islander
ACCELERATING THE DECARBONIZATION OF ISLANDS' ENERGY SYSTEMS

PROGRAMME: H2020-LC-SC3-2020-EC-ES-SCC
START OF PROJECT: 01.10.2020
DURATION: 48 MONTHS

DELIVERABLE 7.1:

ACTION PLAN FOR CITIZEN ENGAGEMENT PROCESS

Authors: Manuel Selinsek, Paul Haering (SEZ)
Due date of deliverable: 31.10.2021
Actual submission date: 29.10.2021

Deliverable Name	Action plan for citizen engagement process
Deliverable Number	D 7.1
Work Package	WP 7
Associated Task	T 7.1
Covered Period	M01-M12
Due Date	31.10.2021
Completion Date	22.10.2021
Submission Date	29.10.2021
Deliverable Lead Partner	SEZ
Deliverable Authors	Paul Haering, Manuel Selinsek (SEZ)
Version	**3.0**

DISSEMINATION LEVEL

PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

Change Control

DOCUMENT HISTORY

Version	Date	Change History	Author(s)	Organisation
1.0	31.08.2021	Table of content drafted	Paul Haering, Manuel Selinsek	SEZ
2.0	01.10.2021	Document drafted	Paul Haering, Manuel Selinsek	SEZ
3.0	29.10.2021	Last version	Paul Haering, Manuel Selinsek	SEZ

DISTRIBUTION LIST

Date	Issue	Group
16.09.2021	Revision table of content	EMEC, KUL, **All partners**
28.10.2021	Revision document	EMEC, KUL, **All partners**, **coordinator**, **WP leader**
29.10.2021	Submission and distribution to partners	PO + All partners

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

TABLE OF CONTENT

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

ABBREVIATIONS

AYE	AYESA ADVANCED TECHNOLOGIES SA
IDE	IDENER RESEARCH & DEVELOPMENT AGRUPACION DE INTERES ECONOMICO
SEZ	STEINBEIS INNOVATION GGMBH
NBG	NORDSEEHEILBAD BORKUM GMBH
ZIGOR	ZIGOR RESEARCH & DEVELOPMENT AIE
CEG	CEGASA ENERGIA S.L.U.
BCM	BCM ENERGY
KUL	KATHOLIEKE UNIVERSITEIT LEUVEN
EMEC	THE EUROPEAN MARINE ENERGY CENTRE LIMITED
DAFNI	DIKTYO AEIFORIKON NISON TOY AIGAIOU AE
REAK	REGIONALNA ENERGETSKA AGENCIJA KVARNER
REC	Renewable Energy Community
SME	Small and medium-sized enterprises
DSO	Distribution system operator
TSO	Transmission system operator
CHP	Combined heat and power plant
PV	Photovoltaics
RES	Renewable energy sources
HES	Hybrid energy systems

1 THE NEW ROLE GRANTED TO ENERGY COMMUNITIES

Most of the information presented in the following sections is based on the guide "Community energy – a practical guide to reclaiming power" issued in October 2020 by Friends of the Earth Europe, REScoop.eu and Energy cities[1].

1.1 New rights for energy communities

A new EU legislation - The EU Clean Energy package – was adopted in 2019 to help communities in EU to actively participate in the energy transition of their region and territories. This new law acknowledges the role of local communities and their rights to produce, consume or sell energy in the energy sector beside the other market actors (TSO, DSO). This means that individuals, local authorities and SMEs can set up so called renewable energy community as legal entity and use the financial resources generated by the production, distribution and sale of electricity or other energy vectors to further develop energy projects and achieve the energy targets of the Clean Energy Package. Every EU Member is required to

[1] Community energy – a practical guide to reclaiming power, October 2020, foeeurope.org/sites/default/files/climate_justice/2020/community-energy-guide.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

transpose these new rights into their national laws by end of 2021 to create an enabling framework to support citizens participation in the energy sector. One of the main challenges to be addressed is the complexity of administrative procedures which undermine certain community projects.

1.2 Benefits and challenges/barriers

Community-owned projects can bring a lot of benefits particularly to the local community and citizens. However, there are some hurdles and barriers that may impede the implementation of these projects. An overview of the main benefits and challenges is provided in the table below.

Table 1: Benefits and barriers of renewable energy community-owned projects (Source: Community energy – a practical guide to reclaiming power)

Benefits	Barriers/Challenges
• Getting communities involved in the energy transition helps to reduce carbon emissions and replacing fossil sources by renewables. • Winning public support for the large-scale development of renewable energy projects. As demonstrated by various studies, the acceptance and support of these projects increase when individuals are involved • Community-based energy initiatives also contribute to tackle energy poverty since there are non-for-profit organisations aiming at providing energy at low prices and redirecting investments towards the local economy. • Energy communities support the development of innovative products and business models. Thus, they contribute to the local economy and to the creation of local jobs leading into an innovative and sustainable EU industry. • Individuals that embark on a common project are more likely to initialize other projects benefiting the community	• Willingness to invest/be involved in is (often) low. Additionally, it's not straightforward to motivate individuals to join such projects. • Internal group conflicts may occur within the community because of differing visions or objectives to be reached. • Access to money and the difficulty to find funding might be one of the main challenges faced by communities. This might require the project to be downscaled leading to a first track record of success that might help to find funds in the future. • Administrative burden may hamper the smooth running of the project. A lot of forms need to be filled to get permits, get planning permissions, or apply for national and EU funding. This requires a lot of time and skills in administrative procedures and accounting. • Depending on the type of projects led by the community, technical issues might occur: e.g. the energy grid will need to be upgraded to host novel technologies or the connection to the grid is more challenging than initially expected. This may lead to new costs that may endanger the overall project. • In some countries, there might be a lack of understanding of what an

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

	energy community is, and this might lead to conflict with local public authorities and stakeholders. Opposition may also arise from dissident individuals that see renewables as something unpleasant because of the noise and the visual impacts of renewable assets leading to regulations on novel technologies. • Another barrier might be that for islands and remote communities, it might be hard to find local workforce with technical background/knowledge to run energy community related projects and operate decentralised energy plants.

