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# Smart integRation Of local energy sources and innovative storage for flexiBle, secure and cost-efficIent eNergy Supply ON industrialized islands

## D 7.5 – Report on Relevant Experiences from Islands Initiatives

Lead Partner: UHI North Highland, University of the Highlands and Islands

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# Acronyms

AMIC - Culatra Island Residents Association

CAPEX – Capital Expenditure

CETA – Clean Energy Transition Agenda

CHP – Combined Heat and Power

$CO_2$ - Carbon Dioxide

DEVEX – Development Expenditure

EFSI - European Fund for Strategic Investments

EIB - European Investment Bank

EMS - Energy Management System

ENEA - National Agency for New Technologies

EU – European Union

EUR – Euro

EVs – Electric Vehicles

GMIT - Galway-Mayo Institute of Technology

GWh – Gigawatt Hour

Km - Kilometre

MW – Megawatt

NCFF - Natural Capital Financing Facility

NESOI - New Energy Solutions Optimised for Islands

NUIG – National University Ireland Galway

NPBs - National Promotional Banks

OPEX – Operating Expenditure

PPC - Public Power Corporation

PV- Photovoltaic

SIC - Sifnos Island Cooperative

WACC – Weighted Average Cost of Capital

# Introduction

## The Robinson Project

ROBINSON[i] aims to optimise the utilisation of local renewable resources by deploying an integrated, smart and cost-efficient energy system coupling thermal and electrical networks, demonstrated in industrial environment on the Eigerøy island, Norway.

The ambition of ROBINSON is to decrease the energy production costs, reduce dependence on mainland power and phase out fossil fuels currently used by the demo island's industries in a relatively short term, thus significantly contribute to island's decarbonisation.

The user-friendliness and high modularity of the developed EMS then ensures a great potential for replication on the follower islands (Western Isle of Scotland and Crete), but also in other remote areas in Europe and beyond. The project will encourage business opportunities for local communities and, by creating new value chains, open up markets for the developed technologies having a positive impact on EU's competitiveness in low carbon economy.

ROBINSON actively engages with relevant existing initiatives and networks to identify opportunities, synergies, and best practices relevant to Eigerøy and the follower islands.

# Clean Energy for EU Islands Background

In the context of the 2015 Paris Climate agreement[ii], the susceptibility of islands to climate change is highlighted and the crucial role of a clean energy transition together with improved climate resilience plays to alleviate this risk is recommended. EU islands are well placed to deliver innovative solutions and attract energy investments that combine local renewable energy production, storage facilities and demand response to attain sustainable, economic, environmentally friendly energy systems. EU islands have the potential to be at the forefront of the energy transition with their strong sense of community and their territorial potential.

Clean energy for EU islands was launched ss part of the 'Clean energy for all Europeans' package in May 2017 with the aim to provide a long-term framework to help islands generate their own sustainable, low-cost energy[iii]. The initiative builds on a political declaration signed by the European Commission and 14 EU countries with large island populations (Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Malta, Portugal, Spain, and Sweden)[iv].

The European Commission and Parliament set up the Clean Energy for EU Islands Secretariat in 2018 to deliver and oversee the objectives of the initiative. In June 2020 as a follow-up, the parties signed a Memorandum of Understanding to create a lasting framework for cooperation to take forward the energy transition and identify best practices on challenges that cannot be addressed at the island level[v]. It builds on the results of the pilot phase (2018-2020) to encourage and generate beneficial clean energy projects on European islands. It seeks to inspire island communities to move from clean energy vision to action, and to match citizen-driven initiatives with expert support that has a real impact on projects that are happening on the ground.

Working in close contact with the Clean Energy for EU Islands Secretariat is the NESOI (New Energy Solutions Optimised for Islands) European Islands Facility. It was kicked off in 2019 and will operate at a local and European level until 2023, selecting 60 beneficiaries for customised, direct support with two competitive calls for proposals. In summary, NESOI will provide technical assistance, €6.2 million as grant funding and direct support and capacity building, through events workshops and toolkits[vi].

*Figure 1 Map of islands committed to decarbonise as part of the Clean Energy for EU Islands initiative during the pilot phase[vii]*

The initiative aims at accelerating the clean energy transition on Europe's more than 2200 inhabited islands, by helpings islands reduce their dependency on energy imports using better their own renewable energy sources, embracing more modern and innovative energy systems and creation of new jobs and business opportunities, boosting islands' economic self-sufficiency.

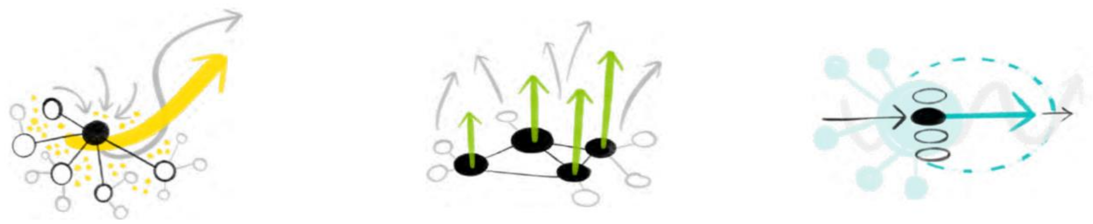
The initiative recognises that favourable conditions in islands for innovative solutions and investments is local renewable energy production and systems. The Clean Energy for EU Islands Initiative aims to provide replicable and scalable projects with funding from private sector investors and existing EU funding, and technical assistance. The Island forum was created to bring together collaborators across island groups, academics, civil society organisations and private sector to bring together best practice and take action on the ground.

## Clean Energy Transition Agenda

The Island Clean Energy Transition Agenda[viii] is a strategic roadmap for the transition process towards clean energy as desired by the stakeholders on the island. The methodology is based on best practices and lessons learnt from transition management experiences in Europe to address climate change at a local level.

The transition aims in the first place to decarbonise the island's energy supply. It can furthermore intend additional objectives such as reducing pollution, strengthening the local economy and improving the quality of life of inhabitants and visitors, while maintaining or improving the quality and security of supply.

The new Islands Clean Energy Transition Handbook[ix] follows a central methodology[x] (EXPLORE, SHAPE, ACT) to cover ideas and projects in all stages of the clean energy transition.



The **EXPLORE** part addresses islands that are just starting their clean energy transition. It guides the development of a Clean Energy Transition Agenda (CETA), i.e., a strategic roadmap to decarbonise the island.

The **SHAPE** part aims to bring forward the potential solutions suggested in the CETA to shape them into a pipeline of bankable clean energy projects. The project idea needs to be first developed, followed by studies assessing the feasibility of the projects, and the development of the business case.

The **ACT** part focuses on further developing the projects so that they are ready to be implemented on the ground, including finding the right funding and financing, developing the business plan, and setting up the required partnerships for implementation.

*Figure 2 Clean Energy Transition Handbook EXPLORE, SHAPE, ACT, Methodology*

## Explore

'The first part of the CETA examines the current dynamics on the island context, geography, population, and energy system is crucial to identifying the focus areas for decarbonisation. The second part of the CETA deals with a vision for the island and the pathways to reach it. This vision is the result of a participatory process and is shared by the island Transition Community. Island stakeholders can collectively work towards this shared vision, common goals, and effective strategies by defining transition pathways.'

The Islands Transition Handbook is an action-oriented guide to start and help navigate the transition towards clean energy for any island that wants to start the journey. The handbook instructs on how to develop a Clean Energy Transition Agenda and provides inspiration for the next steps of the transition, as well as a checklist for clean energy transition management.

The handbook provides background and current thinking, whilst offering practical examples for transition, tools for further reading and performance indicators for self-assessment of the ongoing process. The handbook can act as a starting point to find inspiration and contacts in the EU island community to kick-start, re-start or further boost the decarbonisation.

Every island community is unique with its geography, history, culture and socio-economic setting and this must always be borne in mind when reading the guidance and building the agenda. The handbook is to be used as a normative reference: a readily available framework that an island community can adapt for its own energy transition effort. The main take aways from the handbook and the framework are the strategic phases of building a transition agenda to pave the way for the technical planning and the development of individual projects.

The desire outcome is a strategic roadmap for clean energy transition that spells out the island's vision and identifies transition pathways to attain this vision. For this to be achieved engagement is sought from the island community and frontrunning public authorities, with focus on community-led clean energy activities, demanding an active role of citizens, local businesses and educational institutes in the decarbonisation of the island. The roles and responsibilities of the various stakeholders in this process to achieve full decarbonisation are emphasised on. The agenda should describe the projects and actions, including the specific technology, the timing and financing, for clean energy transition on the island.

## Step 1 - Committing to Decarbonisation

At the core or the Clean Energy Transition Agenda process is the Transition Team made up of organisations and associations that represent larger segments of the island's population. They are the main participants in the transition dialogues and look for inputs from the broader community. As the Transition Team assumes the responsibility over the island's clean energy transition, it is important that the organisations are committed with both resources and availability.

The Transition Team members can commit to each other using the official Clean Energy for EU Islands Pledge which requires the public authorities covering the island (municipalities, regions or similar) are part of the Transition Team as the transition does have a direct planning implication[xi].

The quadruple helix multi stakeholder approach is recommended whereas there are representatives from all four strands in the Transitions team – academia, industry, government, and of course civic society. This approach if implemented correctly should ensure the right balance between involvement of different stakeholders and should allow for collective action towards decarbonisation.

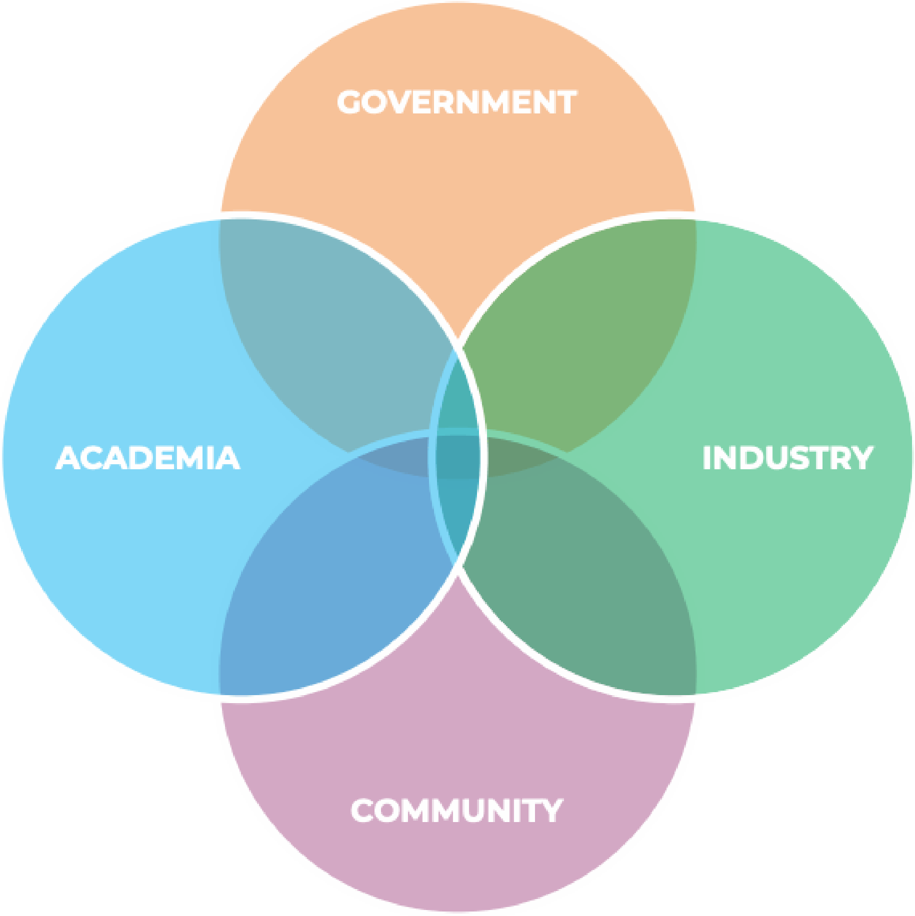



*Figure 3 Visual representation of the quadruple helix structure*[xii]

A strong Transition Team is characterised by a broad range of stakeholders that match the islands general stakeholder dynamic. A strong Transition Agenda includes a clear description of the transition governance and the role of each of the stakeholders. A balance should be found between the members of the Transition Team, and a clear understanding of the mandates and responsibilities held by each of them. This is primarily related to the collaboration between the involved public authorities and the other stakeholders.

