunden Wind Turbine Cooperative and the local utility Copenhagen Energy. All contracts were drawn up jointly during planning and construction, and all investment costs were shared between the two developers. During the construction and testing period, the received income from electricity sales as well as the costs were equally shared between the two developers. Thus, potential conflicts regarding the prioritisation of which wind turbines to complete first were successfully avoided.

Picture 20: Middelgrunden wind park (Arnoldius, 2009). CC BY-SA 3.0

4.16.5. Procedures & Justice

The wind farm's ownership is divided equally (50%) among the 8500 investors in the Middelgrunden Wind Turbine Cooperative and the municipal utility company. Most shareholders are people living in Greater Copenhagen, including also some companies, organisations, unions, and foundations. The information provided to potential shareholders was instrumental in securing a sufficient number of pre-subscriptions. The success of the project was evident as it garnered strong local support, with over 10,000 local individuals expressing their interest. This widespread support played a crucial role during the approval phase.

> *'In my opinion, we can only do it in a way we did it as a joint venture, with a professional developer. It was really important to have the public involved.' (interviewee)*

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4.16.6. Identity

Middelgrunden Wind Farm

Basic details

20 Wind Turbines

40 MW Power

40000 Houses

Wind farm type: Offshore

Location: Copenhagen, Denmark

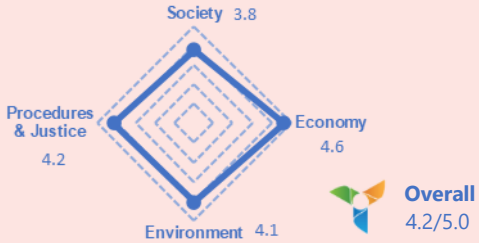
Operator: Middelgrundens Wind Turbine Cooperative

Ownership model: Hybrid

Rotor diameter: 76 m

Hub height: 64 m

Total height: 102 m



Key insights & lessons learnt

Challenges & barriers

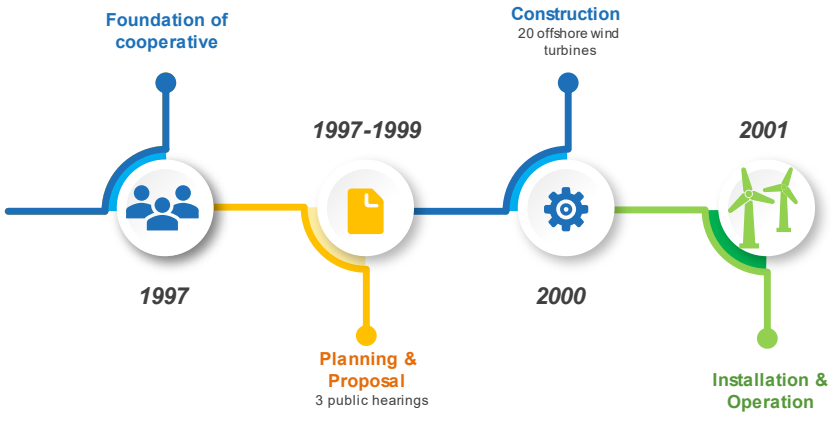
- ✓ Convince people of the need for large scale wind projects and the change in landscape.
- ✓ Opposition from the Danish Society for Conservation of Nature (DSCN).
- ✓ Availability of divers to place/work with undersea cabling.

b) *Enablers*

- ✓ Demonstration tours to interested parties.
- ✓ Information shared openly with local committees of the DSCN.
- ✓ Design of the farm layout changed to accommodate the local opinion and concerns.
- ✓ Three public hearings and dialogues with numerous interest groups.

c) *Impact*

- ✓ Increase of tourist activity in the area.
- ✓ Possible rise in land value of surrounding municipalities.
- ✓ The financial benefit to community shareholders.



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4.17. Neuenkirchen Wind Farm

4.17.1. Background content

Neuenkirchen is a municipality with approximately 1,100 inhabitants, located in the western part of the Dithmarschen district in Schleswig Holstein, near the North Sea coast. The low population density and the open flat landscape of this region make it an ideal place to produce wind energy. The project idea was primarily initiated by local farmers and landowners. Initially, there was opposition from the mayor, but after the municipal elections, the project development received support from the new major and the local council. The wind farm project was supported by a group of citizens who formed the Bürgerwindpark Neuenkirchen GmbH & Co. KG in 2013. The cooperative raised funds from local citizens to finance the project and took responsibility for the planning, construction, and operation of the wind farm. The Neuenkirchen Community Wind Farm commissioning was achieved in 2015. A total of 12 turbines (3 MW Senvion) were installed on 3 sites, with the following technical parameters: rotor diameter: 114 m, hub height: 93 m, total height: 150 m. These turbines were specifically designed for this landscape, covering a rotor area of over 10,000 m², and achieving high wind yield even in low wind conditions.

4.17.2. Environment

Following the municipal examination, three out of the four proposed suitability areas were considered in the regional plan in 2012. Compensation and mitigation measures have also been taken to offset the adverse effects on nature and the local landscape.

4.17.3. Society

The noise impact of the wind turbines on the municipality is minimal as they are known for being one of the quietest options available in the market. The wind farm was installed at a reasonable distance from single houses (450 m), settlements (800 m), and a church of historical heritage (2000 m). Nevertheless, a local citizen group mobilised to voice concerns regarding the visual impact, the high density of wind turbines, and the impact of aviation lighting in Neuenkirchen.

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4.17.4. Economy

The total investment cost of the project amounts to 56.500.000 €. There are many economic benefits for the local community after the project development. The electricity produced by the wind turbines is fed into the Schleswig-Holstein Netz AG grid and the trade tax generated by the community wind farm is directed towards the municipality's revenue (Gewerbesteuer). Furthermore, land lease pooling models were created to compensate landowners. Moreover, the mayor and the organisers of the wind farm have come to an agreement to establish a non-profit citizens' association (Bürgerverein Neuenkirchen e.V., founded in 2016), which will receive 1% of the annual revenues as donations and will provide support for social and cultural projects within the community. The association also receives donations from other local organisations. The association's revenue goes to community organisations, associations and social services (e.g. purchase of a citizens' bus, IT equipment for the school, construction of community facilities, church renovation, etc.).

4.17.5. Procedures and Justice

The initiators in Neuenkirchen adopted a policy of open and transparent information dissemination, along with encouraging citizen involvement in the planning process, as part of their efforts to improve local acceptance. The municipality's mayor actively served as a facilitator and mediator in this process. In addition, two of the landowners that initiated the venture are the managing directors of the Bürgerwindpark Neuenkirchen UG (haftungsbeschränkt) & Co. KG cooperative. In general, most of the shares are held by landowners and founding shareholders. Investors participate in the fund company directly as limited partners, with a minimum investment cost of 500 €. This entrepreneurial participation of individuals or entities grants them certain rights, such as access to information, control over decision-making processes, and the ability to participate in key decisions. They also have obligations, including payment of their contribution, and liability for any associated risks. Through their shareholding quota as defined in contractual agreements, they possess ownership of the funded company's assets and are entitled to receive profits or bear losses proportionate to their level of involvement. It is prohibited for an investor to own more than 25% of the total shares and voting rights. In 2014, 145 citizens were registered as limited partners. The local municipality has been among the shareholders.

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4.17.6. Identity

Neuenkirchen Wind Farm

Basic details

12 Wind Turbines

36 MW Power

18000 Houses

Wind farm type: Onshore

Location: Neuenkirchen, Germany

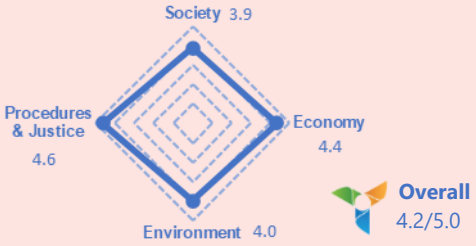
Ownership model: Social

Operator: Bürgerwindpark Neuenkirchen UG & Co. KG.

Rotor diameter: 114 m

Hub height: 93 m

Total height: 150 m



Key insights & lessons learnt

a) *Challenges & barriers*

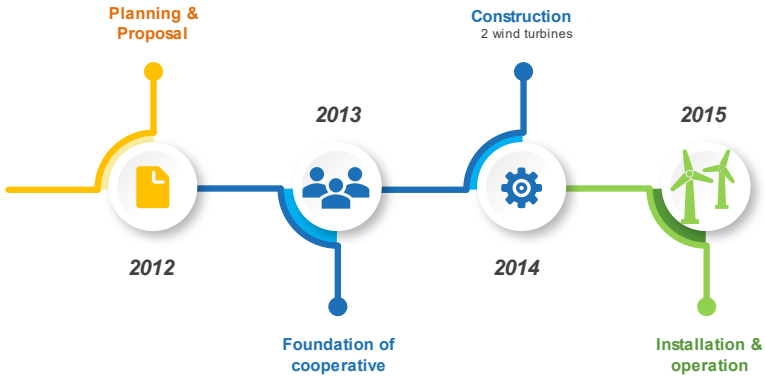
- ✓ Wind energy suitable areas approval (1st referendum: rejection of council regional plan).
- ✓ Project acceptance from previous mayors.

b) *Enablers*

- ✓ Political commitment and continuous political support (mayor and local council acting as facilitators/mediators).
- ✓ Community benefits (financial participation, establishment of non-profit civic association, business tax revenues).
- ✓ Land lease pooling model (Compensation for landowners).

c) *Impact*

- ✓ Added value for the local area (job creation, infrastructure etc.).
- ✓ Economic profit for the local shareholders and landowners.



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4.18. Samsø Wind Farm

4.18.1. Background context

Picture 21: Offshore wind turbines photographed from the ferry between Samsø and Hou in eastern Jutland (News Oresund, 2015). CC BY-SA 3.0

The Samsø Offshore wind farm, located in Samsø Municipality, Denmark, is fully operational. It comprises a total of 21 wind turbines, with 11 turbines (1 MW each) located onshore and 10 turbines (2.3 MW each) situated offshore, at a distance of 3 km from the coast. From 1996, the Danish energy policy was instrumental in setting up favourable conditions for the Renewable Energy Island (REI) project on Samsø. The REI competition was launched as part of the national energy plan 'Energi21', which was presented in 1996. The Danish Ministry of Environment and Energy provided detailed guidelines for the content of the participating islands' master plans. One of the most essential requirements in the guidelines was that there should be a 'strong local engagement' among local organisations and citizens and that the project should be managed by local actors (Sperling, 2017). Furthermore, there was a need to move offshore due to the scarcity of land for onshore sites, and the abundance of shallow waters with ample wind resources (Danish Energy Agency, 2017). Thus, the main need for this wind farm arose from a political decision, after COP3, to find a Danish Island and try to make it 100% self-supplied in renewable energy (RE) in 10 years (as a pilot project). The island of Samsø was chosen as the location for the wind farm due to its suitability for measuring the impact within a well-defined area. The objective of the project was to showcase renewable energy and assess the feasibility of achieving a high percentage of renewable energy using existing technology, without relying on significant financial grants.

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4.18.2. Environment

The local community decided quite early to avoid the northern part of the island, even though there was a greater wind potential. They aimed to preserve the integrity of historical sites and protect a natural bird reserve. The offshore farm was in the south of the island where there was no major negative environmental impact. However, tourism in the area was not positively affected after the installation of the wind farm.

> *"The residents were concerned that the wind turbines would ruin the island, kill a lot of birds". (Interviewee)*

4.18.3. Society

Overall, the well-being of the local population has improved due to the positive snowball effect on the local economy. The cheaper electricity from the wind farm has led to further innovations, improvements in heating, and insulation in the local houses. In general, locals had more opportunities for personal development after the wind farm implementation. In addition, there has been no major impact on human health due to noise pollution or visual impact from the wind turbines. The local population is happy to see the wind turbines. As is noted on the island's website: *'Windmills are much prettier when you are a co-owner, making money when the wind is blowing'* (VisitSamsoe.dk, 2022).

Ole Kaempe, a teacher who, from his farmhouse nestled amidst rows of wine grapes, has a view of the turbine he and his wife invested in, expressed that the income generated by the wind farm made the low mechanical hum more pleasant to hear. *"Otherwise, it would be noise,"* he said, "*but now, it's beautiful music"* (The New York Times, 2015).

4.18.4. Economy

In terms of the economic impacts of the project, it is estimated that the total investment amounted to 57 million euros, generating some 20 man-years of employment per year between 1998 and 2007. From the beginning, the project focused on involving local contractors, machine shops, plumbers, electricians, blacksmiths, and farmers in these projects, both, during the construction and in the subsequent operation and service (The New York Times, 2015).

Additionally, about 44% of the total investments consisted of direct grants or electricity prices supplements for wind power – even though the latter represents a reimbursement to the wind turbine owners on Samsø for providing the "public

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service" of delivering wind power, hence the Public Service Obligation (PSO) on electricity customers' bills, which helps finance the spot market price supplement (The New York Times, 2015).

> *"Here you create a lot of possibilities... You will even save more money and then you have the snowball effect. From a bad story, it turned into a good one, as people could see that it was actually helping the island to survive". (Interviewee)*

In addition to the individual shareholder benefits, the green development has brought new jobs, new businesses, and increased levels of tourism for renewable energy enthusiasts to the island. The island's website, Visit Samsø, includes a prominent section on Samsø as a renewable energy island. The Samsø Energy Academy, opened in 2007 and is a source of renewable energy research, education and training. The academy arranges exhibitions and workshops that attract more than 6,000 politicians, journalists, and students from around the world every year (Climate Heroes, n.d.)

4.18.5. Procedures and Justice

The municipality-owned company 'Samsø Havvind A/S' (Samsø Offshore Wind Ltd.), owns five (5) of these wind turbines, while larger (external) investors own three (3), and two partly local cooperatives own the remaining wind turbines. A decentralized structure was created, with the formation of cooperatives and the sale of shares in each turbine. The local community embraced this initiative enthusiastically, contributing enough through cooperatives to purchase two turbines, while individuals purchased the remaining nine (Reasons to be cheerful, 2015). An integral part of the energy island concept is to ensure that the local community not only actively participates in the transition to renewable energies but also benefits from it. At the beginning of the project, the locals were invited to invest according to their financial capacity. They purchased shares in the plants beforehand and consequently enjoyed direct benefits from subsequent profits.

One of the key prerequisites outlined in the Ministry's guidelines was the necessity for a 'strong local engagement' involving local organisations and citizens, with local actors actively participating in the decision-making process of the project. To ensure the seamless integration of the REI project into the community's consciousness, the initial REI meetings were incorporated into the municipality's formal information system, becoming a regular part of the community's daily routines. The main goal was to create a good atmosphere around the REI project (Sperling, 2017).

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4.18.6. Identity

Samsø Wind Farm

Basic details

10 Wind Turbines

23 MW Power

20000 Houses

Wind farm type: Offshore

Location: Samsø, Denmark

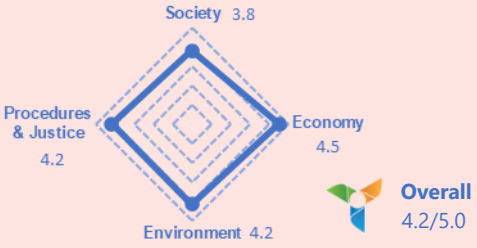
Operator: Wind Estate AS

Ownership model: Hybrid

Rotor diameter: 82 m

Hub height: 63 m

Total height: 103 m



Key insights & lessons learnt

a) *Challenges & barriers*

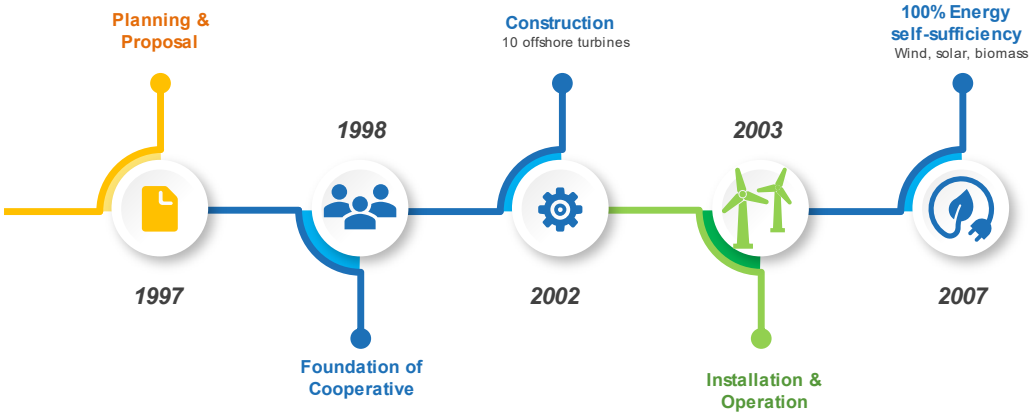
- ✓ Concerns about destroying Viking historical sites.
- ✓ Concerns about natural bird reservation and visual esthetics.
- ✓ Convincing the farmers on the island.

b) *Enablers*

- ✓ Presentation of the project as a business case/opportunity, instead of just an environmental project.
- ✓ Strong efforts by a couple of people, to convince the community.

c) *Impact*

- ✓ Indirectly increase employment on the island.
- ✓ The financial benefit to the co-owners of the turbine.
- ✓ Contribution to the island's touristic activity.



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4.19. Santo Domingo de Luna Wind Farm

4.19.1. Background context

The Santo Domingo de Luna wind farm has 9 wind turbines and a nominal capacity of 30 MW. It produces 116 GWh per year, enough to supply energy to 29,500 families. Its construction began in November 2018 and ended in September 2019. It is located in the Saragossa towns of Luna, Las Pedrosas and Sierra de Luna. This plant has been in operation since 2019 and has contributed to the growth of wind energy in the region and in the country reducing dependence on fossil fuels and countering the climate and energy crisis. The Saragossa area, where the plant is located, has particularly favourable natural conditions for harnessing wind energy. Therefore, many wind farms have been developed in this region. The regional economic context is characterised by the certain criticalities that contribute to an increase in the index of material and social vulnerability: low level of employment, high depopulation of young people, poor infrastructure, and difficult connections that render the area unattractive for investments.

Picture 22: Landscape of Santo Domingo wind farm (Enel Green Power, n.d.)

4.19.2. Environment

This plant is enabling the supply of renewable energy to about 29,500 Spanish households avoiding the emission into the atmosphere of about 76,000 t of CO_2 per year, contributing to Spanish energy transition and reducing Spanish dependence on fossil fuels to benefit the environment. The “Santo Domingo de Luna” wind farm is situated near the ZEPA (Special Protection Area for Birds) “Montes de Zuera, Castejón de Valdejasa and El Castellar”, whose code is ES0000293, specifically located 3.3 km to the south. Additionally, there is another ZEPA “La Sotonera”, with code ES0000290, located 13.3 km to the northeast. As for the Sites of Community Importance (SCIs), the closest one is “Montes de Zuera”, with code ES2430078, which is located 3.1 km to the south, and another one, “Bajo Gállego”, with code ES2430077, which is situated approximately 10 km to the southeast.

There are no protected natural spaces in the immediate vicinity of the facility within the Aragon region. The wind farm is located in a habitat dominated by grassland

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scrubs, alternated with agricultural land and Aleppo pine (Pinus halepensis) reforestation area. Among the fauna, the avifauna stands out, with the presence of species typical of open spaces and cereal pseudo-steppes. The visual analysis of the wind farm takes into consideration the perceptual environment, considering that the visual basin is relatively small. However, due to the flat and slightly undulating terrain in the study area, the wind farm infrastructures are visible from a large portion of the surface.

The impact analysis identifies the primary effects on the physical, biotic, and socioeconomic aspects of the environment. It concludes that during the construction phase, moderate impacts on the landscape are expected due to the movement of machinery and assembly of the wind turbines. The remaining impacts are deemed compatible. During the exploitation phase, the impacts reaching a moderate degree are related to landscape changes and habitat fragmentation caused by the presence of wind turbines, as well as potential collision with fauna. However, the other impacts are considered compatible. No severe or critical impacts resulting from the construction and operation of the wind farm have been identified.

Picture 23: Location of wind turbines in the Santo Domingo de Luna wind farm and location of the lesser kestrel colonies and other places of interest (Enel Green Power, n.d.)

Regarding the preventive and corrective measures, general measures were proposed on the atmosphere, water, soil, vegetation and fires, landscape, waste, services and archaeological and paleontological heritage. Regarding fauna, precautionary measures were implemented to minimize potential impacts on sensitive species. Specifically, efforts were made to schedule construction activities outside the reproductive period

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of the most vulnerable species. The actions that could have the most significant impact on the local fauna, such as clearing and earthworks, were conducted at the beginning of the construction phase.

When the works were carried out during the reproduction period, a specialist technician was monitoring the work area, marking out those areas that were most vulnerable due to the presence of nesting birds. There, work must not be carried out and monitoring of the steppe birds that breed in the vicinity of the wind farm, paying special attention to the lesser kestrel, little bustard, great bustard, black sandgrouse and Montagu's harrier, is conducted. During the exploitation phase, a follow-up of the accident rate of birds and bats is being carried out. In the event of obtaining high values of bird and/or bat mortality, the necessary corrective measures will be adopted. Measures will be also established for the dismantling phase.

The environmental surveillance programme proposed to control both during the works and in the operation of the wind farm, with a minimum duration of 3 years, and was carried out on the surfaces affected by the construction of the wind farm, that is, access roads, platforms and footings, installations attached to the works and underground energy evacuation line, fundamentally. Establishes a series of indicator sheets to verify the control of the proposed measures. With regard to fauna, monitoring of the steppe birds that breed in the area where the wind farm is located and its area of influence was carried out during the construction phase, especially breeding pairs, which are located on the site and in a 5 km radius around the wind farm. In the exploitation phase, the accident rate of birds and bats are being monitored with periodic sampling inside the wind farm to locate the carcass of birds and bats that have occurred as a result of the collision with the wind turbines, within a radius of 50 m around the wind turbines, every two weeks. In addition, to improve the protection of birds, bird detection and deterrence systems have been installed, which can stop the wind turbines in the event that the bird detected by the systems is in danger of colliding. A specific study of the potential interaction between the installation of the wind farm and the populations of the lesser kestrel was presented. After the analysis, it was planned to implement measures to try to make the wind farm compatible with the populations of the species settled in the area, by increasing the safety distances between the location of the wind turbines and the breeding colonies of lesser kestrels.

The separation between the turbines of the wind farm and the safety distance with the existing wind farms in the surroundings should allow permeability to the flight of birds and bats. A restoration plan was included, which defined the works for the contribution and extension of topsoil in the affected areas in a thickness of 20 cm, mesh placement work, hydroseeding of grasses, legumes and woody plants, and tillage, in the periods of March-April or September-October, using the rainy season to carry out natural irrigation on the area of action. During the construction process, the

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roads needed for the wind farm were built on existing roads, to avoid affecting additional area.

4.19.3. Society

In the area impacted by the Santo Domingo de Luna wind farm, the trend of population decline, which had been ongoing for over a decade, persisted and had a more pronounced effect on the town of Luna. In this rural area, approximately 35% of the population lacks formal education. Wind farm development in areas that already have existing wind turbines can indeed lead to a visual impact, particularly for localities that are already visually affected by the saturation of wind farms. The addition of turbines can expand the area classified as having “high” and “very high” visibility, especially in the east-southeast direction from the wind farm location. Regarding the acoustic impact, the urban nucleus closest to the wind farm, Las Pedrosas, is located 1,150 m away from the nearest wind turbine. This proximity can result in a sound level ranging between 35 - 40 dB(A), depending on the specific area within the town.

Finally, preventive and corrective measures were established on the atmosphere-noise, water, soil, vegetation, fauna, landscape, waste and discharges, both during the construction and operational phases. The population in the vicinity of the wind farm benefits from electricity production that does not pollute the water or the air quality and reduces smog, acid rain, and greenhouse gas emissions. Wind energy helps decrease healthcare and environmental costs associated with air pollution and contributes to achieving energy self-sufficiency and sustainable development.

4.19.4. Economy

This area can be classified as a disadvantaged area from the economic point of view as it has historically not had a developed industrial sector. In terms of cultural heritage, the area faces a significant lack of tourist infrastructure, including hotels. Five assets of cultural interest have been catalogued in the area, among which the Church of Santiago and the Church of San Gil de Mediavilla stand out. Four archaeological sites have been catalogued based on the inventory of archaeological heritage in the project area. The main economic benefit to neighbouring communities of this wind energy project is the opportunity for farmers to generate a new source of revenue through land lease payments. These payments are regulated by an agreement between the project developer and landowners. In addition, the involvement of local companies in various aspects of the project, including construction, civil works, services, and ongoing maintenance, has helped foster the local rural economy.

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Picture 24: Building built specifically for the conservation of the lesser kestrel (Enel Green Power, n.d.)

Within the company's CSV (Creating Shared Value) plan, several initiatives were carried out in the municipalities of the project area:

- Direct employment and employability for the local population. Training courses for wind farm supervisors were organised, specifically aimed at individuals from the local community with technical experience. Additionally, in collaboration with the contractor, a list of job offers was created and made available on the Town Council website.
- Indirect employment for local companies. The contractor was provided with a list of local establishments (e.g. restaurants, accommodation, etc.) to encourage the usage of local services.
- Donation to Luna Town Hall of 4kW of solar panels for the Town Hall building and 4 water tanks for the municipal hunting ground.
- Rehabilitation of the Church of San Gil in the town of Luna.
- Rehabilitation of the Ethnological Museum of the Las Pedrosas Town Hall.
- Completion of a training course as a tourist guide in the cultural and natural field in the town halls.

4.19.5. Procedures and Justice

The wind farm is owned by Explotaciones Eólicas Santo Domingo de Luna, S.A. Enel Green Power Spain participates in the shareholding of this plant, with 51%, and General Eólica Aragonesa, with the remaining 49%. The project for this wind farm has been authorised in accordance with current national regulations, which provide for an authorisation process involving mainly several local, and regional entities and authorities. Since the wind farm capacity is less than 50 MW all the procedures and authorisations are managed by regional

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administrations. The environmental impact assessment (EIA) for the project was conducted by specialists on behalf of the developer and the report of the results of the assessment was evaluated by regional authorities, who were able to make comments and request actions to be implemented in the project.

The Enel Green Power "Sustainable Construction Site" model has been applied in the construction of this wind farm, which includes the installation of photovoltaic solar panels to cover part of the energy needs during construction. In addition, water saving measures have been adopted through the installation of deposits and rain collection systems. Once the work was finished, both the photovoltaic panels and the water saving equipment were donated for public use. The construction of this wind farm has contributed to partially financing an Industrial Development Plan in the area. The developer also conducted a study to analyse and understand the context from an institutional, social, cultural and environmental point of view in order to identify relevant plans and projects for the creation of shared value from strategic issues and assets, scaling possible solutions across the territory. The project developer and local administrations engaged in several meetings and discussions to reach a final agreement on the economic feed for landowners in the areas affected by the project. Additionally, they discussed compensatory measures aimed at improving infrastructure, increasing green spaces, and restoring ancient buildings and other landscape elements with significant cultural value in the territory.

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4.19.6. Identity

Santo Domingo de Luna Wind Farm

Basic details

9 Wind Turbines

29.9 MW Power

29500 Houses

Wind farm type: Onshore

Location: Saragossa, Spain

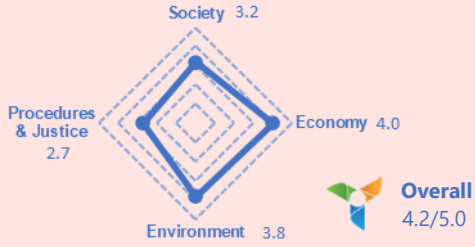
Ownership model: Corporate

Operator: Enel Green Power SpA

Rotor diameter: 132 m

Hub height: 84 m

Total height: 150 m



Key insights & lessons learnt

a) Challenges & barriers

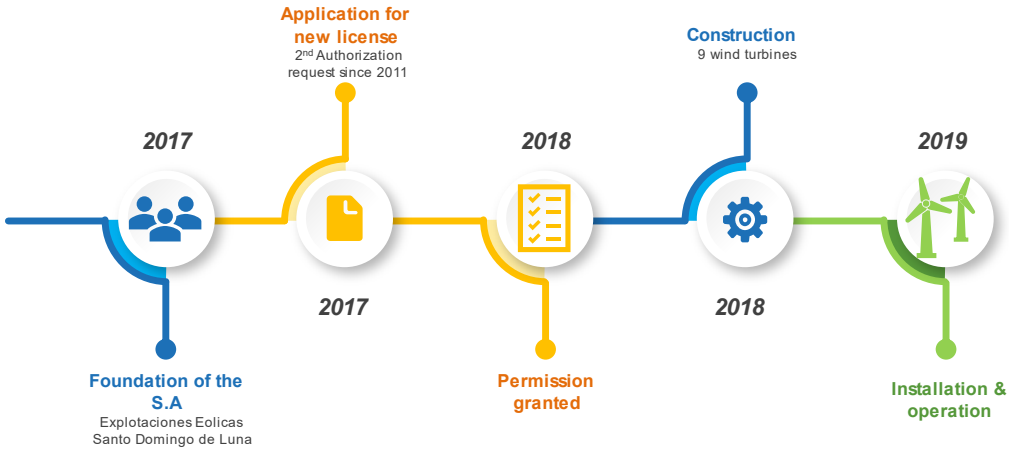
- ✓ Long authorisation process.
- ✓ Environmental issues (bird protection).
- ✓ Demonstrating that the plant was safe for human and animal health.
- ✓ Ensuring the protection of certain birds (preventive measures, environmental surveillance).

b) Enablers

- ✓ Energy transition policies at the national and regional level that fosters the need of implementing new renewable power plants.
- ✓ Implementation of environmental, social and economic compensatory measures, and satisfactory economic fees to landowners of the areas.

c) Impact

- ✓ Creating Shared Value plan in the project's municipalities.
- ✓ Economic benefits for the local community (employment, involvement of local companies, land lease payments).
- ✓ CO_2 emissions avoided: 76,000 t per year.



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4.20. Serra das Penas Wind Farm

4.20.1. Background context

The Serra das Penas wind farm has a capacity of 42 MW and 21 wind turbines. It produces 142 GWh per year, enough to supply energy to 36,200 families, and prevents the annual emission of 93,500 t of CO_2 into the atmosphere. Its construction began in December 2018 and ended in December 2019. It was connected to the network in December 2019 and it's located in Galicia region, in the town of Paradela. The wind farm is owned by Enel Green Power Spain (EGPE). This plant has been in operation since 2019 and has contributed to the growth of wind energy in the region and in the country reducing dependence on fossil fuels and countering the climate and energy crisis. The Galicia region, where the plant is located, has particularly favourable natural conditions for harnessing wind energy. In fact, many wind farms have been developed in this region. The regional economic context is characterized by several criticalities that contribute to an increase in the index of material and social vulnerability: low level of employment, high depopulation of young people, poor infrastructure, and difficult connections that make the area unattractive for investments.

Picture 25: Landscape of Serra das Penas, part of Paradela town and three wind turbines of the wind farm (Enel Green Power, n.d.)

4.20.2. Environment

This plant is enabling the supply of renewable energy to about 36,200 Spanish households avoiding the emission into the atmosphere of about 93,500 t of CO_2 per year, contributing to Spanish's energy transition and reducing Spanish dependence of fossil fuels to benefit the environment.

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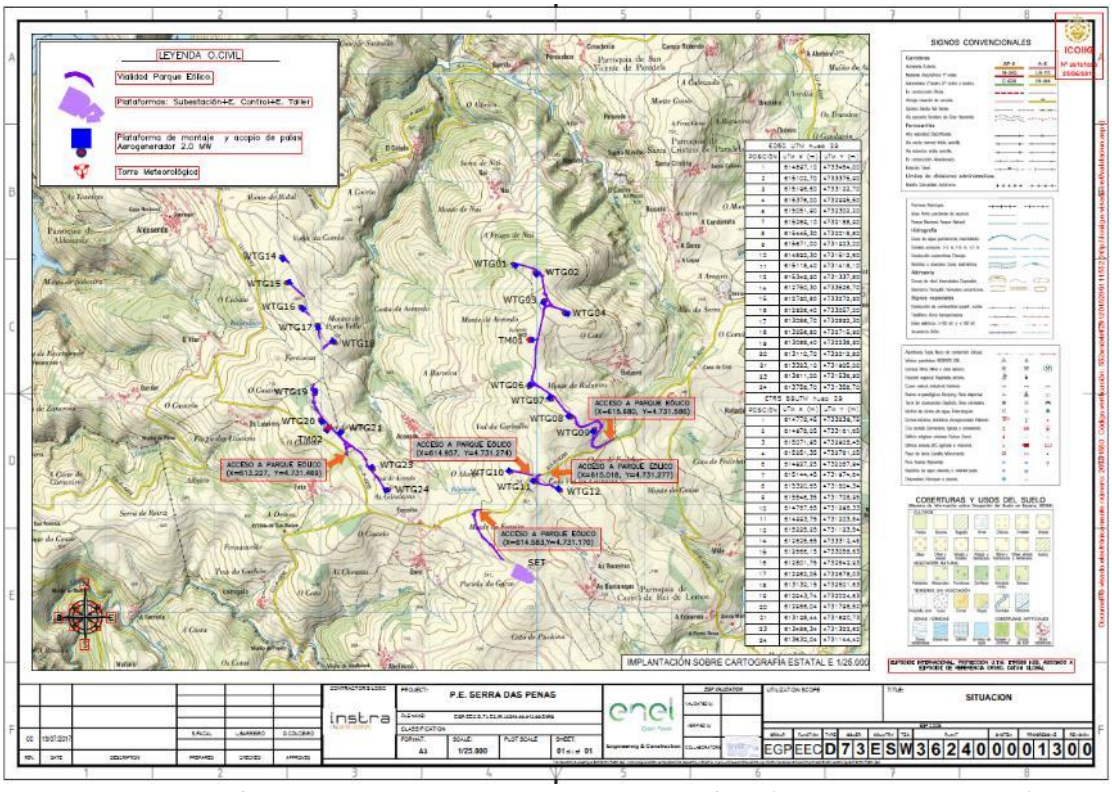
The wind farm is located on a series of elevations in the surroundings of Monte Acebedo in the municipality of Paradela (Lugo), in the Galicia Region. The vegetal landscape of the study area is very marked due to the ancestral use of man, which has modified the natural formations for the use of wood and the need to create cultivation areas. The location of the wind farm does not include land belonging to any Protected Natural Area and it is not included in any of the Important Bird Areas (IBAs) cataloged by Spanish Ornithological Society (SEO) - Birdlife.