1.3 The different forms of community energy projects

Energy communities can engage in broad variety of activities ranging from transport and mobility, heat, energy efficiency, electricity generation, distribution and supply, energy storage, and provision of flexibility to the power grid. Community energy is a broad concept that can refer to different forms. Some individuals involved in an energy community want to work informally and push new energy projects while others want to set up a legal entity and be an active stakeholder of the energy market. Different concepts emerged in past years. A detailed description of the main concepts and their characteristics is provided in the following subsections.

Collaboration with local authorities

A key success factor of energy communities is the strong collaboration with local authorities. Whenever individuals decide to create an energy community, they are strongly advised to promote the concept to municipal staff and local elected representatives. Showing examples of best practices or similar projects implemented in neighbouring countries might convince local politicians to engage in this transition process.

Both parties – the energy community and the local authority – can benefit from a strong collaboration leading to the decarbonisation of the territory. For instance, local politicians can benefit from the expertise of individuals involved in energy communities to develop a sustainable action plan. Furthermore, it is proven that projects led by cooperatives have contributed to shape a more active form of local participation that encourages other initiatives and social innovation projects. In addition, collaborations between communities and authorities can support the local value creation, thus leading to new jobs and a local economic development benefiting to the most vulnerable communities.

Energy cooperatives

The main objective of an energy cooperative is to distribute the benefits and profits of the cooperative across the local community to have a positive social impact. Energy cooperatives are organised in a democratic and open way. Each member of the community is entitled to

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

one vote and can decide on the orientations of the cooperative. The legal status of energy cooperatives differs greatly from one cooperative to another: some which sell energy will impose to their customers to become members of the cooperative while other offer the possibility to invest without having to formally engage in the cooperative. There are different ways of organising governance within a cooperative. Seven key principles of cooperatives have been defined by the International Cooperative Alliance:

1. Voluntary and open membership,
2. Democratic member control,
3. Member economic participation,
4. Autonomy and independence,
5. Education, training and information,
6. Cooperation among cooperatives,
7. Concern for community.

A common principle for cooperatives is that members engage on a voluntary basis. Several energy cooperatives were set up in past years in EU Western countries such as Denmark and Germany to promote the installation of decentralised renewable plants in rural areas, in particular wind turbines and solar PV plants.

Clubs, trusts, associations, and other forms

This section is covering other forms that different ISLANDER participant islands can offer and its current status in their countries (Germany, UK, Greece and Croatia).

Other forms such as club and trust can be easier as a first step than energy cooperatives. In Germany, individuals may create an association ("Verein" in Germany or "asbl" or "vzw" in Belgium) meaning that the association will have members instead of shareholders and equity has to be collected from fees or from national or EU grants to develop projects. However, it should be noted that the primary objective of association is to run idealistic activities and not necessarily to invest into energy-related business activities. Indeed, most of energy communities in Germany are cooperatives or initiatives combining two legal forms: limited company liability (GmbH) and limited partnerships (KG). This forms an entity known as a GmbH & Co. KGs.

In the UK and Scotland, there is a tradition of development trusts, that empower citizen through the ownership and management of assets. These statutes of these trusts are very similar to the one of energy cooperatives: they run for non-profit, assets are owned by the community, and these entities are independent. A specificity of these organisations is that they often enter collaborations with public or private organisations which is not so common for other cooperatives in EU.

In Ireland, some communities' initiatives chose a Limited company as legal form. A drawback of this legal form is that it only allows a limited number of shareholders which makes it difficult to include many individuals. Other communities or social enterprises decide to engage in a community project by creating a Companies Limited by Guarantee. However, this special legal form does not allow any shareholders nor dividends to be distributed. These companies depend on donations.

As of 2021, in the Greek islands there are only a few cases of energy communities with low activity. According to the Greek Law for Energy Communities 4513/2018 the energy communities (ECs) can be established either under profit or non-profit status. The purposes of ECs are the following:

1. Promoting the social and solidarity economy and innovation in the energy sector
2. Addressing energy poverty and promoting energy sustainability

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

3. Production, storage, self-consumption, distribution and supply of energy
4. Enhancing energy self-sufficiency and security in island municipalities
5. Improving energy efficiency in end-use at local and regional level

Special provisions apply for Islands with population below 3100 people: the share to be owned by the island municipality can be up to 50% (instead of 20%) whereas the minimum number is 2 municipal members and 10 for a profitable EC (instead of 15).