In order to establish an engaged and responsible Transition Team, it is recommended that the public authority, from an early stage, agrees to the Transition Team being an 'extension' of its energy planning department. Examples have shown teams built on mutual responsibility and trust between the public authorities and other stakeholders, working together on equal terms, provide the strongest long-term results.

It is vital to have a balanced and strong Transition Team, in terms of human resources, mandate and responsibilities to drive forward the island-wide Clean Energy Transition Agenda process. The Clean Energy for EU Islands Pledge, designed to support the commitments between the different stakeholders involved in the Transition Agenda. The pledge guarantees a united start to the clean energy transition with an emphasis on a series of acknowledgements to other islands and to national and European bodies.

A transition is a long process that requires commitment from all stakeholders. Practical planning towards a Clean Energy Transition Agenda is milestone to form the organisational basis of the transition process.

## Step 2 - Understanding the Island Dynamics

Before embarking on the road to decarbonisation understanding of the island's dynamics must be achieved. Starting with an analysis the island's energy system to identify energy consumption patterns and interdependencies including a description of the current energy system to act as a baseline for the future and allows to determine the key sectors that influence the clean energy transition.

Mapping of the island's relevant stakeholders is then used to determine their role in the transition process and to identify those who are key to the process. Investigation of the policy and regulation that surrounds the island's clean energy transition to identify barriers and opportunities is then undertaken.

The activities in this phase are carried out by the Transition Team, who are responsible for gathering data, researching, and interviewing stakeholders. The CETA template can already be used to structure and format the findings[xiii].

*Table 1 Understanding island dynamics criteria*

| Understanding the island dynamics | |
|---|---|
| Geography, Economy and Population | Describing the island's geography, economy and population provides context to the island's CETA, enabling readers to understand the specificities of the island.<br><br>→ Geographic situation of the island: size, location, distance to mainland, etc.<br><br>→ Demographic situation: permanent population, changes in population throughout the year (for example during summer, high season)<br><br>→ Structure of the local government<br><br>→ Economic activities on the island, mentioning (if known) their impact on the island's greenhouse gas emissions<br><br>→ Connection to the mainland: describe the island's relation to the mainland including physical connections like ferry routes, bridges, or electrical cables. Details on the ferry's fuel consumption or the amount of electricity imported by the interconnection cable are to be further developed in the Energy System Description section |

| | |
|---|---|
| Energy System Description | Having a comprehensive picture of how energy is produced and consumed on the island supports the Transition Team in determining the priorities for the switch to clean energy. A complete analysis of the island's energy system is recommended as input to develop the rest of the CETA. Such a description of the island's energy system allows one to better understand its present situation, and to set a baseline for referral and future comparison. In order to acknowledge the special needs and challenges of islands, the energy system description is classified according to the following sectors:<br>→ Electricity generation and consumption<br>→ Transport on the island<br>→ Transport to and from the island<br>→ Heating and cooling<br>→ Other<br>The Clean energy for EU islands Technology solutions booklet is good starting point for identifying the apt solutions[xiv]. |
| Stakeholder mapping | Mapping the island stakeholders allows for identifying all the relevant actors on the island who are key to the energy transition. It is a useful way to ensure that the relevant stakeholders are engaged, whilst providing a structure for determining the governance of the transition. The stakeholder mapping also facilitates the co-creation process in the next phase of the Transition Agenda. One way to map stakeholders is to build a comprehensive stakeholder list, where each stakeholder is listed and both the reason for their engagement and the perspective on the transition is described. |
| Policy and regulation | The Transition Team should investigate how the island transition process is embedded in the surrounding policy and regulatory framework as this provides the backdrop against which the local energy transition takes place, such as international agreements on climate change, national and regional targets for the integration of renewable energy, local commitments to decarbonisation, etc. The Islands secretariat has developed an inventory of Policy and Legislation for all 15 EU member states with islands in which you can find information on support schemes for renewable energy (electricity, heating & cooling and transport), permits and authorisation processes[xv]. The inventory also contains information on grid-related policies, energy efficiency policies, community energy policies and other supporting policies available. |

The agenda template contains guiding principles for island communities wishing to develop a strategic vision of the clean energy transition for their island, including on how to develop:

- Coherent and effective community building and stakeholder involvement to ensure continuity and clear understanding of each stakeholder's position, role and responsibility in the decarbonisation process
- A de-carbonisation plan bringing together the visions of the island community and the opportunities and actions to fulfil these. The progress is monitored and adjusted according to the collective vision of the island community
- A financial concept to ensure feasible financial coverage for implementation of the de-carbonisation plan with the use of locally owned and managed financing solutions

It is essential to understand the dynamics of the island to create a realistic clean energy transition strategy. A description of the energy system is a useful basis from which informed decisions can be made and next steps prioritised. Having a balanced representation of different stakeholders is key to the success of the transition. An understanding of the policies and regulations on energy for the island allows for the identification of barriers and opportunities.

## Step 3 - Developing an Island Vision

'The development of a shared vision for your island's energy future is an important step in developing an ambitious Clean Energy Transition Agenda that inspires and mobilises action. Having identified the island energy challenges under the island dynamics, the participants of the transition dialogues proceed with the development of a vision around a sustainable energy system that will enable them to maintain the sustainable wellbeing and resilience of their community.

The development of an island vision is crucial for the transition to clean energy sources. A collectively developed vision functions as a compass that orients the island community towards a new 'attractor' – a vibrant carbon-free island, an energy independent island, and a resilient island. Beyond that, the discussions that take place in shaping this vision, enable the actors involved in the transition dialogue to focus their efforts on concrete actions.

A major direct benefit of participatory envisioning is the direct dialogue between local stakeholders, policy makers and local technology providers. The transition of an island community to clean energy sources requires the collaborative efforts of numerous actors on and beyond the island. The completed stakeholder analysis and mapping enable the clarification of questions around the potential roles and responsibilities of the different island stakeholders when strategising and implementing this strategy in the projects that follow.

The first step in an envisioning process is the formulation of principles (e.g., a sustainable island, a socially just island, an accessible island) for the desired outcomes in the future. These principles emerge once the dialogue participants discuss and reflect about their core values (e.g., sustainability, justice). These principles guide the development of the overall vision.

A clean energy vision aims to establish a shared goal for the transition process. It can best be expressed as a sentence or paragraph that describes how the island stakeholders see the transitioning island in the future. This statement provides guidance for future transition activities. Some 'good practices' around envisioning processes are the following:

- Consider existing, local storylines around change and activate them within the vision.
- Allow for open confrontation and the exploration of commonly shared values and future desires.
- Involve actors with different backgrounds and types of knowledge to allow for learning and co-creation. When necessary, external actors may be also invited. Examples of interesting profiles include technological, financial, organisational, etc.
- Thinking outside the box and being creative may help to make a breakthrough.
- Having a workshop facilitator may help to address conflict, engage all the actors, and promote creative thinking.

An island's clean energy transition will benefit from a vision that is co-created by the relevant island stakeholders.  Mid-term goals create urgency whilst mobilising immediate action. Visioning involves a strategic discussion regarding the collective future of your island's community and what everyone will gain though the transition to clean energy. Governance needs to be considered at every step of the process to ensure its ownership and responsibility.

## Step 4 - Exploring Island Transition Pathways

While working on the island's vision, pillars and pathways, the actors involved in the transition need to agree on their role in the transformation of the island's energy system. A clear *governance structure* is key to the success of the transition process. The stakeholder analysis and mapping serve as a starting point to clarify questions about the potential roles and responsibilities of the different actors

Pathways and Pillars may include technical, economic, social and organisational options that exist for the island's clean energy future. Thematic workshops can be organised where participants contribute with their perspectives and ideas. Research can help to identify opportunities and eliminate unrealistic proposals. The results from these activities may be summarised in writing, pictures, and drawings and should be made publicly available.

Having the vision as the goal, the stakeholders may come up at this stage with a combination of solutions across different sectors to reach their objectives: these are the island *Transition Pathways*. Transition Pathways link the present situation on the island with the envisioned future by integrating solutions that span across different Pillars. Pathways are not fixed plans but storylines across scales and sectors that present an overview of the existing possibilities for decarbonisation. There is no one-size-fits-all solution to develop island transition pathways. Based on the input gathered in the transition dialogues, the Transition Team clusters the strategies, ideas, and actions according to identified themes.

*The Pillars* depend on the context and specificities of the island and can also be cross-cutting sectors (e.g., lifestyle, community engagement, education). Once pillars are determined, strategic objectives need to be defined for each one of them. These objectives allow establishing short-term actions and identifying feasible strategies, projects, and activities per pillar.

The Clean energy for EU islands secretariat suggests starting with the same structure as the Energy System Description; therefore, the *pillars* can be divided into:

- Electricity generation and consumption
- Transport on the island
- Transport to and from the island
- Heating and cooling

They can also be based on a sectorial approach, an ownership model-based approach, etc. or incorporate additional areas. The transition dialogues, which can consist of different meetings per pillar, provides insight into the island's wants and needs and increases the effectiveness of the agenda. The pillars are developed by the Transition Team, the island transition community and where appropriate, expert support.

Island transition pathways integrate the different perspectives and identify opportunities to link the present situation on the island with the envisioned future. Pillars of the energy transition are explored and assessed to determine the opportunities for your island's clean energy transition. After the transition dialogue has arrived at clear outcomes, it is important to bring the Clean Energy Transition Agenda to a close.

## Part II – SHAPE

The CETA, developed by engaging the wider island community, is the steppingstone to the next stage focused on shaping energy transition projects. To unfold the energy transition on the island, the visioning and strategising need to lead to concrete actions. the transition Pathways and Pillars from the CETA are, therefore, operationalised into a viable project pipeline, ready for execution in the ACT phase later on.


*Table 2 Clean Energy Transition Handbook SHAPE Methodology*

## Step 5 Project Idea

While building the Transition Pathways and Pillars, specific solutions were proposed to bring forward the island's clean energy transition. During the SHAPE phase, these solutions shape into projects, starting by developing the project idea. At this stage, the stakeholders involved need to be revisited to ensure that all the relevant actors have been contacted and are on board. In addition, the technology needs to be decided and the availability of funding, researched.