Neither the Environmental Impact Studies nor the Environmental Impact Declaration established compensatory measures, but several Corrective Measures of interest were proposed to improve the environmental and social quality of the place and the knowledge and care of the cultural heritage and the birds and bats possibly affected. A hydrological monitoring plan, a birdlife monitoring plan, a restoration and revegetation plan, a noise level monitoring plan and water quality control, an archaeological project and a proposal for compensatory measures on tourist values were developed.



Picture 26: Location of wind turbines in the Serra das Penas wind farm (Enel Green power, n.d.)

During the construction stage, the appropriate measures were adopted to protect the birds reproductive period, including the establishment of an exclusion perimeter of about 500 m in radius around the nest, where any action will be avoided until the end of the reproductive period (being able to continue with the works in another area of the park) and another security perimeter of 500 m, where actions and traffic of the machinery will be limited as much as possible to guarantee the tranquility of the birds.

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An additional action to protect some bird species is the removal of the carcasses of animals of a certain size in the surroundings of the wind farm, to minimise the chances of collision of carrion birds. A plan was developed for the monitoring of birds and bats in view of the appearance of possible cumulative effects (additive or synergistic with another nearby wind farm) on birds and bats between both wind farms, as well as with their energy evacuation line, through the joint evaluation of the results of their respective follow-up plans. If these effects were observed, appropriate protective and/or corrective measures would have to be taken.

4.20.3. Society

In the area affected by the Serra das Penas wind farm, there is a gentle downward population trend, typical of agricultural municipalities. There is a clear aging of the population, which may be due to a possible abandonment of the rural world. The wind farm will visually affect Paradela town, but for the construction and exploitation phases, preventive and corrective measures were established on the atmosphere-noise, water, soil, vegetation, fauna, landscape, waste, and discharges. The population in the vicinity of the wind farm benefits from electricity production that does not pollute the water they drink or the air they breathe and cause less smog, less acid rain, and fewer greenhouse gas emissions. Because it is a clean energy source, wind energy reduces health care and environmental costs associated with air pollution. Furthermore, wind power also helps achieve energy self-sufficiency and it is a step in the direction of sustainable development.

4.20.4. Economy

This Paradela area can be classified as a disadvantaged area from the economic point of view as it has historically not had a developed industrial sector. The average unemployment rate in recent years is 11 %. Regarding cultural heritage, there is a notable lack of tourist infrastructure and also of hotels. 14 assets of cultural interest have been cataloged in the area, among 13 Neolithic mounds and 1 castro from the Iron Age, and a possible imprint of a burial mound. To improve the integration of the project with the tourist values that must be preserved and promoted in the area planned for its implementation, the promoter prepared a proposal for compensatory measures that would minimise the incidence of said values and help maintain the tourist lines of the establishments created and the local administration, as well as enhancing the environment mainly from a touristic point of view. Everything related to the elaboration and development of said proposal of measures was agreed with the General Directorate of Tourism.

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In the case of the compatible impact on the Modorra das Cruces, a works exclusion area of 167 m in radius was established, measured from the outer limit of the asset. Carrying out any type of work in this area required a favourable report from the General Directorate of Cultural Heritage.

The main economic benefit to neighbouring communities of that this wind energy project is a new source of revenue for farmers in the form of land lease payments, regulated by an agreement between the project developer and landowners. In addition, the local economy, mainly rural, was fostered by involving local companies both during construction work, for civil works and services, and for ongoing maintenance work.

Within the company's CSV (Creating Shared Value) plan, several initiatives were carried out in the municipalities of the project area:

- Direct employment and employability for the local population. Training courses for wind farm supervisors were given, aimed at local populations with technical experience, and a list of job offers was created together with the contractor to be published on the Town Council website.
- Indirect employment for local companies. The contractor was provided with a list of local establishments (restaurants, accommodation…) to encourage the use of local services.
- Biomass stove for Paradela Women's Association.
- Energy efficiency actions in various Paradela buildings.
- Ruta do Loio: improvement of an existing tourist route that will promote the socioeconomic development of the area.

4.20.5. Procedures and Justice

The wind farm is owned by Enel Green Power Spain, S.L. The project for this wind farm has been authorised in accordance with current national regulations, which involve a thorough authorisation process including several local, and regional entities and authorities. Since the wind farm capacity is less than 50 MW, all the procedures and authorisations are managed by regional administrations. The environmental impact assessment (EIA) for the project was conducted by specialists on behalf of the developer. The report of the assessment results was evaluated by regional authorities, who were able to make comments and request actions to be implemented in the project.

The Enel Green Power “Sustainable Construction Site” model has been applied in the construction of this wind farm, which includes the installation of photovoltaic solar panels to cover part of the energy needs during construction. In addition, water saving measures have been adopted through the installation of deposits and rain collection

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systems. Once the work was finished, both the photovoltaic panels and the water saving equipment were donated for public use. Furthermore, the construction of this wind farm has contributed to partially financing an Industrial Development Plan in the local area.

The developer also conducted a study to analyse and understand the context from an institutional, social, cultural and environmental point of view in order to identify relevant plans and projects for the creation of shared value from strategic issues and assets, scaling possible solutions across the territory. The project developer and local administrations had several meetings and discussions to finalize an agreement on the economic feed satisfactory for landowners of the areas and on compensatory measures to improve the infrastructures, increase the green spaces and restore ancient buildings and other landscape elements with high cultural value in the territory.

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4.20.6. Identity

Serra das Penas Wind Farm

Basic details

21 Wind Turbines

42 MW Power

36200 Houses

Wind farm type: Onshore

Location: Paradela, Spain

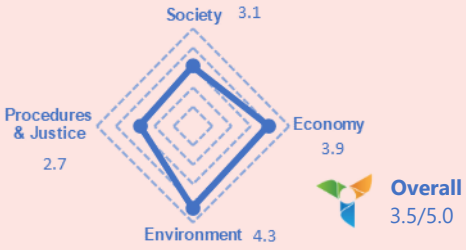
Ownership model: Corporate

Operator: Enel Green Power SpA

Rotor diameter: 114 m

Hub height: 93 m

Total height: 150 m



Key insights & lessons learnt

a) Challenges & barriers

- ✓ Long authorisation process (more than 15 years of bureaucratic processing).
- ✓ Proximity of some wind turbines to urban areas.
- ✓ Permitting phase regarding the payment of compensations.
- ✓ Demonstrating that the plant was safe for human and animal health.

b) Enablers

- ✓ Energy transition policies at national and regional level.
- ✓ Implementation of environmental, social and economic compensatory measures.

c) Impact

- ✓ Avoiding the emission into the atmosphere of around 93,500 t of CO_2 per year.
- ✓ Economic benefits for the local community (employment, involvement of local companies, land lease payments).
- ✓ Creating Share Value plan for local municipalities.

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[3] The analysis of this case took into consideration information from files and documents that are used internally within EGP. Among others, the following files and documents were particularly taken into account: Environmental Impact Assessment, June 2004; Environmental Impact Statement, September 2006; SEECA_Plan CSV Serra das Penas wind farm, January 2018; Serra das Penas wind farm Project, June 2018; Environmental studies of project surroundings.

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4.21. Sifnos hybrid power plant Wind Farm[4]

4.21.1. Background context

The development of the wind park, as a part of the integrated hybrid power plant with a seawater pumped hydro system, was initiated by the Energy Community of Sifnos to address the electricity demand in Sifnos. The island of Sifnos, being a typical one in the Cyclades complex, has high wind potential, which prompted the members of the Sifnos Energy Community to follow the European trend of harnessing RES. Recognizing the island's high wind potential, they decided to explore the option of harnessing wind energy to meet the island's energy needs (Katsaprakakis, D., 2018).

The members of Energy Community initiated the development of a highly effective and beneficial hybrid power plant, and subsequently proceeded with the necessary studies for its implementation. Their primary motivations were to meet the energy needs of the island and mitigate the risks associated with the exclusive dependency of the island on imported oil, which was transferred to Sifnos by ships. They recognised the risk of energy shortages on the island if the required oil supplies failed to arrive at Sifnos due to adverse weather conditions or geopolitical issues. Additionally, their environmental awareness and understanding of the negative impact of oil consumption on the atmosphere, such as the emission of carbon dioxide and other harmful pollutants, were also significant motives for their involvement in the project.

Picture 27: Photomontage picture of the wind park's view from the opposite hill of Agios Symeon (Personal photo archive of D. Katsaprakakis)

At last, another important motivation was the recognition of the extremely high electricity production cost on the island with the existing autonomous power plant, which, ultimately burdens the consumers through electricity bills. Currently, all the Greek consumers have the same electricity procurement price. The islanders pay less than the actual electricity production cost, while mainland consumers pay more than the electricity production cost in the mainland electricity system. So, indirectly, the higher production cost in the insular autonomous systems in Greece is subsidized by the mainland consumers. If this subsidization was to stop and the islanders were

[4] Unless otherwise stated all information is taken from the Stakeholders Interview.

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required to pay the real electricity production cost in their islands, unfortunately, they will not be able to afford it. This raises concerns regarding energy security as well.

4.21.2. Environment

The wind park has been located outside and at a considerable distance (closest distance to the boundaries being 2.7 km) of the unique NATURA 2000 region in the island (SCI GR4220008 (Natura 2000 viewer, 2023), with the title "Profitis Ilias until western coast and sea region"). Additionally, on the whole island there is no Special Protection Area for birds. The installation site is characterized by small thorny bushes and limestone rocky formations. As a result, the selected area is not environmentally sensitive and therefore, the wind park and the seawater pumped storage system will have minimal to no impact on the natural environment.

> *"The wind park has been sited outside and far away (2.7 km) of the unique NATURA 2000 region in the island. The hybrid power plant will not have any effects on the natural environment." (Interviewee)*

4.21.3. Society

The public opinion in Sifnos regarding wind parks was predominately negative due to a previous unfavourable experience. Specifically, in 2003 the private firm "PPC Renewables" made an attempt to install 2 wind turbines of 900 kW each in Sifnos without informing the local community which led to the negative public opinion on wind parks. As a result, the residents of Sifnos became angry and opposed the installation of the wind turbines. The strong opposition from the community led to the investors being sent away. One of the first priorities of the Energy Community of Sifnos was to inform the local community about the numerous benefits that could be derived from the exploitation of the wind energy on the island. Through a series of initiatives, such as the implementation of measures to reduce plastic bag usage on the island, the Energy Community of Sifnos gradually gained the appreciation and the acceptance of the local residents. The final outcome of these efforts was the unanimous decision from the Municipal Council of Sifnos to support the hybrid power plant, leading to the official participation of the Municipality of Sifnos in the Energy Community (Katsaprakakis, D. A. et al, 2022a).

The careful design and siting of the project played a significant role in achieving this outcome. The wind park is located at a considerable distance from the island's settlements, (more than 4 km from the closest settlement) and the main touristic areas (Katsaprakakis, D. A. et al, 2022b). As a result, there is no visual or noise disturbance

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expected from the wind park's operation. Thus, minimal to no impact is expected on the existing human activities throughout the island.

In October 2018, representatives from the European Commission for the "Clean Energy for EU Islands" initiative visited Sifnos and engaged in meetings with all the stakeholders involved. During the meetings, they witnessed the full approval and support of the local community for the project. As a result of these factors, Sifnos was ultimately chosen as a pilot island for the "Clean Energy for EU Islands" initiative. This decision generated high expectations among the residents of Sifnos. However, since the Community's initial attempts to implement the project in 2016, there have been significant challenges and delays, resulting in a sense of disappointment among the local residents. They feel frustrated by the long and difficult journey ahead towards achieving energy democracy and independency on their island. The citizens now perceive the Greek Centralized Administration, as an adversary rather than a partner, as they feel defeated by the challenges posed by the administration.

4.21.4. Economy

The hybrid power plant will supply the generated electricity to the grid utility at a predetermined contractual price. A portion of the net profits, to be determined by the Management of the Board, will be distributed among the Community's members based on their respective shareholdings in the Community. The remaining profits will be reinvested in new development projects, aiming at creating new professional opportunities and addressing critical issues on the island, such as improving the potable water supply and enhancing maritime transportation during winter.

Picture 28: A photomontage picture depicting the view of the wind park from the nearby hill of Agios Silivestros (Personal photo archive of D. Katsaprakakis)

Furthermore, the local community will benefit from the increased energy supply security, ensuring uninterrupted access to electricity for their current activities on the

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island. The project will also enable the provision of low-cost electricity to the insular community, by harnessing the local RES. This could prevent private investors, who have no connection to the island, from exploiting these resources and potentially driving up electricity prices for the end consumers. When the electricity procurement price remains low for the insular consumers, it enables the residents to sustain their livelihood on the island, and it also allows businesses and professional activities to be more profitable. Another benefit is the characterization of the island as "green island", which is expected to attract a significant number of ecologically sensitive tourists from Europe and beyond. These tourists prioritise visiting places that actively contribute to addressing climate change.

The land value in the vicinity of the wind park's installation site is not anticipated to be significantly affected either positively or negatively. The specific area chosen is a remote location on the island with high wind potential. This characteristic, along with other factors, led to its selection for the wind park. As a result, it is not considered suitable for the development of another settlement or any other human activity. These arguments are supported by the fact that no significant human activity has been developed in the specific area over the last few decades.

4.21.5. Procedures and Justice

The owner of the hybrid power plant, including the wind park, will be the funders of the project until all the private or bank loans are paid back. Once the received funds have been repaid, the ownership of the project will be transferred to the Energy Community of Sifnos. The project's annual profits will be distributed among all the members of the Community, according to their respective percentages in the shareholders' synthesis.

For the funding of the project, regarding equities, the Community will issue an open call inviting its members to participate based on their individual interest and financial capacity. The maximum participation percentage of a single member (whether an individual or a legal entity) in all the Community's projects is legally defined at 20%. However, the Community is likely to significantly reduce this percentage, possibly to 10% or even 5%, in order to enable more members to participate in the investment. Priority will be given to those who apply first.

> *"The maximum participation percentage of a single member in the project will be at 10% or even 5% to allow the participation of a greater number of members in the investment..."*
> *(Interviewee)*

The Municipality of Sifnos is fully aware and actively participating in the project, along with the Regional Authority of South Aegean, the Regulatory Authority of Energy and

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the insular grid utility (HENDO), who are well-informed about the project. The Ministry of Environment and Energy has been regularly informed about the project through multiple letters sent by MEC. Therefore, it can be assumed that the ministry is fully aware of the project. The local society is kept well-informed about any potential news on the projects, any changes that have been done, and the overall project's progress.

4.21.6. Additional Information

The efforts of Energy Community of Sifnos, since its foundation, have been pioneering. It is a fact that they gained broader public acceptance as RES became widely known and familiar to the local community through the mainstream media. For the residents of Sifnos, there is no longer any doubt that they should proceed as a society with the renewables. The remaining question, however, is which specific technologies to adopt and how to implement them. The Russian invasion in Ukraine and its consequences in Europe helped to understand the risks associated with the dependence on imported energy sources. Conclusively, it is widely accepted that RES should be the primary energy production sources. There is no longer any doubt for the necessity of implementing the hybrid power plant in Sifnos.

The Sifnos Energy Community's initiative particularly through the design and the development of the hybrid power plant, has several innovation features at a global level, such as:

- It is the first global level project of a hybrid power plant that combines the operation of a wind park and a pumped hydro storage (PHS) system utilising seawater (all of its components: storage reservoir, pumps, and hydro turbines).
- It is the first global level project with a sizing, which aims to achieve 100% coverage of electricity consumption in an autonomous, non-interconnected insular electrical system.
- It is the first global level project, which aimed at achieving 100% coverage of the energy needs for all final energy forms in an autonomous, non-interconnected island, implemented by a local energy cooperative scheme.

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4.21.7. Identity

Sifnos hybrid power plant Wind Farm

Basic details

4 Wind Turbines

12 MW Power

1500 Houses

Wind farm type: Onshore

Location: Sifnos, Greece

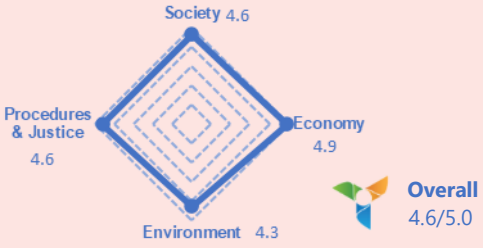
Ownership model: Social

Operator: Sifnos Energy Community

Rotor diameter: 82 m

Hub height: 78 m

Total height: 119 m



Key insights & lessons learnt

a) *Challenges & barriers*

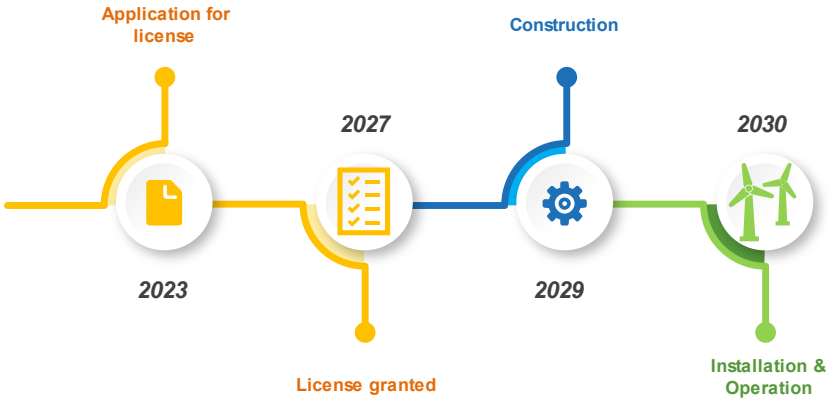
- ✓ Convincing the Ministry of Environment and Energy about the necessity of the hybrid power plant.
- ✓ Convincing the local citizens to accept the hybrid power plant and participate in this.
- ✓ Attracting external funders.

b) *Enablers*

- ✓ The high wind potential available in the installation site.
- ✓ The huge developmental perspectives that the project can have for the insular community.
- ✓ The capacity of the Community to approach the local society and promote its involvement in the project.

c) *Impact*

- ✓ The project will prove the capacity of energy communities in Greece to install large size energy transition projects.
- ✓ It will be worldwide pilot project, for 100% energy needs coverage from a local energy community, with a wind park and a seawater pumped storage.



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4.22. Sitia Wind Farm[5]

4.22.1. Background context

The owner, is the 'Sitia Development Organisation' (SDO), is a multi-shareholder developmental joint-stock company. It is characterized as a 'Local Government Organisation' and it counts 20 shareholders, among them 2 Municipalities of the area, Cooperatives, Collective organisations, the Pan-Cretan Bank and others. The oldest of the two wind parks of Sitia Development Organisation was commissioned in 1993 (Katsaprakakis, D. et al., 2012). This wind farm was installed as a part of an experimental programme initiated by the European Union and the contract for its installation was signed in 1989-1990. It is one of the oldest wind farms in Greece and perhaps the first in Crete. When it was installed, it was considered a novel and pioneering development, attracting attention and interest from people. Schools and universities organised field trips to the wind farm. With this installation, the SDO paved the way for the utilisation of wind energy in Greece, opening up new possibilities and inspiring new projects. Another reason for the participation of 'Sitian Development Organisation' was the potential income it could generate. The first project wind farm project faced obstacles primarily due to insufficient legislation and the difficulties in obtaining permits. However, after the successful completion of the project, it paved the way for improvements in legislation and the licensing process for the future projects (Katsaprakakis, D. Al et al 2022).

Picture 29: The first wind turbine of the Sitia Development Organisation (Personal photo archive of Mr. Tsantakis).

[5] Unless otherwise stated all information is taken from the Stakeholders Interview.

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4.22.2. Environment

The operation of the three (3) wind turbines of the Sitian Development Organisation has not caused any environmental impacts, and there have been objections from the local community. The environmental terms were set during the licensing stage, and they have been fully respected. On the contrary, the other wind farms in the area do encounter comparable issues, including visual disturbances and environmental burdens, which provoke strong reactions from local residents. There are also applications submitted for licensing in the Regulator for new large wind farms often initiated by big corporations, which involve extensive road construction over several km. The extensive road construction can indeed result in a significant environmental burden, especially in this area that hosts an UNESCO World Geopark.

> *"There are no environmental impacts caused by the 3 wind turbines of the Sitian Development Organisation and neither do people have any objections. The environmental terms were set during the licensing stage, and they have been fully respected."* (Interviewee)

4.22.3. Society

At first, the local community welcomed the project with curiosity and joy, and there was even an increased interest in visiting it. Then, unfortunately, the uncontrolled development of numerous new wind farms – a trend that has occurred in many regions of Greece, including that of MEC – has created the exact opposite feelings. This uncontrolled installation of wind parks has generated objections and environmental concerns, particularly in areas like the Municipality of Sitia that have high wind potential. There are no concerns regarding the wind farms of Sitia Development Organisation, which have low nominal power.

The area of the wind parks' installation is primarily used for sheep grazing and it is not utilised for other activities. The sheep grazing activity continues without any problems, and there are no fences or restrictions that block access to the area. No environmental impacts of the Sitia Development Organisation wind parks have been reported and there have been no objections from the local residents.

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4.22.4. Economy

The local community benefits from the wind parks by being relieved of the several usual municipal rates, such as for water supply for domestic use and irrigation. In addition, rural road construction has been carried out in the areas surrounding the wind farms, improving accessibility and infrastructure. Furthermore, the wind farms do provide a complementary income to the owners of the land which is rented to host the installation. The fixed costs of the company are covered from the aforementioned revenues, and the remaining funds are primarily allocated to the local community. Another benefit that should be mentioned is the provision of a discount on electricity bills for residents residing in close proximity to the wind farm. Practically, the residents in the nearby settlements of the wind parks have been offered considerable discounts in the electricity procurement cost since the beginning of the wind parks' commercial operation.

The Sitia Development Organisation rented lands from private individuals, some of which were previously barren or unused. In certain cases, the owners were not fully aware of the exact location or boundaries of their owned lands. The projects have not significantly increased the land value in the area. After the excessive concentration of wind farms in Municipality of Sitia, there is a general concern in the local community that the land value may decrease. However, no facts have been recorded so far.

4.22.5. Procedures and Justice

The wind farms in question are owned by the Sitia Development Organisation, which is a multi-shareholder joint-stock company 152 categorised as a 'local Government Organisation'. Among the shareholders of the Organisation are the Municipalities of the region, as well as 18 shareholders in addition, including cooperatives, associations of hoteliers, traders, and the Pancretan Bank. The profit distribution follows the standard practices of joint-stock companies. The generated profits are primarily reinvested in the local community through various developmental projects, infrastructure works, including studies, sponsorships, events and other initiatives. In this way SDO turns the exploitation of wind energy into a pylon for the general development of the local community.

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The planning of the wind farms was carried out by the Sitia Development Organisation, with the involvement of public bodies during the licensing stage. The local community had a positive response to the whole project, and no public consultation was required as there was no need to convince anyone.

> *"Public bodies were involved in the licensing stage, and the local community had a positive response to the whole project. As there was no need to convince anyone, public consultation was not conducted."* (Interviewee)

4.22.6. Additional Information

The specific wind farms can be considered as an example of good practice as they paved the way for the utilisation of wind energy in Greece. They were among the first wind farms to be installed and successfully overcame the difficulties encountered, especially during the licensing phase. A successful model was established for wind energy investments with no issues of social acceptance raised. The impacts on wildlife, in particular birds, are negligible, and the project ensures compliance with environmental terms and regulations.

The two (2) wind farms of the Sitian Development Organisation were groundbreaking and pioneering investments of their time and were widely and comprehensively accepted by society. Furthermore, these investments paved the way for future similar investments in Crete. However, since 2010 a large number of applications for new wind parks installation have been submitted to the Regulator, capturing almost all the mountain ridges and tops in the eastern part of the island and creating, in this way, important risks on the environmental conservation, the landscape aesthetics and the existing human activities. These large size applications for new wind parks projects have configured a strong negative attitude in the whole island against them.

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4.22.7. Identity

Sitia Wind Farm

Basic details

3 Wind Turbines

1.7 MW Power

1500 Houses

Wind farm type: Onshore

Location: Crete, Greece

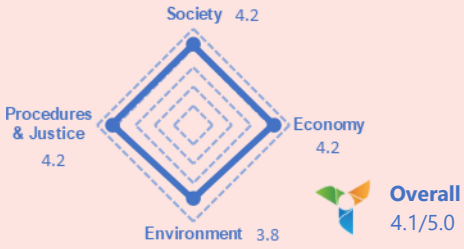
Ownership model: Hybrid

Operator: Organisation for the Development of Sitia

Rotor diameter: 44 m

Hub height: 45 m

Total height: 67 m



Key insights & lessons learnt

a) *Challenges & barriers*

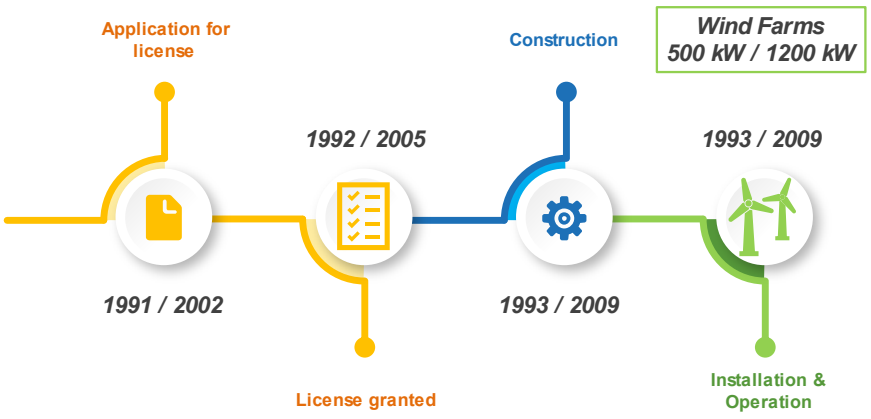
- ✓ Development and contrast of a new innovative project.
- ✓ Convincing the local citizens and stakeholders to form the new organisation.
- ✓ Overcoming the licensing process, given the lack of an integrated legal framework.

b) *Enablers*

- ✓ The high wind potential available in the installation site.
- ✓ The lack of any other similar projects in the area and the availability of plenty of candidate installation sites.
- ✓ No negative reactions and/or concerns from the local community about the environmental impact and the existing human activities.

c) *Impact*

- ✓ It proved the capacity of local initiatives in Greece to install wind energy projects.
- ✓ An example of good practice for the utilisation of wind energy in Greece.
- ✓ It has paved the way for the utilisation of wind energy on the service and for the benefit of local communities.



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4.23. Tilos Wind Farm[6]

4.23.1. Background context

The wind park serves as a component of the hybrid power plant in Tilos island. The main need that was addressed with the decision to develop the specific project was the improvement of the quality of the electricity supplied to the local residents of the island. Tilos island is interconnected with an underwater sea cable, passing through the island of Kos, which connects it with the insular grid of the islands Kos-Nisyros and island of Kalymnos. Tilos, being the final destination of the underwater cable's route, has experienced several contingencies, such as intermittencies and other stability issues in the electricity supply. Recognizing the need to enhance the security and quality of electricity supply in Tilos, the installation of the hybrid power plant was deemed necessary.

The key advantage of the small insular communities is the proximity between local Authorities and residents. Unlike in larger cities, these communities are more personal and connected. All aspects of the hybrid power plant installation and the concerns raised by the residents were extensively discussed in organised open-public workshops, as well as in gatherings at the traditional cafés of the island, where the residents usually meet each other. This allowed for thorough and in-depth discussions, addressing several issues and taking into account residents' perspectives before the installation began.

4.23.2. Environment

No environmental impacts have been recorded on the island due to the operation of the wind turbines. The site of the project was carefully selected. Since the whole island is designated as a special environmental region, in particular NATURA 2000 region (SCI GR4210024, with the title "Antitilos, Pelekousa, Gaidouronisi, Giakoumis, Agios Andreas, Prasouda, Nisi and sea region") (Natura 2000 viewer, 2023), a special environmental impact study was conducted. It must be underlined that during the planning phase of the hybrid power plant, a different installation site was chosen for the wind turbine's installation. Since the island of Tilos constitutes a wildlife habitat, two environmental impact studies had to be conducted (Boulogiorgou, 2020),

> *"The initially chosen location for the wind turbine's installation was identified as a habitat for a pair of eagles. To mitigate any [potential] risk for these eagles, the wind turbine was installed in a different site."*
>
> *(Interviewee)*

[6] Unless otherwise stated all information is taken from the Stakeholders Interview.

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(Duchaud, J.-L. et al 2019). From these studies, it was discovered that the initially chosen location for the wind turbine's installation was utilised as a habitat by a pair of eagles. To mitigate any potential risks to this pair of eagles, the decision was made to install the wind turbine in a different location.

4.23.3. Society

The local community is well-informed and aware of both the wind park and the hybrid power plant. During the planning phase of the project, there were several meetings held with the consultant (the University of Western Attica). Plenty of workshops were implemented to ensure that all the citizens on the island are fully informed about the hybrid power plant. There was not even a single citizen in Tilos who was not aware of the technology to be installed, as they were informed well in advance of the installation of the project (Stephanides, P. et al 2019).

The local community is satisfied with the wind park and the hybrid power plant. After making many efforts, the local community has successfully achieved its main goal of improving the quality of the supplied electricity and enhancing the stability of the local grid. This achievement signifies that the residents in Tilos island were able to convince the project's owner to operate the hybrid power plant during periods of intermittencies in the islands of Kos or Nisyros. There have been recorded cases where, although power blackouts occurring in these islands, Tilos continues to receive an uninterrupted electricity supply. At this moment, the residents in Tilos have raised a new demand that is considered fair and sensible by the local Municipality. After the Russian invasion in Ukraine, the cost of electricity procurement has significantly increased, leading the residents of Tilos to demand that a portion of the economic benefits from the hybrid power plant's operation be offered as discounts in the electricity bills.

Although the wind turbine of the hybrid power plant has been installed close to one of the most popular beaches on the island, no problems have been recorded so far. Another activity taking place in the same area is traditional livestock, which, fortunately, is unaffected by the wind park's operation.

4.23.4. Economy

The local community benefits from the promotion of the island. Thanks to the hybrid power plant, Tilos has gained significant exposure abroad and has become popular. The project has received 4 European awards, out of which one was also accompanied by a monetary prize. Another benefit of the project is the creation of one job position. Additionally, there is a compensatory public fee paid to the local Municipality, although it is relatively small.

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This amount is offered exclusively bi-annually for the settlement of the Big Village, given its proximity to the hybrid power plant's installation site. The impacts of the hybrid power plant are primarily indirect, as it is a privately owned project. However, to ensure some benefit for the local residents, a portion of the project's revenues is proposed to return back to them in the form of a discount on their electricity bills. The electricity demand in Tilos is 100% covered by the hybrid power plant. However, the local residents still have to pay for their electricity consumption. The importance of this wind park lays on the fact that it constitutes a component of an innovative hybrid power plant, funded by the European Commission project, which achieved to engage and stimulate the local citizens as active actors in the energy transition process in the island.

4.23.5. Procedures and Justice

The hybrid power plant is entirely owned by the private firm EUNICE Energy. The site where the wind turbine has been installed belongs to the Greek State, while the site of the photovoltaic plant belongs to the Municipality of Tilos. However, the rental fee for the photovoltaic plant site is very small. The local Municipality generally believes that the benefits from the operation of the hybrid power plant are not fairly distributed, as the main recipients are not the final consumers.

> *"The benefits from the operation of the hybrid power plant are not fairly distributed, as the main recipients are not the final consumers." (Interviewee)*

4.23.6. Additional Information

The project in Tilos is considered a best practice case in Europe, as it is the first project to combine a wind turbine, photovoltaics and batteries for the electrification of an island. It was one of the pioneering projects that aimed to meet the power demand and enhance the stability and security of the grid in an island system through the integrated operation of renewable energy production plants and storage devices.