There aren't many examples of energy communities in Croatia either. However, a new Electricity Market Act (NN 111/2021) was adopted in October 2021, and it provides a legal framework that regulates the establishment and functioning of these associations. Energy communities are defined as legal entities, associations whose members benefit from the exchange of energy that was produced and consumed in a specific local community area. Both natural and legal persons (Local Authorities, small and micro enterprises) can own a share or be a member of the energy community as long as they are located in the same Local Authority as the energy community. When it comes to decision making, shareowners/energy community members are entitled to vote regardless of the size of their share, in line with the "one member, one vote" principle. The Electricity Market Act states that energy communities are eligible to generate electricity in order to meet the needs of the shareowners/energy community members, and they can engage in other activities that are focused on shareowners/energy community members, such as power management, aggregation, energy storage, various energy efficiency activities, charging services for electric vehicles, etc.

2 UNDERSTANDING BORKUM'S DYNAMICS AND VISION

Most of the information provided in the following sections are from the ISLANDER Grant Agreement which was drafted by the consortium.

2.1 Borkum's energy system

The island of Borkum is the largest of the seven East Frisian Islands with an extension of about 31 km². It is located around 20 miles from the mainland and is Germany's most north-westerly point. Borkum lies in the North Sea close to the border to the Netherlands and is bordered to the south by the Wadden Sea.

The total population of Borkum has around 5,500 permanent residents who mostly live in the only town of the island, also called Borkum. Nonetheless, there is a significant influx of tourists attracted by the island's preserved natural environment, clean air and the wide range of spa treatments at the Gezeitenland water and wellness complex. Indeed, the total population in the island during the main tourist season usually reaches over 25,000 residents. In summer, during tourist high season, the energy consumption grows exponentially and reaches the highest level of net consumption[2]. The North Sea Island of Borkum is the largest of the East Frisian islands and accommodates around 290,000 overnight guests a year with around 2.4 million overnight stays.

[2] The NETfficient Handbook: aggregated energy storage for smarter communities, https://www.steinbeis-europa.de/files/ebook_netfficient_final.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

The energy supply in Borkum is guaranteed by Stadtwerke Borkum (NBG), the public utility company, water authority and the only electricity distributor in the island:

- Generation: NBG has a contract with EWE AG, a main energy group provider of electricity and natural gas, to buy energy from the mainland (by a submarine power cable and fossil fuel imports) and then resell it to the island. Also, NBG owns and operates a 1.8 MW wind turbine. A 1.4 MW solar park and another 1.8 MW wind turbine are owned privately.
- Distribution: NBG is the only Distribution System Operator in the island. They oversee the transmission of electricity from medium-voltage and low-voltage distribution systems towards its transmission to end users (the distribution grid consists of 112 km of low voltage cables and 85 km of medium voltage cables connected by 60 substations). The distribution grid is also connected to the mainland (24 km of 420 kV submarine cables).
- Meter reading: NBG is the responsible entity of the final contracts and the manager of the system for metering.
- District heating: NBG is also the operator of the heating network. Specifically, there is a combined heat and power (CHP) plant which participates in the energy mix and which provides heat to the island inhabitants.
- Public lighting: NBG is responsible for the public lighting systems as well, which is a separate electric grid. There are 1,100 light points remotely controlled, accounting for about 800 hours/year of running lighting.

Furthermore, NBG also operates the airport and the public harbour.

2.2 Former NETfficient project

Following concerns of the population regarding air quality due to a new coal fired power plant on the Dutch coast, Borkum started on a path towards renewable energy many years ago. In fact, the Stadtwerke Borkum find the procurement from the wholesale market, especially at peak times, increasingly expensive (thus making local generation increasingly attractive as well). Yet the challenges associated with the intermittent nature of power supplied by such renewable sources currently remain: consumption peaks cannot be met readily by solar and wind energy and expensive grid electricity needs to be bought in. Vice versa, peak generation leads to energy exports at unfavorable conditions. A logical step to tackle this challenge is to investigate energy storage, which was indeed the research objective of the previous H2020 NETfficient project coordinated.

The NETfficient project started in 2015 and finished by the end of 2018. The main objective of this project was to validate several types of storage technologies in combination with renewable energy sources. Following technologies were tested:

- Hybrid energy storage systems (Ultracaps and Li-ion batteries) for peak shaving and intra-day storage at MV and LV levels;
- Second Life Electric Vehicles Batteries, for intra-day storage at domestic level;
- Household storage technologies (Li-ion batteries + related power electronics), for peak shaving and intra-day storage;
- Small-scale PV-coupled with hydrogen storage systems for off-grid applications.

During the NETfficient project, 279 kWp of PV based generation capacity and a thermal storage solution for low temperature heating of the aquarium were installed. The energy storage prototypes were dismantled after project end due to liability implications.

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

2.3 The current ISLANDER project

ISLANDER will run for four years, starting in October 2020 and ending in September 2024. The project strongly builds on the NETfficient project. ISLANDER aims at developing an even more integrated and efficient central energy management platform in order to manage the various energy assets and balance fluctuations between generation and demand, using local flexibility options such as storage technologies and demand response in combination with renewable energy sources. In addition, an innovative concept for heat supply based on a seawater-powered heat pump and a heat storage tank will be installed in a newly built district close to the port of Borkum. A large hydrogen-based storage will also be deployed. For the household solutions and the district heating, the consumers, the citizens of Borkum, are actively engaged within the project to strengthen their participation in the island's energy transition and to include their behavior into the energy management. For the energy transition on Borkum it is on the one hand necessary to involve the consumers and on the other hand large investments will be needed, therefore the consumer engagement is accompanied by the creation of a Renewable Energy Community to facilitate the transition and maximizing benefits for the islands' inhabitants.