*Table 3 Developing a project idea criteria*

| Developing a project idea | |
|---|---|
| Stakeholder engagement | Stakeholders need to be identified and engaged from an early stage in the island's energy transition, as indicated in the EXPLORE section. Once the project pipeline starts to take shape, the stakeholders should be revised to ensure that everyone affected by the development and potential outcome of the project is on board as early as possible. |
| Technology and site selection | The first step when shaping the clean energy transition is to narrow down the technologies to be deployed. This is something that has ideally already been discussed within explore as part of the Pathways and Pillars of the CETA. The specific local circumstances are important when considering a technology:<br><br>→ Available natural resources,<br><br>→ Financial supplies,<br><br>→ Local know-how,<br><br>→ Landscape constraints,<br><br>→ Regulatory constraints,<br><br>→ Suitable sites that best serve the stakeholders, etc. |
| Funding | → Identify a relevant funding programme - careful attention should be given to the priority of each funding programme, eligibility criteria, type of actions that are financed, funding rates and other specific requirements. Clean energy projects will likely need a source of co-financing; hence, internal resources should be examined at this point. Also, preparing a proposal requires substantial work and time: making enough resources available at this point should be a priority.<br><br>→ Choose amongst the call for proposals - The most important elements to consider in a call for proposals are the objectives, eligible actions, eligibility criteria (e.g., eligible countries, minimum and maximum budget, eligible expenditure, eligible activities), co-financing |

| | |
|---|---|
| | rules, administrative and documentation requirements, application form needed, selection process, evaluation methodology, and the deadline for submission.<br><br>→ Developing a project proposal - Constructing a summary of the project idea is helpful at this stage to start developing the idea and reach out to potential partners. This summary would include the objectives, target group, milestones/main deliverables, and the ideal project partnership.<br><br>→ Identifying partners -The active participation of the main stakeholders and experts is key to ensuring a successful project partnership<br><br>→ Communication, dissemination, exploitation are crucial horizontal activities that must be taken up in EU-funded projects. These activities not only inform about the project and promote its results, but they also ensure that other entities can make concrete use of those project results and learn from success and/or mistakes. |
| | |

## Step 6 Pre-feasibility and feasibility studies

Once the project idea is sufficiently advanced, it is time to evaluate the viability of the project through first a pre-feasibility and (if applicable) then a feasibility study. Both pre-feasibility and feasibility assessments have a similar structure and touch upon the same aspects of the project: the main difference is the thoroughness of the analysis and, therefore, the uncertainty of the results.

*Table 4 Pre-feasibility and feasibility study criteria*

| | |
|---|---|
| Pre-feasibility: | The pre-feasibility study is the first high-level review of the potential of the project. It aims to determine whether the project is worth bringing forward by investing more money and time; in other words, whether an elaborate feasibility study should be done. The pre-feasibility study allows also pointing out the elements that are critical to the viability of the project. |
| Feasibility | For the projects with the most favorable pre-feasibility assessment, a feasibility study will follow. If it has been decided to proceed with a feasibility study, it means that the project has been deemed feasible and the financial resources have been already identified. When the feasibility study determines that a project is feasible, this usually means that the project is also bankable. A feasibility study contains the main aspects of the pre-feasibility study, but is more thorough, carrying out detailed analyses and calculations. A feasibility |

| | |
|---|---|
| | study is a valuable instrument to evaluate practical risks at all levels of a clean energy project. As such, it may be solicited by developers, asset managers, architects, engineers, building owners, contractors, or financial institutions. To help islands assess their renewable energy project—especially for larger projects— recourse to a professional consultancy or engineering firm is advisable. |
| Technical Assessment | Technical analysis is one of the cornerstones of both the pre-feasibility and feasibility studies.<br><br>→First, the key characteristics of the technology need to be determined, to allow for the necessary calculations, such as typical efficiencies, technical lifetime, space requirements, and other technology-specific features<br><br>→ The second step requires estimates of the demand, depending on the nature of the clean energy project (energy, heat, mobility needs, etc.), and its temporal as well as spatial distribution. This will help determine the required size of the project, the space needed, and whether later expansions will be necessary<br><br>→For projects that are based on the use of renewable energy sources, the third step would require a resource assessment study. Depending on the resource (wind, sun, geothermal energy, water, organic waste), different tools and methods may be used, but in most cases, renewable energy resource maps are developed[xvi]. |
| Policy and Regulatory Assessment | Policy and legislation are key when developing a clean energy project: they may affect its viability through certain restrictions or limitations or foster it through subsidies. The pre-feasibility and feasibility studies should therefore analyse the regulatory framework: including the available support schemes, the possible restrictions to the development of the project, and the required authorisations and permitting procedures |
| financial and economic analyses | A financial analysis evaluates the profitability of a project from an investor's viewpoint. The costs and expected revenues are assessed over the lifespan of the project. This includes costs of financing, taxes, and subsidies.<br><br>Key financial parameters<br><br>→ CAPEX<br><br>✓ Capital expenditure (CAPEX) covers the main construction costs, including procurement and infrastructure (EUR/MW)<br><br>✓ Development expenditure (DEVEX) covers the costs until signing the main construction contracts, e.g., development and planning, permitting and logistics, land acquisition, etc. DEVEX is sometimes included as part of the CAPEX (EUR/MW) |

| | |
|---|---|
| | → Operation and maintenance cost (OPEX) refers to ongoing expenses during the project's lifetime, such as management, operation and maintenance, insurance, etc. (EUR/MWh)<br><br>→ Revenue streams for the project can have different sources: markets, agreements, existing subsidy schemes and even sales of residues or by-products<br><br>→ Inflation rate (%)<br><br>→ Lifetime of the project (years)<br><br>→ Weighted average Cost of Capital (WACC) is the minimum rate of return required by a company for a project to invest in it. |
| Environmental and social aspects | Studying the environmental and social impacts allows for identifying early enough potentially serious issues that may appear during the project implementation or operation phase. Key aspects to take into account are:<br><br>→ Pollution of the air, water, and soil<br><br>→ Carbon emissions<br><br>→ Endangerment of wildlife<br><br>→ Visual impact, noise, odour<br><br>→ Land use<br><br>→ Interference with other activities such as agriculture or fishing<br><br>→ Loss of jobs in other sectors because of competition, etc. |
| Organisational and scheduling aspects | Preparing an implementation plan with a tentative timeline to identify potential risks is useful even for the pre-feasibility study. Delays may come from permitting procedures, the development or testing of new technology, delivery issues, or resource shortages. The project team should have the necessary organisational capacity to carry out the work in the foreseen timeframe. This involves both the development of the project, such as the construction of an installation and also the maintenance and management during the entire project's lifetime. This is a good opportunity to also address end-of-life considerations for the project |
| Risk assessment | Risk assessment is a vital element following the entire project's lifecycle and is part of both pre-feasibility studies – as an initial, high-level assessment – and feasibility studies – in more depth, aiming at quantifying and/or qualifying the risks and reducing uncertainties. The potential risks should be described in terms of their expected impact on the project. Impact refers to the harm that could be caused by an event, while likelihood refers to the probability of that event occurring. |

### Step 7 Business Development

After the pre-feasibility study, the stakeholders decide whether to continue pursuing the project and go ahead with the feasibility study. Once the latter is finished, the relevant actors have all the necessary information to resolve whether the project should be implemented. The development of the project's business model and the financing concept help the transition towards the ACT phase by focusing on preparing the projects for implementation

*Table 5 Business development criteria*

| | |
|---|---|
| Business model | The most appropriate business model for a given project will depend on local conditions, the financial and regulatory environment, the institutional framework, and the support mechanisms in place. Also, the scale of the project, identified risk and expected revenues play a major role in the business model definition. Business models can be categorised in different ways, the most common being as ownership models or as service models. |
| Financing Concept | Different financing opportunities exist for clean energy transition projects, depending on the technology, the stakeholders involved, and other project-specific factors. A financing concept is an analysis of the steps and approach required to develop a pipeline of projects on the island. It outlines how various sources of public and private funds are combined to develop a viable and effective financing structure. A financing concept is more than just a financial plan for a single project. It is a solid basis from which to implement parts of the decarbonisation plan and it is a starting point for discussion with potential promoters and financiers. This concept can target national and European public funds, institutional investors, impact investors, banks, and specialised private investment funds. It should include a blend of subsidies, fiscal incentives, and public funding while attracting market and private capital. |

## ACT

Once the viability of the project has been confirmed and the stakeholders have decided to continue with its implementation, concrete actions can then be undertaken to develop the clean energy project. In this phase, the project pipeline contains feasible projects to be executed by developing adequate business models, obtaining the right funding and financing, and starting the collaboration with the right partners

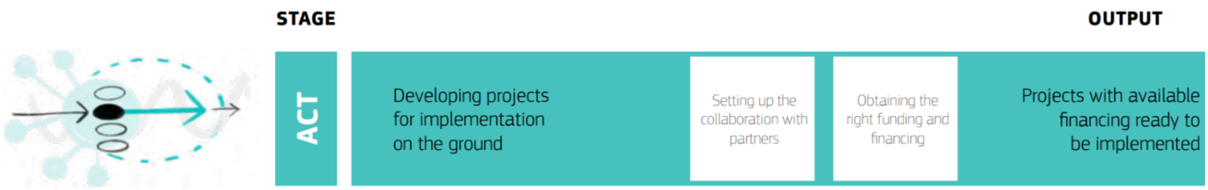



*Figure 4 Clean Energy Transition Handbook ACT Methodology*

## Step 8 - Setting up the collaboration with partners

The project developers should make the necessary arrangements to prepare the project to be successfully implemented. At this point, the potential suppliers and subcontractors are brought in, a schedule is set up, materials and tools are ordered, and instructions are given to the personnel. Ideally, an energy project should be implemented by a professional partner, who will use information from the feasibility and any other detailed studies.

## Step 9 - Obtaining the right funding and financing

In both the private and the public sectors, financial instruments are used to finance clean energy projects. Clean energy projects are usually capital-intensive: they require a large upfront cost, which poses an important barrier to clean energy deployment. Adequate financial instruments are thus crucial, also to overcome obstacles such as lack of long-term financing, limited participation from the private sector, underdeveloped financial markets where obtaining financing at reasonable costs is difficult.