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4.23.7. Identity

Tilos Wind Farm

Basic details

1 Wind Turbines

800 kW Power

500 Houses

Wind farm type: Onshore

Location: Crete, Greece

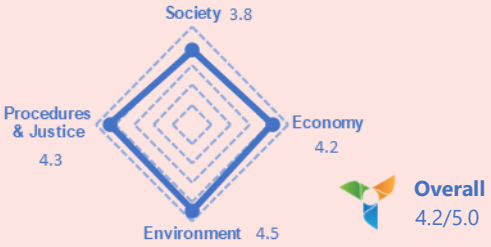
Ownership model: Corporate

Operator: Eunice

Rotor diameter: 53 m

Hub height: 60 m

Total height: 87 m



Key insights & lessons learnt

a) *Challenges & barriers*

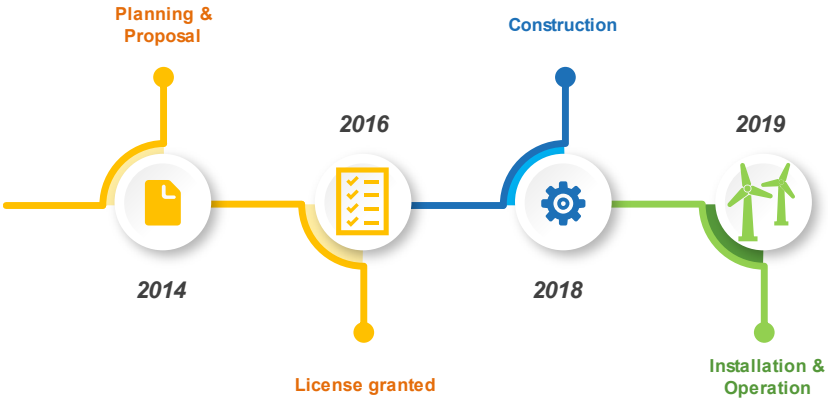
- ✓ Supporting the local citizens to understand and accept the overall project.
- ✓ Convincing the plant's owner to keep the plant under operation during periods of cut off from the underwater cables.
- ✓ Avoiding potential risks on the bird's fauna in the island.

b) *Enablers*

- ✓ The high wind potential available in the installation site.
- ✓ The usual black-outs and the low power quality in the island.
- ✓ Support of the local Municipality and the University of Western Attica.

c) *Impact*

- ✓ The wind park covers 100% of the annual electricity demand in Tilos.
- ✓ The residents in Tilos have been familiarized with the RES technologies.
- ✓ It will constitute the first small size hybrid power plant in Europe which covers 100% the electricity demand of an island.



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4.24. Tragoudistis Wind Farm[7]

4.24.1. Background context

The basic need that led to the decision to support the wind park was to meet a portion of the electricity demand on the island and reduce the reliance on the polluting thermal power plant operating there. In 2003, the private firm PPC Renewables initiated the licensing process for the installation of two (2) wind turbines in a site with the name "Tragoudistis" (that means "singer" in Greek), located in the northern Sifnos, close to the settlement of Heronissos. Although the Municipal Council made the necessary decision for the installation of the wind park, it was met with as a significant negative reaction from the residents of Heronissos (Katsaprakakis 2012a). This development prompted the Mayor to reconsider the municipal decision, leading the Municipal Council to appeal to the Council of State, requesting a review of the decision regarding the installation of the wind park.

The main challenge was to convince the residents in the broader area about the necessity of installing the wind park. This task proved to be considerably difficult, due to the mentality of the local residents, particularly among the elderly population. They were concerned about the potential damages that the wind park could cause in their area, based on what they had heard or read.

After the change in leadership with a new Mayor and Municipal Council in 2011, the negative attitude towards the wind park's installation persisted among the residents. A major objective of the new Municipal Authority was to achieve energy autonomy of Sifnos. A consultation and awareness raising process was initiated with the residents of Heronissos to address their concerns and provide them with information. After two years, in 2012, the residents of Heronissos were convinced of the important benefits and the minimal environmental impacts of this project. So, the initial negative opinion was changed, and the vast majority of the local residents reached an agreement in support of the project. The appeal to the Council of State was withdrawn, and the local community approved the installation of the 1.2 MW wind park in the area.

4.24.2. Environment

The residents, of course, had read relevant articles, mainly in social media, which claimed that wind parks have serious, destructive impacts on the local flora and fauna and pose particular risks for birds. However, in practice, no important impacts of the installed wind turbines on the surrounding environment have been observed so far.

[7] Unless otherwise stated all information is taken from the Stakeholders Interview.

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The wind park has been sited outside and far away from the unique NATURA 2000 region in the island (SCI GR4220008), with the title "Profitis Ilias to the western coast and sea region" (closest distance to the NATURA 2000 regin's boundaries 3.3 km) (Natura 2000 viewer, 2023). Additionally, in the whole island there is no designated Special Protection Area for birds. The installation site is characterised by small thorny bushes and limestone rocky formations. Consequently, the selected area is not environmentally sensitive and therefore, the wind park and the seawater pumped storage system are not expected to have any significant effects on the natural environment.

> *"The wind park has been sited outside and far away (3.3 km) from the unique NATURA 2000 region in the island. No impacts of the wind turbines on the natural environment have been observed." (Interviewee)*

4.24.3. Society

In the neighbouring area of the wind park's installation site there are no other existing activities apart from agricultural crops. However, these crops have not been affected by the wind park in any away. Based on the achieved result, it can be concluded that the residents in the area are satisfied with the installation of the wind park. Now the residents also recognise the necessity of this project. There was an agreement between the PPC Renewables and the Municipality of Sifnos based on which an initial amount of 50,000 euros was offered to the Municipality of Sifnos with the construction of the project for covering needs of the settlement of Heronissos (the closest settlement at the wind park's installation site) (Katsaprakakis et al., 2022a). Additionally, an annual fee of 2,500 euros is deposited to the Municipality of Sifnos every year for the use of the municipal land. This amount is allocated for small projects aimed at the settlement of Heronisos. Another compensation measure for the residents in Sifnos is that 2.7% of the project's revenues is provided to the local Municipality as a discount on the electricity procurement bills of the local households in Heronissos.

4.24.4. Economy

The local community benefits from the operation of the wind park. The local Municipality has received a lump sum of 50,000 euros from the PPC Renewables, and for the 20-year renting of the municipal land, it will annually receive the amount of 2,500 euros. Additionally, there is a 25-30% discount on the electricity procurement bills, which, on average, can be estimated at the amount of 200 euros per year and per household (Katsaprakakis et al 2022b).

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The surrounding area has gained significant value as it can now serve as a field for educational or recreational visits from universities, schools and tourists. The area can be highlighted and promoted, leading to the creation of multiple benefits for the island. The Municipality of Sifnos has been a co-partner since 2013 in an effort initiated for achieving energy autonomy of the island. This effort was initiated by the organisation known as Energy Cooperative of Sifnos, which has since been transformed into the Energy Community of Sifnos as per the Greek legislation. The organisation now boasts more than 150 members. The wind park at the site "Tragoudistis" marks the beginning of a larger hybrid power plant construction project, which aims to achieve full energy autonomy in the island.

4.24.5. Procedures and Justice

The insular community in Sifnos is well-informed and aware of the wind park and the importance of energy transition. However, the public authorities often pose obstacles and challenges throughout the process of developing renewable energy projects for electricity production. Significant bureaucracy often leads to ongoing problems and delays not only in the development of wind parks but also in other developmental and public interest projects implemented in Greece. The procedure for obtaining the required approvals from the involved authorities is time-consuming. As an indicative example, the licensing process for the development of this specific wind park started in 2003 and the park was ultimately installed in 2019. It took 16 years for the integration of the process and the installation of the project, while it could have taken only 3 years.

> *"The development of this wind park started in 2003 and park was installed in 2019. It took 16 years for the integration of the process and the installation of the project, while it could have taken only 3 years." (Interviewee)*

The wind park at the site with the local name "Tragoudistis" belongs to the company PPC Renewables, which pays a fee to the Municipality for the use of the municipal land. For the 20 years of the project's operation, the Municipality of Sifnos will receive in total 50,000 euros. However, the benefits for the PPC Renewables from the wind park's operation will be multiple and considerably higher. Unfortunately, a better agreement could have been reached if the project's construction had not been delayed for over a decade. In 2007, PPC Renewables offered as compensation measures an amount close to 300,000 euros, the construction of a new port in Heronisos, and the renovation of a public square. Conclusively, the received benefits as compensation for the project's construction and operation are considerably fewer compared to what could have been gained if the project had been implemented on time.

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4.24.6. Additional Information

The wind park of PPC Renewables in Sifnos can be characterized as a success case example, since it is one of the first wind parks that was, eventually, and after considerable delays, installed in an island in the Cyclades archipelago. This example should be followed by other islands as well, so they can benefit from the installation and operation of similar projects. Sifnos has made efforts to become an energy independent island. New applications in Sifnos for large-sized wind parks will not be accepted by the residents. These projects are usually proposed by big investors, who seek to install a large number of wind turbines without any planning and approval from the local community. The primary objective of these projects is to transport the generated electricity to the mainland grid, aiming for the interconnection of Sifnos. The residents of Sifnos strongly oppose such a perspective because the potential installation of 80 or 100 wind turbines in Sifnos would dramatically change its insular character, degrade the natural aesthetics, and have a significant negative impact on existing human activities.

The conversation in Sifnos, during the last years, on the benefits that can be gained from the energy autonomy, has become more mature than ever. The Municipality of Sifnos was among the first ones that had signed the Covenant of Mayors in 2012 in Brussels for the reduction of the annual CO_2 emissions at least by 20% until 2020. This target was successfully achieved in Sifnos through the installation of the wind park. The Municipality of Sifnos continuously makes efforts towards the reduction of its energy footprint, through the implementation of studies for the energy performance upgrade of the municipal buildings, the installation of photovoltaic stations for net-metering operation, the installation of electrical vehicles chargers etc., so that the island can gradually move forward towards its goal of “energy independency and democracy”.

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4.24.7. Identity

Tragoudistis Wind Farm

Basic details

2 Wind Turbines

1.2 MW Power

1500 Houses

Wind farm type: Onshore

Location: Sifnos, Greece

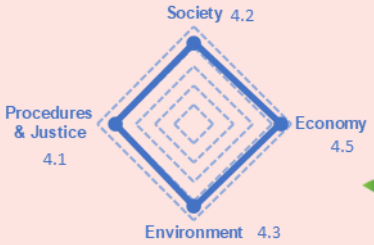
Ownership model: Corporate

Operator: PPC Renewables

Rotor diameter: 44 m

Hub height: 45 m

Total height: 67 m



Overall 4.3/5.0

Key insights & lessons learnt

a) Challenges & barriers

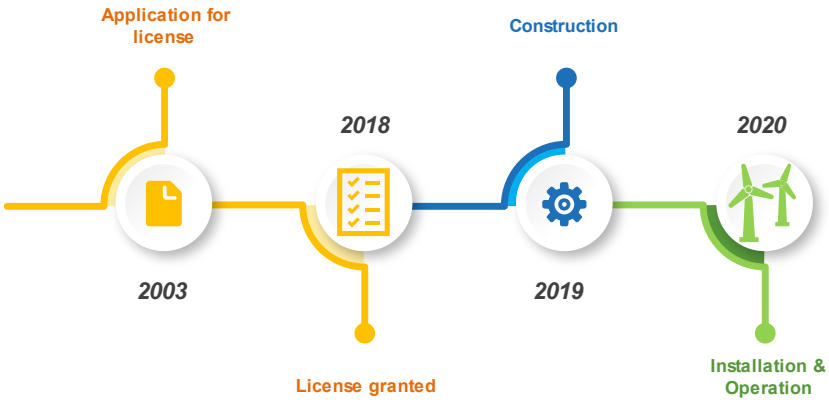
- ✓ Convincing the local citizens to accept the wind park.
- ✓ The transportation of the large wind turbines' components through the narrow roads of the insular settlements.

b) Enablers

- ✓ The high wind potential available in the installation site.
- ✓ The site is out of any regions of environmental or cultural interest.
- ✓ Support by the local Municipality and the Energy Community of Sifnos.

c) Impact

- ✓ Covering more than 10% of the annual electricity demand in Sifnos.
- ✓ Direct benefits for the citizens of Sifnos Island.
- ✓ Contribution to the alteration of negative common attitude against wind parks in the Cyclades complex.



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4.25. Uthleben Wind Farm

4.25.1. Background content

Picture 30: Uthleben village (Craigenhagen, 2005). CC BY-SA 3.0

The Uthleben wind farm was initiated by the project developer Energiequelle GmbH with headquarters in Zossen/Kallinchen in the federal state of Brandenburg close to Berlin. The main focus of the operating company is the production of green electricity. Energiequelle in collaboration with the municipal utility company Stadtwerke Nordhausen have implemented a successful energy community project. Their main motives for the project implementation was the need for more energy projects in regional level and the land availability. The Uthleben wind farm started operating in 2018. It consists of two Enercon E-115 wind turbines, each with an output of 3 MW and 149 m height (Solarserver, 2021) . The average annual electricity generation of the wind farm is 14.65 MWh, and about 4.000 3-person households are supplied (COME RES, 2022).

4.25.2. Environment

There are no environmental concerns as there were already 10 wind turbines on this landscape. So, the addition of other 2 did not have a significant impact. The wind farm Uthleben saves 7000 t of CO_2 per year (Glashagel, 2019). The project is close to a landfill (waste disposal) which is operated by a recycling company. The wind farm is built on agricultural ground which is still used by the farmers. It can be approached by people (e.g. for a walk) as there is a local road there. In addition, compensation measures were taken for the environmental impact focusing in renaturation (e.g. a fruitgarden with appletress). Overall, the wind farm has been developed by focusing on the protection and safety of its surrounding environment (e.g. detection lights at night).

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4.25.3. Society

Uthleben is a local district of the rural municipality of Heringen/Helme located in the Nordhausen district in Thuringia and has 1,231 inhabitants. The location of the Uthleben community wind farm is within the proximity of the municipality. Usually, wind farms that are in north Thuringia face less problems than the projects in the west or south Thuringia. Some places face local opposition because of the wind farm's lights or sound. However, there has not been recorded any essential negative feedback for this case. The wind farm could be described as a prime example of energy transition case driven by local citizens. The local participants in the cooperative are 463 people, whereas about 1000 people are guarantors via household association (Stadtwerke Nordhausen, n.d.).

> *"The bigger picture is that citizens can be part of energy transition. There are new energy forms that can be created near your house or village. Everyone should be part of the energy transition and participate on the operating schemes." (Interviewee)*

4.25.4. Economy

The Wind Farm Uthleben shows that good cooperation between the project developer, the municipal utility company and energy cooperatives can lead to local financial participation and thus to local value creation. The involvement of locals on this project was aimed for two reasons: 1) The involvement of energy communities increases the acceptance of the project. 2) The need for contribution from more experienced partners for the management of this project. For the cooperatives, the shares represent a good interest-bearing investment that yields returns in the mid-single-digit percentage range. The economic benefits provided to the project's stakeholders by the wind farm are presented below:

- Direct financial participation of citizens' energy cooperatives.
- Indirect financial participation of the municipality of Nordhausen.
- Direct financial participation of the municipality of Heringen/Helme.
- Land lease payments to the landowners.
- Business tax (Gewerbesteuer) payments.
- Local value creation.

In 2019, the company's (Windpark Uthleben GmbH & Co. KG) net profit was EUR 199,000. In 2020, the company's profit was EUR 44,000. The balance sheet total in 2020 was EUR 9,168,555 (2019: EUR 9,806,478). Business tax payments of the wind farm amounted to 40,000 euros in 2020 (2019: 11,000 euros). The business tax

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revenues accrue to the municipality where the wind farm operating company is registered (Heringen/Helme). Uthleben, a district of the rural municipality Heringen/Helme, was able to renovate its day-care centres and sports arena solely through the business tax revenues from the wind farms on its territory including the Uthleben wind farm (COME RES, 2022).

4.25.5. Procedures and Justice

The wind farm in Uthleben is based on an intense cooperation between the project developer, the Nordhausen municipal utility company and the Thuringian energy cooperatives. The Energy Agency of the State of Thuringia supports the municipalities and cooperatives in preparing the shares to be subscribed. In the discussion between the local district of Uthleben and Heringen about repowering of the wind farm in 2020, Heringen's mayor played a mediating role. With a minimum investment of 2500 euros, all employees who wanted to become investors could join the wind farm operating company (COME RES, 2022) .

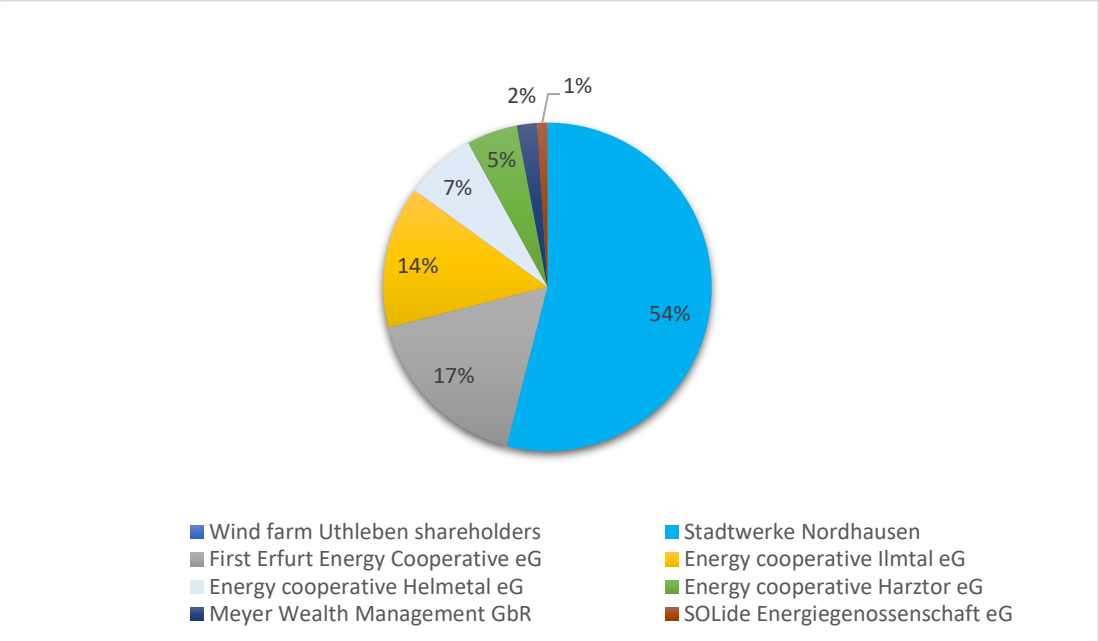

Figure 11: Wind Farm Uthleben stakeholders (Stadtwerke Nordhausen, n.d.)

As the bearer of the Thuringian seal "Partner for fair wind energy", Energiequelle says it creates participation opportunities for citizens, companies and municipalities in Thuringia. The company is also active in other federal states. Energiequelle sold the Uthleben wind farm to Stadtwerke Nordhausen in 2018. This happened under the condition that the public utility company would give up 49% of the shares to citizens' energy cooperatives over the next three years (ZFK, 2021).

The energy cooperatives organise meetings to discuss news, projects and financial aspects for wind farm's development. Every shareholder can participate and vote in

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the decision making process for the wind farm. The transparency of each decision has enabled the cooperative members to avoid any conflicts. The votes are weighted depending on the percentage of shares. In many energy cooperatives, the shares are also equally weighted, so each member's vote has the same value.

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4.25.6. Identity

Uthleben Wind Farm

Basic details

2 Wind Turbines | **6 MW Power** | **4000 Houses**

Wind farm type: Onshore

Location: Uthleben, Germany

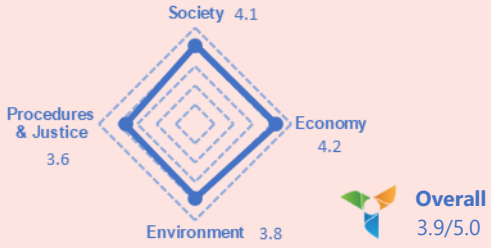
Ownership model: Social

Operator: Haftung GmbH & Co. KG

Rotor diameter: 116 m

Hub Height: 92 m

Total height: 149 m



Key insights & lessons learnt

a) *Challenges & barriers*

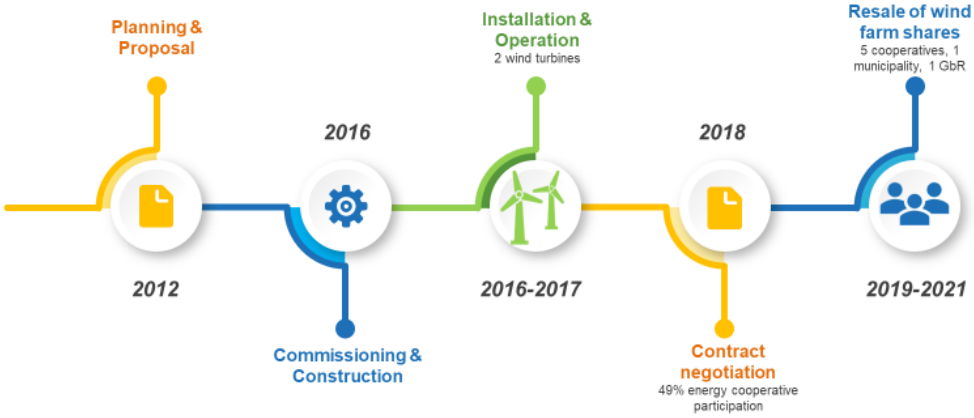
- ✓ High investment costs for the project implementation.
- ✓ Cooperation between the project developer, the municipality and energy cooperatives.

b) *Enablers*

- ✓ The precondition that 49% of its business shares must be sold to energy cooperatives after 3 years of operation.
- ✓ The involvement of local municipalities and local stakeholders.
- ✓ Support by Energy Agency of the state of Thuringia.

c) *Impact*

- ✓ Local value enhancement and promotion of RES projects in Thuringia.
- ✓ Financial benefits for local citizens' cooperatives and landowners.
- ✓ Environmental benefits including compensation measures in renaturation.
- ✓ Financial participation of Nordhausen Heringen/Helme municipalities.



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5. Cross-fertilisation analysis (synthesis)

After having presented a comprehensive mapping exercise of wind energy projects across the EU, we analyse the collected lighthouse onshore and offshore wind farm cases by doing a cross-fertilisation synthesis of them, highlighting the following core aspects:

(i) socio-economic impact
(ii) environmental impact
(iii) business models and participatory processes established
(iv) co- benefits and financial gains at the community level
(v) employed practices used to increase community acceptance
(vi) main challenges faced

The six dimensions (themes) that are used for the analysis are defined in the DoA. It should be noted that there may be some level of overlap (low, medium, high) among these six dimensions (themes). However, this observation does not influence the cross-fertilization synthesis, as each of the six dimensions can be considered and approached individually.

5.1.1. Socio-economic impact

The socio-economic impact of wind farms varies depending among others on the location, community dynamics, and project design. The best 25 wind farms analysed contribute to the social and economic development of their local communities, among others by the following ways:

- **Information and active engagement** of local population from the early stages of development. Community identification with the wind farm and its benefits help foster social acceptance. It ensures satisfaction and contentment of local residents, as well as addressing and handling of any reservations or objections they might possess. Social acceptance and support for wind farms can be achieved, among others, through (a) effective communication, (b) public education, (c) field visits, and (d) involvement of stakeholders at different levels. For example, in Midddelgrunden, a demonstration tour of a modern onshore wind turbine and the local involvement in the planning phase of the project mitigated social opposition.

- **Economic benefits** that improve the overall well-being of the local population. The main positive economic impact is (a) the establishment of lower electricity prices for the whole community. Moreover, wind farms contribute to the local economy by (b) providing job opportunities during various phases of a project, including the construction and maintenance phases. They also (c) bring additional revenue through lease payments to property owners in the wind farm area. For example, in

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Feldheim, the locals pay a reduced electricity cost (-31%) and the creation of job positions has led to 0% unemployment rate.

- **The allocation of a share to the community** from wind operator's revenue towards social projects in the region. This can include (a) supporting, among others, local clubs, organisations, and (b) infrastructure development. More specifically, improvements in local infrastructure include (b1) the construction of roads, sidewalks, lights, sports fields and schools. In addition, (b2) they include the development of innovations and improvements in heating and insulation in local houses. In Carretera Arinaga wind farm 20% of the projects' stakes is owned by the municipality. In other cases, such as the Elhoft wind farm, the local municipality benefits through business taxes, social projects and activities.

- **The co-existence with other projects and activities,** contributing to a diversified and sustainable community. This may include (a) energy projects, such as solar parks, biogas plants and pellet systems. In addition, the presence of (b) most of the analysed wind farms didn't have any negative impact on the primary sector of their region, such as agricultural activities and fisheries. Furthermore, (c) most communities substantially improved their touristic activity by promoting their locations as "energy landscapes". For example, Tilos project is a pioneering project which combines a wind turbine, photovoltaics and batteries for the electrification of an island.

- **Health and social well-being**, by the generation of clean wind energy, reducing air pollution and greenhouse gas emissions. This has (a) positive impact on public health, as it reduces healthcare cost associated with air pollution. In addition, (b) the selection of a strategic location away from residential areas and cultural or historical sites, minimises noise and visual disturbances and preserves social well-being. (c) Noise assessments are conducted to ensure compliance with legal limits, and (d) advanced technology is used to reduce noise levels further. In Samsø case, there has been no major impact on human health due to noise pollution or visual impact from the wind turbines and the local population is found to be happy seeing the wind turbines.

The following table indicates the most indicative aspects of **socio-economic impact** that were addressed by each wind farm based on the in-depth analysis. It needs to be noted that the practices employed with positive socio-economic impact for the wind farms' local communities, possibly exceeds the number of practices that has been identified through the desk research or the interviews. These practices can be divided into five main categories: local engagement, community benefits, local economic benefits, co-existence with other projects, health & social well-being.

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Table 7: Most important aspects of socio-economic impact identified through the in-depth analysis

No.	Name of Wind Farm	Information & engagement	Community benefits	Economic benefits	Co-existence	Health & social well-being
1	Asterousia		✓	✓		✓
2	Barile Venosa	✓	✓			
3	Brebek	✓	✓	✓		
4	Carretera Arinaga	✓	✓			✓
5	Castelmauro		✓			✓
6	Duikeldam	✓		✓		✓
7	Eeklo	✓		✓		
8	Ellhöft	✓	✓	✓		
9	Feldheim	✓	✓		✓	✓
10	Hilchenbach	✓	✓	✓		
11	Hollich	✓	✓	✓	✓	✓
12	Königshovener Höhe	✓	✓	✓		✓
13	Krammer	✓		✓	✓	✓
14	Lichtenau	✓	✓	✓		✓
15	Los Arcos	✓	✓			✓
16	Middelgrunden		✓	✓	✓	✓
17	Neuenkirchen	✓	✓	✓		✓
18	Samsø	✓	✓	✓	✓	
19	Santo Domingo de Luna	✓	✓		✓	✓
20	Serra das Penas	✓	✓			✓
21	Sifnos	✓	✓	✓		
22	Sitia		✓	✓	✓	
23	Tilos	✓	✓	✓		✓
24	Tragoudistis	✓	✓	✓		✓
25	Uthleben	✓	✓	✓	✓	

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5.1.2. Environmental impact

The best 25 wind farms analysed highlight various cases across different European countries, emphasising their positive impact on wind energy generation and their efforts to minimise environmental concerns. Despite some environmental challenges and potential risks associated with wind farms, it can be stated that these cases have successfully contributed to the transition towards sustainable energy, while addressing environmental conservation and community needs and concerns. The main environmental aspects considered by these wind farms include:

- Site location (selection and landscape) of the wind farms
- Environmental impact mitigation measures: wildlife protection; air pollution reduction and visual impact reduction
- Climate change: energy transition and CO_2 reduction
- Environmental compensation (measures)

Site location: One common theme across the 25 wind farm cases is the commitment of developers to avoid or minimise any negative impacts on the natural landscape. The projects have undergone thorough environmental impact assessments (EIAs) and compliance with local and national regulations to ensure that the wind farms are situated in appropriate locations. This includes avoiding protected areas such as Natura 2000 regions, Birds Directive sites, Habitats Directive areas, and other nature conservation areas. By carefully selecting sites, wind farm developers have reduced the potential impact on biodiversity and ecosystems. In terms of visual impact, wind farms have been strategically positioned to minimise their visibility from residential areas, or culturally significant sites. Some projects have even incorporated landscaping and the development of recreational areas to enhance the surrounding environment and community acceptance. For example, Sifnos wind park has been sited 2.7 km outside of the unique NATURA 2000 region in the island, where there is no Special Protection Area for birds and the area is mainly covered with limestone rocks and bushes.

Wildlife protection: Another important factor for the wind farm's social acceptance is the mitigation of the potential risks to wildlife. To minimise the danger for bird and bat species, several measures have been implemented. For instance, in Castelmauro and Krammer wind parks, to enhance environmental compliance, monitoring and protection systems have been implemented on the wind turbines. These systems utilise cameras and ultrasound microphones to effectively monitor and protect avian and bat species. These include the installation of bird and bat detection systems, which can automatically shut down turbines when large birds or sensitive species are detected. Another measure is a different colouring at the end of the blade compared to the initial section, which makes wind turbines more visible to birds. Such systems contribute to the protection of avian and bat populations, reducing the risk of

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collisions. Additionally, protection measures have been undertaken, such as creating habitats for steppe birds, implementing agri-environmental measures, and establishing protected areas for amphibians and meadow birds. Moreover, during the construction and operation phase of the offshore wind farm cases, monitoring and mitigation strategies have been established to reduce the impact on marine ecosystems. Specifically, the potential influence on fish populations and water flow in the sea has been assessed and compensatory measures proposed to ensure that the overall ecological balance is maintained. These measures demonstrate a proactive approach to environmental conservation and the preservation of local biodiversity.

Noise Mitigation: Noise pollution and visual impact have been addressed through technological advancements and careful planning. Upgrades to turbine blades and other components have reduced noise levels, minimising the disturbance to nearby communities. An indicative example is Lichtenau wind farm, where the turbines are equipped with 'trailing edge serration' devices which help to reduce air turbulence and make the rotor blades significantly quieter. Barile Venosa wind farm also serves as an example for its modifications aiming to minimise the noise generated during the rotation of the blades, while it prevents the turbines from ceasing their operation when encountering abrupt gusts of wind.

Climate change: In general, the environmental benefits of the wind farms cannot be understated. They contribute significantly to the reduction of greenhouse gas emissions, helping combat climate change and promoting sustainable energy. By harnessing wind energy, the wind farms provide a clean and renewable source of electricity, thus reducing reliance on fossil fuels. This transition to RES aligns with European and global efforts to achieve carbon neutrality and mitigate the adverse effects of climate change. For instance, Serra das Penas wind farm is contributing to combat climate change by avoiding the emission into the atmosphere of around 93,500 t of CO_2 per year. The impact of a wind farm on the climate highly depends among others on its size (MW) and efficiency to harvest the wind.

Environmental compensation: Some wind farms have allocated funds to support local nature conservation measures or established non-profit associations to manage and maintain protected areas. For instance, in Brebek case, the wind farm developers, following the impact regulation of German nature conservation law, except for the compensatory payments, also founded a non-profit nature conservation association (NBN e.V.) for the maintenance and management of the wind farm areas. Financial contributions from wind farm operators have been used to support green energy projects, energy-efficient upgrades in households, and the development of sustainable infrastructure, benefiting the local population and enhancing the overall quality of life.

It is worth noting that not all wind farms have encountered universal acceptance among local communities. The analysis of the best 25 wind farm cases highlights the

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need for careful consideration and proactive measures to address potential challenges. While efforts have been made to address concerns and minimise impacts, some cases faced initial social opposition based on landscape preservation and environmental protection concerns. Public engagement, transparent communication, and ongoing dialogue between developers, communities, and environmental stakeholders remain crucial for successful wind farm projects.

The following table encompasses the most indicative practices related to the mitigation and addressing of the **environmental impact** that were implemented by each wind farm based on the in-depth analysis. It needs to be noted that the practices really employed for the environmental protection, possibly exceeds the number of practices that has been identified through the desk research or the interviews. These practices can be divided into five main categories: Site selection, wildlife protection, noise mitigation, climate impact and environmental compensation.

Table 8: Most important practices associated with the environmental impact identified through the in-depth analysis

No.	Name of Wind Farm	Site Location	Wildlife Protection	Noise Mitigation	Climate Impact	Environmental compensation
1	Asterousia		✓			
2	Barile Venosa	✓		✓		✓
3	Brebek		✓			
4	Carretera Arinaga			✓		✓
5	Castelmauro		✓	✓	✓	
6	Duikeldam	✓	✓			
7	Eeklo				✓	✓
8	Ellhöft				✓	✓
9	Feldheim	✓				
10	Hilchenbach	✓				✓
11	Hollich				✓	
12	Königshovener Höhe	✓			✓	
13	Krammer					
14	Lichtenau		✓		✓	
15	Los Arcos		✓			✓

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No.	Name of Wind Farm	Site Location	Wildlife Protection	Noise Mitigation	Climate Impact	Environmental compensation
16	Middelgrunden	✓				✓
17	Neuenkirchen		✓			✓
18	Samsø	✓				
19	Santo Domingo de Luna		✓		✓	✓
20	Serra das Penas	✓	✓	✓	✓	✓
21	Sifnos	✓				
22	Sitia					
23	Tilos	✓				
24	Tragoudistis	✓			✓	
25	Uthleben					✓

Cross-fertilisation analysis of the best 25 wind farm cases demonstrates that they can serve as best case examples, given that they have made significant contributions to wind energy generation and environmental sustainability. The developers have prioritised minimising the impact on the natural environment, and employing various mitigation and compensation measures, for example protecting biodiversity, preserving landscapes, and reducing noise pollution.