These measures will set the course for the creation of a largely carbon-free energy system on the island of Borkum by 2030. Further, ISLANDER aims to replicate its results to the widest possible adopters. To do so, the project entails a 3-wave replication strategy along with the dissemination measures required to support it:

- Replication in the follower islands in Great Britain, Greece, and Croatia
- Replication in the related archipelagos
- Replication in other EU islands by means of the cooperation with the European Islands initiatives.

1st pillar - Increase the penetration of distributed renewable sources

The ISLANDER project is designed to trigger improvements to the island's energy network infrastructure in preparation for the Borkum 2030 plan. As the two existing wind turbines will be dismantled for the construction of a weather radar tower essential for the DWD (the German national weather service), it is planned to connect Borkum to the offshore wind power plant in Riffgat. This, combined with the large-scale deployment of decentralised photovoltaic installations for households and buildings planned under the ISLANDER project, will add up to 103.9 GWh of renewable electricity to the system per year by 2030.

Furthermore, in order to make the island's heat supply CO_2 neutral, the ISLANDER project will deploy a district heating project for 100 residential units in a first phase, taking advantage of the thermal energy of North Sea water. The connection of the central heat pump and the decentralised auxiliary heat pumps of this innovative solution to the electricity grid will make it possible to take advantage of the synergies of the two networks (electricity and heating). The optimal integration provided by the ISLANDER smart grid solution, in addition to the modular extension of seawater district heating to the rest of the island's districts, will avoid the production of 135 GWh of heat from natural gas.

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

Table 2: Key performance indicators to measure the progress of DER' penetration on Borkum (Source: ISLANDER Grant agreement)

	Current Baseline	After ISLANDER		After Borkum 2030 emission-free plan	
Electricity excluding e-mobility and heating		GWh			
Total consumption per year	30.6	30.9	+1%	31,82	+3%
Electricity imports from the mainland (+)	17.06	16.76	-2%	0	-100 %
Electricity exports to the mainland (-)	-1.2	0	-100%	0	N/A
Electricity generated by wind turbines	10.6	10.6	+0%	50.07	+372%
Electricity generated by PV solar plants	1.24	1.62	+31%	5.27	+225%
Electricity generated by gas CHPs	2.9	1.92	-34%	0	-100%
Renewable power installed		MW			
Wind turbines generation capacity	3.6	3.6	+0%	36.5	+914%
Solar PV generation capacity	1.67	1.85	+11%	5.92	+220%
Heat*		GWh per year			
Total consumption	130	131	+1%	135	+3%
Heat gen. by gas CHP and natural gas boilers	130	124.66	-4%	0	-100%
Heat gen. by sea water heat pumps assuming a COP of 3.5	0	1.81	N/A	38.6	+2032%
E-mobility					
Diesel powered vehicles for public transport replaced gradually by electric vehicles	5.89	3.7	-37%	0	-100%

Ad-hoc KPIs to measure the progress of the project	No. of solutions	kW
Self-consumption household solutions (PV+Li-ion)	+30	+120
Self-consumption building solutions (PV Li-ion)	+3	+60
Residential customers connected to district heating based on sea water heat	+100	+300

2nd pillar – Implement a storage infrastructure on the island

Within ISLANDER, the storage system of the island will be significantly improved by extensively deploying the next set of technological solutions:

- A fast response electricity storage (ultracapacitor), which will increase the stability of the network by providing up to 1MW.
- A grid-scale Li-ion battery pack which that will provide a total of 730 MWh per year while operating on an intra-day basis.

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

- 30 additional PV + Li-ion batteries household solutions, which will store a total of 194 MWh per year while operating on an intra-day storage basis.
- 3 additional PV + Li-ion batteries building solution, which will provide a 244 MWh storage per year while operating on an intra-day storage basis.
- A seasonal hydrogen-based storage, which will complement the electricity storage system by carrying out medium to long term charge/discharge cycles (10-100 days). In this way, the total accumulated energy that can be stored though a year has been estimated at 120 MWh (assuming 25 full charging/discharging cycles per year).
- A distributed heat storage system provided by hot water tanks that is part of the seawater-based district heating network. This will enable a total energy storage per year of 182 MWh and will create synergies between the electrical and the thermal networks.

Table 3: Key performance indicators to measure the progress of the implementation of energy storage solutions on Borkum (Source: ISLANDER Grant agreement)

	Current Baseline	After ISLANDER		After Borkum 2030 emission-free plan	
Electricity stored per year		MWh			
Ultracaps (fast response) + grid-scale Li-ion batteries (intra-day)	0	730	N/A	2400	+229%
Household small-scale Li-ion batteries (intra-day)	0	194	N/A	820	+322%
Buildings small-scale batteries (intra-day)	0	244	N/A	370	+52%
H_2 storage (seasonal)	0	120	N/A	1620	+1250%
Heat storage	12	182	+1416%	4796	+2535%

Ad-hoc KPIs to measure the progress of the project	No. of solutions
Ultracaps (fast response) + grid-scale Li-ion batteries (intra-day)	+1
Self-consumption building solutions (PV Li-ion)	+30
Buildings small-scale batteries (intra-day)	+3
Residential customers connected to district heating based on sea water heat	+100

3rd pillar – Develop an IT platform for smart load balancing

The development of a smart IT platform to make the most of the Borkum's zero-carbon infrastructure is a central pillar of the project. This will be developed to provide energy services for an extensive number of highly distributed users, with controllable and non-controllable loads, local generation and hybrid storage balancing, and for the commercial, industrial and residential segments. The IT platform will be conceived to optimally balance and manage the various energy and storage systems of the islands (1.47 GWh of load balancing capacity by the end of the project) and implement demand response (equivalent to 0.94 GWh of energy demand shifted by year by the end of ISLANDER).