Selecting the correct type and level of the financial instrument allows for effectively tackling these barriers. As opposed to funding, which refers to public money in the form of grants and other governmental schemes, financing involves capital or money for business purposes usually provided by financial institutions, such as banks or other lending agencies

*Table 6 Financial instruments criteria*

| Financial instruments | |
|---|---|
| European Fund for Strategic Investments (EFSI) | EFSI is an initiative launched jointly by the European Investment Bank (EIB) Group and the European Commission to help overcome the investment gap in the EU. EFSI is one of the three pillars of the Investment Plan for Europe. It is not a fund in the traditional sense, but a guaranteed instrument allowing the EIB to increase its risk-bearing capacity to lend to higher risk projects. |
| Investment Loans | Islands have a variety of financing needs. When a single large investment project needs long-term funding, the EIB can provide dedicated project- |

| | |
|---|---|
| | specific loans, which are known as Investment loans. EIB lends to individual projects for which the total investment cost exceeds €25 million. EIB support is often the key to attracting other investors. These loans can cover up to 50% of the total cost for both public and private sector promoters, but on average this share is about one-third |
| Framework Loans | Framework loans are used to finance tens or even hundreds of projects in different sectors. The projects, most frequently regarding infrastructure, energy efficiency/renewables, transport, and urban renovation, are re-grouped into multi-component, multi-annual investment programmes. |
| Natural Capital Financing Facility (NCCF) | The NCCF combines EIB financing and funding under the LIFE Programme, acting as a financial instrument that supports projects delivering on biodiversity and climate adaptation through tailored loans and investments, backed by an EU guarantee. The facility can provide between €2 million and €15 million. In combination, a technical assistance facility can provide each project with a grant of up to €1 million for the preparation, implementation, and monitoring of the outcomes. |
| National Promotional Banks (NPBs) | Across Europe, NPBs support commercial banks' lending to low-carbon projects by using financial instruments that mix public and private funding. They act as financial intermediaries for EIB Group investments directed to small-scale projects. They channel EIB loans to businesses and local authorities in their home countries. This method of financing is relevant for all sectors of interest to islands and their investment plans, from urban development and housing to transport, energy and adaptation to climate change. |

## Step 10 - Monitoring the Transition and Communicate on the progress and achievements

Monitoring is an important part of the learning process. Both the transition process itself and the way that it is managed are monitored and reflected upon. Periodic assessment is recommended – to keep track of the developments and indicates whether the transition is going in the right direction

It is important to keep all relevant stakeholders such as island inhabitants, supporting organisations, other islands, the Islands secretariat, updated on the progress and achievements of the project.

| SCORE | CETA | VISION | COMMUNITY | |
|---|---|---|---|---|
| | | | STAKEHOLDER | ORGANISATION |
| 5 | A island-wide Clean Energy Transition Agenda exists that has been accepted by the Clean Energy for EU Islands Secretariat. | There is a long or medium-term island-wide vision on clean energy, approved by the relevant authority, that includes explicit targets. | There is a formal shared commitment from all 4 stakeholder groups on clean energy transition of the entire island. This commitment is formalised at an island level (e.g. the CE4EUI pledge). | A formal island-wide Transition Team is in place that consists of and is supported by actors from the four stakeholder groups that drives and takes responsibility of the energy transition process (e.g. a periodically convening Transition Team with an official mandate from the relevant authority). |
| 4 | The Transition Team works together with stakeholders from multiple stakeholder groups to develop a shared vision and transition pathways to achieve this vision. | There is a long or medium-term island-wide vision on clean energy that includes clear objectives. | There is a commitment from multiple stakeholder groups (2-3) to advance the transition to clean energy on the island. This commitment is formalised at an island level (e.g. the CE4EUI pledge). | An island-wide Transition Team is in place that consists of and is supported by actors from multiple stakeholder groups that drives the energy transition process. (e.g. a community initiative with the support from academia). |
| 3 | The Transition Team has a good understanding of the island dynamics, the different perspectives on clean energy and the barriers and opportunities for clean energy on the island. | There is an island-wide vision on clean energy, though expressed in general terms. | There is strong commitment from individual actors though there is no shared commitment on an island-wide level. | There are active partnerships in place between multiple stakeholder groups working on clean energy transition including shared activities. |
| 2 | The Transition Team has gathered and defined a writing plan for the Clean Energy Transition Agenda. | There is a vision on clean energy but it is either not specific for the island or only covers part it. | There is awareness on clean energy transition among different individual stakeholders. | There are individual stakeholders working on clean energy transition with little collaboration between them. |
| 1 | There is no intention to develop a Clean Energy Transition Agenda. | There is no vision on clean energy. | There is limited awareness on clean energy transition among individual stakeholders. | There are few or no individual stakeholders working on clean energy transition. |
| ISLAND SCORE | | | | |
| COMMENTS | | | | |

*Figure 5 Transition indicators[xvii]*

## Islands with Clean Energy Transition Agendas

Since the inception of the Initiative and the formation of the secretariat, islands across Europe have engaged with the process of accelerating their clean energy transition. In 2019, six pilot islands published their transition agendas and were followed in 2020 by 22 more islands, with a further 7 to follow in the near future. Emphasising that EU islands are distinct in their location, geographic and climatic potential, size and population, which provides specific opportunities and challenges that require tailor-made solutions. This is not to say that those tailored solutions cannot be transferred, modified, and adopted in other locations, with different climates, size and population.

This report contains a summary of the published agendas from both the pilot islands and wider islands that have published transition agendas of relevance. Unfortunately, a number of islands CETA's are not published in English and we were not able to access the information.

## Aran Islands – Ireland

The Aran islands are a group of three islands located approximately 10-13 km from the coast of County Galway, Ireland. Árainn (Big Island), Inishmaan (Middle Island) and Inisheer (East Island) along with Árainn (also known as Inishmore) the largest of the three Aran Islands, are located in the Atlantic Ocean, an hour away from Ireland mainland by ferry.

The Aran islands have an energy dependence on expensive and polluting fuels for electricity production, heating and transport. Electricity is imported from the mainland via a cable and thermal fuel and transportation fuel, including for the ferries, are imported in as well. Any fault to the subsea cable can lead to blackouts.

The Clean Energy Transition Agenda for the Aran Islands was developed by Comharchumann Fuinnimh Oileáin Árann Teo (The Aran Islands Energy Co-Operative), who is the main member of the islands' Transition Team, on behalf of and with the input from local stakeholders, in particular the development cooperatives and organisations of the three islands Araínn, Inis Oírr and Inis Meáin. The Energy Cooperative also works closely with the Galway-Mayo Institute of Technology (GMIT) and Galway University (NUIG) on the mainland to advance the clean energy transition on the Aran Islands[xviii].



*Figure 6 The Aran Islands location on the west coast of Ireland and Aran Islands three main islands.*

*Table 7 Aran Islands in Ireland*

| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| **700 regular residents**<br><br>**~ 3000 during tourist months**<br><br>**Aran Islands energy cooperative formed in 2012 to enact local renewable energy projects.**<br><br>**Engagement with citizens across the three islands including the development cooperatives. Works closely with Galway-Mayo Institute of Technology (GMIT) and Galway University (NUIG).** | Three islands located off the west coast of Ireland, an hour ferry journey.<br><br>Under responsibility of Count Galway administration<br><br>Thanks to ferries and an airstrip • ~17 km to Rossaveel • 1.5 h by ferry, 10 min by flight | Tourism, transport, retail.<br><br>Seasonal fluctuation calls for creative economic planning – while Árainn counts just above 700 regular residents, it sees up to 3,000 visitors daily during the summer months. | 3MW subsea cable, Diesel powered generator when cable failed<br><br>Dependence on expensive and polluting fuels for electricity production, heating and transport<br><br>Transport major source of emissions and energy demand<br><br>The islands are connected to the mainland through a subsea cable. In 2017, Árainn alone imported from the mainland 1,855 MWh of electricity, 5,622 MWh of thermal fuel and 12,93 MWh of transportation fuel, including 9,541 MWh for fuelling the ferry costing over 250,000Euros. The | Energy independent 2022, install community turbine and investigate role of solar pv, storage solutions such as hydrogen and batteries<br><br>Eliminate dependence and use of fossil fuels in particular for space and water heating<br><br>All homes insulated to a sufficient level for the installation of heat pumps for space and water heating<br><br>Begin reducing the island's dependence on fossil fuels for transport and switch to sustainable fuels.<br><br>Increase community education and learning for the future energy system and develop an energy education centre. |

| | | | | |
|---|---|---|---|---|
| | | | measured losses of the undersea cable<br><br>are around 50% | |

## Cres-Lošinj – Croatia

The Clean Energy Transition Agenda was coordinated by the Island Development Agency (OTRA), which was in charge of the transition team. Established in March 2019 with the Clean Energy Secretariat for the EU islands, the City of Cres and the City of Mali Lošinj signed a Memorandum of understanding to create a program. In addition to the employees of the Island Development Agency, the transition team it consists of representatives of the City of Cres, the City of Mali Lošinj and Water Supply and Drainage of Cres Lošinj.

The Cres-Lošinj island group is located in the northern part of the Adriatic Sea, in Kvarner Bay. Spatially, it is the largest island group in the Adriatic, numbering a total of 34 islands, islets, shells and reefs located around the island of Cres (the largest island on Adriatic) and the island of Lošinj (the 11th largest island in the Adriatic).

The group consists of 6 more inhabited islands located along the western and southern coast of the island of Lošinj: Unije, Ilovik, Susak, Srakane Male, Srakane Vele and St. Peter. The island of Lošinj is separated from Cres by an 11-meter-wide channel in Osor, across which it stretches drawbridge.

In the Kvarner Gulf, next to the Gulf of Trieste, the sea is the deepest in Europe mainland, and because of this, this island group has always importance in transport. Today this the archipelago has a strategic position in terms of tourism, given that it is a few hours' drive away by car from important emitting tourist markets (Slovenia, Austria, northern Italy, southern Germany).[xix]

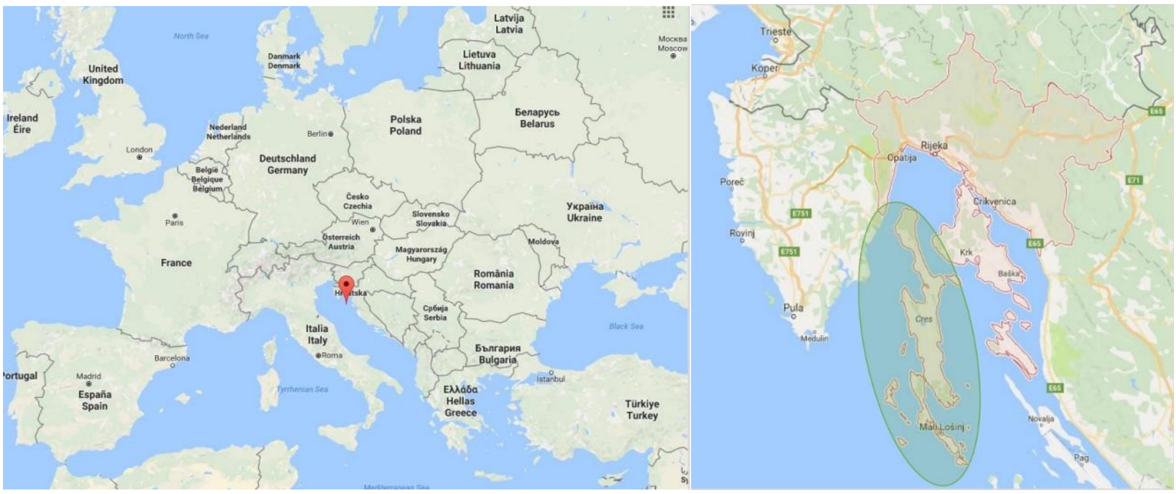



*Figure 7Cres-Lošinj islands group located in Europe and a then in the Adriatic Sea*

*Table 8 Culatra Island Residents Association*

| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| 10,995 residents<br><br>Tourism peak of 33,588 daily visits in the summer. | Largest archipelago in the Adriatic, Strong boat connections to Krk and the mainland.<br><br>Cres 405,78 $km^{2,}$ Lošinj 74,68 $km^2$<br><br>200 million $m^3$ water supply from lake on island | Tourism is the central economic activity, steady growth in construction in recent years. | Interconnector with mainland and island of Krk<br><br>Electricity and heat largest energy consumption.<br><br>Electricity and transport on island biggest carbon emitters.<br><br>PV capacity 714kW.<br><br>The vessels connecting Cres-Losinj with mainland are powered by diesel engines. There are: 2 car-ferry lines (up to 17 departures in summer). 2 fast catamaran lines (departures once a day) | Solar PV to provide half of electricity consumption, installation of 22.5 MW and new spatial planning for PV.<br><br>Buildings: Retrofitting for energy efficiency, Solar thermal Wood chips & pellets Air source & seawater heat pumps, Rooftop solar photovoltaic<br><br>Road transport: E-bike sharing system Electric public vehicles Electric buses for public transport<br><br>Maritime transport: Electric + LNG ferries Electrification of small boats Amend criteria for grants Adapt legislative framework |

| | | | | |
|---|---|---|---|---|
| | | | | Information campaigns: Raise awareness among citizens |

## Ilha da Culatra (Portugal)

Ilha da Culatra (Culatra Island) is a large sandy island located to the south of the cities of Olhão and Faro in the Algarve region of Portugal. Culatra Island is a 4.34 km$^2$ island that is around 7 km long and up to 1.2 km wide. Around 1000 people live permanently on the island, primarily reliant on fishing and tourism. Ferries from Olho and Faro are the only ways to get to the island. Additionally, Culatra has no paved roads, thus the only way to go across the island is on foot via its wooden walkways. As part of the Ria Formosa National Park there are strict development rules in place

The local population of Culatra made the decision to take control of their own future after learning about the prospects for renewable energy. The Culatra Island Residents Association (AMIC) is preparing to create a roadmap and put in place a sustainable energy transition framework for the island in collaboration with the University of Algarve. Their common goal is to convert Culatra into the first Portuguese clean island community.