5.1.3. Business models and participatory processes established

The best 25 wind farm cases have established different business and ownership models, but all of them are aimed at the direct or indirect involvement of their local communities during their planning, construction, and operation. Based on their ownership models and their allocation of profits, these wind farms can be classified into three main categories: Social (36%), Hybrid (36%) and Corporate (28%), as seen in Figure, below.

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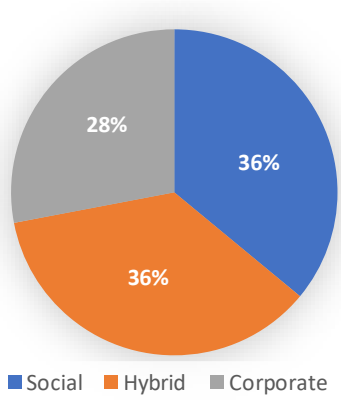

Figure 12: Ownership model of best wind farm cases (%)

Social: The ownership of these wind farms is held by the local community or cooperative organisations. The residents, citizens, or members of the community are shareholders and actively participate in the projects. These wind farms prioritise social acceptance and engagement. Efforts are made to build trust, foster cooperation, and ensure a sense of shared responsibility among local stakeholders. Out of the analysed wind farms, the ones that have established social ownership model include: Asterousia, Brebek, Duikeldam, Ellhöft, Feldheim, Hilchenbach, Neuenkirchen, Sifnos, Uthleben. Their main characteristics are outlined below:

i. **Financial participation**: These wind farms offer opportunities for financial participation to the community members. Interested individuals can invest in the projects by purchasing shares or contributing funds, with varying minimum investment amounts.
ii. **Decision-making**: The decision-making processes in these wind farms emphasise equal participation and democratic principles. Local shareholders or cooperative members typically hold equal decision-making weight, regardless of the size of their investment.
iii. **Local engagement**: Local engagement is a common feature across such wind farms. Local authorities, municipalities, mayors, and public representatives are actively involved in the planning, licencing and development phases. Community meetings, assemblies, and referendums are often organised to inform and engage the residents, providing them with opportunities to ask questions, discuss, and vote on the projects.
iv. **Transparency and information dissemination**: These wind farms prioritise transparency and open communication. Efforts are made to ensure that the residents and stakeholders are well-informed about the wind farm's details, benefits, and progress. Open calls, letters to households, public presentations, and information events are conducted to disseminate information and address any concerns or queries.

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v. **Economic benefits**: These wind farms aim to maximise the economic benefits for the local community. Profits generated by the projects are reinvested locally or distributed among the shareholders/cooperative members. Additionally, some wind farms contribute to the local economy through business tax payments, or by engaging local contractors and suppliers for various project activities.

vi. **Renewable energy transition**: These wind farm initiatives align with the broader goals of transitioning to RES and reducing dependence on imported energy. They contribute to local energy production and supply, promoting clean and sustainable energy generation.

Hybrid: Several wind farms analysed have adopted hybrid ownership models. The local community, residents, and municipalities have actively participated in the projects, either through cooperative ownership, limited partnerships, or direct investments. This approach allows the local population to have a stake in the wind farms and benefit from the generated profits. The wind farms that have established hybrid ownership models include: Carretera Arinaga, Eeklo, Hollich, Königshovener Höhe, Krammer, Lichtenau, Middelgrunden, Samsø, Sitia. Although, these wind farms present high variability in the structure of their business models, regarding the allocation of costs and profits, the number of local shareholders, and the type of local participation, some of their main characteristics can be outlined below:

i. **Stakeholder collaboration**: Wind farm projects involve collaboration between various stakeholders, including local governments, developers, operators, landowners, interest groups, and community representatives. The collaboration aims to ensure that the projects align with the needs and aspirations of the local community and foster a sense of ownership and support.

ii. **Local engagement**: In most cases, there has been a strong emphasis on local engagement and participation. Local communities have been involved in the decision-making process, including determining the location and number of wind turbines, addressing concerns, and ensuring benefits for the community. Open dialogues, public meetings, and consultation sessions have taken place to gather public opinions and address potential issues.

iii. **Transparency and information dissemination**: The wind farms have made efforts to ensure transparency by providing detailed information about them to the public. This includes financial data, technical specifications of the turbines, operational aspects, and real-time data on electricity generation. Websites, mobile applications, and online platforms have been created to share this information with interested individuals.

iv. **Economic benefits**: The wind farms have contributed to the local economy by generating profits, creating jobs, supporting local businesses, and investing in

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community development. Some projects have distributed dividends to shareholders, offered rent to landowners, funded local projects and initiatives, and provided benefits such as reduced electricity costs to those in energy poverty.

v. **Environmental protection**: The wind farms have considered environmental concerns and implemented measures to minimise the impact on local ecosystems. Some examples include the protection of birds and bats, utilising renewable energy during construction, implementing water-saving measures, and conducting environmental impact assessments.

Corporate: These wind farms are all owned, developed, and operated by private companies in the national and international markets. While there may be differences, among others, in the project's structure, local engagement details, and specific challenges faced, they demonstrate some common elements. The wind farms that have established corporate ownership models include Barile Venosa, Castelmauro, Los Arcos, Santo Domingo de Luna, Serra das Penas, Tilos, Tragoudistis. In these cases, the local citizens don't have direct economic benefits from the wind farms. However, their developers have implemented practices such as compliance with regulations, environmental impact assessments, engagement with authorities, and have done efforts to create shared value and promote sustainable construction that can serve social acceptance and mitigate concerns. These practices, which foster social welfare and community acceptance, are outlined below:

i. **Compliance with national regulations**: All wind farms analysed have undergone an authorisation process in compliance with current national regulations. This process involves the participation of various local, regional, and state entities and authorities responsible for approvals and evaluations.

ii. **Environmental Impact Assessment (EIA)**: The wind farms have conducted environmental impact assessments (EIA) as part of the authorisation process. The assessments were carried out by specialists appointed by the developers, and the assessment reports were evaluated by national, regional, and local environmental authorities. These assessments aim to evaluate the potential environmental impacts of the projects and identify actions to mitigate or address them.

iii. **Engagement with local and regional authorities**: The wind farms have engaged with local and regional authorities throughout the authorisation process. These engagements include among others meetings, discussions, and negotiations to address concerns, reach agreements on economic compensation for landowners, and plan compensatory measures for enhancing infrastructure, green spaces, and cultural elements.

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iv. **Shared value creation**: Several wind farms have conducted studies to understand the institutional, social, cultural, and environmental context and identify relevant plans, projects, and strategic issues that can contribute to the creation of shared value within the territory. The aim is to scale and implement viable solutions across the area, addressing both the energy transition and local development needs.

v. **Sustainable construction practices:** The wind farms have applied sustainable construction practices, including the installation of photovoltaic solar panels to cover part of the energy needs during construction, and water-saving measures through the installation of deposits and rain collection systems. Furthermore, donated equipment and resources were used for public use after the completion of the wind farms.

5.1.4. Co- benefits and financial gains at the community level

The best 25 wind farm cases analysed have brought numerous economic benefits to the local communities involved. They have had a positive impact on the local economies, employment rates, and the well-being of the residents. They have demonstrated the potential of renewable energy to create sustainable and inclusive development while addressing environmental concerns and fostering community involvement.

Firstly, the projects have (1) established agreements with local landowners, providing them with land lease payments and creating a new source of revenue for farmers and ranchers. This has contributed to the stimulation of the local economy, particularly in rural areas.

Moreover, in cases of social and hybrid ownership model, (2) the electricity generated from the wind farms is mainly sold to the grid utility at a contractual price, generating profits for the projects. Some of these profits are then distributed back to the community's members, based on their shares in the community's shareholders registry. This approach allows residents to directly benefit from wind energy projects and improve their standard of living. In other cases of wind energy projects, (3) developers (including corporate ones) have helped to ensure the availability of affordable energy at reduced prices for the local population tackling this way energy poverty.

Wind farms (4) have also provided job opportunities for the locals, both during the construction phase and for ongoing maintenance activities. (5) Local companies have been actively involved in various stages of the projects, such as civil works and services, providing further economic opportunities to the community. In some instances, the wind farms have revitalized and stimulated growth in industries such as agriculture.

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Furthermore, (6) compensatory measures were implemented in certain cases to address any potential concerns or impacts of the wind energy farms. These measures included road restoration, the creation of green spaces, the renaturalization of areas, and support for energy efficiency initiatives. These efforts have been well-received by the local population, fostering community acceptance and support for wind energy.

In addition to the economic benefits, (7) the wind energy projects have promoted a sense of community support and engagement. Residents have been given opportunities to invest in the projects, becoming shareholders and receiving returns on their investments. The profits generated by the projects have been used to fund social projects, support local businesses and services, and improve infrastructure within the communities.

5.1.5. Employed practices used to increase community acceptance

Based on each wind farm's type and location, various practices have been implemented by their developers and/or operators in the best 25 wind farm cases analysed in-depth. These practices aim to address concerns, build trust, involve local communities, and ensure the social, economic, and environmental benefits of wind farms are maximised. By implementing such practices, wind farm developers can foster social acceptance and facilitate the successful implementation of their projects. The employed practices by the best wind farms can be classified into five (5) categories:

Local engagement and mobilisation are key practices in most of the best wind farm cases analysed. The local communities have embraced projects proposed by project developers who were familiar with and have presented to them all the wind farms' positive outcomes. To achieve this, some of the following actions were implemented:

i. Involvement and mobilisation of the local community to create awareness and support for the wind farm project.
ii. Holding meetings, discussions, and dialogues with local residents, landowners, and stakeholders.
iii. Trustworthiness and credibility through the involvement of local developers and municipal authorities.
iv. Conduction of informative meetings, presentations, and tours to educate the public about wind energy and the benefits of the project.
v. Sharing transparent information with multiple stakeholders at different levels.

Citizen ownership and participation practices have been used in most of the selected wind farms. In these cases, the locals economically benefit from the wind farm, and they participate in the implementation of the project as community members. To this sense, the following actions have been made:

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i. Citizen ownership facilitation through the establishment of energy cooperatives or non-profit civic associations.
ii. Citizen participation in the planning phase of the wind farm.
iii. Direct involvement and economic benefits for local shareholders in the project.
iv. Involvement of the local community in the decision-making processes related to the project.

Environmental protection measures have been implemented for many cases to counteract the social opposition regarding the landscape preservation. They consist of the following actions:

i. Site location avoiding protected and/or rich in biodiversity areas.
ii. Site location with a considerable distance from houses, minimising shadow flickering and noise effects.
iii. Design of wind turbines using advanced technology to minimise noise pollution and avoid bird collisions.
iv. Implementation of environmental compensatory measures to support sustainable development.
v. Development of strategies to reduce risks of soil erosion and landscape degradation.

Financial benefits to the municipality (and residents) are essential for community acceptance. They can positively impact social acceptance by improving quality of life and fostering community development. They have been established in both private and social ownership models and they include practices, such as the following:

i. Offer fair economic compensation to landowners whose properties are utilised for wind farm installations.
ii. Offer a share of wind farm's profits to the municipality development through social projects.
iii. Creation of job opportunities, reducing the unemployment rate of the area.
iv. Promotion of tourism in the area through social activities and project dissemination.
v. Provision of lower electricity prices to the local residents.

Supportive policies and legislation for green energy projects empower communities by providing the necessary frameworks, resources, and protections to foster growth, social well-being, environmental sustainability, and effective governance. These actions may include:

i. Establishment of energy transition policies at national and regional levels that promote the need for wind energy farms.
ii. Creation and reforming of a supportive legal framework specifically referring to wind farms.

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iii. Integration to regulatory frameworks that prioritise feed-in tariffs or incentives for wind energy projects.

Below are presented the **two** main employed category practices that foster social acceptance for each wind farm project. It's important to note that some wind farms may fall into multiple categories as they employ a combination of practices. The classification is based on the information and data recorded and found in the analysis of the wind farm cases.

Table 9: The two most important practices employed by each wind farm that foster social acceptance

No.	Name of Wind Farm	Local Engagement & Mobilisation	Environmental Protection	Community Ownership	Financial Benefits	Policies & Legislation
1	Asterousia	✓	✓			
2	Barile Venosa	✓	✓			
3	Brebek			✓		✓
4	Carretera Arinaga				✓	✓
5	Castelmauro		✓		✓	
6	Duikeldam	✓		✓		
7	Eeklo	✓		✓		
8	Ellhöft			✓	✓	
9	Feldheim			✓		✓
10	Hilchenbach	✓		✓		
11	Hollich	✓		✓		
12	Königshovener Höhe	✓			✓	
13	Krammer	✓	✓			
14	Lichtenau	✓	✓			
15	Los Arcos				✓	✓
16	Middelgrunden	✓				✓
17	Neuenkirchen				✓	✓
18	Samsø			✓	✓	

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No.	Name of Wind Farm	Local Engagement & Mobilisation	Environmental Protection	Community Ownership	Financial Benefits	Policies & Legislation
19	Santo Domingo de Luna		✓		✓	
20	Serra das Penas				✓	✓
21	Sifnos	✓			✓	
22	Sitia	✓	✓			
23	Tilos	✓			✓	
24	Tragoudistis		✓		✓	
25	Uthleben	✓				✓

5.1.6. Main challenges faced

The best 25 wind farms cases came against various challenges and barriers during their planning, development, and operation. The analysis of these challenges allows us to gain valuable insights into the common hurdles faced by wind farm projects. Based on the analysis of the wind farm cases, these challenges can be divided into four (4) categories:

i) Social acceptance and opposition challenges, which emphasise the need for community engagement, addressing concerns, and building trust.
ii) Regulatory and authorisation challenges, which highlight the importance of navigating complex legal frameworks and obtaining necessary permissions.
iii) Environmental and health challenges, which indicate the significance of sustainability, wildlife protection, and ensuring the well-being of local ecosystems.
iv) Financial and investment challenges, which underscore the importance of securing funding, maintaining financial stability, through efficient project management.

Social Acceptance and Opposition challenges

- ✓ Convincing local citizens and stakeholders to accept and support the wind farm project.
- ✓ Overcoming opposition, for example from the local population, citizens' associations, nature conservation groups, city councils or mayors.
- ✓ Addressing concerns and building trust related to environmental impacts, visual aesthetics, and historical or cultural sites.
- ✓ Demonstrating the need and benefits of wind projects to the community.
- ✓ Resolving conflicts over land use and potential conflicts with other stakeholders.

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Regulatory and Authorisation challenges

- ✓ Dealing with gaps in legislation for wind energy projects.
- ✓ Communication with various regional authorities in order to obtain the necessary licenses and permits.
- ✓ Lengthy authorisation processes leading to delays in project implementation.
- ✓ Compliance with environmental regulations and establishment of compensation measures.

Environmental and Health challenges

- ✓ Ensuring safety of human and animal health in relation to wind farm operations.
- ✓ Avoiding negative environmental impacts and ensuring landscape conservation, especially in protected areas or locations with high level of biodiversity.
- ✓ Mitigating noise pollution on habitats and animals.
- ✓ Preventing shadow effects and addressing potential disturbance to residents.

Financing and Investment challenges

- ✓ Raising funds from potential stakeholders and managing high investment costs for the project implementation.
- ✓ Securing financial stability for wind farm projects by managing operational costs, through subsidies, incentives or tax breaks.
- ✓ Cooperation between project developers, municipalities, and energy cooperatives.

By understanding these challenges, stakeholders in the wind energy industry can proactively address them, develop strategies to overcome obstacles, and promote the successful implementation of wind farm projects.

The **two main** challenges faced by each wind farm are presented below.

Table 10: The two main challenges faced by each wind farm case analysed

No.	Name of Wind Farm	Social Acceptance & Opposition	Regulatory & Authorisation	Environmental & Health	Financing & Investment
1	Asterousia	✓			✓
2	Barile Venosa	✓	✓		
3	Brebek	✓		✓	
4	Carretera Arinaga	✓			✓
5	Castelmauro	✓	✓		
6	Duikeldam	✓		✓	

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No.	Name of Wind Farm	Social Acceptance & Opposition	Regulatory & Authorisation		Environmental & Health	Financing & Investment
7	Eeklo	✓				✓
8	Ellhöft		✓			✓
9	Feldheim			✓		✓
10	Hilchenbach		✓	✓		
11	Hollich		✓			✓
12	Königshovener Höhe	✓		✓		
13	Krammer		✓	✓		
14	Lichtenau	✓		✓		
15	Los Arcos	✓	✓			
16	Middelgrunden	✓		✓		
17	Neuenkirchen	✓	✓			
18	Samsø	✓		✓		
19	Santo Domingo de Luna	✓		✓		
20	Serra das Penas	✓	✓			
21	Sifnos	✓				✓
22	Sitia	✓	✓			
23	Tilos	✓		✓		
24	Tragoudistis	✓		✓		
25	Uthleben	✓				✓

It can be observed that the main challenge the wind farms face is the social acceptance and opposition from the community. The local opposition is usually expressed before the project implementation, and it is commonly associated with the potential environmental and health impacts. An intensive social opposition could stop the authorisation process and increase the total investment cost needed for the project, often leading to time delays. Therefore, social opposition could provoke, trigger or empower other challenges and needs to be ultimately confronted.

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6. Conclusion

The storytelling of our research sheds light on the challenges we encountered throughout our research process.

The storytelling of our research highlights the complexities and obstacles we faced in our endeavour of understanding and analysing wind farm cases. By narrating the history of Task 2.1 that led to the development of D2.1, we aim to provide a transparent record of the barriers we overcame and the lessons we learnt.

The current report does not claim to have covered and considered all wind farm cases throughout Europe, nor does it argue that its evaluation process is a complete methodology for assessing social acceptability criteria. These aspects were outside the scope of Task 2.1 and its final deliverable, D2.1. Our objective was to establish an initial knowledge baseline from which future activities of the WENDY project could draw inspiration and build upon. To achieve this, we conducted an extensive search for good examples of wind farm cases across the EU, resulting in an initial pool of 44 cases.

Subsequently, we implemented a structured approach to evaluate and rate the wind farm cases. While this evaluation framework does not provide a definitive method for assessing wind farm cases, it proved beneficial in exploring the theoretical aspects and contextual factors that influence social acceptability and community acceptance. Furthermore, this evaluation exercise helped us gain a deeper understanding of the identified wind farm cases, align with our partners' work, establish a common foundation for future tasks, and create a framework example that can be utilised in other project tasks, such as Task 4.1.

The resulting ranking list informed an interactive workshop among partners where we selected 25 cases for further investigation, taking into account practical considerations and various other issues.

During the in-depth analysis, we encountered challenges related to data completeness, accuracy, conflicting sources, stakeholder outreach, and language barriers. Although we made efforts to overcome these challenges, the overview analysis of the wind farm cases inevitably reflects some of these difficulties to a certain extent.

Considering various types of ownership models enabled us to gain valuable insights for social acceptance in wind farm projects.

Following the requirements of the DoA, we made an effort to place some special emphasis on the wind farm cases that were not exclusively corporate-owned. More than half of the 25 analysed cases (72%) followed either a social ownership model, or

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a hybrid ownership model. However, the consideration of diverse ownership structures was crucial, allowing us to capture different perspectives on fostering the social acceptance. Besides, it is also important to acknowledge the significance of investigating corporate wind farm projects, as they may face unique challenges. Unlike wind farms with a social ownership model, which may enjoy some level of community acceptance by default, corporate projects often require additional efforts to address social acceptance issues.

The analysed wind farm cases exhibit significant differentiation from one another and in relation to the social acceptance practices they prioritise.

Throughout our overview and analysis, we observed that many identified wind energy farm cases are located in the northern and central part of Europe, out of which many of them are placed in Germany. In these countries community energy and social ownership model are well-established, and thus numerous wind farms are owned by local communities and cooperatives. Community-owned projects are often supported by favourable policies and incentives that promote citizens involvement in renewable energy production. On the other hand, wind farm cases selected from the south part of Europe were mostly representing the corporate ownership model. One notable characteristic of these corporate wind farm cases is their strong emphasis on environmental protection measures and the provision of community benefits. These cases imply a commitment to sustainable practices, with the aim of minimising the environmental impact of their wind farm operations.

The true strength of our research process lies in generating an informed systemization of the existing knowledge and understanding.

Despite the difficulties we faced in general throughout our analysis, we think that the true strength of our process lies in the cross-fertilisation, analysis, and synthesis of the gathered information and data, as presented in Chapter 4. The overall contribution of our work in analysing the lighthouse wind farm cases is the generation of new insights and the enhancement of existing knowledge and understanding. Chapter 5 provides a systematic overview of the various aspects that are closely related to or influenced by a wind farm being considered a good practice example in terms of social acceptance. Through a distillation of the individual analysis reports for each wind farm case, we have identified several crucial aspects that are related to the social acceptance of these cases. To organise and present this information effectively, we have grouped them under the six dimensions (themes) already defined in the DoA. Our approach to this categorization involved a simple form of qualitative thematic analysis, utilizing a mixed deductive and abductive rationale.

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Another unique point of our research was the active involvement of two wind farm developers in the implementation of the Task 2.1.

Another valuable aspect of our research was the engagement of two wind farm developers, namely the big corporate company EGP and the energy community MEC, both of which are partners in the WENDY project. Their involvement provided access to primary data and information directly from the main stakeholders of these initiatives, thereby enhancing the reliability and relevance of our analysis.

Addressing at least one field of intervention is crucial for achieving social acceptance in a wind farm project.

Through our research, we have discovered that social acceptance of a wind farm is typically influenced by a combination of multiple factors rather than a single, distinct cause. Therefore, the analysis framework we developed aimed to encompass these multiple aspects while being grounded in well-established theoretical concepts. We utilised four umbrella criteria, namely the three pillars of sustainability (society, environment, and economy), along with the fourth criterion of "procedures and justice". The latter one combines two concepts that are often essential and are typically found in wind energy projects. Its inclusion allowed us to examine both the community engagement-related procedures and the equitable distribution of benefits. While there may be some overlap between these criteria, this conceptualization facilitated a more straightforward analysis of each individual wind farm case. Through this framework, we gained insight into the importance of making improvements in at least one of these areas to achieve social acceptance.

Multi-dimensionality of wind farm cases highlights the complexity of our research and its limitations.

Through our analysis, we have uncovered the complexity and multi-dimensionality of wind farm cases, both in comparison to each other and as individual case studies. These wind farms exhibit significant variations across a plethora of parameters, including technical specifications (e.g. height and size of turbines, capacity, engines, etc.), operational considerations (e.g. density of turbines, proximity to settlements, etc.), environmental factors (e.g. special protection areas, wildlife, biodiversity, etc.), socio-economic aspects (e.g. unemployment, tourism, fisheries, etc.), cultural aspects (e.g. good or bad former experience with wind energy or renewable energy, etc.), ownership models and practices, and others. It is important to note that the emphasis and focus of each analysis varied, with some cases prioritising socio-economic aspects while others placed greater emphasis on environmental mitigation measures. These observations highlight certain limitations within our analysis framework.

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Proactively considering multiple factors and employing a bouquet of practices to foster social acceptance is important.

The practices employed for social acceptance in wind farm cases were aimed at addressing, both directly and indirectly, the underlying causes of social opposition. In some instances, social acceptance appears to be achieved by addressing and mitigating environmental concerns through the provision of social benefits or economic incentives to the local communities. In other cases, our analysis implied that wind farms successfully mitigated social concerns and issues through the implementation of economic and environmental compensation measures. Additionally, through the analysis it seems that strategic site selection and maintaining transparency throughout the project implementation process can play a role in minimising social opposition, even in cases where there were no direct economic benefits for the local communities. The various recorded approaches highlight the importance of proactive approach in terms of mitigation measures, as well as of considering multiple factors and employing a set of strategies to enhance social acceptance in wind farm projects.

A tailored approach based on a pool of alternative approaches is needed to meet the local needs of any unique wind farm case.

Furthermore, these findings lead us to the understanding that there is no one-size-fits-all approach to ensure the social acceptance of any wind farm case. Each case is unique in terms of its specific context, location, historical time, and characteristics. To effectively address the challenge of social acceptance, it is crucial for the relevant stakeholders, including public authorities, energy communities, developers, and operators, to adopt a tailored approach that is specifically designed to meet the local needs and circumstances. It is essential to carefully examine the specific characteristics of each wind farm before implementing any practice to ensure its effectiveness and suitability. There is no panacea solution that can be universally applied.

The overview of the analysed wind farm cases provides us with a valuable pool of alternative approaches, methods, techniques, and tools that can be drawn upon to create a customized and well-suited mix of strategies. By leveraging the insights and lessons learnt from these cases, stakeholders can develop a comprehensive and context-specific approach to promote social acceptance and address the unique challenges posed by each wind farm project.

Ongoing and long-term efforts to build and maintain social acceptance are essential from the very beginning.

It is essential to recognize that the development of a wind farm is a dynamic and ongoing process that runs and evolves over time. This process encompasses various

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abstract stages, including ideation, planning, licensing, development, operation, expansion, and decommissioning, among others. Throughout this entire process and lifecycle of a wind farm, social acceptance cannot be assumed or guaranteed at any specific step or persist indefinitely once emerges. Instead, it continuously represents a potentially changing, present state or situation that reflects the evolving sentiments, thoughts, perceptions, and attitudes of the local community towards the wind farm project or installation. Social acceptance does not comprise a static outcome but rather a reflection of the dynamics between the community and the wind farm. Thus, it is vital to recognize the need for ongoing and long-term efforts to build and maintain social acceptance at different stages throughout the whole lifecycle of a wind farm.

Various areas for potential future research related to and extending beyond our analysis can be suggested.

The evaluation process employed aimed to facilitate the selection of wind farm cases for analysis. The resulting ranking was used as input for the workshop-meeting discussion, leading to the final list of 25 cases to be analysed. It is important to acknowledge that the scores assigned to the four (4) criteria are subject to the limitations of evaluator subjectivity and the available data at the time of assessment (brief reporting of 44 wind farm cases). Although the evaluation went beyond the scope of the DoA, it was helpful since it provided a structured working process, and the scores were documented in the spider graphs within the identity tables of each wind farm case. For future research, the evaluation process could be further enhanced by implementing two rounds of assessments using an adapted Delphi technique. In this approach, either the same or different evaluators would consult the average scores from the first round and consider the data obtained through in-depth analysis of the selected wind farm cases.

Given that our analysis focused on successful examples of social acceptance, the investigation of the dynamics of social opposition was beyond the scope of this deliverable. However, it is important to note that social opposition to wind farms does not necessarily represent the views of the entire community. It is possible that a minority expresses resistance while the majority remains neutral or supportive. Besides, people who accept a wind farm are not expected to demonstrate in favour of it. Therefore, it is worth exploring the nature and dynamics of this opposition to gain a deeper understanding of the factors that contribute to social acceptance or opposition.

Given the complex nature of social acceptance in wind farm projects, it was not feasible for us to determine the relative importance of each parameter contributing to it. This aspect was beyond the scope of our research, but it presents an interesting area for future investigation. Additionally, exploring and analysing cases of poor social

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acceptance in relation to wind farms would provide valuable insights. While our research focused on identifying and analysing successful cases according to the requirements of the DoA, examining unsuccessful cases and bad examples, including those that faced strong (social) opposition and resistance, and were never implemented, could enhance our understanding, and inform our knowledge in this area. Employing a similar approach to analyse these negative cases would provide new perspectives and valuable insights.

In addition, considering the dynamic nature of social acceptance, updating the status of the wind farm cases in the future as the projects evolve and mature could provide opportunities for the emergence of new and valuable insights.

Contrary to the inherent limitations of our research, the transferability potential of the identified good practices of social acceptance is unlimited.

The outcomes of Task 2.1 are based on a combination of desk research and stakeholder interviews, whenever necessary. However, it is important to acknowledge the inherent limitations of our qualitative research in terms of the data availability and the "subjectivity" of the analysis and results' interpretation. While our research provides valuable insights into the qualitative aspects of wind farm cases, further research would be necessary to gain further insights into the relationships between the involved stakeholders of each wind farm, for example by conducting a detailed network analysis. However, such an approach was outside of the scope of WENDY. Nonetheless, our deliverable ultimately serves as a valuable resource of information by highlighting best practices in lighthouse wind farm cases in Europe, and paving the way for their transferability and potential adoption in future wind projects.

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8. Annex

8.1. Exploitation potential of D2.1 results and findings

This special section discusses the exploitation strategy of the results and findings of D2.1, as well as their value to the partners who own them. The following table addresses four (4) dimensions: Exploitation potential, IP protection, Potential exploitation pathways, and Partners' plans. Additionally, it allows for the inclusion of any unforeseen dimensions.

		Analysis
1	**Exploitation Potential**	**Main users** that stand to benefit from the results or findings are the: wind energy farm developers and operators; regulatory authorities and/or government agencies responsible for energy and environmental policies and procedures; NGOs related to issues such as environment, local development, cultural heritage; local authorities/governments and local communities; consultants, citizens residing close to wind farm installations. The **added value** of the results or findings for WENDY, its partners or external stakeholders is based on the following aspects: comprehensive analysis of best wind farm cases in terms their social acceptance, in various contexts across EU based on desk research supplemented by field research, whenever necessary; structured approach for the identification, reporting, evaluation and shortlisting of lighthouse wind energy farms; cross-fertilisation analysis of the wind farm cases; catchy illustration of the wind farm cases using a storyboard format. **Unique features** of the deliverable's results that may be attractive: focusing on onshore/offshore wind farms cases from various EU countries and contexts with varying ownership models, stage of operation, technology, size; being resulted by a combination of desk and field research; thorough and comprehensive cross-fertilisation analysis; structured approach for the evaluation wind energy farms in terms of social acceptance.
2	**IP protection**	The protection of IP generated could be based, for example, on the following measures: applying data protection measures that ensure confidentiality and security of any personal data collected; use of Creative Commons to disseminate and use the results and findings.
3	**Potential exploitation pathways**	Exploitation actions could include, among others, the following: knowledge transfer activities through KEP or other means (such as workshops, webinars, publications, to disseminate the findings); development of a new service related to the enhancement of social acceptance of wind energy farms; consultation of involved stakeholders, leveraging the creation of new energy communities, and the willingness of the corporates to comply with the ESG criteria, or address sustainability priorities (social, economic, and environmental aspects); further development of research through other funding opportunities.
4	**Partners' plans**	Partners can inform their business plans or/and policy strategies considering the results and findings as a key information resource on the topic. Partners' plans could include: knowledge transfer activities; development of new services; new opportunities for relevant research.
5	**Other**	The exploration of potential collaborations and synergies with key actors and stakeholders could enhance the exploitation potential of the results.