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

Table 4: Key performance indicators to measure the progress of the implementation of smart aggregation platform (Source: ISLANDER Grant agreement)

	Current Baseline	After ISLANDER		After Borkum 2030 emission-free plan	
Smart grid digital platform energy levelling per year	GWh per year				
Storage + Optimal Power Load Balancing (PLB)	0.23	1.47	**+539%**	13.94	**+848%**
Demand response (DR)	0	0.94	**N/A**	8.95	**+852%**
Ad-hoc KPIs to measure the progress of the project	No. of interconnected devices				
Distributed prosumer installations	**+33**				
Grid-level renewable power plants (PV solar power plant and Riffgat offshore wind farm)	**+2**				
Grid-level storage (ultracaps + Li-ion batteries + H_2-based seasonal storage)	**+3**				
EV charging stations	**+5**				
Number of households connected to the district heating network	**+100**				

2.4 The bigger picture – Borkum 2030

The long-term objective is to make Borkum carbon neutral by 2030. Besides the ISLANDER project, other initiatives have been launched in the past year to reach this long-term goal:

- The project H2Watt (Interreg): The island is currently working on solutions for hydrogen production and storage within the Interreg project H2WATT. There are two case studies: the island of Ameldand in the Netherlands and Borkum[3].
- WB KEAN Klimakommunal – Kommunale Klimaschutzstrategie (German Federal State Funding): Borkum was awarded a price at the 2020's Lower Saxony's 'Klima kommunal' competition to reward Borkum's outstanding municipal climate protection projects[4].
- Quartierkonzept Reede (KfW 432): An application has been submitted to get fund for the development of an energy-efficient neighbourhood concept and to cover the costs of a refurbishment/neighbourhood manager under KfW Programme 432 (German funding programme) for the area of Reede, which includes the port, the largest youth hostel in Europe and some company apartments.
- ISEK/VU Stadtumbau: An integrated urban development concept (ISEK) was developed

[3] https://www.deutschland-nederland.eu/en/project/h2watt/
[4] https://www.klimaschutz-niedersachsen.de/zielgruppen/kommunen/WettbewerbKlimaKommunal.php

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

for the entire island.

- Machbarkeitsstudie Klimaneutrale Insel (DIN 14044 und DIN 14067): a feasibility study has been launched to see if Borkum fulfils the requirements to be certified as carbon neutral island.

3 PLAN FOR THE CREATION OF A RENEWABLE ENERGY COMMUNITY ON BORKUM

3.1 Main steps

The ISLANDER project aims to contribute to the decarbonisation of Borkum, yet public funding is only able to finance a minor part of such decarbonisation process. Thus, the project aims to kick-start a Renewable Energy Community in Borkum (REC, as defined in the recently adopted Renewable Energy Directive EU 2018/2001). Thanks to the extensive plan for the replication of results, the partners aim that this action will also have further replication well beyond Borkum. Indeed, the creation of RECs was found to be a highly suited model for achieving the objective of complementary finance and maintain the further uptake of renewable and storage technologies across islands. This model has the advantage of retaining and embedding economic, social and environmental protection within the local community; with the community on Borkum already being highly aware on energy and environmental issues.

Additionally, RECs can be powerful vehicles for social inclusion and political, economic empowerment specially for women. Overall, cooperatives are often particularly well accepted by women to whom they can offer attractive ways for their inclusion in the labour market and economy, thus contributing towards gender equality by expanding women's opportunities to participate in local economies. Cooperatives can also empower women by collaborating with civil society and gaining government recognition, as the democratic processes characterising RECs management requires shared decision-making between women and men.

To start a REC in Borkum, ISLANDER partners have planned the next set of stages and related dissemination activities, which are centred around dedicated workshops to be held in close collaboration with partner NBG:

Stage 1 - The Preparatory stage

It provides the planning of all activities related to creation of a REC, defining the basic parameters in close coordination with the local utility, identifying interested stakeholders and citizens and ways of reaching them. Questions to be covered are: Which stakeholders can contribute knowledge/experience on energy/ RES+HES technologies/ energy markets etc.? Which examples/ best practices are in the region? Which external advisors (known to the proposers already) are best suited? (e.g., from REScoop.eu at European level, Bündnis Bürgerenergie e.V., services of German Chambers of Commerce and Industry etc.). Which further actions are required? The resultant detailed plan is presented in the present Deliverable D7.1 in chapter 4.