The locals' goal is to empower the people of Culatra Island by implementing a decentralised method of electricity production and fostering a sense of community. Producing renewable energy to become energy independent, coming up with effective ways to handle and manage the island's waste, and producing water for self-consumption are the key areas of concentration. The University of Algarve intends to begin a participatory process in conjunction with the regional and national governments, as well as the local community, in order to successfully implement all of the project's various phases. The stakeholders on the island will collaborate to determine the best technical solutions and will create cost-benefit evaluations for each solution while taking into account the unique characteristics of the island context[xx].

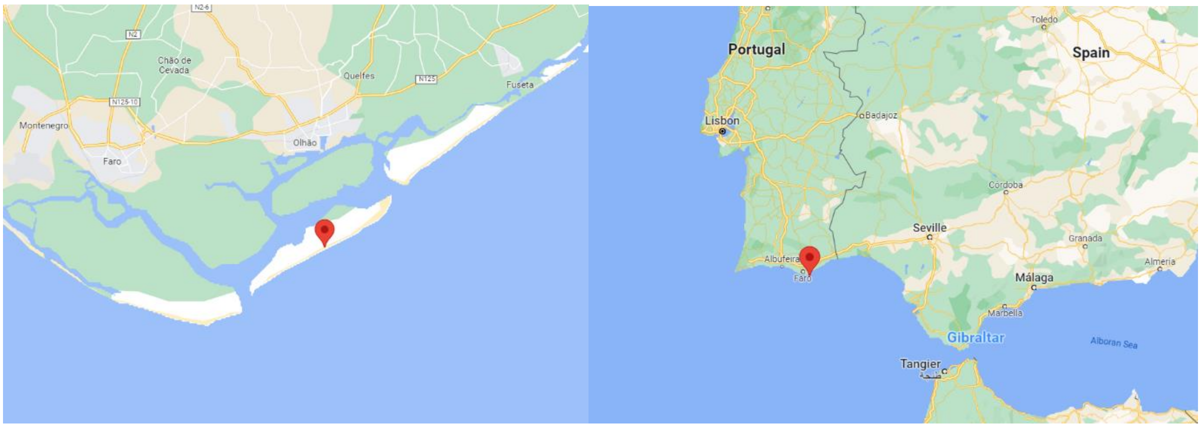



*Figure 8 Ilha da Culatra location in Portugal and in the Algarve Region*

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*Table 9 Ilha da Culatra in Portugal*

| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| **Permanent population 1000 over three villages, population triples in high season.**<br><br>**High citizen engagement, history of collective action** | 6km long, width 100-900 metres<br><br>Small island in the Algarve, part of Ria Formosa National Park, sand bar island without paved roads.<br><br>Ferry from Olhao and Faro<br><br>Water pumped to island through a pipe and sewage is pumped back out to mainland | Fishing and tourism key activities, natural reserve is most productive aquaculture zone in Portugal | Interconnector to mainland 15kV. 25% houses not connected<br><br>Heating largest energy demand, followed by transport to the island.<br><br>Heat mostly provided by electric heating and heat pumps.<br><br>No local generation | Energy independent by 2030.<br><br>Decentralised renewable energy generation and storage systems based on solar pv.<br><br>Sea water desalination power plant powered by local energy.<br><br>Energy efficiency and sustainability actions<br><br>Digitalisation of energy systems, local smart grid, intelligent use of energy using peak hours and efficient management<br><br>Promotion of electric transport, solar boats, explore hydrogen transport ferry<br><br>Treat and value waste on the island, produce fresh water for self-consumption |

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## Las Palmas - Spain

La Palma is the greenest of the eight Canary Islands, a group of volcanic islands located in the Atlantic Ocean with a population of close to 82,000 and area of 708km². The island's primary industries for economic growth are tourism and banana farming. The island relies significantly on pricey fossil-fuel imports for its energy needs because it is not connected to the mainland or the nearby islands.

Prior to a group of locals deciding in 2014 that it was time to take a different path that would utilise the island's abundant renewable energy resources, diversify La Palma's economy, create local jobs, and lower energy consumption, the island had ignored its great potential for renewable energy.

The citizen group Plataforma para un Nuevo Modelo Energético planned to create a manifesto that would incorporate a broad vision for La Palma in order to launch the island-wide transition process. The Electron Manifesto, which was the outcome of a multi-stakeholder process open to everyone on the island, was named after the first mini-hydropower plant on the island. All fourteen of the island's municipalities, including the Cabildo of La Palma, the regional administration, have signed it.

In particular with its neighbours in the Canary Islands, but also with other islands that may be working on comparable aims and projects, the community of La Palma is eager to collaborate and exchange experiences with other islands starting the clean energy transition. The island will get assistance from the Clean Energy for EU Islands Secretariat in developing a detailed plan for its energy transformation and increasing local capabilities.[xxi]

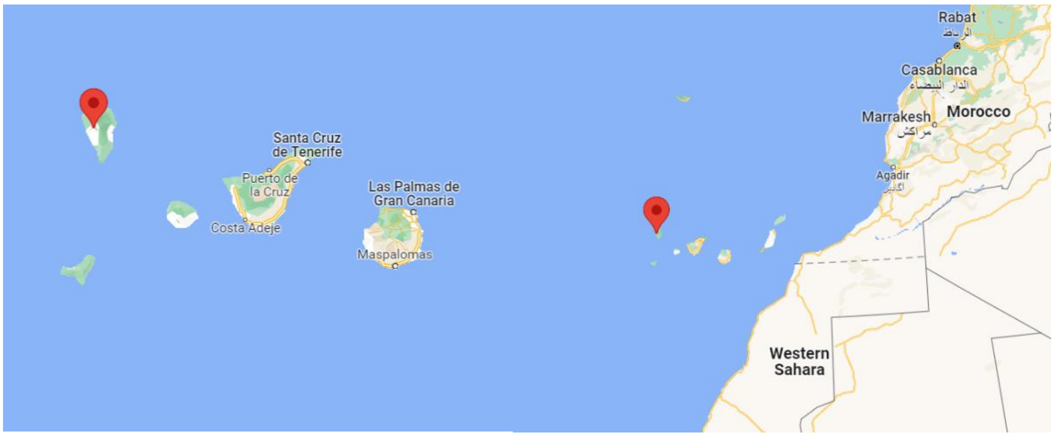


*Figure 9 La Palma location in the Canary Islands and off the coast of Africa*

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*Table 10 Las Palmas in Spain*

| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| **Permanent population 82,000**<br><br>**Tourist arrivals per month 20,000-30,000** | Small island in the Algarve, part of Ria Formosa National Park, sand bar island without paved roads.<br><br>Ferry from Olhao and Faro<br><br>Water pumped to island through a pipe and sewage is pumped back out to mainland | Fishing and tourism key activities, natural reserve is most productive aquaculture zone in Portugal | Interconnector to mainland 15kV<br><br>25% houses not connected<br><br>Heating largest energy demand, followed by transport to the island.<br><br>Heat mostly provided by electric heating and heat pumps.<br><br>No local generation | Energy independent by 2030. Decentralised renewable energy generation and storage systems based on solar pv.<br><br>Sea water desalination power plant powered by local energy.<br><br>Energy efficiency and sustainability actions<br><br>Digitalisation of energy systems, local smart grid, intelligent use of energy using peak hours and efficient management<br><br>Promotion of electric transport, solar boats, explore hydrogen transport ferry<br><br>Treat and value waste on the island, produce fresh water for self-consumption |

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## Salina – Italy

Salina is a member of the Aeolian islands, which are located north of Sicily. Salina is the second-largest island in the archipelago and is home to the three cities Santa Marina, Malfa, and Leni, which together have 2,500 residents living over an area of 26 km². The archipelago was designated a UNESCO World Heritage Site due to its beautiful natural settings. Salina's main economic sectors are tourism, small organic farms and sustainable fishing.

Salina's annual carbon emissions total about 6,000 tonnes of $CO_2$ due to its 1,800 tonnes of diesel and liquefied petroleum gas usage, which accounts for more than 70% of the island's energy consumption. Old housing stock leads to high electricity bills for the island's inhabitants, as part of the energy needs to be imported from the mainland.

An organisation that is controlled by the three municipalities oversees public transportation on the island. Minibuses powered by diesel emit around 135 tonnes of $CO_2$ annually, and they are used to cover it. The primary method of transportation to and from the island of Salina, as well as the supply of drinking water and gasoline for the vehicles on the islands, is by boat.

The municipalities driving the transition are working to include all community actors such as citizens, companies, trade associations and tour operators. After the recent completion of the European clean energy package, additional national legislation in support of renewable energy is anticipated in the next years. The Regional Department of Energy, which will participate in the transition with the three towns and the National Agency for New Technologies (ENEA), is supporting Salina's efforts.[xxii]


*Figure 10 Salina in Aeolian Islands and located off the coast of Italy*

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*Table 11 Salina in Italy*

| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| **Permanent population 2,600**<br><br>**Peak summer months up to 8,000 (210% increase)** | 26 $km^2$<br><br>Located off north-east Sicilian coast, world heritage site<br><br>Well connected to the mainland, Calabria and Sicily<br><br>70km boat to Sicily<br><br>1.5h hydrofoil | Tourism is main economic activity | No inter-connector, Transport to & from island highest energy consumptions<br><br>2 diesel power plants 5.1MW, 3.1MW<br><br>Heating with LPG, high costs<br><br>14m2 solar installed, 17kW biomass boiler<br><br>Transport mostly cars<br><br>Fresh water is transported by tankers | Explore wave/wind/pv/geothermal/biomass for electricity. Including storage options<br><br>Solar thermal and heat pumps for heat with smart solutions for demand response<br><br>Transport electrified on island<br><br>LNG ferries with incorporation of biofuels<br><br>Engage with community |

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## Sifnos - Greece

Greece's South Aegean Sea includes Sifnos Island as a member of the Cyclades island chain. Sifnos is around 130 kilometres (km) from mainland Athens, a trip that takes three to five hours.

Sifnos is a 74 km$^2$ island that is 15 km long, 7.5 km broad, and has a 70 km shoreline. The Natura 2000 European Network of Nature Protection Areas covers more than 25% of Sifnos. In addition, Sifnos has been recognised as a Landscape of Outstanding Natural Beauty since 1976 due to its rich cultural and environmental heritage, traditional Cycladic architecture, and other factors.