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8.2. Identification and brief reporting of the 44 wind farm cases

1	Wind farm	Description
General Information	Name	Middelgrunden
	Country	Denmark
	Developer/Operator	HOFOR, Middelgrundens Wind Turbine Cooperative
	Maturity Stage	Long-term operation phase
	Year	2000
	Type of Wind Farm	Offshore fixed
	Power (MW)	40
	Power (Houses)	30000
	No. of Turbines	20
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	Middelgrunden Wind Turbine Cooperative (50%), HOFOR (50%)
	Public Information/Transparency	[✓] Annual meetings between stakeholders
	Participatory process	[✓] 3 public hearings before approval
Economy	Local value enhancement	[✓] Tourists/visitors
	Local Employment	>50000 locals have worked on the project
	Financial Gains/Benefits	Community shares (1000kWh/yr)
Society	Co-Existence with Other Activities	Fisheries
	Local Opposition	Minor
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.middelgrunden.dk/middelgrunden-windmill-cooperative/
	Interview	—
	Comments	>50000 locals have worked on the project

2	Wind farm	Description
General Information	Name	Feldheim
	Country	Germany
	Developer/Operator	Energiequelle GmbH
	Maturity Stage	Long-term operation phase
	Year	1995
	Type of Wind Farm	Onshore
	Power (MW)	123
	Power (Houses)	55000
	No. of Turbines	55
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	Feldheim Energie GmbH & Co. KG
	Public Information/Transparency	[✓] Community meetings
	Participatory process	[✓] Community decisions for electricity prices
Economy	Local value enhancement	[✓] Energy training and landscape activities, tourism (4000 people/yr), other energy projects (PVs, biogas plants)
	Local Employment	100%
	Financial Gains/Benefits	Community stakes, reduced electricity cost (-31%)
Society	Co-Existence with Other Activities	Energy communities
	Local Opposition	Minor
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	—
	Biodiversity Loss	Negligible
Additional Information	Sources	https://nef-feldheim.info/?lang=en
	Interview	—
	Comments	—

3	Wind farm	Description
General Information	Name	Samsø
	Country	Denmark
	Developer/Operator	Samsø Havvind/ Wind Estate AS

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	Maturity Stage	Long-term operation phase
	Year	2003
	Type of Wind Farm	Offshore fixed
	Power (MW)	23
	Power (Houses)	2000
	No. of Turbines	10
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	Samsø Municipality (50%), Community Ownership (20%), Private Owners (30%)
	Public Information/Transparency	[✓] Online database (Energy Institute), meetings
	Participatory process	[✓] Communtiy meetings
Economy	Local value enhancement	[✓] District heating plants (biomass, solar) , individual renewable energy installations, energy projects in households
	Local Employment	30 new jobs/yr (renewable projects)
	Financial Gains/Benefits	Community shares
Society	Co-Existence with Other Activities	Fisheries
	Local Opposition	Minor
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.visitsamsoe.dk/en/inspiration/energy-academy/
	Interview	—
	Comments	100% renewable electricity island

4	Wind farm	Description
General Information	Name	La Jacterie
	Country	France
	Developer/Operator	Nordex-David Energies/VSB Energies Nouvelles-(local community)
	Maturity Stage	Long-term operation phase
	Year	2016
	Type of Wind Farm	Onshore
	Power (MW)	15
	Power (Houses)	7100
	No. of Turbines	6
Procedures & Justice	Type of Ownership	Social
	Owner(s)	La Jacterie SAS (100% local stock company)
	Public Information/Transparency	[✓] Informative meetings (global)
	Participatory process	[✓] Local meetings, consideration of public opinions
Economy	Local value enhancement	—
	Local Employment	—
	Financial Gains/Benefits	Local stakeholders (380,100%)
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Negligible
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	—
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.vsb.energy/hr/en/references/detail/la-jacterie/
	Interview	—
	Comments	—

5	Wind farm	Description
General Information	Name	Duikeldam
	Country	Belgium
	Developer/Operator	Fortech-Wase Wind
	Maturity Stage	Long-term operation phase
	Year	2012
	Type of Wind Farm	Onshore
	Power (MW)	8
	Power (Houses)	6000
	No. of Turbines	4
Procedures & Justice	Type of Ownership	Social
	Owner(s)	Wasewind (energy cooperative)
	Public Information/Transparency	[✓] Annual general meetings

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	Participatory process	[✓] Board of elected directors voting for various matters
Economy	Local value enhancement	[✓] Landscape for pedestrians and cyclists
	Local Employment	—
	Financial Gains/Benefits	Cooperative shares
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Negligible
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.wasewind.be/onze-windparken
	Interview	—
	Comments	—

6	Wind farm	Description
General Information	Name	Neuenkirchen
	Country	Germany
	Developer/Operator	Senvion SE
	Maturity Stage	Long-term operation phase
	Year	2017
	Type of Wind Farm	Onshore
	Power (MW)	36
	Power (Houses)	—
	No. of Turbines	12
Procedures & Justice	Type of Ownership	Social
	Owner(s)	Bürgerwindpark Neuenkirchen UG & Co. KG.
	Public Information/Transparency	[✓] Transparent information disclosure by the project initiators
	Participatory process	[✓] Formal and informal participation in zoning, planning, permitting
Economy	Local value enhancement	[✓] Establisment of a local non-profit association which receives 1% of total wind farm revenue as donation. The donation supports community organisations, associations and social services (e.g. purchase of a citizens' bus, IT equipment for the school, construction of a multifunctional room for the community, church renovation, etc.)
	Local Employment	Job creation (unspicified number)
	Financial Gains/Benefits	Municipality shares, local stakeholders, land use compensation, civic associations
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Minor
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.buergerwindpark-neuenkirchen.de/projekt/infos/
	Interview	—
	Comments	—

7	Wind farm	Description
General Information	Name	Fryslân
	Country	Netherlands
	Developer/Operator	Ventolines, Siemens Gamesa and Van Oord/ Siemens Gamesa
	Maturity Stage	Short-term operation phase
	Year	2021
	Type of Wind Farm	Offshore fixed
	Power (MW)	382.7
	Power (Houses)	500000
	No. of Turbines	89
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	Windpark Fryslân Holding BV (75.5%), Fryslân Province (24.5%)
	Public Information/Transparency	[✓] Informative meetings/presentations
	Participatory process	—
Economy	Local value enhancement	[✓] 1/3 of the province proceeds will be reinvested in the Frisian IJsselmeer area, touristic activities (guided tours, boat trips)
	Local Employment	—
	Financial Gains/Benefits	Annual Environmental Fund, province will issue bonds for inhabitants, fishermen rehabilitation assistance
Society	Co-Existence with Other Activities	Fisheries

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	Local Opposition	Minor
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Minor
Additional Information	Sources	https://www.windparkfryslan.nl/the-wind-farm/
	Interview	—
	Comments	—

8	Wind farm	Description
General Information	Name	Burgerwindpark de Spinder
	Country	Netherlands
	Developer/Operator	SpinderWind BV
	Maturity Stage	Short-term operation phase
	Year	2020
	Type of Wind Farm	Onshore
	Power (MW)	9.6
	Power (Houses)	7221
	No. of Turbines	4
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	Energiefonds Brabant (50%), civilian (50%)
	Public Information/Transparency	[✓] Published brochure and regulations, monitoring application
	Participatory process	[✓] Joint decisions for wind farm
Economy	Local value enhancement	—
	Local Employment	—
	Financial Gains/Benefits	Regional cooperative shares
Society	Co-Existence with Other Activities	Water treatment plant, landfill
	Local Opposition	Negligible
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.spinderwind.nl/
	Interview	—
	Comments	—

9	Wind farm	Description
General Information	Name	Löwenstedt
	Country	Germany
	Developer/Operator	WEB Andresen
	Maturity Stage	Long-term operation phase
	Year	2014
	Type of Wind Farm	Onshore
	Power (MW)	42
	Power (Houses)	22000
	No. of Turbines	13
Procedures & Justice	Type of Ownership	Bürgerwindpark Löwenstedt GmbH & Ko. KG
	Owner(s)	Social
	Public Information/Transparency	[✓]
	Participatory process	[✓]
Economy	Local value enhancement	[✓]
	Local Employment	—
	Financial Gains/Benefits	Local shareholders
Society	Co-Existence with Other Activities	Energy communities
	Local Opposition	Minor
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	—
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.web-andresen.de/de/windpark-view/Buergerwindpark-Loewenstedt-138
	Interview	—
	Comments	—

10	Wind farm	Description
General Information	Name	Havsnäs
	Country	Sweden

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	Developer/Operator	HgCapital & Nordisk Vindkraft (subsidiary of RES)
	Maturity Stage	Long-term operation phase
	Year	2010
	Type of Wind Farm	Onshore
	Power (MW)	94.5
	Power (Houses)	50000
	No. of Turbines	47
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Fu-Gen
	Public Information/Transparency	[✓] Nordisk Vindkraft provided detailed information about their plans and intentions at various public meetings and guided tours
	Participatory process	[✓] Integration local views into final plan
Economy	Local value enhancement	[✓] Guided tours, activities (skiing, snowmobile, walking etc.)
	Local Employment	1000 jobs/yr (25% local)
	Financial Gains/Benefits	Community compensation for impacts
Society	Co-Existence with Other Activities	Tourism
	Local Opposition	Negligible
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	—
	Biodiversity Loss	Minor
Additional Information	Sources	https://www.vasavind.se/havsnas-eng
	Interview	—
	Comments	—

11	Wind farm	Description
General Information	Name	Schönberg
	Country	Germany
	Developer/Operator	BayWa re/Bürgerwindpark Schönberg GmbH & Co. KG
	Maturity Stage	Short-term operation phase
	Year	2019
	Type of Wind Farm	Onshore
	Power (MW)	23.5
	Power (Houses)	14700 (2-person)
	No. of Turbines	10
Procedures & Justice	Type of Ownership	Social
	Owner(s)	Bürgerwindpark Schönberg GmbH & Co. KG
	Public Information/Transparency	[✓] Citizens and Municipalities Participation Act (Law 2016)
	Participatory process	[✓] To be analysed
Economy	Local value enhancement	—
	Local Employment	—
	Financial Gains/Benefits	Community shares
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Negligible
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	—
	Biodiversity Loss	Negligıble
Additional Information	Sources	https://www.baywa-re.de/en/projects-in-germany/schoenberg
	Interview	—
	Comments	—

12	Wind farm	Description
General Information	Name	Barile Venosa
	Country	Italy
	Developer/Operator	Vestas Wind Systems A/S (Manufacturer)/ EGP(Operator)
	Maturity Stage	Long-term operation phase
	Year	2016
	Type of Wind Farm	Onshore
	Power (MW)	8
	Power (Houses)	1800
	No. of Turbines	4
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Enel Green Power SpA
	Public Information/Transparency	[✓] The wind park was developed with full support of the local Municipality. Articles in the national press
	Participatory process	[✓]

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Economy	Local value enhancement	[✓] Improvement of the area's infrastructure
	Local Employment	—
	Financial Gains/Benefits	Annual funding for 18 years to the municipality to carry out rehabilitation activities in the area
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Negligible
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.corriere.it/notizie-ultima-ora/Economia/Enel-avvia-lavori-nuovo-parco-eolico-Italia/20-02-2015/1-A_015962646.shtml
	Interview	—
	Comments	—

13	Wind farm	Description
General Information	Name	Castelmauro
	Country	Italy
	Developer/Operator	Nordex SE (Manufacturer)/ EGP(Operator)
	Maturity Stage	Short-term operation phase
	Year	2022
	Type of Wind Farm	Onshore
	Power (MW)	29
	Power (Houses)	29,000
	No. of Turbines	7
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Enel Green Power SpA
	Public Information/Transparency	[✓]The wind park was developed with full support of the local Municipality. On Ocotober, 2022, the inauguration of the Wind farm was celebrated. With participation of members of the Italian Parliament, the mayor and the national press. Details about the wind farm can be found on EGP website.
	Participatory process	[✓]
Economy	Local value enhancement	[✓] Upgrading of public lighting in Castemauro town; Construction of 4 photovoltaic plants at public areas; Enhancement of the 2 playgrounds in Castelmauro; Installation of No. 1 electric car charging station in public area
	Local Employment	—
	Financial Gains/Benefits	The implementation of urban enhancement and energy efficiency measures in Castelmauro town.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Negligıble
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligıble
Additional Information	Sources	EGP-Castelmauro
	Interview	—

14	Wind farm	Description
General Information	Name	Los Arcos
	Country	Spain
	Developer/Operator	Siemens-Gamesa (Manufacturer)/ EGP(Operator)
	Maturity Stage	Short-term operation phase
	Year	2020
	Type of Wind Farm	Onshore
	Power (MW)	34.6
	Power (Houses)	28000
	No. of Turbines	10
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Enel Green Power SpA
	Public Information/Transparency	[✓] Full support of the local Municipality during development. Information articles in the national press.
	Participatory process	[✓]
Economy	Local value enhancement	[✓] 1. Enhancement of tourist route Camino de la Ruta de los Castillos de Luna in collaboration with local communities; 2. Training of tourist guides focused on the dissemination of cultural heritage. 3. Sustainable engineering actions: (a)

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		autonomous photovoltaic installations: for auxiliary consumption of the plant with a power of 3.781 kWp;b) 4 rainwater storage tanks c) efficient lighting and illumination. ; list of local establishments (restaurants, accommodation) to promote the use of their services; pictograms for autistic persons
	Local Employment	Direct employment for the local population: creation of a list of job offers, training course for park supervisors
	Financial Gains/Benefits	—
Society	Co-Existence with Other Activities	—
	Local Opposition	—
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	—
Additional Information	Sources	EGP-Los Arcos
	Interview	—

15	Wind farm	Description
General Information	Name	San Pedro de Alacon
	Country	Spain
	Developer/Operator	Vestas Wind Systems A/S (Manufacturer)/ EGP(Operator)
	Maturity Stage	Short-term operation phase
	Year	2020
	Type of Wind Farm	Onshore
	Power (MW)	41
	Power (Houses)	33200
	No. of Turbines	12
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Enel Green Power SpA
	Public Information/Transparency	[✓] Developed with full support of the local Municipality. Articles in the national press.
	Participatory process	[✓]
Economy	Local value enhancement	[✓] Sustainable engineering actions: (a) autonomous photovoltaic installations: for auxiliary consumption of the plant with a power of 13,57 kW; b) rainwater storage tanks: 12 tanks with a capacity of 1,000 L. c) efficient lighting and illumination for site facilities and for public lighting in two town. Social actions: a) Direct employment for the local population; b)training course for park supervisors; c) creation of a list of job offers and list of local establishments (restaurants, accommodation) to promote the use of their services;
	Local Employment	—
	Financial Gains/Benefits	—
Society	Co-Existence with Other Activities	—
	Local Opposition	—
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	—
Additional Information	Sources	https://www.enelgreenpower.com/media/press/2019/01/enel-green-power-espana-starts-construction-of-90-mw-of-new-wind-capacity-in-spain
	Interview	—

16	Wind farm	Description
General Information	Name	Portoscuso
	Country	Italy
	Developer/Operator	Siemens (Manufacturer)/ EGP(Operator)
	Maturity Stage	Long-term operation phase
	Year	2011
	Type of Wind Farm	Onshore
	Power (MW)	89.7
	Power (Houses)	76000
	No. of Turbines	39
Procedures & Justice	Type of Ownership	Enel Green Power SpA
	Owner(s)	Corporate
	Public Information/Transparency	[✓] The wind park was developed with full support of the local Municipality. Articles in the national and regional press

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	Participatory process	[✓]
Economy	Local value enhancement	[✓] Encourage the participation of local companies during the construction works of the plant.
	Local Employment	—
	Financial Gains/Benefits	Yearly economic fee for the lease of areas owned by the Portoscuso municipality.
Society	Co-Existence with Other Activities	Industrial and Tourism
	Local Opposition	—
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	—
Additional Information	Sources	EGP-Portoscuso
	Interview	—
17	Wind farm	Description
General Information	Name	Santo Domingo de Luna
	Country	Spain
	Developer/Operator	Siemens-Gamesa (Manufacturer)/ EGP(Operator)
	Maturity Stage	Short-term operation phase
	Year	2020
	Type of Wind Farm	Onshore
	Power (MW)	31.2
	Power (Houses)	29500
	No. of Turbines	9
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Enel Green Power SpA
	Public Information/Transparency	[✓] Developed with full support of the local Municipality. Articles in the national and regional press
	Participatory process	[✓]
Economy	Local value enhancement	[✓] List of local establishments (restaurants, accommodation); autonomous photovoltaic installations; 4 rainwater storage tanks; efficient lighting and illumination for site facilities.
	Local Employment	Direct employment for the local population; training course for park supervisors; creation of a list of job offers
	Financial Gains/Benefits	Donation to the municipality of Luna of the 4kW of PV (Town Hall building) and the 4 tanks for the municipal hunting reserve Electric vehicle for Enel employees in the site.
Society	Co-Existence with Other Activities	—
	Local Opposition	—
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	[✓] Rehabilitation of a church in Luna town b) Las Pedrosas: Rehabilitation of Pozo de Hielo as Ethnological Museum of the Town Council of Las Pedrosas c) Training course as a tourist guide.
	Biodiversity Loss	—
Additional Information	Sources	https://www.enelgreenpower.com/
	Interview	—

18	Wind farm	Description
General Information	Name	Hilchenbach community WF / Rothaarwind GmbH & Co. KG
	Country	Germany
	Developer/Operator	Rothaarwind GmbH & Co.KG
	Maturity Stage	Long-term operation phase
	Year	2008
	Type of Wind Farm	Onshore
	Power (MW)	10
	Power (Houses)	6700 households
	No. of Turbines	5
Procedures & Justice	Type of Ownership	Social
	Owner(s)	RothaarWind GmbH
	Public Information/Transparency	[✓] During the construction work, active engagement with residents, interested parties and decision-makers continued and they were kept informed about the advantages and disadvantages. This also generated support for the project among the locals. This included arranging for private individuals to visit a wind turbine in a neighbouring municipality.
	Participatory process	[✓] Local residents closely involved in the wind farm project. There are 90 shareholders, 29 of them from Hilchenbach. About

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		75% live in the districts of Siegen and Olpe. The city of Hilchenbach has also become a shareholder. Minimum participation: 3000 euros
Economy	Local value enhancement	[✓] Special touristic attraction for interested citizens, municipalities and companies. (e.g. The Hilchenbach Wind Trail). Various information boards show how wind is being used efficiently and profitably in Hilchenbach with state-of-the-art technology – to the benefit of the region and the environment.
	Local Employment	—
	Financial Gains/Benefits	Around 300 local people benefit from rental income and wind farm profits. The wind farm benefits two forest cooperatives (around 200 Hilchenbach families), local hotels and restaurants.
Society	Co-Existence with Other Activities	Tourism
	Local Opposition	Negligible
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible - Hilchenbach wind power saves around 21,000 t of CO_2 every year.
Additional Information	Sources	Rothaarwind_Buergerwindpark_Hilchenbach_brochure; https://web.archive.org/web/20220307221552/; https://www.gem.wiki/Hilchenbach_wind_farm; BWE_broschuere_buergerwindparks
	Interview	—

19	Wind farm	Description
General Information	Name	Ingersheim community energy cooperative
	Country	Germany
	Developer/Operator	ENERCON
	Maturity Stage	Long-term operation phase
	Year	2010
	Type of Wind Farm	Onshore
	Power (MW)	2
	Power (Houses)	1200 households
	No. of Turbines	1
Procedures & Justice	Type of Ownership	Social
	Owner(s)	Cooperative (360 members): >75% from Ingersheim community and the surrounding municipalities.
	Public Information/Transparency	[✓] Shortly after the plans were first made public in March 2010, the citizens' group organised public meetings (or hearings) in Ingersheim and neighbouring communities.
	Participatory process	[✓] The level of participation was highly remarkable.
Economy	Local value enhancement	[✓] With the compensation measures presented - which are mainly proposed on compensation areas in the Ingersheim and Besigheim districts - an adequate compensation and an upgrading of the living space is achieved within sight of the facility.
	Local Employment	—
	Financial Gains/Benefits	The members benefit in return from the profit of the wind turbine depending on the amount of the purchased shares. In total 22,920 shares were sold with a value of € 125 each share and with a minimum share of € 2500. Members now receive an annual dividend in addition to gradual repayment of their shares for the first 15 years of operation.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Major
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	http://www.eg-ingersheim.de/; https://www.researchgate.net/publication/280322126_Competing_Wind_Energy_Discourses_Contested_Landscapes; https://libstore.ugent.be/fulltxt/RUG01/002/213/693/RUG01-002213693_2015_0001_AC.pdf; Profit and Potential for Community Wind Farms in Taiwan; BWE_broschuere_buergerwindparks
	Interview	—

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20	Wind farm	Description
General Information	Name	Windpark Hollich GmbH & Co. KG
	Country	Germany
	Developer/Operator	Bürgerwindpark Hollich/Windpark Hollich GmbH&Co
	Maturity Stage	Long-term operation phase
	Year	2001
	Type of Wind Farm	Onshore
	Power (MW)	29.5
	Power (Houses)	—
	No. of Turbines	19
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	Shareholders (8), limited partners (217), landlords (55)
	Public Information/Transparency	[✓] Citizen Wind Festival 2018: the community wind farm Hollich Sellen celebrated a large community wind festival with a wind energy fair at the wind turbine WEA 32 in Sellen-Haggarten. A supporting programme with information and attractions for young and old had been prepared at the wind turbine in a 1,250 m² tent and on the outdoor area.
	Participatory process	[✓] Involvement of residents: financial participation, voluntary regular bonus
Economy	Local value enhancement	[✓] Members ('limited partners') of the area are preferred; a capital remains in the municipality
	Local Employment	—
	Financial Gains/Benefits	Rent for all owner of surface in the area of the turbine (not only the used surface)
Society	Co-Existence with Other Activities	Energy communities
	Local Opposition	Negligible
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	[✓] Large amounts of electricity generated, contributing to climate protection goals, environmental protection and the creation of local and regional added value.
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.windpark-hollich.de/; https://www.thewindpower.net/windfarm_en_14401_hollich.php
	Interview	—
	Comments	Energy transition in Germany: wind energy and the role of social acceptance and citizen participation

21	Wind farm	Description
General Information	Name	Eeklo Wind Farm
	Country	Belgium
	Developer/Operator	Ecopower
	Maturity Stage	Long-term operation phase
	Year	2001-2002
	Type of Wind Farm	Onshore
	Power (MW)	-
	Power (Houses)	Eeklo cover 100% of the local electricity demand.
	No. of Turbines	22
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	Ecopower Citizen energy cooperative
	Public Information/Transparency	[✓] Local residents, who had previously been sceptical about wind turbines, were involved from the beginning. They can now decide for themselves where and what is built and what happens to the proceeds.
	Participatory process	[✓] Most of the wind turbines belong to commercial players because the city has less control over private land. A pre-financed share of the citizen energy co-operative Ecopower was provided to 750 people. The local authority owns 25% of one wind turbine.
Economy	Local value enhancement	[✓] Investments were also made in the city's infrastructure in general (e.g., new public sports fields and schools).
	Local Employment	Everywhere you can see the social elements of the co-op's work, such as a second-hand goods store on-site providing employment for local people who've found problems finding employment elsewhere.
	Financial Gains/Benefits	Each wind turbine generates about 250,000 euros in profit per year. The money is used to finance social projects in the community, which in turn strengthens the cooperative's support among the population. Cooperative members use electricity at

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		cost, lowering their energy bills and pay off debts related to energy.
Society	Co-Existence with Other Activities	—
	Local Opposition	Minor - Concerns of the population were taken seriously, for example when it came to construction site noise, engine noise and shadows caused by the turbines.
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://windeurope.org/wp-content/uploads/files/policy/position-papers/20200702-WindEurope-position-paper-wind-industry-commitments-on-community-engagement.pdf; https://cles.org.uk/community-wealth-building-in-practice/community-wealth-building-places/eeklo-belgium/ https://www.rescoop.eu/uploads/rescoop/downloads/Mobilising-European-Citizens-to-Invest-in-Sustainable-Energy.pdf; https://carbon.coop/2016/09/our-visit-to-ecopower-the-brilliant-belgian-energy-coop/; https://cdn.nimbu.io/s/09b7yst/assets/Model%2025_%20Cooperative%20Cases_ECOPOWER.pdf; https://energy-cities.eu/focusing-on-community-in-uncertain-times-the-story-of-two-cities-teaming-up-with-energy-cooperatives/; http://citynvest.eu/content/five-questions-bob-dhaeseleer
	Interview	—

22	Wind farm	Description
General Information	Name	KrammerWind
	Country	Netherlands
	Developer/Operator	Zeeuwind/Deltawind
	Maturity Stage	Short-term operation phase
	Year	2019
	Type of Wind Farm	Onshore
	Power (MW)	102
	Power (Houses)	93.134
	No. of Turbines	34
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	Deltawind and Zeeuwind (51%) with 5,000 members, ENERCON energy supplier (49%) (Regional RES associations)
	Public Information/Transparency	[✓] There is a lot of focus on transparency. The windfarm has a dedicated website. Almost any detail of the windfarm can be found on this website; project planning and project progress, people involved in the construction, financial information, turbine technical information, windfarm operation.
	Participatory process	[✓] Participation took place through crowdfunding. This was a logical step as the initiators of the wind farm were citizen cooperatives. They already had a large support base through their members. The target was to have as many people as possible profit from the windfarm. Everyone was allowed to subscribe but association members and local residents got priority.
Economy	Local value enhancement	[✓]
	Local Employment	—
	Financial Gains/Benefits	The shares were allocated in rounds of 500€, to make sure that as many people as possible obtain shares. For the Krammer windfarm the members raised 10€ million starting capital in the form of loan bonds. The bonds issue was oversubscribed by more than 8€ million. 9€ million was allocated to members of both associations and 1€ million to the immediate residents of the windfarm. The decision on how to assign the bonds is made by the board of Krammer wind. The loans by participants are paid back within 11.5 years with an interest of 6.0-8.0% depending on the wind turbine energy yield. In addition to receiving priority in financing the windfarm, direct residents get financial compensation and discounts on their electricity bills.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	No evidence of protests against the construction of this windfarm has been reported.
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Minor
Additional Information	Sources	WindEurope_Wind industry commitments on community engagement; https://www.windparkkrammer.nl/; https://www.thewindpower.net/windfarm_en_25814_krammer.php; https://windpowernl.com/2018/06/18/joning-forces-in-the-largest-citizens-initiative/
	Interview	—

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23	Wind farm	Description
General Information	Name	Margonin Wind Farm
	Country	Poland
	Developer/Operator	EDP Renovaveis/MEGA SA
	Maturity Stage	Long-term operation phase
	Year	2010
	Type of Wind Farm	Onshore
	Power (MW)	120
	Power (Houses)	63,000 MWh (55000 households)
	No. of Turbines	60
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	EDPR
	Public Information/Transparency	[✓] On September 4, 2008, the inauguration of the construction work of the "Wind Power Plant Team in Margonin" took place. Prior to the construction, the investor EDP initiated cooperation with the owners of 55 plots where the windmills were located. In addition, the accompanying infrastructure required collaboration with 70 residents of the town and municipality of Margonin.
	Participatory process	[✓] The body conducting the administrative proceedings ensured public participation in the process. In order to speed up the procedure of granting permits, municipality administrators were involved in providing information to residents.
Economy	Local value enhancement	[✓] The Project has direct socio-economic impacts on development of the Margonin commune and local inhabitants: increase of the commune tax income by approximately 10%; increase of the annual income of land leasers by approximately PLN 8,000 a year for each; improvement of the local communication routes (approximately 10 km of local roads have already been constructed or remodelled by the Company); The wind farm is expected by the local authorities to be an interesting tourist attraction which will help development of the commune and create new sources of income for the inhabitants. The Project related works increase the safety of the electricity supply to the commune, which creates more attractive environment for business development
	Local Employment	With a final cost of PLN 751m (about 180m EUR), the project has created 300 person-years of temporary jobs during construction and commissioning and 10 permanent positions for the operation of the wind turbines.
	Financial Gains/Benefits	The taxes paid formed 25% of the municipality's budget. The developer, EDPR, is still paying the same amount of taxes and cooperates closely with the community. This collaboration has led to the development of several social responsibility programmes, a new football stadium and other infrastructure upgrades. The support from the wind industry has contributed to making Margonin one of the richest municipalities in the region.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	The greatest concerns were related to the location of wind turbines, as well as their appearance. A small group of residents entered their remarks about the wiring route. Protesting farmers did not hide their fears related primarily to the destruction of drainage, and the costs of its subsequent reconstruction. However, they received the investor's assurance that the land would ultimately be restored to the pre-investment state. Three residents protested against the construction of wind turbines in the vicinity of their property. Therefore, the investor decided to remove two objects despite the fact that environmental requirements were met.
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://windeurope.org/wp-content/uploads/files/policy/position-papers/20200702-WindEurope-position-paper-wind-industry-commitments-on-community-engagement.pdf; https://www.thewindpower.net/windfarm_en_17117_margonin.php; https://www.eib.org/attachments/documents/climate_action_case_study_poland_en.pdf; https://gll.urk.edu.pl/zasoby/74/GLL-3-3-2019.pdf; https://www.gem.wiki/Margonin_wind_farm; https://www.ebrd.com/work-with-us/projects/esia/margonin-wind-farm.html
	Interview	—

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24	Wind farm	Description
General Information	Name	Porspoder Wind Farm
	Country	France
	Developer/Operator	ERG Développement France/SOTRAVAL
	Maturity Stage	Planning phase
	Year	2022
	Type of Wind Farm	Onshore
	Power (MW)	9
	Power (Houses)	6,500 to 7,000 inhabitants supplied
	No. of Turbines	3
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	People who have accompanied the financing of the Porspoder wind project will have priority access for future capital investment opportunities. Indeed, ERG has undertaken to open the capital of the wind farm project company when the farm is commissioned: the objective being to offer this participation in the capital without associating the future shareholders with the risk of the project in phase of development.
	Public Information/Transparency	[✓] "This project has already integrated the local population. Two consultation workshops were organised with the public. These exchanges helped develop four implementation scenarios. Pictures were available all around the study area to give the public an overview of the project.
	Participatory process	[✓] Public participation was requested and organised on the initiative of the project developer, the company ERG Développement France. To ensure the contribution of the public in the development of the project, ERG has initiated an information and educational approach, accompanied by time for constructive exchanges. The conclusions of this participation made it possible to shape the final project.
Economy	Local value enhancement	[✓]The municipality of Porspoder and the Community of municipalities of the Pays d'Iroise will benefit from revenue from the tax revenue generated by the wind turbines installed on its territory throughout the expected operating life of around twenty years. This tax revenue estimated at 90,000 (TFB, CFE, CVAE and IFER) and 106,650 euros (corporate tax) per year will finance public services according to the choice of local elected officials.
	Local Employment	The project leader wishes to involve companies from Finistère and Brittany in its definition, implementation and operation. ERG undertakes, with comparable know-how, to favour regional companies. Thus, more than 2 million euros can be invested locally during construction. The operation of the Porspoder wind farm will call on local actors as much as possible for its upkeep, maintenance operations, environmental monitoring, etc.
	Financial Gains/Benefits	The success of two crowdfunding campaigns in 2018 and 2020 confirmed the support for this renewable energy project. Through this, the Porspoder wind project managed to raise €200,000 from 126 lenders.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	An interference phenomenon due to wind turbines can sometimes disturb the television broadcast behind the wind turbines in relation to the transmitter. In the event of complaints from local residents, ERG will implement all means to quickly identify and correct any problems with the reception of television broadcasts.
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.ergfrance.fr/parc-eolien-de-porspoder https://windeurope.org/wp-content/uploads/files/policy/position-papers/20200702-WindEurope-position-paper-wind-industry-commitments-on-community-engagement.pdf
	Interview	—

25	Wind farm	Description
General Information	Name	Königshovener Höhe wind farm
	Country	Germany
	Developer/Operator	Developer: RWE/BMR, Operator: RWE
	Maturity Stage	Short-term operation phase

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	Year	2016
	Type of Wind Farm	Onshore
	Power (MW)	67
	Power (Houses)	58000 households
	No. of Turbines	21
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	RWE (51%) and the municipality of Bedburg (49%)
	Public Information/Transparency	[✓] During the planning stage the city of Bedburg and RWE developed a joint communication plan to put local people in the picture through information events and press activities and to inform them about the use of wind energy. Local media joined press conferences in the run-up to important project developments. North Rhine-Westphalia's Environment Minister Johannes Remmel and Bedburg's mayor attended the official opening in spring 2016. RWE documented the progress of the project in digital formats. The city of Bedburg invited local residents to an information event to provide in-depth answers to all the residents' questions. A wind festival was set up allowing the people of Bedburg to celebrate "their" wind farm.
	Participatory process	[✓] The energy transition has long since arrived at the municipal level. For the realization of the Königshovener Höhe wind farm, we were able to gain a competent cooperation partner in RWE, who has been active in our region for a long time. As a city, we can make a small contribution to the implementation of the energy transition by participating in the wind farm. At the same time, we are realizing the possibility of relieving the city budget in the long term. This means that every single citizen of the city of Bedburg benefits from the project."
Economy	Local value enhancement	[✓] The wind farm is attracting a lot of interest, and the demand for visits is high notably school visits on Global Wind Day.
	Local Employment	In its more than 20 years of experience in the development, construction and operation of wind farms, RWE also relies on local partnerships. In the meantime, RWE has successfully implemented several wind farms with the participation of municipalities, municipal companies and citizens.
	Financial Gains/Benefits	The income from this 67 MW project flows directly into the city budget, which also benefits citizens. And this helps local stakeholders to identify with 'their' project which leads to more acceptance and support of new projects.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	The Königshovener Höhe wind farm in Germany developed by Innogy/RWE, however, was able to navigate this complex situation through effective community engagement.
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	WindEurope wind industry commitments on community engagement; https://www.gem.wiki/K%C3%B6nigshovener_H%C3%B6he_wind_farm; http://cdn.pes.eu.com/v/20180916/wp-content/uploads/2018/10/PES-W-4-18-innogy-1.pdf; https://www.adlittle.be/sites/default/files/viewpoints/ADL_Securing_the_social_license_0.pdf; https://www.bedburg.de/city_info/display/dokument/show.cfm?region_id=336&id=410204; https://www.windkraft-journal.de/2014/02/13/stadt-bedburg-beteiligt-sich-mit-49-prozent-an-windpark-koenigshovener-hoehe/48768; https://www.rwe.com/en/the-group/countries-and-locations/koenigshovener-hoehe-onshore-wind-farm;
	Interview	—

26	Wind farm	Description
General Information	Name	Kisielice Municipality
	Country	Poland
	Developer/Operator	Iberdrola Renewables
	Maturity Stage	Long-term operation phase
	Year	2006
	Type of Wind Farm	Onshore
	Power (MW)	42
	Power (Houses)	25,000 households
	No. of Turbines	27
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	PGE Polska Grupa Energetyczna

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	Public Information/Transparency	[✓] All conducted meetings were open for the residents, which could freely take part in them. Indeed, the municipal authorities addressed almost all the concerns of the local community through transparent consultations. As a result of consultations and meetings with the residents, a perception of wind energy changed significantly.
	Participatory process	[✓] During these years, the local authorities, especially the mayor of municipality, significantly contributed towards creating mutually beneficial wind energy developments. This was done by creating a platform of trust to enable dialogue and information exchange among all the relevant stakeholders. The mayor was also instrument in carrying out research and guaranteeing external finance for the developments: a central task in all of this.
Economy	Local value enhancement	[✓] Benefits for the residents and local stakeholders; The experiences of Kisielice demonstrate that wind energy can become a driver for local economic development. The municipal strategy led to numerous direct and indirect economic benefits, both for the municipality and its inhabitants. For instance, in 2012 Kisielice raised PLN 2.34 mln in taxes from the wind farms (i.e. 6 per cent of the municipality's total revenue, compared to PLN 1.21 mln in 2008).
	Local Employment	—
	Financial Gains/Benefits	Passive financial participation: Farmers – on whose land the wind turbines have been built – are paid on average EUR 5,000 in land lease fees per year for each turbine. Additional easement fees were paid to land owners for providing access to build power lines connecting the turbines to the grid. This reinforced social support as farmers were able to recognise an opportunity to also benefit from wind energy development in the area. Given the rural nature of the municipality, these farmers were important stakeholders.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	"We've never had any protests against turbines here,"- Mayor of Kisielice
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.offshorewind.biz/2011/07/25/gdansk-shipyard-to-lead-offshore-wind-revolution-poland/; https://winwind-project.eu/fileadmin/user_upload/Resources/Deliverables/Del_4.3.pdf ; https://www.power-technology.com/marketdata/kisielice-poland/
	Interview	—
	Comments	http://www.pnec.org.pl/en/3-aktualnoci-kat/357-kisielice-zwyciezca-w-konkursie-managenergy-2014-swietny-przyklad-dla-polskich-gmin

27	Wind farm	Description
General Information	Name	Partanna
	Country	Italy
	Developer/Operator	Developer: WKN AG Operator: EGP
	Maturity Stage	Short-term operation phase
	Year	2021
	Type of Wind Farm	Onshore
	Power (MW)	14.4
	Power (Houses)	10.000 households
	No. of Turbines	6
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Enel Green Power SpA
	Public Information/Transparency	[✓] The wind park was developed with full support of the local Municipality.
	Participatory process	[✓]
Economy	Local value enhancement	[✓] Compensatory Measures related to the first 7 years of operation of the plant include: The realization of the artistic lighting and maintenance of 10 architectural properties; - Provision of No. 2 charging

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		infrastructure for electric cars; -Funding to promote awareness of artistic-monumental assets.
	Local Employment	—
	Financial Gains/Benefits	Compensatory measures to the municipality in the amount of 3% of annual revenues.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	—
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.enelgreenpower.com/it/impianti/operativi/parco-eolico-partanna
	Interview	—
	Comments	—

28	Wind farm	Description
General Information	Name	Serra das Penas
	Country	Spain
	Developer/Operator	EGP
	Maturity Stage	Short-term operation phase
	Year	2018
	Type of Wind Farm	Onshore
	Power (MW)	42
	Power (Houses)	36200 households
	No. of Turbines	21
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Enel Green Power SpA
	Public Information/Transparency	[✓] The wind park was developed with full support of the local Municipalities.
	Participatory process	[✓]
Economy	Local value enhancement	[✓] CSV (Creating Shared Value) plan
	Local Employment	Creation of a list of job offers; direct employment for the local population; Indirect employment for local companies
	Financial Gains/Benefits	[✓] Land lease payments
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	—
	Mitigation measures-Social	[✓]
Environ-mental	Mitigation measures- Environmental	[✓] A hydrological monitoring plan, a birdlife monitoring plan, a restoration and revegetation plan, a noise level monitoring plan and water quality control
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.power-technology.com/marketdata/power-plant-profile-serra-das-penas-wind-farm-spain/
	Interview	—

29	Wind farm	Description
General Information	Name	Naeras
	Country	Greece
	Developer/Operator	PPC Renewables
	Maturity Stage	Long-term operation phase
	Year	2019
	Type of Wind Farm	Onshore
	Power (MW)	2.7
	Power (Houses)	4000 households and tourist facilities
	No. of Turbines	3
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	PPC Renewables
	Public Information/Transparency	[✓] The wind park is a component of the hybrid power plant of Ikaria, for which a series of information and awareness campaign was implemented before the installation.
	Participatory process	[✓] The Municipality participates in the project with the supply of an existing water reservoir, initially used only for irrigation uses, to be used as the pumped storage upper reservoir.
Economy	Local value enhancement	[✓] PPC Renewables constructed two new roads in the island, following a relevant request from the local Municipality. The

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		project also features as the second hybrid power plant of a wind park and a pumped storage in an isolated island worldwide, after El Hierro, Canary Islands, which aims to maximisation of wind energy penetration in the insular grid. This fact has been promoted and attracts every year new tourists to visit the whole plant.
	Local Employment	5-10 new employees work for this plant.
	Financial Gains/Benefits	The project in total contributes to more than 50% of the annual electricity demand coverage in Ikaria. 3% of the project's annual revenue are given back to the local Municipality.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Negligible
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://ppcr.gr/el/announcements/news/335-naeras-yvridiko-ergo-ikarias
	Interview	—

30	Wind farm	Description
General Information	Name	Alogorahi
	Country	Greece
	Developer/Operator	Ch. Rokas AVEE
	Maturity Stage	Long-term operation phase
	Year	2006
	Type of Wind Farm	Onshore
	Power (MW)	17
	Power (Houses)	500
	No. of Turbines	20
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Ch. Rokas AVEE
	Public Information/Transparency	[✓] It was developed with full support of the local Municipality. The Municipality of Anavras exploited the income from the project and was developed as a pilot mountainous settelment in Greece.
	Participatory process	—
Economy	Local value enhancement	[✓] The wind park, by returning to the local Municipality of Anavras an annual amount of 100,000 euros, contributed to the development of the local settelment and is upgrade to a pilot case for the whole country
	Local Employment	Tens of new positions were created in the settlement of Anavra, through the effective exploitation of the wind park's income to develop new infrastructure and opportunities.
	Financial Gains/Benefits	100,000 euros are supplied every year for the local Municipality
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Negligible
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.thessaliaeconomy.gr/blog/energeia/i-aioliki-eikona-tis-thessalias https://anavra-goura.gr/
	Interview	—
	Comments	The settlement of Anavra, through the effective exploitation of the wind park's public rates was evolved to a pattern of sustainable development for the mountainous country.