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

Stage 2 - Technical feasibility and economic viability analysis

An in-depth study will be undertaken in close cooperation with NBG, clarifying which renewable RES+HES solutions and technologies to consider to reach Borkum's decarbonisation targets, and how to ensure economic viability and technical feasibility for safe and efficient operation of the generation assets in the long term. Risks, opportunities and benefits for the community will also be analysed to serve as a basis for further investment decisions. The results of the technical and economic study will be presented in Deliverable D7.2.

Stage 3 – Launch of the citizen engagement process

This process will entail a series of workshops/community events and other activities aimed to ensure local buy-in for ISLANDER in general, inform local citizens and other stakeholders about all necessary aspects of creating a REC, get feedback on their level of involvement and provide an ongoing forum in which to facilitate and guide the creation of the REC. The activities performed will rely on the outcomes of Deliverable D7.3 and will cover the following topics:

- Background, context, planning for ISLANDER project including implication on Borkum;
- What is a REC? Successful case studies of RECs;
- Planning and requirements for a REC, legal, regulatory, financial (funding opportunities, low-interest loans) and organizational implications.

Upon local demand, the forum can be opened to other topics related to wider climate change mitigation, environmental protection and renewable energies in order to ascertain continued local buy-in to the initiative.

Stage 4 - Accompanying citizens and Borkum 2030 roadmap

The last stage is about accompanying citizens through all necessary steps of Borkum's energy transition process. Based on the inputs of the previous deliverables a roadmap outlining the further steps to be reached to achieve Borkum's full decarbonization objectives will be developed. This roadmap will also indicate how the different stakeholders of Borkum's transition (the local utility, energy service providers and the community) will interact and share tasks and responsibilities. The document will also specify the long-term strategy that will be adopted to ensure the sustained operation of the REC after the end of the project The final roadmap will be presented in Deliverable D7.4.

3.2 Interactions and knowledge sharing with other WPs

The following interactions and knowledge sharing between work packages will take place:

- Inputs from WP1: Task 1.5 on end users selection for ISLANDER pilot activities.
- Inputs from WP4: Task 4.1 data about the residents, their energy consumption and their willingness to engage in energy savings and communities as input for Task 7.3; Task 4.2 - Individual renewable supply generation forecast models required to perform task 7.2 - Technical feasibility and economic viability.
- Inputs from WP1-6 needed for the preparation of information material for citizen in task 7.3 - Citizen engagement process.
- Inputs will be shared between task 7.4 - Roadmap for REC creation and task 9.2 - Roadmap towards exploitation of the project results.
- Output to WP8 "Replication of project results": Learnings from WP7 will be used in

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

WP8 to establish and support the replication in other islands.

3.3 Tasks and partners role

SEZ will coordinate all tasks in close collaboration with partner NBG. Partners will provide inputs for the development of information materials for citizen, to assess the long-term economic & technical viability for safe and efficient operation of the generation assets that will be deployed on the islands and to validate the final roadmap: partners AYE, KUL, BCM and EMEC will provide feedback, ideas and inputs for tasks 7.1, 7.2 and 7.4. Contributions from all partners are expected for task 7.3.

Table 5: Tasks and associated deliverables of WP7

Task	Name	Task leader	Months	Deliverable (Due date)
7.1	Preparatory stage	SEZ	1-48	D7.1 – Action plan for citizen engagement process (M13)
7.2	Technical feasibility and economic viability	SEZ	13-30	D7.2 - Visibility study for ISLANDER Energy Community (M30)
7.3	Citizen engagement process	SEZ	6-48	D7.3 - Infopack for citizens engagement (M20)
7.4	Roadmap and business plan for REC	SEZ	40-48	D7.4 - Roadmap and Business Plan for the ISLANDER Energy Community (M48)

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

4 DETAILED PLANNING OF WP7 ACTIVITIES

Table 6: Gantt chart of WP7

WP7 – Tasks	Creation of a Renewable Energy Community in Borkum	AYE P	IDE P	SEZ L	NBG P	ZIG (P)	CEG (P)	BCM (P)	KUL P	EMEC (P)
T7.1	**Preparatory stage**	**P**	**P**	**L**	**P**				**P**	
T7.1.1	Understand island dynamics and island vision			L	P					
T7.1.2	Map key stakeholders and their level of influence/involvement			L	P				P	
T7.1.3	Understand/complement Borkum clean energy transition agenda			L	P					
T7.1.4	Plan tasks 7.2 -7.4			L	P				P	
T7.1.5	Write, review and submit D7.1	P	P	L	P	(P)	(P)	(P)	P	(P)
T7.2	**Technical feasibility and economic viability**	**P**	**P**	**L**	**P**	**P**	**P**	**P**	**P**	**P**
T7.2.1	Develop - if not yet available - island transition pathways covering following energy vectors (heating, cooling, electricity, transport on the island and from and to the island) using a transition canvas	P	P	L	P					
T7.2.2	Perform a technology assessment to see if decarbonisation objective can be reached/check who needs to be involved in decarbonisation process	P	P	L	P					
T7.2.3	Perform a cost benefit analysis, estimate finance needed (IPT tool)	P	P	L	P					
T7.2.4	Write, review and submit D7.2	P	P	L	P	(P)	(P)	(P)	P	(P)