As of the last five years, an average of 90,000 tourists each year used the island's tourist services as their primary source of income. There is no road bridge or electrical interconnector to the mainland or surrounding islands and this means that there is significant electrical peak demand during summer months with tourists. Currently, the power on the island is mainly generated by a diesel power plant owned by the national Public Power Corporation (PPC). Energy costs are subsidised by the government but are a significant cost to the public purse.

Cost savings as well as emission reductions are the main driving forces in the transition. The Sifnos Island Cooperative (SIC) has since become the leading proponent of the island's energy transition. The cooperative has been collaborating closely with the island's municipality, and as a result, the municipality is now looking into how to join the cooperative[xxiii].

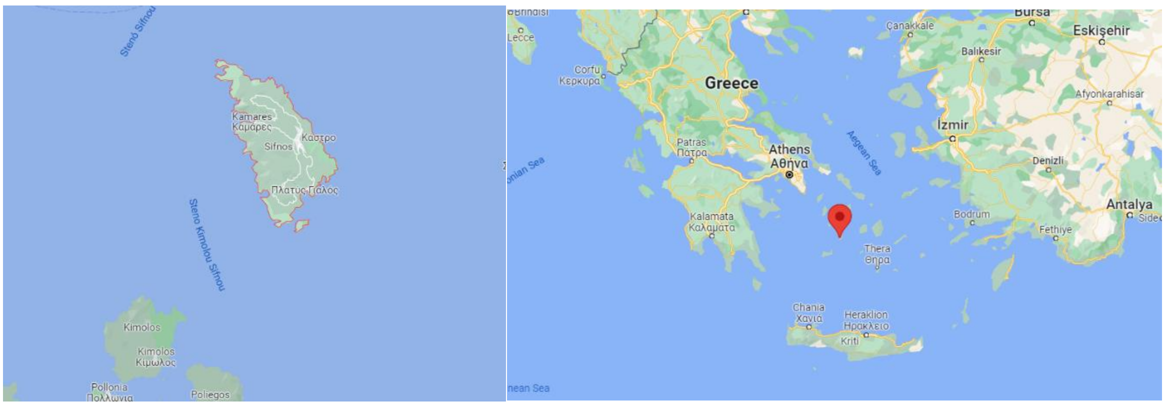


*Figure 11 Sifnos in the south Aegean Sea and in Greece*

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*Table 12 Sifnos in Greece*

| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| **Permanent population 2,625**<br><br>**Peak summer months up to 16,000** | Located in the South Aegean Sea<br><br>25% of territory in nature protection network<br><br>Connection to mainland and Cyclades Islands<br><br>130km boat | Tourism is main economic activity<br><br>Pottery, agriculture, farming, fishing, beekeeping also play smaller roles | No inter-connector,<br><br>Transport to & from island highest energy consumption<br><br>Diesel power plants main power source<br><br>Roof mounted solar pv:335 kW<br><br>From 2019 two wind turbines with capacity of 1.26MW operational<br><br>Household heating using heating oil<br><br>Transport mostly cars, 5 buses | Aim: 100% renewable energy generation system, partly owned by inhabitants, wind/solar pv<br><br>Decarbonised Transport<br><br>Solar thermal/heat pumps for heating<br><br>Sifnos Hybrid Station Project: hydrogen, pumped hydro, electricity storage<br><br>Electric vehicles and public transport, hydrogen ferries |

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## Kökar in Finland

Kökar is one of six self-governed small archipelago municipalities in the Åland Islands with a total land area of 64 $km^2$ (total area 2,165 $km^2$) (total area 2,165 $km^2$). Officially, Kökar Island has 234 residents as of 2018, but politically, the island functions as a full-fledged municipality. A large number of visitors in the summer bringing the population during those months to 1000. This results in high volatility and puts extra demand on the flexibility of the infrastructure.

Kökar is a small, lively archipelago with all the basic services expected of a municipality including a library, a school, a kindergarten, health services and a nursing home. The development of the municipality of Kökar is dependent on a vibrant local business. The main economic activities are shipping, agriculture, coast guard, baking, tourism, and public service are among the activities. The distance to Kökar from the mainland is around 50 kilometres travelling by ferry. Kökar is perceived as a remote place because it takes 2.5 hours to travel there by ferry.

Kökar is connected to the mainland by ferries and an electric interconnector. The Kökar-Sottunga-Gustavs electric cable has a 1.5 MW capacity. There is a weak grid connection with occasional outages (3-4 interruptions per year) in the distribution grid that causes local energy problems on Kökar. Reserve generators need to be taken to the island when there are outages for the nursing home and other buildings.

Considering their overall sustainability has been a priority for Kökar residents for a number of years, and they have previously received funding from the Central Baltic Interreg programme to create a long-term development plan for their island. The undertaking began in the latter half of 2018. Every citizen is involved, it covers every aspect of sustainability, and it is where the island's application to collaborate with the Clean Energy for EU Islands Secretariat first took root[xxiv].


*Figure 12 Kökar located in the Aland Islands and off the coast of Finland*

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*Table 13 Kökar in Finland*

| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| **Permanent population 234**<br><br>**Peak summer months over 1,000**<br><br>**Volatile population from summer to winter months** | 64 $km^2$<br><br>Baltic sea, Kökar municipal council region<br><br>Connected to mainland by ferries, 50km/2.5hrs | Shipping, agriculture, coast guard, bakery, tourism, and public service<br><br>Association of entrepreneurs | Interconnector to mainland, 1.5MW. Weak grid connections with 3-4 interruptions per year. Reserve generators<br><br>Wind turbine provides 50% annual electricity consumption. Micro turbines account for 3%<br><br>Small PV instillation ~1% consumption<br><br>Small number of heat pumps installed<br><br>Public boats main user of energy | Install PV to buildings both public, residential and commercial<br><br>Smart heating systems in buildings<br><br>Heat-pumps to oil-heated buildings<br><br>School to have hybrid energy system including CHP<br><br>Electric vehicles for road transport with carpool<br><br>Hydrogen ferry<br><br>New wind turbine |

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## Illa de Arousa - Galicia, Spain

The Illa de Arousa is located in the middle of the Estuary de Arousa (Pontevedra) next to the municipalities de Vilanova de Arousa e Vilagarcía de Arousa. It occupies a territory of 6.91 km² and is connected to the continent by a 2 km long bridge. Most of Arousa's 5,000 inhabitants work in the fishing and mussel industry.

The main source of energy on Arousa is wind power, which is imported from the mainland, but the island struggles with energy efficiency in buildings, and a significant transport problem: with very few public transport facilities on the island, there is a circulation of around 3,000 private cars, as well as a high number of small and bigger boats used by the inhabitants for work. Almost all fuels are imported.

The islanders recognise the opportunity climate mitigation brings to their community, such as the potential to reinvest money saved through using less energy. Their aim is to build a vision for their energy transition and identify creative ways to finance concrete projects led by the island's inhabitants[xxv].

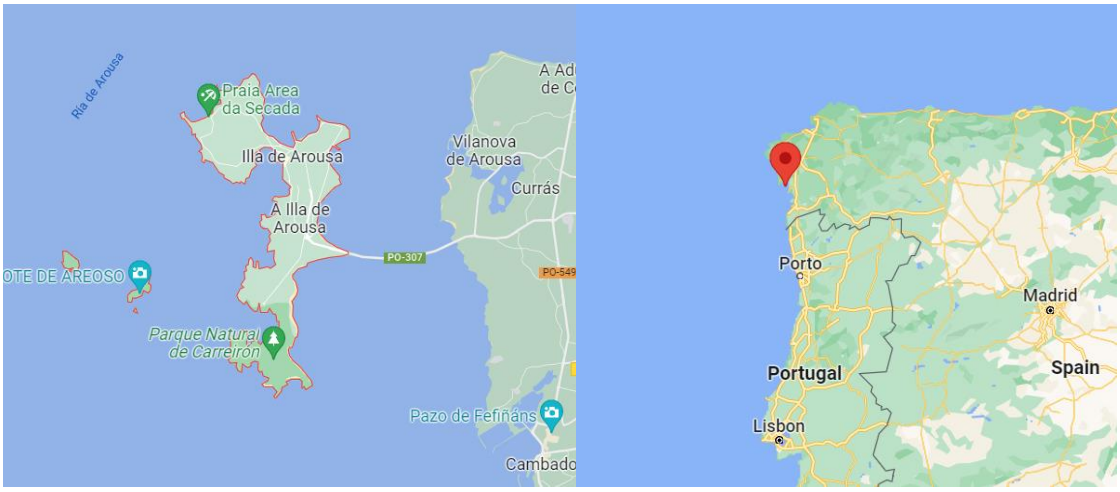


*Figure 13 Illa de Arousa located in the Estuary de Arousa and off the coast of Spain*

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*Table 14 Illa de Arousa in Galicia, Spain*

| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| **Permanent population 4,926**<br><br>**Local corporation of the Island of Arousa is local government body** | 6.91km$^2$<br><br>2km long bridge connection<br><br>Belongs to nature network | Agriculture and fishing, industry and construction, services | 99% of electricity and thermal fuels imported from mainland | Electricity: Generation and self-consumption of energy from renewable sources. Active participation in energy management, Energy efficiency, Electrification for various uses.<br><br>Mobility: EV's improving active travel, electric boats, Shared and public transport, Limitation of the influx of cars in summer, Clean and responsible consumption vehicles.<br><br>Air conditioning (cold/heat):<br><br>Improving energy efficiency and savings.<br><br>Eco systems: Conservation and sustainable development. Air, water and soil quality. A plastic-free Island. Better use of renewable resources. Reduction of pollution and energy consumption through efficient water treatment plan. Use of less polluting products in household cleaning. Change habits in waste reduction. |

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## Cape Clear Island - Ireland

Oileán Chléíre, known in English as Cape Clear, is the southernmost community in Ireland. It is a North Atlantic island, located 12 kilometres by sea from the mainland port Baltimore. It is frequently exposed to adverse weather conditions, particularly throughout winter.

Cape Clear an electricity interconnector to the mainland. Due to its lower import cost than other energy sources, electricity serves as Cape Clear's primary energy supply. The majority of the island's structures lack energy efficiency. The island plans to create an assessment of its electricity consumption and associated emissions as part of its transition strategy. The emissions from peat and coal, which are currently used for fireplaces and stoves and must be imported from the mainland, would be decreased in addition to the energy efficiency of the homes. On Cape Clear, bottled gas is frequently used in kitchens for cooking because residents like to have a backup source in case a storm interrupts power.

The primary form of transportation to and from Cape Clear, as with many other islands, is via ferry. The island's ferry service is dependable, but the transition team wants to lessen its carbon footprint by introducing hybrid and electric boats that could use locally generated electricity from wind, solar PV, or other sources. On the island, there is still potential for improvement in terms of transportation options, as all vehicles—including automobiles, boats, agricultural equipment, and gardening equipment—currently run on gasoline.

To assist in bringing power to the island, the island development cooperative Comharchumann Chlére Teoranta was established approximately fifty years ago. The coop presently participates in a wide range of island development and service-related activities.

In keeping with its inclusive attitude, the Cape Clear transition team wants to make it possible for the entire island community to participate in the island's transition to clean energy in a way that fully considers good governance and equality for all islanders. The locals are hoping that implementing the clean energy transition will make the island desirable as a permanent home base for families and people as well as tourists[xxvi].