31	Wind farm	Description
General Information	Name	Ellhöft
	Country	Germany
	Developer/Operator	Windpark Ellhöft GmbH & Co.KG
	Maturity Stage	Long-term operation phase
	Year	2000
	Type of Wind Farm	Onshore
	Power (MW)	19
	Power (Houses)	—
	No. of Turbines	6
Procedures & Justice	Type of Ownership	Social
	Owner(s)	Bürgerwindpark Süderlügum GmbH & Co. KG, Süderlügum

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	Public Information/Transparency	[✓] Transparent information disclosure by the project initiators
	Participatory process	[✓] Formal and informal participation in zoning, planning, permitting
Economy	Local value enhancement	[✓] The owners of the wind farm provided in kind benefits to local environmental and social associations. In the case of Ellhöft the managers of the community wind park initiated local compensation measures for the compensation of negative impacts on nature and landscape.
	Local Employment	Jobs created (unspicified number)
	Financial Gains/Benefits	Local bank was involved for securing debt capital. land lease pooling models were developed addressing the land owners affected directly or indirectly by the construction of the community wind farms. These models aimed to achieve a fair distribution of the revenues from land lease payments, as well as to avoid envy and conflicts among land owners. Land owners could also participate directly as limited partners
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Negligible
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://windpark-ellhoeft.de/aktuell/
	Interview	—

32	Wind farm	Description
General Information	Name	Sa Turrina Manna
	Country	Italy
	Developer/Operator	Enel Green Power SpA
	Maturity Stage	Long-term operation phase
	Year	2003
	Type of Wind Farm	Onshore
	Power (MW)	84
	Power (Houses)	66.000 households
	No. of Turbines	68
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Enel Green Power SpA
	Public Information/Transparency	[✓] Community meetings
	Participatory process	[✓]
Economy	Local value enhancement	[✓] Thanks to the presence of the wind farm, the municipality of Tula has been able to expand the services it offers the community and upgrade the quality of its existing services. In the context of education, various initiatives have been implemented to support families in the area, such as programmes to reduce school dropout rates, the full reimbursement of expenses incurred in travelling to high schools in neighbouring municipalities, as well as study grants and inclusion services for students with disabilities.
	Local Employment	10 stable jobs
	Financial Gains/Benefits	2% of gross revenue achieved annually for every kWh produced and fed to the network is given to the local municipality. There have been more than 20 types of local social interventions, with a total of € 400,000 used with these resources. A very broad range of individuals and families have directly benefited from this income, and this has consequently been a key driver of social acceptance in the region.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	—
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	Internal documents of https://www.enelgreenpower.com
	Interview	—
	Comments	—

33	Wind farm	Description
General Information	Name	Carretera Arinaga
	Country	Spain
	Developer/Operator	Parque Eolico Ctra. De Arinaga

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	Maturity Stage	Long-term operation phase
	Year	2014
	Type of Wind Farm	Onshore
	Power (MW)	6.9
	Power (Houses)	—
	No. of Turbines	9
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	The local municipality (20%), Enel Green Power Espana (80%)
	Public Information/Transparency	[✓] Informative meetings
	Participatory process	[✓] Meetings (local); public opinions are considered
Economy	Local value enhancement	[✓] As a result of the improved welfare of the region, the social welfare budgets of the local authorities (which had increased due to the land rents incurred from the wind farms) could be used for resolving other social issues rather than "water and energy". With regards to the land rents, the investors would use publicly owned land for the wind farm installations. In return, the municipalities would take ownership of a significant proportion of the installations (20%).
	Local Employment	Employment related to the manufacturing, installation and assembling, and the maintenance of the farms (about 300 job positions)
	Financial Gains/Benefits	The installation of wind energy guaranteed the energy and water an affordable price. The additional energy and water supply has enabled the revitalisation and growth of the agricultural industry. Opportunities have been created for local entrepreneurs to collectively invest in and own a certain proportion them.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	—
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	—
	Biodiversity Loss	Negligible
Additional Information	Sources	https://winwind-project.eu/fileadmin/user_upload/Resources/Deliverables/Del_4.3.pdf
	Interview	—

34	Wind farm	Description
General Information	Name	Uthleben
	Country	Germany
	Developer/Operator	Energiequelle/ Haftung [GmbH] & Co. Kommanditgesellschaft [KG]
	Maturity Stage	Long-term operation phase
	Year	2011
	Type of Wind Farm	Onshore
	Power (MW)	3
	Power (Houses)	4000
	No. of Turbines	2
Procedures & Justice	Type of Ownership	Social
	Owner(s)	Stadtwerke Nordhausen, and the cooperatives with up to 49%.
	Public Information/Transparency	[✓]
	Participatory process	[✓] From 2021, energy cooperatives had the opportunity to obtain shares and participate directly as partners with limited liability. Municipal majority ownership of the wind farm may also be seen as an enabler for a passive financial participation of citizens and local communities.
Economy	Local value enhancement	[✓] The Wind Farm Uthleben shows that good cooperation between the project developer, the municipal utility company and energy cooperatives can lead to local financial participation and thus to local value creation. Business tax revenues and profits from the active, direct financial participation in the wind farm at least theoretically increase the possibilities of the municipality of Heringen/Helme for public spending including for social purposes. The same applies to the municipality of Nordhausen which is the sole owner of Stadtwerke. The Wind Farm Uthleben provides greater security of supply for the population, since in addition to the electricity produced by the city of Nordhausen in its own combined heat and power plants via EVN, the two wind turbines also secure the supply of electricity.

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	Local Employment	Jobs created (unspicified number)
	Financial Gains/Benefits	Compensation measures for the intrusion into landscape and nature in renaturation, but no distinctive, additional environmental benefits are noted. Lower-income households' benefit, at least indirectly, from local business tax paid by the wind farm operating company to the municipality where the company is registered. For the cooperatives, the shares represent a good interest-bearing investment that yields returns in the mid-single-digit percentage range.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	—
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	Mund, Thomas (2021): Der Windpark Uthleben. Eine erfolgreiche Bürgerbeteiligung. Presentation delivered to the COME RES German Country Desk Status Meeting, 30 September 2021, available from https://come-res.eu/resource?uid=1162
	Interview	—

35	Wind farm	Description
General Information	Name	Brebek
	Country	Germany
	Developer/Operator	Bürgerwindpark Brebek GmbH & Co. KG
	Maturity Stage	Long-term operation phase
	Year	2009
	Type of Wind Farm	Onshore
	Power (MW)	36
	Power (Houses)	—
	No. of Turbines	12
Procedures & Justice	Type of Ownership	Social
	Owner(s)	BREBEK GMBH
	Public Information/Transparency	[✓]
	Participatory process	[✓]
Economy	Local value enhancement	[✓] The operators committed themselves to dedicate a certain share of the revenues towards social projects, as not all citizens were able to benefit directly from the wind farm through their shares. This includes the purchase of a van for the local food bank ("Tafel"), support to a volunteer organisation distributing food to people in need, and high-speed Wi-Fi for public use. Eecological compensation payments from other CWF have been used to purchase additional 80 ha as amphibian and meadow bird protection areas, which in turn are leased to farmers for nature-oriented management.
	Local Employment	jobs created (unspicified number)
	Financial Gains/Benefits	The company belongs 100% to the citizens of the region. The profits of the company flow directly to locally anchored limited partners, none of whom has a determining influence on the company. There is no capital fund or institutional investor involved in the company.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Negligible
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.reinhard-christiansen.de/6.html
	Interview	—

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36	Wind farm	Description
General Information	Name	Lichtenau
	Country	Germany
	Developer/Operator	Bürgerwind Buchgarten GmbH & Co. KG
	Maturity Stage	Long-term operation phase
	Year	2014
	Type of Wind Farm	Onshore
	Power (MW)	730 GWh
	Power (Houses)	—
	No. of Turbines	173
Procedures & Justice	Type of Ownership	Social
	Owner(s)	Bürgerwind Buchgarten GmbH & Co. KG Lichtenauer, Bürgerwind GmbH & CO. KG, energy cooperative Energiegenossenschaft Paderborner Land eG.
	Public Information/Transparency	[✓]
	Participatory process	[✓] Participation by citizens was possible in two ways. Citizens could on the one hand become a member of an energy cooperative (from 500 euros), or, on the other hand could purchase shares to become a limited partner in the Bürgerwind Buchgarten GmbH & Co. KG (from 10,000 euros).
Economy	Local value enhancement	[✓] Citizens benefit indirectly from the proceeds from the wind turbines via a foundation. Nearly all turbine operators pay 1% of their profits into this foundation, bringing in 200,000 euros every year. This money was used to renovate the two primary schools and the secondary school of Lichtenau, to sponsor sports club's activities and to organise numerous cultural events. The foundation also finances a citizens' bus, which runs daily from 7 AM to 7 PM, connecting the surrounding villages with the town of Lichtenau (Lichtenau eMobil 2020). The main transport operator, by saving on the non-profitable connections to the villages, agreed to offer more frequent bus service between Lichtenau and Paderborn, the closest major city.
	Local Employment	Job creation (unspecified number)
	Financial Gains/Benefits	The people of Lichtenau pay considerably less for their electricity (around one third), drinking water prices have not increased for years because the city's public utilities also operate six wind turbines, and taxes remain stable because the city's trade tax has doubled.
Society	Co-Existence with Other Activities	Agriculture
	Local Opposition	Negligible
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	Germany's policy practices improving community acceptance of wind farms
	Interview	—

37	Wind farm	Description
General Information	Name	Wind Park Baltic1
	Country	Germany
	Developer/Operator	EnBW
	Maturity Stage	Long-term operation phase
	Year	2011
	Type of Wind Farm	Offshore
	Power (MW)	48.3
	Power (Houses)	50000
	No. of Turbines	21
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	EnBW
	Public Information/Transparency	[✓]
	Participatory process	—
Economy	Local value enhancement	[✓] An environmental foundation was created, and a bubble curtain was used to reduce underwater construction noise – an innovative approach at the time, but standard nowadays. These measures led to an agreement with environmental NGOs and fostered acceptance. A local control office was established to monitor the park, local shipping companies manage the transport of service technicians and local service companies

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		profit from contracts related to the provision of catering, repairs and harbour services. Additionally, the park can be visited as part of tourist tours.
	Local Employment	Job creation (unspecified number)
	Financial Gains/Benefits	Apart from local value creation, there was however no financial participation by local communities, even though the operating company is partly owned by different “Stadtwerke” (communally owned public utilities) in South-West Germany, where EnBW, the owner of the wind park, is located. Thereby, the communities of some of the electricity consumers are financially involved in the project.
Society	Co-Existence with Other Activities	Tourism
	Local Opposition	—
	Mitigation measures-Social	—
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://www.enbw.com/erneuerbare-energien/windenergie/unsere-windparks-auf-see/baltic-1/
	Interview	—

38	Wind farm	Description
General Information	Name	Touba Anthovouni
	Country	Greece
	Developer/Operator	Anemos Makedonias SA
	Maturity Stage	Long-term operation phase
	Year	2013
	Type of Wind Farm	Onshore
	Power (MW)	28.9
	Power (Houses)	20000
	No. of Turbines	34
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Anemos Makedonias SA
	Public Information/Transparency	[✓] Extensive, open public info days for the local community in the Prefecture of Florina, Western Macedonia, Greece
	Participatory process	—
Economy	Local value enhancement	[✓] It was the first wind park in the specific region, one of the poorest and most mountainous regions in Greece. It was a prove of successful collaboration of private foreign funds with the Greek society. It was the highest wind park in Europe (2000 m altitude) until the installation of another one in Switzerland. It offered practically experience in Greece for the operation of wind parks under severe climate conditions (extensive icing effect). In general, it empowered technically and economically a region very close to the borders of the country.
	Local Employment	Plenty of jobs during the installation phase, ten permanent positions during the operation phase. 5-10 occupation position under the wind park's normal operation phase. More people are employed to fix the regular malfunctions in the park due to the extreme weather conditions.
	Financial Gains/Benefits	3% of the project's annual revenue are given back to the local Municipality.
Society	Co-Existence with Other Activities	No
	Local Opposition	Negligible
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	—
Additional Information	Sources	https://www.thewindpower.net/windfarm_en_15473_anemos-makedonia.php
	Interview	No
	Comments	—

39	Wind farm	Description
General Information	Name	Wind parks of Organisation for the Development of Sitia, Crete
	Country	Greece
	Developer/Operator	Organisation for the Development of Sitia
	Maturity Stage	Long-term operation phase
	Year	1993 & 2021
	Type of Wind Farm	Onshore

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	Power (MW)	0,5 & 1.2
	Power (Houses)	1500
	No. of Turbines	3
Procedures & Justice	Type of Ownership	Hybrid
	Owner(s)	Organisation for the Development of Sitia
	Public Information/Transparency	[✓] The Organisation for the Development of Sitia (Eastern Crete) is typically a Society Anonymous firm, which, however, is based on the public contribution. It was begun and is still operated by the initiative of the citizens of eastern Crete and their target to exploit wind energy for the development of their territory.
	Participatory process	[✓] As stated also previously, the initiative begun from the local community. Given the lack of the concept of Energy Communities in the early '90s, it was expressed in the form of a typical SA firm. However, by definition, due to the way it begun, the participatory process was open to the local community.
Economy	Local value enhancement	[✓] The wind parks are exploited to support the development of the region in the Eastern Crete, with the construction of new projects of public interest.
	Local Employment	Apart from the permanent occupation positions created for the wind parks' operation, the projects offer their revenue, once the operation expenses have been covered, to fund the construction of important developmental works for the Eastern Crete. In this way, practically a strong economic activity is maintained in the town of Sitia thanks to the wind parks.
	Financial Gains/Benefits	As described in the previous columns.
Society	Co-Existence with Other Activities	Other
	Local Opposition	None
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	—
Additional Information	Sources	https://oas.gr/wind-farm-12mw/
	Interview	—
	Comments	The wind parks of the Organisation for the Development of Sitia is the unique example, most probably in the whole country, on how wind energy can be utilised by organised local communities and be exploited for the development of local communities. The first 500 kW wind turbine, installed in 1993, was the first wind park in Crete and one of the very first in Greece.

40	Wind farm	Description
General Information	Name	Tragoudistis, Sifnos
	Country	Greece
	Developer/Operator	PPC Renewables
	Maturity Stage	Long-term operation phase
	Year	2019
	Type of Wind Farm	Onshore
	Power (MW)	1.2
	Power (Houses)	1200
	No. of Turbines	2
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	PPC Renewables
	Public Information/Transparency	[✓] The local insular community in Sifnos was initially against the installation of this wind park. However, the Sifnos Energy Community worked on the approach of the islanders and succeeded to change the local opinion.
	Participatory process	[✓] Members of the Sifnos Energy Community supported the development of the wind park.
Economy	Local value enhancement	[✓] A new infrastructure was created in the island, which will contribute to the achievement of the target of the Sifnos Energy Community, which is the energy independency of the island.
	Local Employment	5 new occupation positions were created in Sifnos.
	Financial Gains/Benefits	3% of the project's annual revenue are given back to the local Municipality.
Society	Co-Existence with Other Activities	Energy communities
	Local Opposition	Only in the beginning.
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible

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Additional Information	Sources	https://www.energyregister.gr/stathmos/%20195
	Interview	—
	Comments	The project is important because it refers to a wind park installed in a Cycladic island, where there are very strong reactions against wind parks. It's a live proof that these projects can be installed in such sensitive environments only in sensible size and with the support of the local communities.

41	Wind farm	Description
General Information	Name	Wind parks of the "Energeiaki Samou SA" in Samos
	Country	Greece
	Developer/Operator	Energeiaki Samou SA
	Maturity Stage	Long-term operation phase
	Year	1998, 2000, 2001, 2006
	Type of Wind Farm	Onshore
	Power (MW)	6
	Power (Houses)	5200
	No. of Turbines	8
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Energeiaki Samou SA
	Public Information/Transparency	[✓] "Energeiaki Samou SA" is a local SME, in western Samos, where the wind parks have been installed. All activities were communicated to the local community.
	Participatory process	[✓] The local municipality and the local stakeholders were informed of the projects.
Economy	Local value enhancement	[✓] "Energeiaki Samou SA" is an SME acted in the island of Samos, Eastern Aegean Sea. With the construction of these wind parks, it proved that these projects are possible to be implemented also from local SMEs, maximizing the added value and the benefits for the local community.
	Local Employment	5-10 new employees work for the wind parks. More occupation positions in Samos by reinvesting the profits in the local community.
	Financial Gains/Benefits	3% of the project's annual revenue are given back to the local Municipality. Much more economic benefits through the support of the local community with new projects.
Society	Co-Existence with Other Activities	Tourism
	Local Opposition	None
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	http://www.ergons.gr/gr/energeiaki-samou
	Interview	No
	Comments	Energeiaki Samou SA has expanded its activities also to tourism with the construction of a 4-star hotel, creating a series of new occupation positions. This is a live proof on how wind energy can help small local stakeholders to approach sustainable development and support the local economy.

42	Wind farm	Description
General Information	Name	Wind park in Tilos of the TILOS project
	Country	Greece
	Developer/Operator	Eunice
	Maturity Stage	Long-term operation phase
	Year	2018
	Type of Wind Farm	Onshore
	Power (MW)	0.8
	Power (Houses)	500
	No. of Turbines	1
Procedures & Justice	Type of Ownership	Corporate
	Owner(s)	Eunice
	Public Information/Transparency	[✓] The project refers to the hybrid power plant in Tilos, funded by the H2020 project TILOS. For all activities there was a close contact and awareness of the local Municipality of Tilos and the local community (from the writing of the initial proposal to the integration of the project).
	Participatory process	[✓] The project refers to the hybrid power plant in Tilos, funded by the H2020 project TILOS. All activities were implemented in

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		common with the active involvement of the Municipality of Tilos and the local community.
Economy	Local value enhancement	[✓] Tilos has been equipped with the first small size hybrid power plant in Greece for electricity production and approaches more than 60% annual coverage of the electricity demand from renewables.
	Local Employment	5-10 new employees work for the hybrid power plant.
	Financial Gains/Benefits	3% of the project's annual revenue are given back to the local Municipality.
Society	Co-Existence with Other Activities	Tourism
	Local Opposition	None
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	https://eunice-group.com/el/projects/tilos-project-gr/
	Interview	—
	Comments	The project TILOS has been awarded with 4 European awards.

43	Wind farm	Description
General Information	Name	MEC in the eastern Asterousia mountain ridge in Crete
	Country	Greece
	Developer/Operator	Minoan Energy Community
	Maturity Stage	Planning phase
	Year	—
	Type of Wind Farm	Onshore
	Power (MW)	12
	Power (Houses)	11000
	No. of Turbines	4
Procedures & Justice	Type of Ownership	Social
	Owner(s)	Minoan Energy Community
	Public Information/Transparency	[✓] MEC has already started the presentation of the project in the local community.
	Participatory process	[✓] All members of the Community and the Municipalities can participate in the project.
Economy	Local value enhancement	[✓] It will the first large size wind park from an energy community in Greece.
	Local Employment	At least 5 new occupation positions in the wind park. More positions from the reinvestment of the project's profits in new energy transition projects.
	Financial Gains/Benefits	All economic benefits from the park will be returned in the local community.
Society	Co-Existence with Other Activities	Energy communities
	Local Opposition	Unknown yet
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	Not available yet
	Interview	—

44	Wind farm	Description
General Information	Name	Wind park of Sifnos hybrid power plant
	Country	Greece
	Developer/Operator	Sifnos Energy Community
	Maturity Stage	Planning phase
	Year	—
	Type of Wind Farm	Onshore
	Power (MW)	12
	Power (Houses)	11000
	No. of Turbines	4
Procedures & Justice	Type of Ownership	Social
	Owner(s)	Sifnos Energy Community
	Public Information/Transparency	[✓] Sifnos Energy Community has implemented a series of open to the public info-days for the presentation of the project.
	Participatory process	[✓] All citizens of Sifnos and friends of Sifnos, members of the Sifnos Energy Community, participate in the project. Also the Municipality of Sifnos.

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Economy	Local value enhancement	[✓] Sifnos Energy Community has designed this hybrid power plant of a wind park and a seawater pumped storage system for the implementation of energy independency and democracy in Sifnos. The project has been designed and sized to guarantee 100% energy independency in Sifnos. The project will also contribute to the full transition to e-mobility, to the production of potable water via desalination and the establishment of a daily maritime voyage with a new 100-passenger vessel, power by hydrogen, which will be produced by electrolysis unit with the electricity surplus from the hybrid power plant. In this way, the problem of maritime connection of Sifnos with the neighbouring larger islands will be solved.
	Local Employment	The project will be the pylon for a sustainable, effective and fare social and economic development of all the islands. Tens, if not hundreds of new occupation position in agriculture, in tourism, in maritime cruises and of course on the energy field are expected to be created.
	Financial Gains/Benefits	4,000,000 million euros on average are anticipated annual for the 20 years of operation of the project for the local community (new developmental works, members' shares etc).
Society	Co-Existence with Other Activities	Tourism
	Local Opposition	None
	Mitigation measures-Social	✓
Environ-mental	Mitigation measures- Environmental	✓
	Biodiversity Loss	Negligible
Additional Information	Sources	Sifnos island to achieve energy autonomy with hybrid power plant project
	Interview	—
	Comments	Sifnos has been declared as one of the six pilot islands of the "Clean Energy for EU Islands" Initiative, because of this project and the overall vision and effort.

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8.3. Predefined interpretations of the evaluation scores

The predefined interpretations of the "average" [1], "good" [3] and "excellent" [5] scores are analysed below for the four criteria.

8.3.1. Society

***Excellent**:* The wind farm promotes social welfare by supporting good health and habitat conditions. In these cases, the local habitats are reported to be happy, and their well-being is not affected by the wind farm. The wind farm is beneficial for the other activities that take place in the community (e.g. tourism, agriculture, fisheries, energy communities). The local communities were positive about the implementation of the initiative and the local opposition is considered negligible.

Good: The wind farm has social acceptance, despite some minor local opposition. The social issues of local communities were mitigated by the implementation of measures, including modifications to wind turbines (e.g. design, height, motor, colour, placement) or regional policies (e.g. working hours, distance, etc.). The wind farm doesn't disturb other activities that take place in the community (e.g. tourism, agriculture, fisheries, energy communities).

***Average*:** The wind farm affects the social life of the local habitats (in terms of e.g., noise pollution, shadow flicker, aesthetic, communication interference) and major local opposition is reported. The wind farm disturbs other activities in the community. In some cases, the wind farm site/placement is located at a short distance from the community and/or social heritage sites are affected.

8.3.2. Economy

Excellent: The wind farm created jobs exclusively for locals and minimised local unemployment. It brings financial profits to the municipalities and communities, either directly (e.g. community funds, compensation for land use), or indirectly, for example by providing lower energy prices and taxes for local inhabitants. The wind farm has enhanced the local value by improving for example the area's infrastructure; the activities in the location (educational excursions, landscape, sports activities, etc.), etc.

Good: The wind farm had led to job openings and supported employment. The local communities and inhabitants gained financial benefits from the wind farm (community funds, compensation for land use, lower taxes, etc.).

***Average*:** The local unemployment rate has not been significantly reduced because of the wind farm. There are no financial gains and benefits for the local communities by the wind farm.

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8.3.3. Environment

Excellent: The wind farm doesn't have any environmental impact on wildlife and the ecosystem. The wind turbines are developed with an environmental design (sustainable materials, tower height, noise insulation, blade painting, etc.) and sites of natural heritage are excluded (sites such as: Natura 2000 areas, protected landscapes, forests, low fragmentation zones). The site of the wind farm was selected by implementing integrated frameworks based on various sitting criteria (including, among others, regional planning policies). The wind farm case ensures climate neutrality and reduces its Greenhouse gas emissions (GHGs) during the whole supply chain and life cycle of its development and operation, namely: raw material extraction, manufacturing, installation, operation, and maintenance.

Good**:** The wind farm environmental impacts on wildlife and the ecosystem are insignificant and/or actions have been taken for their mitigation. A clear environmental strategy was followed for the wind farm development site, according to the EU policies and regulations, and considering land diversion effects (e.g. soil erosion, vegetation loss, deforestation). The wind farm contributes to the overall reduction of GHGs.

Average: The wind farm causes environmental impacts that remain unaddressed and/or unresolved, including, among others, noise pollution (e.g. wildlife disturbance and species displacement), biodiversity loss (e.g. collision mortality of birds and bats, wildlife barrier effects, etc), and microclimate changes (e.g. temperature, humidity).

8.3.4. Procedures & justice

Excellent**:** A local community or company owns the wind farm under a social ownership model (e.g. community shares). The local stakeholders actively participate and take decisions for the development of the wind farm (e.g. participatory planning, consenting process). Sufficient information about the wind farm is provided to local communities through social activities (e.g. conferences, meetings, etc.). The initiative is characterized by transparency, mutual understanding, and trust between stakeholders. There is distributional justice concerning the financial gains and benefits of the wind energy initiative.

Good**:** There is some distributional justice concerning the wind farm's costs and benefits. The wind farm has adopted a hybrid ownership model, sharing the ownership between the local community and other actors (e.g. companies) outside of the local area. The locals are well-informed about the initiative and actively participate in the development of the wind farm.

Average**:** The wind farm is owned by one or more companies outside of the local area. There is no active participation of the local communities in the development process

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of the wind energy initiative. There is not any fair distribution of the wind farm's benefits, and the affiliated companies mostly gain the profits.

8.4. Example of rating of a best wind farm case

Below, a typical example of the rating method for a best wind farm case is presented. A corresponding description for each criterion was provided to facilitate the rating process.

Example case: *Feldheim Wind Farm*

***Society*:** It is considered that the village residents don't have any concerns about the noise or the aesthetics of the wind turbines. There was some local opposition from neighbouring towns, but it was mitigated by offering them lower electricity prices (Carrington Damian, 2012; Guevara-Stone, 2014). In addition, the wind farm harmoniously co-exists with other energy projects (biogas, PVs) and agriculture activities.

Rating score: 3

***Economy*:** All the renewable projects in the area created jobs (0% unemployment rate in Feldheim). The residents pay 31% less for electricity and 10% less for heating (Guevara-Stone, 2014). Energiequelle spokesman Werner Frohwitter claimed, *"Our aim is to let as many people as possible directly benefit from our turbines, thus encouraging social acceptance for renewable energies".* In addition, the wind farm enhanced tourism with more than 4000 people visiting Feldheim per year, for energy training, landscape, and other activities (Morris, 2019).

Rating score: 5

***Procedures & justice*:** The development was made by a local renewable energy company, Energiequelle GmbH. The town of Feldheim and Energiequelle has established a local joint venture "Feldheim Energie GmbH & Co", which owns the wind farm (Kang, 2014). Moreover, it was noted that locals decide on their electrical prices during community meetings (participatory process). In addition, there is trust and cooperation between the local stakeholders (von Bock and Polach et al., 2015)

Rating score: 5

***Environment*:** Climate change or other environmental considerations did not play an important role in the process of setting up this renewable energy project (Islar & Busch, 2016). The development efficiently achieves the transmission to lower GHGs emissions as the electricity produced in Feldheim is carbon-free. No opposition has

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been made to the effects of land diversion as natural heritage sites were not affected. The impacts of the project on wildlife are considered insignificant.

Rating score: 4

Summary: Overall, Feldheim wind farm can be considered a good practice case for its environmental and social impacts. Meanwhile, based on its operational and planning procedures and economic strategy, it can be characterized as an excellent practice case.

Sum score (evaluation rating): Assuming equal weights for all criteria, the total evaluation rating is calculated as the average of the four scores.

Feldheim case score = [3+5+5+4]/4= 17/4 = 4.25. Overall, it can be considered as an ***excellent*** practice case.