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

T7.3	**Citizen engagement process**			**L**	**P**				**P**	
T7.3.1	Detailed design of the citizen and stakeholder engagement process including definition and preparation of the needed information materials			L	P				P	
T7.3.2	Workshop/event 1: background, context, collect needs			L	P				P	
T7.3.3	Workshop/event 2: report on project progress, inspiring testimonials from energy communities			L	P				P	
T7.3.4	Workshop/event 3: presentation of the final roadmap and project continuity			L	P				P	
T7.3.5	Write, review and submit D7.3	(P)	(P)	L	P	(P)	(P)	(P)	P	(P)
T7.4	**Roadmap and business plan for REC**	**P**	**P**	**L**	**P**				**P**	
T7.4.1	Business plan based on the outputs of CBA	P	P	L	P					
T7.4.2	Prepare a roadmap for the establishment of a renewable energy community / to achieve Borkum's full decarbonisation by 2030	P	P	L	P				P	
T7.4.3	Write, review and submit D7.4	P	P	L	P	(P)	(P)	(P)	P	(P)

L: lead partner, P: partner with major contribution , (P): partner with minor contribution

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

5 STAKEHOLDER ANALYSIS

From the point of view of a project or an activity, stakeholders include all people, groups and organizations that are involved or affected. In a stakeholder analysis these groups will be identified and grouped according to their level of influence and interest to determine how to engage and how to involve them before actually starting the activity. The purpose of the stakeholder analysis is to find support in your activity, gain alignment among all stakeholders and address conflicts or issues early on. Therefore, conducting a stakeholder analysis increases the chance for success of the project or activity.

In preparation of the action plan for citizen engagement, a stakeholder analysis was performed to better understand the different groups and design a suitable engagement strategy. In the following subchapters the methodology, analysis and the resulting stakeholder engagement plan are presented.

5.1 Methodology[5]

The adopted methodology consists of the following three steps.

Step 1: Determination of stakeholders

The first step is to start by brainstorming a list of potential stakeholders for your project or activity. The list can be adapted and reduced later throughout the process, but at the beginning you don't want to miss out any potentially important group. The brainstorming can be supported by small research on your topic. As a result, you will end up with a preliminary list, that will be detailed in the second step.

Step 2: Group and rate these stakeholders

After completion of the brainstorming session and determination of your potential stakeholders, you want to start to categorize them by their level of influence and interest in your project. One method to accomplish this, is by using the power-interest grid. The grid consists of four categories that will be used to group your stakeholders:

1. **Players:** High-power, high-interest stakeholders with whom you will want to collaborate.
2. **Subjects:** Low-power, high-interest stakeholders can offer great insights and ideas for the project but whom you don't need to always say yes to.
3. **Context-setters:** High-power, low-interest stakeholders need to be kept up to date since they can have a lot of influence over the project but don't want to be involved in the details.
4. **Crowd:** Low-power, low-interest stakeholders require ongoing communication about the project's progress but probably the least of all stakeholders.

The power-interest grid is shown in the following figure.

[5] Adopted from: https://www.productplan.com/glossary/stakeholder-analysis/

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

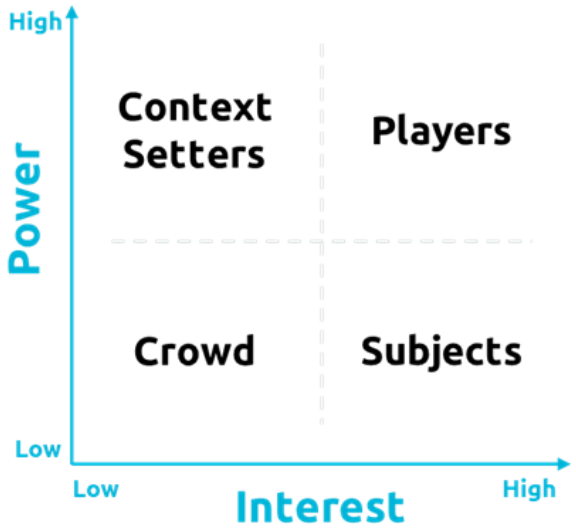

Figure 1: Power-Interest grid for the categorization of the stakeholders.

Step 3: Development of a communication strategy for each type of stakeholder

In this final step, you need to think how to strategically engage and earn the support of your stakeholders. You will want to ask yourself the questions:

- What is the motivation of this stakeholder?
- What priorities do they have and how could those align with our project? How do we make sure that our project is not threatening their other priorities?
- What is the likely view of this stakeholder on our project? Is it positive, good, is it not, what can we do about it?

Once you've completed your stakeholder profiles, you can define an engagement/ communication plan by defining the communication channels and needed communication materials.

5.2 Analysis of stakeholders for the creation of the REC

In our stakeholder analysis for the creation of the Renewable Energy Community in Borkum we started by listing different interest groups in renewable energies. We found and defined the three groups: Energy/power consumers, energy/power producer and politics. The individuals of each group have then been identified through brainstorming. The resulting list and our view on their level of power and interest is shown in Table 7.

Table 7: List of stakeholders and their level of power and interest in the creation of a REC on Borkum.