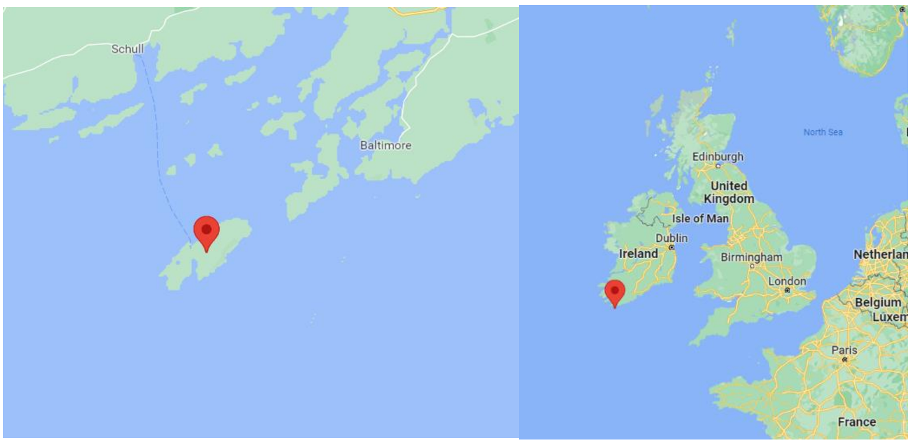


*Figure 14 Cape Clear off the coast of Ireland and in western Europe*

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*Table 15 Cape Clear Island in Ireland*

| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| **Permanent population 130**<br><br>**Summer Peak: 750**<br><br>**Part of West Cork Municipal district**<br><br>**Comharchumann Chléire Teoranta (Cape Clear Island Development Cooperative)** | 6.71 $km^2$<br><br>Connected via ferry | Tourism, farming, community development, Gaelic language summer college, fishing, IT services, marine leisure | Electricity provided through 1MW cable to the mainland, no system sized back-up generators<br><br>Small-scale solar PV<br><br>Diesel use in agriculture is biggest emitter, followed by heating of homes | Electricity Generation: Wind, PV, micro hydro, wave & tidal<br><br>Heating and cooling: Retrofitting, solar thermal, heat pumps<br><br>Transportation: EV's, reduce emissions from ferries as technology develops<br><br>Waste management: Introduce small digestors in the future to produce biogas, local distillery utilises biomass waste to generate heat.<br><br>Water: Currently pumped from boreholes, recently rehabilitated, reuse and rainwater collection encouraged to reduce water pump consumption |

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## Menorca - Spain

Menorca is one of the Spanish Balearic Islands located in the Mediterranean Sea. Menorca has a population of around 94,000 with an area of around 696 $km^2$.

Menorca's Clean Energy Transition Agenda has been named the 2030 strategy. The Menorca 2030 Strategy serves as the roadmap for decarbonising the island of Menorca's energy system, moving from its current configuration to a model based on renewables.

The majority of Menorca's electrical needs are met by burning fuel oil and diesel, and renewable energy sources account for barely 1% of all primary energy. The system's absolute reliance on fossil fuels and the recent incident of Menorca being disconnected from the Mallorca-Menorca electric power system amply illustrate the vulnerability of the system and the requirement for a model that is independent of external energy sources.

Menorca is the perfect testing ground for the incorporation of renewable energies, alternative modes of transportation, efficiency in construction, and new economic sectors due to its size (702 $km^2$, 100,000 residents, and 8 municipalities), location in the Western Mediterranean, and high tourist affluence.

The Menorca 2030 Energy Office is intended to act as a facilitator for the main players, encouraging community involvement and training. The office would have the power to finance and carry out pilot projects, joining the network of regions and centres that prioritise a shift in energy mode.

The ultimate objective of the Menorca 2030 Strategy is to establish Menorca as a leader in the use of sustainable energy and as a standard for other EU member states. It outlines the energy transition for the island of Menorca in order to set priorities for energy policy, measures to be taken, the establishment of channels for collaboration, support, and financing, as well as the development of a manual for decision-making in the public and private sectors[xxvii].

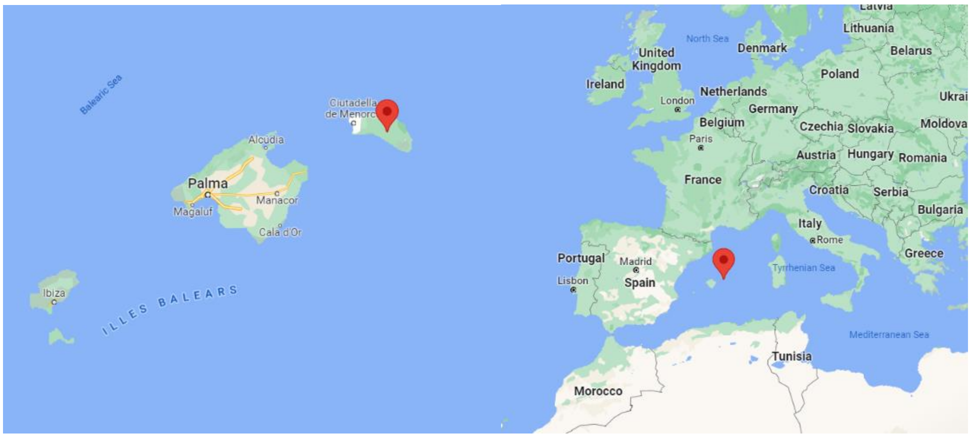


*Figure 15 Menorca located in the Balearic Islands and in Europe*

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*Table 16 Menorca in Spain*

| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| **~93,000 residents**<br><br>**Up to 2 million visitors on a single day**<br><br>**Council + Autonomous Balearic community main drivers** | 268.6 $m^2$ | Tourism | Power system 97% thermal power plant, with 3% solar and wind.<br><br>Land transport 30% total energy consumption. | 2030 plans: 50% GHG reduction from 1990 levels<br><br>Electricity Generation 85% renewables, mostly PV, with supplementary wind, tidal storage. Use of smart grids, dual power link with Mallorca, thermal power plant as backup and emergency power with natural gas or hydrogen<br><br>Land Transport: 50% reduction in fossil fuel consumptions. Electrification and collective transport<br><br>Thermal/heating: 30% reduction in fossil fuel consumption. Efficiency and renovations, demand management, electrification and self-renewables + biomass<br><br>Industry: 10% reduction is fossil fuels (red diesel).<br><br>Efficiency and renovations<br><br>Waste: Biodigester/biogas plant planned |

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## ROBINSON Follower Islands

The ROBINSON Project is focussed on one demo island, Eigerøy, and two follower islands, the Western Isles, and Crete.

*Table 17 Basic information on Eigerøy and follower islands*[xxviii]

| Name | Eigerøy | Western Isles | Crete |
|---|---|---|---|
| **Country** | Norway | Scotland | Greece |
| **Location** | South west coast of Norway | A chain of islands off the west coast of Scotland | Approximately 160 km south of the Greek mainland |
| **Size** | 20 $km^2$ | 3,059 $km^2$ | 8,336 $km^2$ |
| **Population** | About 2,500 within about 800 households | More than 26,000 within about 12.500 households | About 635,000 in about 214.150 households |
| **Climate** | Influenced by the coast with relatively high temperatures in winter and low temperatures in summer, wind speeds are high | The climate is mild and oceanic. High wind speed. | The climate is mainly Mediterranean |

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## Eigerøy (Norway)

Eigerøy is an island in the Elgersund municipality in Rogaland county, Norway.

With only a small amount of electricity demand coming from wind and solar energy, almost all of Eigerøy Island's electricity is imported from the mainland. An underwater cable connects the island to the mainland.

A new fish company was established on the island in January 2019, which increased its demand for power as well as heat and steam. In the coming years, further enterprises and industries are planned for and being discussed for Eigerøy. The new fish sector plans to use an LNG boiler in order to meet these demands without spending money extending the transmission infrastructure.

The island now hopes to stop using LNG, restructure its system by adding more RES, and take use of other circular economy ideas like using biomass (available wood), waste water, and industrial symbiosis. To do this, Eigerøy requires assistance with the installation of new technology, the sharing of best practises, and training pertaining to energy's transition and commercial and investment potential.


*Table 18 Eigerøy location in Norway and Europe*

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*Table 19Eigerøy in Norway*

| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| **~2500 (800 households)** | 20 $km^2$<br><br>Relatively high temperatures in winter and low in summer; relatively high wind speed<br><br>Bridge connects to mainland | A new fish industry has been implanted in January 2019, increasing the island's need for electricity and steam. Moreover, new industries are to be established in the next years; they will increase the island's energy demand and require an upgrade of the existing energy system. | Electricity: ~100% is imported from the mainland with minor share of wind and solar. (Eigerøy is connected to the mainland by an undersea cable: average load 7,9MWh/hour, peak demand 18,5MWh/hour) υ<br><br>Thermal: 6950 MWh liquid fuel; ~ 26500 MWh/year LNG | Development of an integrated energy system tailored to islands with industrial activities. A flexible and modulable system that can answer to the different needs of the environment.<br><br>Couple locally available energy sources, electrical and thermal networks and innovative storage technologies, thus increasing energy efficiency and security of supply.<br><br>Technological innovation: development and demonstration of several new technologies that will unlock new energy sources and a new energy integration system.<br><br>Cover the energy demand while reducing the use of fossil fuels and the islands' emissions. |

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## Crete - Greece

Crete is the largest island in Greece, and the fifth largest one in the Mediterranean Sea.

Three power plants in three different regional units of Crete, with an installed power (nominal capacity) of 820 MW and a combination of generator units (steam turbines, internal combustion engines, and combined cycle gas turbines using conventional energy sources), provide nearly 80% of the total electricity demand.

Due to problems with the local electrical network's stability, there is a relatively low penetration of RES. Heavy Fuel Oil (58%), and Diesel (20.4%) are used to carry fossil fuels to Crete from the mainland, where they are used to generate the majority of the island's power. RES accounts for 21.6% of total energy production, with small hydropower making up just 0.01% of the total.