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8.5. Evaluation scoring

		Criteria				Average evaluation outcomes		
	Criterion Weight (%)	25	25	25	25	*The evaluation outcomes will result automatically based on the assumption that criteria are weighted equally*		
Case	Best Wind Farm Cases	Society	Economy	Environment	Procedures & Justice	Rating score	Overall	Final Ranking
44	Wind park of Sifnos hybrid power plant	4.64	4.91	4.27	4.64	4.6	Excellent	1
43	Wind park of the MEC in Crete, in the eastern Asterousia mountain ridge	3.91	4.73	4.00	4.73	4.3	Excellent	2
22	KrammerWind	4.64	4.45	3.64	4.45	4.3	Excellent	3
5	Duikeldam	4.82	3.55	4.27	4.45	4.3	Excellent	4
40	Tragoudistis, Sifnos	4.18	4.45	4.27	4.09	4.3	Excellent	5
18	Hilchenbach community wind farm	4.27	4.18	4.18	4.36	4.3	Excellent	5
21	Eeklo Wind Farm	3.73	4.73	4.09	4.45	4.3	Excellent	5
6	Neuenkirchen	3.91	4.36	4.00	4.64	4.2	Excellent	8
36	Lichtenau	4.18	4.64	4.00	4.09	4.2	Excellent	8
42	Wind park of the TILOS project	3.82	4.18	4.45	4.27	4.2	Excellent	10
2	Feldheim	4.00	4.91	3.64	4.18	4.2	Excellent	10
1	Middelgrunden	3.82	4.64	4.09	4.18	4.2	Excellent	10
3	Samsø	3.82	4.55	4.18	4.18	4.2	Excellent	10
35	Brebek	4.36	4.36	4.27	3.55	4.1	Excellent	14
39	Wind parks of Organisation for the Development of Sitia, Crete	4.18	4.18	3.82	4.18	4.1	Excellent	15
31	Ellhöft	4.18	3.82	4.00	4.00	4.0	Excellent	16
33	Carretera Arinaga	3.82	4.55	3.73	3.82	4.0	Good	17
34	Uthleben	4.09	4.18	3.82	3.64	3.9	Good	18
29	Naeras	4.00	3.73	4.27	3.64	3.9	Good	19
20	Windpark Hollich GmbH & Co. KG	4.18	3.55	4.00	3.91	3.9	Good	19
41	Wind parks of the "Energeiaki Samou SA" in Samos	3.73	4.00	3.91	3.82	3.9	Good	21
25	Königshovener Höhe wind farm	3.91	3.73	4.00	3.73	3.8	Good	22
4	La Jacterie	4.36	3.09	3.45	4.45	3.8	Good	22
24	Porspoder Wind Farm	3.64	4.00	3.82	3.73	3.8	Good	24
11	Schönberg	4.00	3.27	3.82	4.00	3.8	Good	25
19	Ingersheim community energy cooperative	2.64	4.00	3.73	4.55	3.7	Good	26
8	Springer Burgerwindpark	3.73	3.36	4.00	3.64	3.7	Good	27
23	Margonin Wind Farm	3.18	4.09	3.73	3.55	3.6	Good	28
10	Havsnäs	3.82	4.36	3.18	3.18	3.6	Good	28
32	Sa Turrina Manna	3.27	4.00	3.82	3.36	3.6	Good	30
26	Kisielice Municipality	3.73	3.36	3.73	3.64	3.6	Good	30
30	Alogorahi	3.55	4.09	3.82	2.91	3.6	Good	32
38	Touba Anthovouni	3.64	4.09	3.55	3.00	3.6	Good	33
37	Wind Park Baltic1	3.45	3.91	4.36	2.55	3.6	Good	33
28	Serra das Penas	3.09	3.91	4.27	2.73	3.5	Good	35
13	Castelmauro	3.18	3.73	4.18	2.82	3.5	Good	36
7	Fryslân	3.09	4.18	3.55	3.00	3.5	Good	37
9	Löwenstedt	4.09	3.00	3.36	3.36	3.5	Good	37
17	Santo Domingo de Luna	3.18	4.00	3.82	2.73	3.4	Good	39
12	Barile Venosa	3.00	3.45	4.18	2.73	3.3	Good	40
14	Los Arcos	2.91	4.00	3.64	2.73	3.3	Good	41
15	San Pedro de Alacon	2.73	3.91	3.45	2.73	3.2	Good	42
27	Partanna	3.18	3.09	4.00	2.55	3.2	Good	42
16	Portoscuso	2.91	3.27	3.27	2.55	3.0	Good	44

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8.6. Questionnaire form

8.6.1. General data for interviewee/respondent

General data for the interviewee/respondent		
A. General data NOT shared		
1	Full name of interviewee/ respondent	
2	Organisation/ project	
3	E-mail	
4	Telephone	
5	Stakeholder name	
6	Position/ affiliation	
B. General data potentially shared, being linked with the description of the wind farm case		
5	Wind Farm case	
6	Stakeholder type	
7	Position/ affiliation type	
C. General data potentially shared, in an aggregated way		
8	Age range	
9	Gender	
10	Education/field of expertise	

8.6.2. Main body of questionnaire

No	Interview's discussion topics/ questions
	Background information
1	**What is your relation with the wind farm sector, and/or the energy sector, and/or the wind farm case under discussion?** *The goal is to understand the relation of the interviewee with the domain or the particular wind farm under discussion. This may include some information on the knowhow, experitise, professional background, or the type of relation to the specific case.*
2	**What was the main need when the decision to embark on the wind farm project was taken? What were the key motives/drivers and what were the key barriers? What were the main objectives?** *It's a crucial question. The goal is to understand the background CONTEXT of the wind farm project; the need that led to the decision of developing the wind farm; the motives/drivers that pushed towards development and the barriers that had to be overcome; the objectives of the project; who was mainly involved in its launcing and why.*
	Society

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No	Interview's discussion topics/ questions
3	**Are the local citizens/ residents happy and/or satisfied with the wind farm? What are their main concerns about their well-being?** *The goal is to investigate the support and/or rejection by the community, and the feeling and opinions of the individuals within the local area. Discussion could cover, among others, practices that prevented or efficiently managed conflicts between developers and local communities (e.g. in sites of social heritage, in the case of sites being in a short distance from the community), mitigating local opposition. The well-being aspects could be related to practices that promote social welfare by supporting good health and habitat conditions. Within this topic, actions for the mitigation of social disturbance issues (e.g., noise pollution, shadow flicker, aesthetic, communication interference) are also included.*
4	**Is the area/landscape nearby the wind farm used for other activities by the local population? What impact does the wind farm have on these activities?** *The goal of this question is to discuss the co-existence aspects of the wind farm case, by analysing, among others, practices where the harmonious co-existence with other activities is achieved (e.g. tourism, agriculture, fisheries, energy communities, etc.).*
	Environment
5	**What are the opinions of the local residents about the environmental impact of the wind farm?** **If any environmental challenge had arisen, what measures were applied in order to tackle it or mitigate it?** *The goal is twofold:* *(i) to understand what are the attitudes and opinions of the individuals being in proximity to the wind farm development towards the environmental impact of it;* *(ii) to explore the practices that were applied with the aim of mitigating or tackling the environmental challenges, for instance, in relation to:* ○ *Ecosystem and Wildlife: practices that mitigate environmental impacts for the protection of wildlife and ecosystem (addressing e.g. noise pollution, biodiversity loss, microclimate changes, etc.);* ○ *Climate neutrality: practices that promote climate neutrality. They include cases that reduce Greenhouse gas emissions (GHGs) along the whole supply chain and life cycle of the wind farm development, e.g. during raw material extraction, manufacturing, installation, operation, and maintenance.;* ○ *Land diversion: practices that encompass a clear environmental strategy for the wind farm development site, mitigating the land diversion effects (e.g. soil erosion, vegetation loss, deforestation, etc.).*
	Economy
6	**How does the community economically benefit from the wind farm?** *The goal is to understand if and how the local community is benefiting from the wind farm, by exploring both* *(i) the financial gains and benefits: for example, practices that bring financial profits to municipalities or/and communities, either directly (e.g. community funds, compensation for land use), or indirectly by providing lower energy prices and taxes for local inhabitants;* *(ii) the employment: for example, practices that lead to job openings and promote local employment.*
7	**How was the local value of the area affected by the wind farm?** *The goal is to understand if and how the "local value" was enhanced. Indicative practices that can enhance the "local value" may include: improving the area's infrastructure; promoting tourism in the location (educational excursions, landscape, sports activities, etc); etc.*
	Procedures & Justice

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No	Interview's discussion topics/ questions
8	**What is the ownership model of the wind farm case?** **Is the allocation of the outcomes perceived as being fair? Why?** *The goal is is twofold:* *(i) to comment on the ownership model, and discuss it into more detail, especially if a "social ownership model" is applied (namely, in cases where the shares of the wind farm initiative are offered to local inhabitants, e.g. "Community shares");* *(ii) to comment on practices (if any) based on which the costs and benefits are equally (or to some extent proportionally) allocated among society, local communities, and private actors (companies). This is generally understood as "distributional justice".*
9	**How did the public and stakeholders participate in the planning and construction phase of the wind farm?** **Are the local communities well-informed about the wind farm?** *The goal is to investigate the local participation, the information provision level and the transparency. In particular, the aforementioned concepts may include:* ✓ *Local Participation: practices that include the involvement of local stakeholders and individuals (from the local community). In these cases, the locals are engaged, actively participate and take decisions for the development of the wind farm (e.g. participatory planning, consenting process).* ✓ *Information level: practices that provide information for the wind farm development and address knowledge gaps in local communities (e.g. public meetings, conferences, etc.)* ✓ *Transparency: practices that promote and ensure mutual understanding and trust between stakeholders. This could be achieved for example, by the establishment of certain regional policies.*
	Summarising & concluding questions
10	**What were the main challenges and impact?** **What is the main reason (if any) due to which this wind farm could be considered as a good practice wind farm case across Europe?** *It's a crucial question. The goal is to highlight the main challenges and main impact, as well as to elicit the main reason according to which this case could be considered as a good case example that could ensure a high level of community acceptance. The phrasing shall be soft allowing the interviewee to challenge the statement or confirm it justifying his/her opinion.*
11	**Is there any possibility and/or "room" for improvements regarding the wind farm operation and its social acceptance?** **Please provide some examples** *The goal is to elicit the main reason according to which this case could be considered as a good case example that could ensure a high level of community acceptance. The phrasing shall be soft allowing the interviewee to challenge the statement or confirm it justifying his/her opinion.*
12	**Would you consider any additional factor that contributed to the social acceptance of the wind farm, or any other aspect of our discussion topic that we did not manage to address?** *The goal is to check the completeness of the questionnaire & make adjustments; also to receive feedback on aspects not covered.*

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8.7. Interview reports

8.7.1. Lichtenau wind farm

No	Written notes (transcript)
1	I represent the interests of the city in questions of renewable energies and serve as an intermediary to legal mandate holders and independent investors, especially in the field of wind energy. In 1997, the first wind farm was built in Lichtenau Asseln with a total of 67 turbines. At that time, it was the largest wind farm in Europe. This was followed by a further 5 wind priority zones for the expansion of wind farms (number of turbines from 11 to 33 turbines). The energy city of Lichtenau now has a total of 187 wind turbines. In the period between 2016 and 2023, a total of 87 wind turbines were built with an installed capacity of 3-5 megawatts. Most of them are turbines from the company ENERCON - 105. From the very beginning, the city attached great importance to getting a high level of citizen participation.
2	As already briefly described in point 1, the city of Lichtenau was already trying to define itself in the 1990s through renewable energies and to promote the energy transition. The aim was to call itself an energy city, based on 100% renewable energies. Positive effects such as increased tax revenue, local added value and the prosperity of the regional economy naturally played a major role. But it was important from the outset to involve the local population, farmers, foresters and landowners. The planning was preceded by a long public process involving meetings, the involvement of the regional parliament and the political parties. One can say that all socially relevant people were involved in the process.
3	Since the beginning of wind energy development, the involvement and participation of the citizens has been a central element of a strategy of cooperation between the municipality and the local people. According to surveys and estimates, it can be said that about 40% are proud and happy about the development of wind power on the Lichtenau territory, 40% are satisfied. The remaining 20% are at least peaceful through certain significant measures. These measures are: a) For the citizens - stable taxes, stable drinking water prices, a capped electricity price, company and cooperative participations, promotion of various projects in the club life of the place b) All wind power operators/parks give a share of their feed-in tariffs to a foundation. The annual approx. €250,000 then benefits regional associations.

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No	Written notes (transcript)
	c) The wind energy operators pay trade taxes, leasing concessions, compensation payments to the municipality, and there is also an expansion of economic routes and infrastructure d) The 6 wind turbines (ENERCON E115) of Stadtwerke Lichtenau generate profits, trade tax income and interest/guarantee commissions
4	A harmonious coexistence of the areas of tourism, agriculture, fisheries and energy cooperatives was a prerequisite for the development of the wind priority areas right from the start. The regional farmers benefit in a variety of ways (lease, plant construction, energy farmer status) Tourism, for example, has developed a so-called "Energieland-Lichtenau Tour" that reconciles rural beauty with modern technology. The city of Lichtenau has been officially allowed to call itself an energy city for 2 years and is also marketing this to tourists. The wind farms are destinations for hikers and e-bikes; there are also charging facilities there. Benches invite you to linger.
5	Naturally, local residents have different opinions on the environmental impact. On the one hand, it is recognized that the energy city of Lichtenau makes a significant contribution to the energy transition, but of course there is also criticism of the red air traffic warning lights, for example. Here technicians have now developed things that greatly reduce the light impairments. In addition, there are specific shutdowns of wind turbines in the wildlife area during the breeding season of red kites and black storks.
6	Look Grafi citizens: • The wind energy operators pay trade taxes, leasing concessions, compensation payments to the municipality, and there is also an expansion of economic routes and infrastructure • The 6 wind turbines (ENERCON E115) of Stadtwerke Lichtenau generate profits, trade tax income and interest/guarantee commissions • The energy city of Lichtenau is now benefiting nationally and internationally from the “Energy City” label, as a pioneer in the development of renewable energies in Europe
7	The local value of the area of the energy city of Lichtenau was significantly improved. Approx. 1 billion euros were invested in Lichtenau in all aspects of wind power. In addition, two commercial parks were created that deal exclusively with renewable energies, mostly wind energy. This created jobs and maintained the local value chain. The initially feared reduction in living quality and loss of value of the property did not materialize. On the contrary, there was an increase in value and the associated acceptance. The demand

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No	Written notes (transcript)
	from young families for home ownership cannot currently be met. One can say that young families in particular are very interested in living in one place.
8	As already described under point 6, there is a mature concept for the participation of many citizens in the wind farms; dug the community wind farms we achieve the highest possible acceptance. In terms of distributive justice, the Lichtenau strategy is also rated very highly by institutes such as the Rheinisch-Westfälische Universität Aachen and the Universität Paderborn, which work with us on various projects.
9	In Lichtenau, the highest possible degree of local participation, the highest possible degree of information provision and transparency were provided within the framework of the legal provisions. For local participation, see the graphic “How do citizens benefit.” **Milestones of the energy city of Lichtenau** • Largest inland wind farm at the time - 67 turbines in 1998 • Technology centre for future energies - opening 2015 • Energy cooperative Paderborner Land - founded in 2009 • Working group Energiestadt Lichtenau - honourary working group since 2011 • Energy village Herbram-Wald - self-sufficiency through woodchip heating plant since 2013 Naturbad Altenautal - CO_2-neutral natural pool with energy experience house • Active climate protection management with climate protection concept - full-time employment of a climate protection manager since 2015 • Approval of the land use plan - designation of wind concentration areas in 2016 • Stadtwerke Lichtenau - 6 own wind turbines and 1 open space photovoltaic • Civic and Energy Foundation - has been supporting club life projects since 2016 • Lichtenau eMobil association - citizens' bus with volunteer drivers • Climate campus - education, sports and leisure park in the energy city of Lichtenau

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No	Written notes (transcript)
10	The biggest challenges for the wind farm development in Lichtenau lay in the early nineties. Wind energy was still largely unknown, and reservations were great. It is thanks to a few visionaries and pioneers that the administration, trade and industry and the citizens have embarked on the adventure of wind power. Thanks to the nationwide label "Energy City" and scientifically documented studies, for example by the University of Aachen (ArKESE project - design of robust energy systems based on renewable energies), we are already a good European role model, similar to the island of Samsø in Denmark.
11	Perhaps it is a bit presumptuous to say that the protagonists of the energy transition and wind energy development here in Lichtenau did everything right in terms of social acceptance. At the moment we don't see any room for improvement, apart from perhaps even more targeted activities to link the topic to tourism.
12	From my point of view, the most important factor is maximum identification with the topic. In contrast to the 1990s, nobody is denying climate change anymore and the local population stands united in support of renewable energies. They just want to be really well involved, that is, to benefit personally, both financially and ideally. I once said the following to parents of children: "In Lichtenau, the children only draw wind turbines when it comes to energy, in other regions they still draw lignite excavators".

8.7.2. Middelgrunden wind farm

No	Written notes (transcript)
1	I am into the offshore wind sector, simply because I have interest in that. I was a shareholder in the first Copenhagen wind farm Lynetten. And then I started my own company, where my main objectives are to help people with good ideas to get into business in renewable energy. And you have to understand that in my background is I only work in wind where I live. Uh, it's a very important statement because …I feel you should feel what you are doing. I mean, if I create a wind farm 300 km away, I don't see it. I don't feel it. Yeah, I have to have it in my backyard.
2	It was a private initiative. The only initiative from the government was, in 1996-97, about the budget for the coming years - 40 million Danish kroner to be used the following five years, in 4 four different areas (solar, ocean,

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No	Written notes (transcript)
	wind), and to involve people. So so you can say no, we started it and the government took over something. [The Middelgrunden Wind Turbine Cooperative was founded in May 1997 with the aim to produce electricity through the establishment and management of wind turbines on the Middelgrunden shoal.] * A protest was coming up in 1998 where we sent out the environment impact assessment for public consultation. And then then we got more than 1000 protests. And the protest was about vision impact. What we have been doing. And so we proposed the 27 turbines. Each 1.5 megabyte, that was the largest one we could buy that time in the northern part of the reef to avoid having any kind of conflict. [After the public hearing in 1997, where this layout was criticised, the farm layout was changed to a slightly curved line and the number of turbines had to be decreased to 20]. *
3	People are extremely happy about the project. We have a lot of local people have being shareholders. And when we four years of five years ago start discussing repowering project or should we close the project? There was a lot of people telling us you cannot close that. I mean everybody in the around the world knows this project. I only remember 3 protests, which were easy to handle. The first one was from the Swedish Association of Fishermen and they were afraid of the sea cables and the electromagnetic fields around it and the impact on fish. And the government told them simply, well, we have sea cables and we have it for more than 90 years now and Denmark between the islands, we have never seen anything. Protest #2 was from the an association established by some architects about spoling the view. And then the the most difficult one - from the mayors of Gentofte, Charlottenlund down that area, you know, north occupying where all the rich people are living... they were afraid of real estate value, but already at that time there was quite a number of studies in the western part of Denmark about impact from putting off wind farms on real estate prices, and there we couldn't find any impact. [..For instance, locals were worried about potential noise impact from the farm, but after a demonstration tour to a modern on-shore wind turbine, the locals were convinced that there would be no noise impact from the Middelgrunden turbines.] *
4	[Middelgrunden was used for dumping harbour sludge and other material for 200 years. The investigations showed that 3-4 turbine sites were contaminated by heavy metals (mercury and copper). The chosen project

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No	Written notes (transcript)
	with the arch made it possible to avoid some contaminated areas, and the problems with heavy metals were less than in the original proposal.] *
5	Well, first of all, you have to maybe find a better place. When site citing. I mean if if you were really in an area where a lot of people will be influenced I I would suggest you move a little more north. So I think that's where the sun is not behind the turbine, but it's of course you can stop the turbines. That's a simple way you do it is that there's the same way you do with wind turbines if you are in an area with the with bats, I mean, if you slow down the turbines, you don't give any harm to the bats. It looks about five years to learn that. But that works perfect. And you can because the bats are so easy to predict. You should careful study because it's so easy to calculate. I mean you if you are really proposing a project in the area where you have a lot of people will be influenced, you have to avoid, you have to move the windfarm. I mean you cannot move people usually.
6	The benefit I know some people living there and they are very positive about the benefit of employment because I guess it's windfarm needing the service; having the ownership and they have established a local office there and for service people, they have engaged the boats. They have an engagement with local boat owners, if they need extra traffic. So people see exactly how you get benefit direct because it's a small community. Employment, of course there's indirect because the people working in wind farms, so the people working in the construction field and things like that. But it's not dominating, I mean it's just still a very small wind farm.
7	-
8	In my opinion, we can only do it in a way we did it as a joint venture, with a professional developer. It was really important to have the public involved. [The Middelgrunden Wind Farm is the world largest wind farm based on joint ownership by a cooperative and a utility. The model builds on positive experiences from the onshore wind developments at Avedøre Holme and Lynetten, which were established in 1993 and 1996 in collaboration between local cooperatives and the utility. The whole project has been developed in cooperation between Middelgrunden Wind Turbine Cooperative and the local utility Copenhagen Energy. All contracts were drawn up jointly during planning and construction, and all investment costs were shared between the two developers. During the construction and testing period income from electricity sale as well as the costs were equally shared between the two developers, thus avoiding conflicting interests on what wind turbines to

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No	Written notes (transcript)
	finish first. After final delivery the two owners run as separate businesses. The cooperative owns and manages the 10 southern turbines, and the 10 northern turbines are owned by the utility. But still the two owners collaborate on the operations.]
9	[Planning phase - The project had to pass three public hearings, before it finally received the approval from the Danish Energy Authority on December 13, 1999.At the final hearing a large number of local groups and committees, not mentioning the several thousands of shareholders, recommended and supported the project. Only a relatively small group of yachtsmen, fishermen, individuals and politicians remained in opposition.] *[1600 people visited the construction site during a visitors-day in May 2000. During the construction process the cooperative paid large attention to involving the members and the public.] * [A comprehensive information work took place, in relation to relevant authorities, NGOs and many future shareholders of the cooperative. During the process we were in contact with 50-100,000 people. 10,000 local people pre-subscribed for shares. This proved strong local support and helped in the approval phase.] *
11	No, not really. If I look at the wind project, only technical things that could be improved, but that's the probably because they were not developed that time, so. No, I guess I feel it has been. We have been doing it in in a way where you we can also see that people are not selling the shares and the people want to continue with another 25 years.
12	Don't surprise people, get them involved and be honest and accept that they're may don't like it. I mean, you can still do it. It's a lot of psychology and that's what I have learnt from the wind activity working in the cooperatives. If you if you have could argument, of course they will all the time be somebody that don't like things. I mean, we all know that 15% in Denmark are against everything. You can see that in public. You can see that in public inquiries, I mean.

8.7.3. Samsø wind farm

No	Written notes (transcript)
1	Well, one role I have for this project is being part of the municipal council, as a local politician.

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No	Written notes (transcript)
2	The main need/motive arose from a political decision, after COP3, to find a Danish Island and try to make it 100% self-supplied in renewable energy (RE) in 10 years (as a pilot project). An island – because it was easy to measure the impact in the defined area. The objective was to highlight renewable energy and study how high a percentage of renewable energy a well-defined area could achieve using available technology, and without big grants. Another objective was local participation and citizen involvement, support. So this in my opinion, this was one of the main drivers that the residents or the citizens living here the whole year accepted this overall plan and this overall term - being self supplied with renewable energy. Key barriers – mostly farmers on the island who needed to be convinced, who thought the turbines would ruin the island; only 2 people initially who did all the initial project planning, discussions with community, without being paid.
3	Yes, the local citizens are happy, more than satisfied with the wind farm, as it improved the local economy in different ways. A big reason was that the windfarm was presented as a business case, instead of just an environment/energy project. Then the plan was developed together with the community. There were initial concerns about destroying viking historical sites, natural bird reserve in the northern part of the island, and esthetic concerns. People were 'afraid of looking at' the wind turbines.
4	The local ownership decided quite early in the process that the northern part of the island, this is the I think it's the 3rd or 4th largest bird reservation in Denmark. There was a lot of Viking history. We have a lot of protected nature areas out there. So instead of discussing on, we should build wind turbines or not we said – Let's from the start, agree on that we will not build wind turbines on the north part of the island to protect the nature to protect the wildlife, to protect the birds and everything. The windfarm was located offshore, and was placed in the south of the island so as to avoid the bird reserve in the northern part (even though there is a higher wind potential in the north). Other than that, no major impact on activities, i.e., farming, fishing. Tourism on the island is one of the main activities prior to the windfarm, and got a boost after the windfarm. [Wind conditions are better at sea. There is very little landscape disturbance (a variable quantified in technical production estimates) and therefore greater production.] *
5	The residents were concerned that the wind turbines would 'ruin the island', 'kill a lot of birds'. If that's an argument for not building wind turbines, then

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No	Written notes (transcript)
	you should probably ban windows and cats and cars before wind turbines (as they also kill birds). There were 150 people that wrote angry letters to the municipality that we shouldn't have any wind turbines or that it would destroy tourism. The future of the island. People were really, really angry. After they were built, both the on land and offshore, there were we have had zero complaints. But no environmental challenges were faced.
6	When we made out tenders, instead of having one big that built 11 onshore wind turbines, we broke them down in very small tenders somewhere. And we said to the company that should deliver the wind turbines, we have a local blacksmith. Maybe he can make the doors for the wind turbines, for example, and some of the local entrepreneurs could take the holes and the local concrete factory could maybe make the mold for the foundation of the wind turbines and so on. So we tried to cut them down in very small pieces. So the small businesses over here, they could do and lift the task and they could employ. We had a big abattoir slaughterhouse, about 50 to 100 people working there. And this slaughterhouse closed in. The people that were laid off by the slaughterhouse and instead of losing 80 to 100 jobs, we actually created at its peak, 130 new jobs. By doing it this way and investing this small amounts of tenders locally for local entrepreneurs to to do and also there. And we have 450 local shareholders in the wind turbines. I get 1000 Danish crowns after taxes each month and I there are 494 others that have the same experience as me. That this transition on the green energy actually support the the local economy in a very good way in a circular way, and it sounds really crazy. But one of the examples that I used to give is that - When I buy us here in, in the wind turbines earn some money, then I call the carpenter, I want to insulate my house to save even more money. Or then he earns some more money and have to employ somebody. He calls the electrician. You know, I want to have a a new lighting. I want LED lighting in in the my whole house. And I want the heat pump because I'm outside the district heating; the electrician, he goes down in the local store and buy a nice dress for his wife and some flowers at the local florist. Here you create a lot of possibilities... You will even save more money and then you have the snowball effect. It turned to

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No	Written notes (transcript)
	be a bad story to be a good story, because people could see that it was actually helping the island to survive.
7	I think the 66% of the total area is farming over here and it has been the biggest occupancy over here for many, many years. I think in the last three years it has been tourism but.
8	We actually managed to have about 450 local shareholders and have 100% local ownership on the wind turbines. And what it ended up being agreed on by the local citizens and also the local politician, the local decision maker said. This is the overall goal. We'll go for this. [2018] The offshore wind turbines were sold to Danish company in Randers called Wind Estate. We could not take the chance to own the wind turbines anymore in local hands. Because they have been up and running for 20 years. There are only maybe one or two companies in Denmark that can make the maintenance on these wind turbines, so the expenses of the maintenance are really, really, really high. So it was too big a risk for us to continue the ownership, especially when the prices on electricity were so low that they couldn't even pay for the maintenance.
9	The energy island organisations arranged a number of public meetings. These had two purposes: to keep the public informed and to further the positive interest this project was generating for investments in wind turbines. To ease implementation and secure broad public support, the energy island project also proposed, in conjunction with the National Wind Turbine Association, an ownership scheme which would give all island citizens the chance to invest in the forthcoming wind turbines. [The results of the project are communicated effectively to both the local populace and the world at large. The islanders have adopted the project and it in turn has placed Samsø on the map around the world. The local media have been used extensively as communication channels, both to inform about and mobilise participation in different activities, and to give general status reports about the progress of the project. Innumerable public meetings have been arranged during the last ten years, often with an amazing turnout. This cannot be attributed to the free coffee and cake alone. The islanders' interest in the project has been both widespread and genuine, after a little slow start with a natural touch of scepticism.] *

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No	Written notes (transcript)
10	Well, we're using different tools when we're working all over the world. We have one that is called the pioneerguide.com. It's a tool that we use for facilitating workshops, but you can go in and see it. So actually we say no to sponsorships. We have the big companies that want to pay as wind turbines, so build a biogas plan. But we cannot decide what is going in and so on. So we want to things to go on market terms. The framework behind it all on agreeing on this overall plan, having this discussion, having the citizen involvement, having the energy democracy showing the good ways of the circular thinking, how can we put more value into the local society.. How is it somewhere in other possible to have a social sustainable angle to this also in the circular thinking, not only on economy. [The psychological effect of spreading ownership also greatly improved citizen acceptance for the erection of these wind turbines.] *
11	That's a really, really good question. I've actually never got that before. Something I would do different, I think that the first plan was only looking at three different levels. I think you can have a higher level of synergies between the sectors if you can lift it up a level. So, you're using the whole system across sectors that can work together and this will add a new level on the circular thinking because if you have some ways here and you only have 1 sector 1 silo. If you examine the entire system from a different perspective, you may discover a utilization for this product within your own local area or system, even if it initially incurs costs to dispose of it.. So, I think that instead of just having an energy plan is good, you should have like a, we call it a 'helhed' or an overall plan.
12	-

8.7.4. Krammer wind farm

No	Written notes (transcript)
1	I am a resident of Netherlands. I have studied in the field of economics. Throughout my career my focus was on sustainability issues. In the last 12 years I have worked in the field of renewable energy (wind, solar, etc.), I worked as manager of a group of engineers responsible for the design of wind turbines.
2	The Netherlands has set a number of sustainability goals, so more wind farms need to be built. Citizen cooperatives also invest in new wind farms and look for new sites to build them.

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No	Written notes (transcript)
3	Many people were against the wind farm in the beginning. People were concerned around visibility of the park and the nature surrounding it. People find the obligatory red lights installed in the wind turbines for flight safety very disturbing. The wind farm has taken people's concerns seriously. As the Windpark Krammer was the first wind farm in the Netherlands wanting to install a new system that allows to turn off the lights when there are no airplanes close by, we were waiting for the government to change the regulations for this kind of system, which was a really long process but shows the commitment of the wind farm to take people's concerns into account.
4	The wind farm is built on the Krammer dikes. These dikes are passed by ships to go to the harbor and are also part of the Dutch protection system for high water. It was therefore a difficult decision for the government to allow for building wind turbines on top of them, from safety concerns. For the Windpark Krammer, safety is of great importance and the park has taken people's concerns very seriously.
5	Many measures have been taken to protect the environment and to ensure social acceptance by local residents. Windpark Krammer is the first wind farm in the Netherlands to install a bat and bird protection system that shuts down a wind turbine when large birds are nearby. The red lights, which are also installed on the wind turbines to prevent possible flying accidents, switch off when there are no aircraft approaching. For this reason, the Dutch government had to change its regulations. Every year, 0.5 % of production is lost because the wind turbines are switched off to protect bats and birds. On top of that there are also the maintenance costs, but protecting biodiversity is really important for our wind farm.
6	In a variety of ways: a. Distribution of dividends. b. Set out bonds loans to invest directly in the wind farm – were open for prioritise groups of citizens that live close to the windfarm or are members of the two citizen cooperatives that are our shareholders. c. A special wind fund from which residents can apply for funds for community action, such as fixing up solar panels. d. an ecology fund for nature-improving measures.
7	The area where the wind farm is built is not very densely populated. Since not many people live nearby and the area is not used for other purposes, the local value is considered not to be affected to a great extent.

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No	Written notes (transcript)
8	60% of the wind farm belongs to two cooperative initiatives where citizens have shares in the cooperatives, while the remaining 40% belonged until recently to Enercon, which exited in 2021 and whose share was bought by Kallista Energies Renouvelables. The wind farm has also offered some other benefits, such as free installation of solar panels for citizens living within a certain radius of the park.
9	In the planning phase of the wind farm, citizens were actively involved in the process, by ensuring multiple dialogues to adress the concerns. In the design of the wind farm a number of these concerns were taken into consideration, for example the DT Bird and Bat system. From the construction phase until today, people are well informed about the activities of the wind farm. The company organises open days and other activities to inform people.
10	It took about 12 years from idea to construction, so a commercial company would probably not go through this process. Dealing with legislation was another difficult task. It was a lengthy process to get licences and permits etc. You also had to deal with local residents and address their concerns. The main reason why this wind farm can be considered a good practice case is the fact that the cooperatives and the citizens are involved in the wind farm. Also, the way the dialogue with the people is conducted and the funds they have set up so that people can benefit are another example of a good practice wind farm. A third element is the extra efforts to protect the natural environment around the wind farm.
11	There are 34 wind turbines in the wind farm, but they could put up one more. The Krammer wind farm could not put up the 35th wind turbine because an NGO was against it. The NGO wanted to protect a duck species near the area. With the current experience with the bird and bat system we hope to develop the last wind turbine as well.
12	The wind farm takes every concern, no matter how small, very seriously and strives to mitigate it through appropriate measures.

8.7.5. Uthleben wind farm

No	Written notes (transcript)
1	I am member of an energy cooperative involved in the project. We are operators and shareholders of the Uthleben wind farm for the last 2.5 years. The energy cooperative is relative far from the project, so we have a managerial role on this project. It was the first project we had the role of the operator. We manage various wind energy projects in north Thuringia.