Stakeholder	Power	Interest	Category
Energy/power consumer			
Citizens (active, want to participate)	Low - Medium	High	Subjects
Citizens (passive, don't want to participate)	Low - Medium	Low	Crowd
Islands guests	Low	Medium	Crowd

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

Industry	Medium	Medium - High	Player
Public institutions	High	Medium - High	Player
Energy/power producer			
NBG – Stadtwerke Borkum	Medium - High	High	Player
Energy provider from mainland	Medium	Low	Crowd
Trianel Windpark Borkum	Low	Low	Crowd
SB Solarpark Borkum GmbH & Co. KG	Low	Low	Crowd
Politics			
Local politics	Medium - High	Medium - High	Player
State Niedersachsen	High	Medium	Context Setters
Germany	High	Low - Medium	Context Setters
European Union	High	High	Player

5.3 Stakeholder contacts and means of communication

Based on the results of the previous section, we then sorted the stakeholders by their power-interest category and brainstormed possible contacts and channels to engage them. In our case, players and context setters seem to have a quite small and limited number of possible contacts and therefore our strategy can include directly contacting individual representatives of them. The subjects and the crowd, especially citizens and island guests, on the other hand will be difficult to engage individually. It was therefore decided to engage them mainly through available channels, e.g., local media, and through the citizen engagement workshop series planned in the Islander project. The action plan is presented in the next section.

Table 8: List of possible stakeholder contacts and means of communication.

Stakeholder	Possible Contacts	Means of communication
Player		
Industry	Tourism (hotels), Craft union, Union for gastronomy	Direct contact
Public institutions	Town and NBG	Direct contact
NBG	Project partner	Direct contact
Local politics	Mayor, City council, Working group „Kommunales Energiemanagement“	Direct contact
European Union	Rescoop EU project	Direct contact
Context Setters		
State Niedersachsen (Germany)	Innovation centre Niedersachsen GmbH	Direct contact
Subjects		
Citizens (active, want to participate)		Inform through available channels, e.g. local media and through the workshops planned in the ISLANDER project

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

Crowd		
Citizens (passive, dont want to participate)		Inform through available channels, e.g. local media and through the workshops planned in the ISLANDER project
Island guests		
Energy provider from mainland		
Trianel Windpark Borkum		

6 ACTION PLAN FOR CITIZEN ENGAGEMENT

The action plan for citizen engagement presented in this section is based on the stakeholder analysis performed in section 5. Besides actions to engage the citizens, it also includes actions to involve other stakeholders in the process of creating a Renewable Energy Community. By inclusion of all relevant stakeholders from the beginning, chances of success are maximized. The action plan is presented in the following figure and is described in more detail below.

Figure 2: Action plan for citizen engagement process.

1. Preparation of materials for stakeholder engagement

The first step is to prepare messages and materials for the engagement of the stakeholders complementary to the project flyers providing information on ISLANDER to the general public. This will include e.g., a presentation for personal meetings, an official letter describing the intention to initiate contact and a poster to visualize information and the process. The materials will be personalized depending on the stakeholder by inclusion of their focus interests. As of October 2021, the messages and materials are not yet defined, but will be developed in the next 6 months. Finally, the materials will be made publicly available in May 2022 as deliverable D7.2 of the ISLANDER project.

2. Direct contact of players and context setters

The players and context setters will be contacted directly via phone and or email to start a

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

personal discussion on their level of interest and involvement. The materials prepared in the first step will aid in this process, by making our intentions easily accessible for the stakeholders. While some contacts are already available, others still need to be identified before the engagement can take place. Since this activity aims at building a long-term relationship it will therefore likely carry on until the end of the project.

3. Informing the citizens and tourists through local media

On Borkum, there are 5,500 permanent citizens and 290,000 overnight guests per year. Those individuals can best be reached by utilizing the available channels they are used to and that are available. This action will have a strong focus on the permanent citizens of the island and therefore local media is an ideal platform. The goal is to keep them informed and to offer a channel to involve them, if they want to. Similar to the second step, this activity will likely carry on until the end of the project. Communication materials will be displayed at strategical locations of the island such as the tourist office to keep tourists informed on the progress of ISLANDER.

4. Series of workshops bringing all stakeholders together

A series of workshops will be organized on Borkum to generate a platform for the stakeholders to get involved. The main focus is to involve the citizens of the island and to offer more opportunities for them to collect their concerns and needs. Additionally, the platform can be used to hold expert discussions with stakeholders that are deeper involved. Ultimately the aim is to bring all stakeholders together to achieve common ground for the creation of a REC. The series of workshops will likely start in the second half of 2022 and will continue with one event per year for a total of 3 events by the end of the project.

5. Roadmap for the creation of the Renewable Energy Community

The combined results of steps 1 – 4 together with other activities, e.g., technoeconomic analysis or activities in the BRIDGE project, will lead to the roadmap towards the creation of a Renewable Energy Community on Borkum. The roadmap will contain the necessary steps and best practices to lead this activity after the end of the ISLANDER project.

7 MAIN CONCLUSIONS

Borkum is aware of the energy problem and started its pathway towards net zero emissions already years ago. The agenda Borkum 2030, expressing carbon neutrality by this year, lead to numerous projects and initiatives to realize this goal. Renewable Energy Communities can facilitate the energy transition process on the island by involvement and alignment of the relevant stakeholders and therefore they play an important role in this context. Based on this premise, the action plan presented in this report was developed to include not only the citizens of the island but all relevant stakeholders to increase the chances of success. The five-step plan will lead to a roadmap that will keep the activity going even after the end of the ISLANDER project. We are sure that with this approach we have created the basis for a sustainable roadmap towards the creation of a Renewable Energy Community on Borkum.

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669

DEVIATIONS

Delivery of the content is in time and to full satisfaction, without any deviations to actions planned.

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 957669