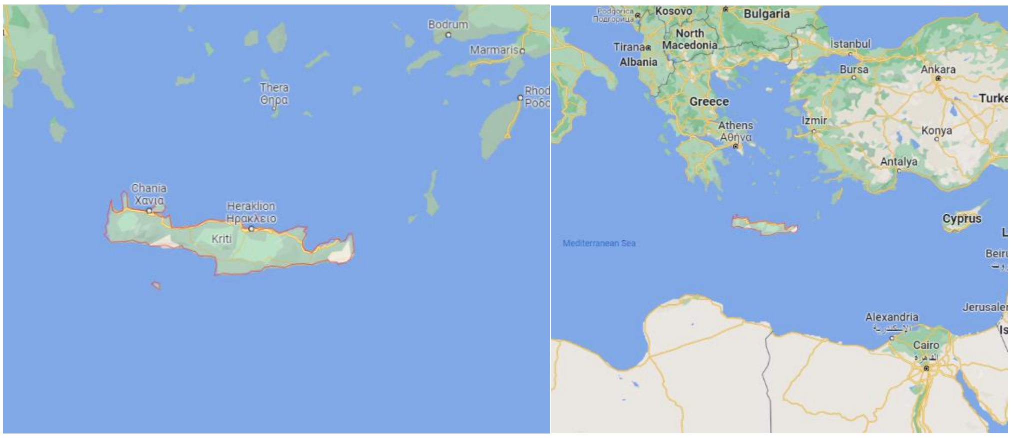


*Table 20 Crete in Greece and Crete in the Mediterranean Sea*

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| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| **around 630,000** | Crete is the largest and most populous of the Greek islands, the 88th largest island in the world and the fifth largest island in the Mediterranean Sea. Crete rests about 160 km south of the Greek mainland, and about 100 km southwest of Anatolia. | The economy of Crete is predominantly based on services and tourism. All three sectors of the Cretan economy (agriculture/farming, processing-packaging, services), are directly connected and interdependent. There is a major industrial area in Heraklion. The construction of two more industry parks is planned which will require extra cost of energy, as will the increasing touristic industry. | Almost 80% of the total electricity demand is covered by three power plants located in three different regional units of Crete with an overall installed power (nominal capacity) of 820 MW, based on a mix of generator units (steam turbines, internal combustion engines and combine cycle gas turbines) using conventional energy sources. There is a limited RES penetration due to stability issues of the local electricity network . Most of the electricity in Crete is produced from fossil fuels that are transported from the mainland with Heavy Fuel Oil 58% and Diesel 20.4%. RES represents 21.6% of the overall energy production: 17% wind turbines, 4.6% solar (mainly PVs) and only 0.01% from small hydro.<br><br>Tourism is one of the main fields of the economy of Crete Island with 5.5 M of passengers from airports (80% from abroad) and 2 M from cruise ships. There is therefore an intense seasonality in the energy consumption, the population of the island is increased three of four ties in summer | Crete is evaluating the potential production of local Renewable Energy Sources (RES) from livestock and other organic wastes that are available on the island. In particular, the island requested the Islands secretariat to investigate biogas-treatment facilities on various input streams and of different capacities taking into account the limitations on the island. Based on assessment of statistical data, it was found that the biological conversion of municipal organic waste and manure of animals can provide about 65 000 000 $m^3$ biogas, which with a methane content of 55%, the production equivalent per year is 28 MWe continuous. Based on the information provided, and assuming that all the biomass would be available, 42% of the electricity and 100% of the heat demand could be theoretically generated by biomass. Next step for them is to create a CETA to follow through |

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## Western Isles (Scotland)

Every industry in the Western Isles of Scotland is reliant on the use of imported liquid fuels, with gas oil playing a significant role, accounting for 75% of all energy consumed in 2013 (gas oil being the largest fuel source, accounting for 25% of all supply in 2013).

The Western Isles received 583 GWh of non-electric fuel in total in 2013. There is no access to natural gas, and people are largely reliant on oil and electricity for heating, with the exception of a tiny gas network that serves about 1,500 homes in the Stornoway region. Due to a reliance on expensive imported energy, poor incomes, and levels of climate exposure, fuel poverty rates are widespread.

The average cost of dual fuel is about £2,012, which is 49% more expensive than the UK average. Residents of the Western Isles emit 3% more carbon dioxide per person than those living on the mainland. The use of renewable resources has been sparse up to this point, but the building of the subsea interconnector will enable the supply of a sizeable amount of recently approved wind farms.


*Figure 16 The Western Isles located of the coast of Scotland and in Europe*

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| Population | Location/Remoteness | Key Industries | Current Energy System | Transition Plans |
|---|---|---|---|---|
| 26,830 | The Outer Hebrides, also known as The Western Isles, is an island chain off the north west coast of Scotland. They are made up of more than 70 islands, of which only 15 are inhabited. | The majority of large industrial energy users are located on the Isle of Lewis. Users such as QinetiQ and Marine Harvest control sites across the Western Isles resulting in a small consumption of gas oil on Harris and the Uists. Tourism generates £65m in economic value for the islands, sustains around 1000 FTE jobs, and is one of the key growth sectors in the economy of the Islands. The islands receive 219,000 visitors per year; 930 accommodation providers are directly supported by tourism, and hundreds of other businesses depend on the visitor economy. Seasonality is a key issue for the local tourism sector. | On Western Isles of Scotland, each sector is heavily dependent on the consumption of imported liquid fuels with gas oil playing a key role accounting for 75% of the total energy consumed in 2013 (gas oil being the largest fuel source with 25% of the total supply in 2013). The total non-electric fuel supply to the Western Isles in 2013 was 583 GWh. Other than a small gas network serving approximately 1,500 households in the Stornoway area, there is no access to natural gas and households heavily dependent on oil and electricity for heat. Fuel Poverty rates are rampant due to a dependence on high cost imported energy, low incomes and levels of climatic exposure. The average dual fuel bill is approximately £2,012, which is 49% higher than the UK average. The per capita carbon dioxide emissions of inhabitants on the Westerns Isles are 3% higher than those on the mainland. The exploitation of renewable resources to date has been limited; however installation of the subsea interconnector will unlock delivery of a substantial capacity of recently consented wind farms. Scheduled ferry services between the Outer | |

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| | | | | |
|---|---|---|---|---|
| | | Other commercial activities centre on crofting, fishing and weaving which includes the manufacture of Harris Tweed and the area offers potential in renewable energy generation. Over two thirds of the island population now live on community-owned estates. | Hebrides and the Scottish Mainland and Inner Hebrides operate | |

## Benefits of Island Initiatives

The Initiative is developed as a growing empowering network that enables all EU islands to start, restart or boost their clean energy transition on their own. This is based on the resources available within the initiative, such as contacts to relevant experts, publications and guidance to find the right support. Some individual highlights showing examples of the empowering effect achieved already in the Pilot Phase are shown below. The list is a selection and in no way an exhaustive list of local achievements[xxix].

- **Job creation**: Cres in Croatia, and the Irish Island Federation have created new employment in managing island transition.
- **Community energy development**: Crete in Greece and Cres in Croatia have established local energy co-operatives to engage citizens directly.
- **New multi-stakeholder collaborations**: The collaboration around the CETA that invites all stakeholders was also utilised to respond to talking Covid-19.
- **New inter-municipal collaborations**: Salina in Italy, saw a renewed collaboration between the three municipalities on the island due to the CETA process.
- **Empowering Initiative**: In addition to the 26 Islands supported directly with their CETA activities, 7 other islands have submitted their CETA independently by making use of material, events and network as sources of guidance.
- **Multi-level governance dialogues**: In Ireland the Cork County Council coordinated support for their 6 islands to develop CETAs, this has ‘trickled up’ in the Irish governance levels as attention and support from the Irish national government has now been put in place.

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## Recommendations for Eigerøy

ROBINSON activity on Eigerøy is extensive in its scope and outputs when contrasted with the other islands, but there is further space for collaboration and communication. As ROBINSON covers a wide range of issues, from different aspects of the Energy Management System to the environmental, economic, and social impacts being measured, it means that there is much cross-over with the activities of the other islands. There are also geographical similarities which may provide further opportunities to share knowledge and understanding between the islands. Some notable features and recommendations are highlighted below:

- **Aran Islands**: Pro-active and keen to engage across transition space.
- **Ilha da Culatra**: Fishing shared as a key industry with strong community and association. Water production and waste treatment and management high priorities, with participative process already underway with University of Algarve to find solutions.
- **Las Palmas**: Wide ranging coordinating and community organisations, with strong approaches to citizen participation and engagement. Shared knowledge from water and energy hybrid solutions as well as waste treatment.
- **Salina**: Similar in size to Eigeroy which can offer lessons on scale of intervention.
- **Sifnos**: Hybrid power plant utilising wind turbine and pumped hydro storage system.
- **Kökar**: Similar geography and altitude (climate), with plans for new wind power and energy system which includes CHP and biomass and battery system.
- **Brac** - The first step for the local transition team with regards to the energy transition is educating the local population about the new technologies and possibilities of using renewable energies for their own benefit and wellbeing.

Working closer with the Clean Energy for EU Islands Secretariat will also provide opportunities to better understand the unique position of the ROBINSON project with other transitions occurring across Europe. Further recommendations can be highlighted below:

- Close contact and dialogue with Clean Energy for EU Islands Secretariat:
  - Explore possibility of publishing ROBINSON information into Secretariat 'island map' and forum pages.
  - Through Secretariat, find key contacts across islands and partners that would provide most beneficial/similar/useful opportunities for collaboration and knowledge sharing.
- Reach out to island groups with similar or relevant aims as ROBINSON to understand fully unique opportunities for collaborations:

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- Pilot Islands most likely to be furthest ahead with plans (unreported), with exception to possibly Kokar.

- Identify islands with the Clean Energy Secretariat who have not made the pledge but have valuable experience and knowledge. Orkney as one example is listed on Secretariat page but is not a member. Malta is a further island identified.

### Key Considerations

A formal plan should be considered on how the progress of ROBINSON activity on Eigerøy can be utilised or incorporated into the Islands' Initiative. This should include inter-island learning, sharing of best practices, and integration of outputs from Eigerøy into other agendas.

Further consideration of how shared learning can be undertaken beyond transition agendas and existing publications, including possibilities of networks in islands and study trips.

## Recommendations for Eigerøy and Follow Islands

Recommendations applicable to all three islands have been compiled based on Pillars of Energy Transitions collected from Islands CETAs.

Electrical energy should be produced on island from renewable sources, matching generation and demand, and utilising energy storage and smart grid technologies for any discrepancies. This can ensure greater energy autonomy and security.

Energy used in heating and cooling can be reduced by facilitating the renovation and retrofitting of homes and other buildings to be more sustainable in their energy usage. Further consideration on the roll out of heat pumps or other renewable heating sources for both domestic water and space heating. This can be achieved across a multi-year work programme after identification of suitable funding partners.

Industry should be encouraged to identify sources of generation to enable energy consumption to be from renewable sources. Energy savings and reductions through efficiencies and management should also be undertaken, this should also have added benefit of cost savings over time. Implementation of the ISO 50001 energy management standard should be considered. Electrification should also be considered in some instances to aid in the decarbonisation of energy consumption.

A societal shift in transportation should be embarked on to create a sustainable, healthy, clean, and responsible future for island communities. Road transport, where appropriate, should be

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transformed to encompass more active transport. Public transport should be encourage over private car use where possible with measures such as pedestrianisation, new shuttle busses, and deterrent parking being undertaken.

Where road transport is required, it should be made renewable with the encouragement of electric vehicles (EVs) and associated charging infrastructure. Sustainable liquid fuels may also be appropriate. Marine and air transport should transition to alternative technology types such as electric or hydrogen vessels. Tender documents for new air service could include a requirement for the provider to be proactive in decarbonising its service. Island communities could act as a test bed for new technologies.

Training and education should be a key enabler in transition agendas. Education on climate and energy should be incorporated through all levels of learning, including training for educators. Integral, multidisciplinary, and transversal training of students in energy transition, climate change, ecological footprint, and sustainability should be considered at higher levels. Teaching practice can be extended outside classrooms in contact with the nature of the environment. Ecological activism initiatives such as beach cleaning, tree planting, and care of natural environments should be encouraged alongside the creation of new green spaces.

The impact of certain industries should also be considered. One key theme across islands was the pressure of tourist overcrowding and the requirement for sustainable urban mobility planning. Planning should incorporate the organization of tourist practice, as well as the management of associated local traffic.

Innovative financial mechanisms should be investigated. Such measures could include the creation of a financing line which will allow residents to access micro-credit with the aim of financing passive energy efficiency measures and to decentralise energy generation. This line of financing can be closely linked to the possibility of establishing, in the medium term, an eco-rate for all vehicles visiting the Island.

The creation of energy working groups should be encourage across the quadruple helix platform to deliver societal change. Collaborative work strategies could be used to create a team made up of many people representing civil society, institutions, and local entities. This can help with measures such as active participation in energy management or a council for energy management in island groupings.

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