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No	Written notes (transcript)
2	We tried to be involved in the project from the start. However, it is difficult to embark on these projects without the financial support of a big company. The investment costs can put these projects at risk. You need to make contracts with the landowners and pay a lot of money (500k-1M) for environmental protection purposes. You don't get a refund if your project is rejected. That's why we tried to cooperate with companies that could share after their stakes, such as Energiequelle. Stadwerk nordhausen had the idea of building these 2 wind turbines. (Nearby them there 10 other wind turbines but they are probably from private companies). Their main motives were that they wanted more energy projects in regional level and that they had available land. The objective was to give shares to the locals (49% by locals, local communities, energy communities etc.). The involvement of locals on this project was aimed for two reasons: 1) The involvement of energy communities increases the acceptance of the project. 2) It was the first wind project of Stadwerke Nordhausen, so they needed contribution from more experienced partners for the management of this project.
3	Usually, wind farms that are in north Thuringia face less problems than the projects in the west or south Thuringia. Some places face local opposition because of the wind farm's lights or sound. However, I did not receive any negative feedback for this case.
4	The project is close to a landfill (waste disposal) which is operated by a recycling company. The wind farm is built on agricultural ground which is still used by the farmers. It can be approached by people (e.g. for a walk) as there is a local road there.
5	There are no concerns as there were already 10 wind turbines on this landscape. So, the addition of other 2 did not have a significant impact. We have made a fruitgarden with appletress as a compensation of the environmental impact.
6	The financial benefits include the money local shareholders receive from selling the energy to the market. We aim to do energy sharing and directly consume the energy we produce. We need to have a community owned electricity grid. Right now, we pay a lot of taxes for selling the energy to the market and buying it back.
7	Some of the money go to fruit garden and operational costs. A meeting was held between shareholders to discuss about building new turbines. The money is distributed to the shareholders. There is a guaranteed threshold by law. *Who pays for this price gap*?

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No	Written notes (transcript)
	As a private company we have to pay the allocation costs. Since the last year the law changed, and the government pays the gap. It was part of the energy price
8	Around 46% of the stakes belongs to energy communities and around 3% will belong to municipality (local authority), but not yet. You need to make a vote in order to become a member.
9	There was no opposition on this case. Our energy community was not involved in the planning and construction phase. Helmetal may be involved in the construction phase. (*That was at the end*) We organise meetings to discuss news, projects, financial aspects, wind farm's development. For the wind farm project, we make decisions together through discussion. We have never been on a conflict. The votes are weighted depending on the percentage of shares. Inside our energy community the shares are equally weigted for each member.
10	The main challenge was to make a connection between the companies. After the connection it was easy to participate. We are collaborating in other projects with Energiequelle from start where we face regulatory problems. It is important that we have made money, but Uthleben citizens have to pay a lot of money for the market energy price. It is not energy community's aim to make money. The main objective is citizens to get renewable energy at very low prices.
11	There is signal lightning for airplanes (safety), they are closed at night and they blink when an airplane is close.
12	The bigger picture is that citizens can be part of energy transition. There are new energy forms that can be created near your house or village. Everyone should be part of the energy transition and participate on the operating schemes. We should work more on public relations and engage political actors.

8.7.6. Hilchenbach wind farm

No	Written notes (transcript)
1	Managerial position in energy cooperative company.
2	The wind farm consists of 5 wind turbines, 4 turbines were built in 2007 and one in 2008.

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No	Written notes (transcript)
3	The project had full social acceptance and people are happy for its benefits. However, another project in nearby area faces a lot of resistance. They claim that it will destroy the local landscape and they believe that is better to be located in another area.
4	There are a lot of farmers in the nearby area and many of them are benefited from the project. Initially, some local owners have some concerns but after the project implementation they changed their opinion about the project. Now more people are visiting their shops.
5	It is obligated by the law to maintain the ecological value of the area. The developers placed plants with higher ecological value (bushes and grassland). A lot of focus was given to the EIA. The wind farm was planned to use the minimum amount of land area (1.5 hectares) and not to destroy a lot of vegetation.
6	The wind farm has raised the local economy in the region. It has offered job positions during the construction e.g. removal of soil) and for the maintenance of the wind farm (e.g. cleaning snow from the turbines). The citizens are owners of the wind farm and they benefit from lower prices in the energy bill. The new community wind farm that is going to be developed will also provide: i) Extra Tariff possibilities for shareholders ii) Land lease payment for landowners iii) Pay compensation fees for the whole area to the municipality iv) Another compensation for locals that live in close proximity from the instalment
7	The local municipalities are benefited by enhancing their local value. Maintenance of community pool, payment of firefighters, kindergarden schools etc. The touristic activity in the area, especially after the project development has been increased. People can attend lessons and events and learn about wind energy. People can enjoy the landscape by going on hiking or sitting at resting benches. There are also organised visiting groups that go and see the wind farms. Moreover, people are gathering at local restaurants.
8	The ownership of the wind farm is 100% social. The wind farm consists of 96 members, and most of them come from the region. There is not a big company involved in the project and that contributed its social acceptance.
9	The company is GmBH (limited liabilty company), were all the shareholders of the wind farms can take part in the decision making processes by voting. There are also discussions and local meetings where people can be informed about the wind farm and express their opinion.For example, there was a local meeting to decide about the connection with the energy grid.
10	• The main challenges in order to develop a project is the planning of the wind farm. It took 11 years for the paperwork and activities for the authorisation process. • The Wildlife protection measures, and assessment costed about 800000 euros until now. • Convince the local politics – convince citizens. You have to talk people about the positive impacts of the wind farms.

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No	Written notes (transcript)
11	Two more projects in two municipalities. 1) There is now the plan to build 100% by the municipality risk part investment. The shares will be then provided to the local residents. 2) Farmers and foresters in Hilchenbach conduct a survey before they risk capital.
12	-

8.7.7. Sifnos wind farm

No	Written notes (transcript)
1	I am a member of the Energy Community of Sifnos, which was founded after the transformation of the former Energy Cooperative of Sifnos. I have been watching the energy sector since before the foundation of the Cooperative.
2	The development of the wind park, as a part of the hybrid power plant, was created following the need for the coverage of the electricity demand in Sifnos. Our island has high wind potential, so we just followed the European trend for the exploitation of the renewable energy sources. In this way we had the possibility to investigate the option for the harvesting of the wind energy for the coverage of our energy needs. We saw that the proposed project was effective and beneficial and so we proceed to the implementation of the required studies for its development. Our basic incentives were the coverage of our energy needs and the treatment of the risk imposed by the exclusive dependency of our island on imported oil, transferred to Sifnos by ships. We realized that there is always a danger to run out of energy on the island if, for any reason, either due to adverse climate conditions or due to geopolitical issues, the required oil for our energy needs may never arrive at Sifnos. Additionally, our ecological sensitivity and the realization that by consuming oil we emit in the atmosphere carbon dioxide and other harmful pollutants for the atmospheric environment, were also major motives for our involvement in the project. Finally, another important motive was that we also realized the extremely high electricity production cost in the island with the existing autonomous power plant, which, practically, is compensated by the consumers with the electricity procurement bills. Currently, all the Greek consumers have the same electricity procurement price. The islanders pay less than the electricity production cost and the mainland consumers pay more than the electricity production cost in the mainland electricity system. So, indirectly, the mainland consumers subsidize the higher production cost in the insular autonomous systems in Greece. If this subsidization stops and the islanders have to pay the real electricity production cost in their islands, unfortunately they will not be capable to afford it. So, a matter of energy security also arises. Unfortunately, there are several obstacles regarding the development of the project, with the most important being the breach of the Greek State's laws from the Greek Centralized Authorities. We designed a project (wind park and pumped storage), absolutely according to the legal framework, it was inspected by the authorities in

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No	Written notes (transcript)
	charge and our proposal was found integrated, so we submitted to the Regulator the required documentation for the licensing of the project. The deadlines for the licensing of the project were violated and the result was that the license was eventually issued 4 years after our application. However, in the meanwhile, the law has changed, so, actually, we received a Power Production Certificate, with different terms and without a predefined electricity selling price, as was defined in the former existing law, at the time of our application's submission. Then, 8 months after the issuance of the Certificate, a new law was issued which introduced the obligation of the Certificate's owners to submit a letter of guarantee (in our case it should be for an amount of 420,000 euros), while new deadlines were introduced for the next required licenses. The result was that we were forced to leave the Power Production Certificate to expire. The Greek Centralized Administration seems to have a clear negative attitude against the initiatives and the activities of citizens in Greece on energy transition projects. The Greek Centralized Administration does not wish the activation of citizens and their involvement in energy transition. Every citizens' group or initiative created and activated on the field of energy transition is blocked through the laws and the regulations or through the breach of the laws and the regulations.
3	The public opinion in Sifnos on wind parks was clearly negative, since we had a former unfavourable experience. Specifically, in 2003 there was an attempt from the firm "PPC Renewables" to install 2 wind turbines of 900 kW each in Sifnos, without informing the local community. As a result, the residents in Sifnos became angry and opponents against the installation of the wind turbines and, eventually, the investors were sent away. One of the first priorities of the Energy Cooperative of Sifnos was to inform the local community that with the exploitation of the wind energy we can have several benefits. Through a cluster of activities, such as the elimination of the plastic bag use on the island, the Energy Cooperative of Sifnos gradually gained the appreciation and the acceptance of the local residents. The final resultant of all these efforts was the issuance of a unanimous decision from the Municipal Council of Sifnos for the support of our project, while the Municipality of Sifnos officially joined the Energy Cooperative. Additionally, when the representatives of the European Commission for the "Clean Energy for EU Islands" initiative visited our island, they had meetings with all the involved stakeholders and they ascertained the full approval and support of the local community on our project. Sifnos was eventually selected as a pilot island for the "Clean Energy for EU Islands" initiative. Following all these facts, high anticipations were created for the residents of Sifnos. So, as they see now their project not to be implemented, they feel considerably disappointed for the long and difficult road which has to be covered towards the achievement of energy democracy and independency on our island. The citizens now feel that they have been defeated by the Greek Centralized Administration, which is considered as an opponent rather than an ally. So, when the Greek Centralized Administration achieve to maintain continuous "defeated" against the initiatives and the activities of the local citizens, the rest residents of Sifnos, not yet members of the Energy Community, prefer to keep a safe distance from the Community and the risk to feel "defeated" too.

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No	Written notes (transcript)
	I don't think that there are any concerns in the local community regarding the standard of living of the residents in Sifnos, which has not been connected with our energy independency. While electricity production is directly related with the main professional activity on the island, which of course is tourism, this relationship has not been substantially realized.
4	At the current moment and all the previous 4,500 years for which we know that this island has been inhabited, there is not any activity implemented in the wind park's installation site. The installation site is covered with small thorny bushes and limestone rocky formations, without any type of livestock in that. It is a dry site and, hence, there isn't any potentially existing activity in the area that can be affected by the wind park. The wind park is far away from the island's settlements, (more than 4 km from the closest settlement) and the main touristic areas in the island, without optical contact and, due to the long distances, without any type of noise disturbances. So, no impacts are expected due to the wind park's operation on the existing human activities in the entire island.
5	We tried to facilitate as much as we could the installation of the other wind park we have in our island, from the "PPC Renewables", the development of which had begun earlier and significant reactions were raised against it. We managed to face these reactions successfully and so 2 wind turbines of 900 kW each were installed. The public reactions in Sifnos regarding wind parks were evaluated with the installation of this project. The vast majority of the initial concerns referred to the potentially disposed radioactivity, a fact that reveals the extent of the misinformation in the Greek islands regarding wind turbines. The next concern of the residents of Sifnos was the possibility for the wind blades to be cut and detached from the turbine's rotor and hit, by accident, a probably passing by car from the neighbouring road. In our case, there is no road close to the installation site of the wind turbines, so, having successfully treated the first two concerns of the residents of Sifnos, we don't expect to have any other reactions from them. The wind park of the hybrid power plant in Sifnos does not have any other consequences, since it is sited outside and far enough from any NATURA region and far away from all the settlements in the island, to ensure that no optical contact will be with them and no noise disturbances will be caused in the existing residential environment.
6	The local community's benefits from the wind park are, first of all, the enhancement of the energy supply safety, which will enable the residents to continue to perform all their current activities on the island. Secondly, it will provide low-cost electricity for the insular community, by exploiting the local available renewable energy sources and by preventing these sources to be exploited by private investors, with no relationship and bonds with the island, which, being the only producers in the island, can potentially configure the electricity selling price for the final consumers considerably high. When the electricity procurement price remains low for the insular consumers, the living in the island can be kept and the firms and professional activities can be more profitable. The third benefit can come from the characterization of the island as

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No	Written notes (transcript)
	"green island", something that is expected to attract a large amount of ecologically sensitive European (and not only) citizens as tourists, which prefer to visit places that act substantially towards the remedy of climate change.
7	The land value in the neighbourhood of the wind park's installation site is not expected to be affected either positively or negatively. The specific area is a remote area in the island, with high wind potential, a main reason for which it was selected for the wind park's installation, hence it is not suitable for the development of another settlement there or any other activity. These arguments are proved by the fact that during the last decades, in the specific area no activity was developed.
8	The owner of the hybrid power plant (including the wind park), until all the private or bank loans are paid back, will be the funders of the project. When the received funds have been paid back, the project's owner will be the Energy Community of Sifnos. The project's annual profits will be distributed to all the members of the Community, according to the percentage of each one of them in the shareholders' synthesis. With regard to the question whether this profit distribution can be considered fair, I would like to inform you that we are already in the tenth year since the foundation of the former Energy Cooperative of Sifnos. At least 5 more years will be required for the project to be implemented and another 15 for the investment to be paid back. So, please let me know if, according to your judgment, it can be considered fair for the members of the Community to start having profits after 30 years from the time they started to invest in the project by joining the energy community.
9	As mentioned also in a previous answer, the initial plan was approved by the involved stakeholders in the licensing process. Additionally, when it was requested from the friends and the allies in the European Community to contribute to improve the planning of the project, their answer was that they would also like to participate in this project. In this way we were convinced that our consultant who conducted the project's study, had done his work appropriately. The Municipality of Sifnos has full awareness and participates in the project. Similarly, the Regional Authority of South Aegean, the Regulatory Authority of Energy and the insular grid utility (HENDO) are fully informed about the project. The Ministry of Environment and Energy has received several letters from us on the project, so we think that they are fully aware too. The local society is continuously informed for any potential news on the projects, any changes that have been done and for the project's overall progress.
10	We are not in the position to know other similar projects in Europe, but since the European Federation of Energy Cooperatives (RESCoop.eu) selected to present our project in the one out of the two promo-videos developed for the promotion of energy cooperatives in Europe (posted on its web-site) and since also the "Clean Energy for EU Islands" Secretariat selected Sifnos to be one of the 6 pilot islands, we have the impression that our project is innovative and technically correct and can act as pilot in the whole Europe. Practically it is the first project that combines a wind park and a pumped storage system providing for 100% of the island's energy needs in an insular, non-interconnected system, designed and owned by a local, public scheme, such as an energy community.

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No	Written notes (transcript)
11	There are some minor changes introduced in the project, with regard to the initial plan. We constantly seek for new improvements. We never denied to investigate a new proposal for the improvement of the project and we always remain open to adopt any even better approach for our energy independency, however, so far, we haven't found anything better. According to the initial planning, the project consists of a wind park and a seawater pumped storage with a sizing adequate to ensure the energy supply security and independency in Sifnos, which can be paid back with the revenues from the produced electricity. We have extensively investigate other options which have been proposed to us by different actors, however all of them exhibited lower economic efficiency than the selected solution, while their technical specifications were not better. The residents in Sifnos look for their energy security supply, with an electricity procurement cost that they would be capable to afford.
12	The efforts of Energy Community of Sifnos, since its foundation, were pioneering and it is a fact that we gained broader public acceptance when the renewable energy sources became widely known and intimate through main stream media, for the local community. There is no longer any doubt that we should proceed as a society with the renewables, the remaining question, yet, is with which specific technologies and how. The Russian invasion in Ukraine and its consequences in Europe helped us understand how dangerous it can be if you remain dependent on imported energy sources. Conclusively, I would like to say that it is now widely accepted that the renewable energy sources should be the energy production sources and there is no longer any doubt for the necessity for the implementation of the hybrid power plant in Sifnos.

8.7.8. Sitia wind farm

No	Written notes (transcript)
1	The owner of the specific two wind farms we are discussing is the 'Sitia Development Organisation' which is a multi-shareholder developmental joint-stock company. It is characterized as a 'Local Government Organisation' and it counts 20 shareholders - among them 2 Municipalities of the area, Cooperatives, Collective organisations, the Pan-Cretan Bank and others.
2	Since we are discussing 2 wind farms, for this particular question we will focus on the oldest one which was commissioned in 1993. This particular wind farm was installed by an experimental programme of the European Union and the contract was signed in 1989-1990. It is one of the oldest wind farms in Greece and perhaps the first in Crete. When it was installed it was something new to the world-the people perceived it as an attraction. Schools and universities went on field trips there. With this installation, the way was essentially opened for the utilisation of wind energy in Greece and this was the main motivation for us. The second reason that the 'Sitian Development Organisation' participated was the income generated by this particular investment. As for the obstacles, the only thing we encountered in the first

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No	Written notes (transcript)
	project (because we already had had experience by the time the second one was installed) was the insufficient legislation and the difficulties during obtaining the permits. After the specific project, the road was opened for both legislation and licensing.
3	At first the local community accepted the project with curiosity and joy. There was even an increased interest in visiting it. Then, unfortunately, the uncontrollable advancing of countless new wind farms – an advancing that has taken place in many regions of Greece and in ours - created the exact opposite feelings. This uncontrollable advancing created objections, and environmental fears- especially for areas like ours that have high wind potential. We have now gone to the opposite extreme. Concerns about our wind farm (Sitian Development Organisation) - which is small in force - do not exist.
4	No, the area in question is not utilised for the purpose of other activities -except for sheep grazing. This activity continues without any problems, nothing is fenced off and access is not blocked.
5	If we focus on the 3 wind turbines of the Sitian Development Organisation there are no environmental impacts and neither do people have any objections. The environmental conditions were set during the licensing stage, and they have been respected. The same is not true for the rest of the wind farms in the area. There is visual nuisance and environmental burden, to which people react strongly. There are also applications for large wind farms-on behalf of big corporations- with many kilometers of road construction required. Such an extent of road construction would really bring about a significant environmental burden in an area that also hosts a UNESCO World Geopark.
6	The local community benefits in the following way: The residents are being unburdened from the fees collected by the Municipalities. In addition rural road construction has been implemented in the areas nearby the wind farms. Also, the wind farms do provide a complementary income to the owners of the land which we rent to host the installation. The fixed costs of the company are covered from the aforementioned revenues and the rest are essentially channeled to the local community. The third benefit that should exist is a discount on electricity bills for residents who are close to the wind farm. I know that in the beginning this was not implemented as it should be, maybe now it is, I don't know. Regarding the wind farms in the surrounding area - especially for the first installing companies - I will refer to the economic benefits of the local community and some sponsorships they did or some financing for buildings and others.
7	The Sitian Development Organisation rented lands from private individuals- lands that were barren and in some cases the owners did not even know the exact location of the lands they owned. I would not say that the land has added substantial value in the area. After the excessive concentration of wind farms in our area, there is fear that the opposite will happen, that the land will lose its value.

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No	Written notes (transcript)
8	The wind farms in question belong to the Sitian Development Organisation, which is a developmental multi-shareholder joint-stock company characterized as a 'local Government Organisation'. Among the shareholders are the Municipalities of the region and 18 other shareholders including cooperatives, associations of hoteliers, traders as well as the Bank of Crete. The profit's distribution is done as in all joint-stock companies. All profits essentially return to the local community through various projects (studies, sponsorships, events and others). Regarding the other wind farms in our area, apart from the first ones who gave a percentage of 2% to the Municipality, the rest did not give anything except the 3% they were obliged to.
9	The planning of the wind farms was conducted by the Sitian Development Organisation. Public bodies were involved in the licensing stage. The local community, had a positive response to the whole project. No one needed to be convinced, and therefore there was no public consultation then.
10	The specific wind farms can be considered as an example of good practice as they opened the way for the utilisation of wind energy in Greece. They were among the first ones to be installed and successfully they faced all the difficulties created mainly during the licensing phase. So a model was created for wind energy investments
11	We do not have any issue of social acceptance. Even the effects on poultry are non-existent. All that needs to be done is to meet the project's environmental commitments.
12	Summarizing, I would like to add that the 2 wind farms of the Sitian Development Organisation were remarkable and pioneering investments of their time and were widely and comprehensively accepted by society. Also, from there on, the way was opened for specific investments in Crete. Unfortunately, things are no longer like this, with uncontrolable licensing, all control is about to be lost and there is no longer social acceptance of wind energy exploitation projects. Otherwise, I have nothing else to add, I think we have covered all the issues.

8.7.9. Tragoudistis wind farm

No	Written notes (transcript)
1	One of the objectives of me, personally, and my partners too, was to achieve the upgrade of the classification of our island with regard to the energy production and use and, particularly, regarding the energy autonomy of Sifnos. Before taking on the Municipality of Sifnos, the private firm PPC Renewables had begun the licensing process for the installation of 2 wind turbines in a site with the place name "Tragoudistis" (means "singer"), located in the northern

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No	Written notes (transcript)
	Sifnos, close to the settlement Heronisos. Despite the Municipal Council took the decision that had to be taken, when the final decision was issued for the installation of the wind park, there was a significant negative reaction from the residents of Heronisos, which forced the Mayor to change the municipal decision and the Municipal Council to appeal to the Council of State, asking to recall the decision for the installation of the wind park. Since, as I have already said, a major objective of the new Municipal Authority was the energy autonomy of Sifnos, a consultation and awareness process with the residents of Heronisos started and after two years, in 2012, their convincement for the project's benefits was achieved. So, the initial negative opinion was altered with the agreement of the vast majority of the local residents. The appeal to the Council of State was recalled and the local community approved the installation of the 1.2 MW wind park in the area.
2	The basic need that was faced with the decision for the support of the wind park was the coverage of a portion of the electricity demand in the island. In Greece, and particularly in islands, we have to harvest the energy which is abundantly given by the wind, the sun and the sea. So, the wind park harvests a renewable energy source and can contribute towards the limitation of the operation of the polluting thermal power plant in the island. The main obstacle was to persuade the residents in the broader area for the necessity of the wind park's installation. This was something considerably difficult, since the residents of Sifnos were afraid, they have heard several things about the potential damages that the wind park can cause in the area. We achieved to change this negative opinion and convince them for the important benefits and the minor environmental impacts of this project.
3	Judging from the achieved result, I think that they are satisfied. Now they also see the necessity for the installation of the wind park. There was an agreement between the PPC Renewables and the Municipality of Sifnos through which the amount of 50,000 euros was offered to the Municipality of Sifnos for the needs of the settlement of Heronisos (the closest settlement at the wind park's installation site). Additionally, an annual fee of 2,500 euros is deposited every year to the Municipality of Sifnos for the use of the municipal land. This amount is offered for small projects for the settlement of Heronisos. Another compensation measure for the residents in Sifnos is that 2.7% of the project's revenues are given to the local Municipality as a discount on the electricity procurement bills of the local households in Heronisos.
4	In the neighbouring area of the wind park's installation site there are not any other existing activities, apart from agricultural crops, which, however, have not been affected in any away at all.

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No	Written notes (transcript)
5	Until this very current moment, I have no environmental impacts to mention on the installation area, as far as I am aware. The residents, of course, had read relevant articles, mainly in the social media, which claimed that the wind parks have serious, destructive impacts on the local flora and fauna and that they impose particular fatal risks for the birds. In practice, so far, we haven't seen any important impact of the installed wind turbines on the surrounding environment.
6	As I already mentioned, the local community benefits from the wind park's operation. The local Municipality has received from the PPC Renewables a lump sum of 50,000 euros, while for the 20-year renting of the municipal land, it will annually receive the amount of 2,500. Additionally, there is the economic benefit for the local residents I referred to previously, namely a 25-30% discount on the electricity procurement bills, which, on average, can be estimated at the amount of 200 euros per year and per household.
7	My personal opinion is that the surrounding area has gained significant value, because it can constitute a field for educational or recreational visits from universities, schools and tourists. We can highlight and promote the area, so as multiple benefits can be created for the island. At this point I would like to add that the Municipality of Sifnos has been a co-partner since 2013 in an effort initiated for the energy autonomy of the island. This effort was initiated by the Energy Cooperative of Sifnos, which today, following the Greek legislation, has been transformed to the Energy Community of Sifnos and has more than 150 members. The wind park at the site "Tragoudistis" from the PPC Renewables is only the beginning for the construction of a larger hybrid power plant, which will lead us to the full energy autonomy of our island.
8	The wind park at the site with the local name "Tragoudistis" belongs to the company PPC Renewables, which pays a fee to the Municipality for the use of the municipal land. For the 20 years of the project's operation, the Municipality of Sifnos will receive in total 50,000 euros. I have to admit that I am not satisfied with the signed agreement, since I think that the benefits for the PPC Renewables from the wind park's operation will be multiple and considerably higher. Unfortunately we could not achieve a better agreement because the project's construction was delayed for more than one decay. Indicatively I can mention that in 2007 the PPC Renewables offered as compensation measures an amount close to 300,000 euros, the construction of a new port in Heronisos and the renovation of a public square. Conclusively, I consider that the benefits we have received as compensation for the project's construction and operation are considerably fewer with regard to what we could have gained if the project had been implemented on time.

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No	Written notes (transcript)
9	The insular community in Sifnos is adequately aware. The public authorities unfortunately usually raise obstacles in the whole process. There is significant bureaucracy which imposes continuous problems and delays not only regarding the development of wind parks, but also for all developmental and public interest projects implemented in Greece. The procedure for the issuance of the required approvals from the involved authorities is time-consuming. As an example I will just mention that the licensing process for the development of this specific wind park started in 2003 and the project was eventually installed in 2019. It took 16 years for the integration of the process and the installation of the project, while it could have taken only 3.
10	The main challenge we faced for this project was that we had to change the public opinion in Sifnos on wind parks. The project's main impact in the local community is the reduction of the electricity production from the thermal generators installed in the local autonomous thermal power plants and, consequently, the CO_2 emissions. Right after this, the next impact was the reduction of the electricity procurement cost for the residents in the area close to the installation site. The wind park in Sifnos can be characterized as a success case example, since it is one of the first wind parks that was, eventually, and after considerable delays, installed in an island in the Cyclades archipelago. This example should be followed by other islands too, so as they can have the benefits from the installation and the operation of such a project. At this point, I would like to underline that Sifnos has made an effort to become an energy independent island and we would not like applications, in any case, in our island for large size projects, usually proposed by big investors, through which a large number of wind turbines can be sited without any planning and approval from the local community, aiming at the transportation of the produced electricity to the mainland grid, after the interconnection of Sifnos. We are strictly opponents against such a perspective, because, simply, the potential installation of 80 or 100 wind turbines in Sifnos will dramatically change its insular attitude, it will deteriorate the natural aesthetics and it will considerably affect negatively the existing human activities.
11	As far as I am aware, there is a margin for the increase of the total nominal power of the wind park. The PPC Renewables have received a Power Production Permit of 1.2 MW for the total wind park. However, since the smallest available wind turbine model in the market at the time of installation was 900 kW, two wind turbines were installed with nominal power 900 kW each. Their maximum output power is restricted to 600 kW for each turbine, according to the issued permit. Yet, in practice, the installed wind turbines have a nominal output capacity of 900 kW each. This practically means that if

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	the power demand in Sifnos increases, or after the island's interconnection with the mainland grid, both wind turbines can increase their power output at their nominal capacity, namely 33% more power production and less CO_2 emissions. This of course will require an update of the issued license.
12	Closing our interview, I would also like to underline that the conversation in our island, during the last years, on the benefits that we can have from our energy autonomy, is more mature than ever. The Municipality of Sifnos was among the first ones that had signed the Covenant of Mayors in 2012 in Brussels for the reduction of the annual CO_2 emissions at least 20% until 2020. This target was satisfactorily achieved in Sifnos through the installation of the wind park. The Municipality of Sifnos continuously makes efforts towards the reduction of its energy footprint, through the implementation of studies for the energy performance upgrade of the municipal buildings, the installation of photovoltaic stations for net-metering operation, the installation of electrical vehicles chargers etc, so as we can gradually move forward towards what we have named as "energy autonomy of Sifnos".

8.7.10. Tilos wind farm

No	Written notes (transcript)
1	The specific wind park is a component of the hybrid power plant of Tilos. During the development of the project, the Municipality of Tilos officially approved for its installation. Personally, I was involved in the installation process of the project.
2	As I mentioned before, the wind park constitutes a component of the hybrid power plant in Tilos. The main need that was handled with the decision for the development of the specific project was the improvement of the quality of the electricity supplied to the local islanders. Tilos is interconnected with underwater sea cable, through the island of Kos with the insular grid of Kos-Nisyro and Kalymnos. Tilos is the final destination of the underwater cable's route, with several contingencies, such as intermittencies, and other stability issues regularly occurred. Hence, the need for the improvement of the electricity supply security and quality in Tilos has been detected and for this reason the hybrid power plant's installation was considered necessary.
3	The local community is satisfied with the wind park and the hybrid power plant. After several efforts, the local community succeeded in achieving its main target, which was the improvement of the supplied electricity quality and the stability of the local grid. This, practically, means that the residents in Tilos succeeded to convince the project's owner to operate the hybrid power plant when there are intermittencies in Kos or in Nisyros. Although power black-outs may occur in these islands, Tilos still is normally supplied with electricity. At this moment, a new issue, or even more accurately, a new demand has been raised by the residents in Tilos, absolutely fair and sensible,

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No	Written notes (transcript)
	according to the local Municipality. After the Russian invasion in Ukraine, the electricity procurement cost has been significantly increased. The residents of Tilos now claim that a portion of the economic benefits from the hybrid power plant's operation should be offered as discounts in the final consumers' electricity bills.
4	Although the wind turbine of the hybrid power plant has been installed close to one of the most popular beaches of the island, so far there are no problems recorded. Another activity which is implemented at the same area is traditional livestock, which, however, is not affected in any way by the wind park's operation.
5	No environmental impacts have been recorded in the island due to the wind turbine's operation. We had been very careful with regard to the project's siting, while, since the whole island is a NATURA 2000 region, a special environmental impact study was implemented. It must be underlined that during the planning phase of the hybrid power plant, a different installation point had been selected for the wind turbine's installation. Since the island of Tilos constitutes a wildlife habitat, two environmental impact studies had to be implemented. From these studies it was found that the initially selected point for the wind turbine's installation was used as habitat by a couple of eagles. To avoid any accident risk for this eagles' couple, the wind turbine was eventually installed in another location.
6	The local community benefits from the promotion of the island. Thanks to the hybrid power plant, Tilos has been extensively promoted abroad and has become quite popular. The project has received 4 European awards, one of them was also accompanied with a monetary amount. Another benefit from the project is the creation of one occupation position. Finally, there is also a compensative public rate for the local Municipality, which however is very small. This amount is offered exclusively bi-annually for the settlement of the Big Village, given its vicinity with the hybrid power plant's installation position. The hybrid power plant's impacts are rather indirect, since it is a private project. A portion of the project's revenues should be returned back to the local consumers, as a discount in their electricity bills. The electricity demand in Tilos is 100% covered by the hybrid power plant, however, the local residents still pay for their electricity consumptions.
7	This is something for which I am not aware.
8	With regard to the hybrid power plant's ownership model, this entirely belongs to the private firm EUNICE Energy. Regarding the project's installation area, the site where the wind turbine has been installed belongs to the Greek State, the site where the photovoltaic plant was installed belongs to the Municipality of Tilos, however the renting fee is very small. In general it is considered by the

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	local Municipality that the benefits from the hybrid power plant's operation are not fairly allocated, since the final consumers are not their main recipients.
9	The local community is adequately aware about the wind park and the hybrid power plant. During the planning phase of the project, there were several meetings with the Consultant, which was the former Technological Educational Institute of Piraeus (now University of Western Attica). Plenty of workshops were implemented, so all the citizens in the island are fully informed on the hybrid power plant. I think that there was not even a single citizen in Tilos who did not know what technology were to be installed, much earlier than the installation of the project.
10	The project in Tilos constitutes a best practice case in Europe, since it is the first project that for first time a wind turbine, photovoltaics and batteries were combined for the electrification of an island. It was of the first projects studied and implemented, aiming at the coverage of the power demand and the improvement of the grid's stability and dynamic security in an insular system from the combined operation of electricity production plants from renewable energy sources and storage devices.
11	Of course there are margins for the improvement of the hybrid power plant's operation. More photovoltaic panels can be installed to increase the photovoltaic park's nominal power, as well as the battery storage capacity can be also increased. A second wind turbine does not seem to be necessary. Regarding social acceptance, since there are not negative reactions against the plant's operation, it seems that there is not anything that should be done. The project has been in total accepted by the local community.
12	I would also like to add, closing this conversation that the good think with small insular communities is that the local Authorities are always close to the residents. The communities are not impersonal, such as in big cities. All issues regarding the hybrid power plant installation were extensively discussed in the organised open-public workshops, as well as in the traditional cafes in the island where the islanders usually meet each other. Hence, all the project's aspects and the residents questions had been in depth discussed before the project's installation begins. This is a peculiarity that small communities and islands like Tilos have.

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8.7.11. Other interviews (internal)

The interviews of the following wind farm cases were conducted from EGP and MEC within their organisation: Barile Venosa, Castelmauro, Los Arcos, Santo Domingo de Luna, Serra das Penas, Asterousia.

It should be noted that certain interviews were conducted internally, deviating from the customary procedure of employing semi-structured interviews. Consequently, the absence of interview reporting templates can be attributed to the nature of information retrieval employed in these instances. The rationale behind departing from the standard procedure may vary, and factors such as time constraints, familiarity between interviewers and interviewees, or specific circumstances within the organisation might have influenced the decision to adopt a more informal approach and direct approach.

It is crucial to note that the absence of interview reporting templates does not diminish the value of the information acquired through the interviews. The information retrieved was arranged and presented directly in a coherent and meaningful manner in the storyboard form analysis.

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