KEY NUMBERS & FACTS

Demonstration of **smart grid solutions** in operational environment on **Borkum island**

Project duration: **4 years** from October 2020 – September 2024

7 EU countries represented by **11 organisations**: research centres, SMEs, and large enterprises

About **€ 8,3M total budget**, co-funded with € 7M by the European Commission

4 Followers Islands: Cres (Croatia), Lefkada and Skopelos (Greece), Orkney (UK)

CONSORTIUM & CONTACTS

Ayesa

Steinbeis Europa Zentrum

ZIGOR Research and Development AIE

Planète OUI

EMEC - The European Marine Energy Centre

IDENER R&D

Nordseeheilbad Borkum GmbH

CEGASA

KU Leuven

DAFNI - Network of Sustainable Greek Islands

Regional Energy Agency Kvarner

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islander

ACCELERATING THE DECARBONISATION OF ISLANDS' ENERGY SYSTEMS

2020 - 2024

BACKGROUND

The goal of the ISLANDER project is to make substantial progress towards a fully decarbonised, smart geographical island. Pilot technologies will be installed and tested on Borkum, a German East Frisian island in the North Sea. Replication strategies will pave the way for other European follower islands towards a zero-emissions energy system.

OBJECTIVES

Avoid fossil fuels through renewable energies

Large scale uptake of renewable solutions

Creation of a renewable energy community

Enhance power network stability by using local flexibility

Replication to follower islands

TECHNOLOGIES

A smart energy management solution aggregating distributed energy resources will be implemented on Borkum.

Smart IT platform for energy management

The IT platform (Gridpilot) will monitor, operate and maintain green energy assets (renewables, storage, electromobility) in Borkum. Specifically, Artificial intelligence will be deployed into the Smart IT platform to predict and automatically decide how to operate and maintain aggregated green energy assets. This platform will allow aggregations to participate as a Virtual Power Plant in different energy markets providing advanced services.

Solar photovoltaic plant

Onshore wind turbines

Hydrogen based storage

The electrolyzer converts the excess electricity into Hydrogen, which is then stored in a pressurized tank. On demand, a fuel cell converts the stored hydrogen back into electricity. The hydrogen storage system also includes a buffer Li-ion battery pack for short term storage and power balancing.

Demand Response app for consumers

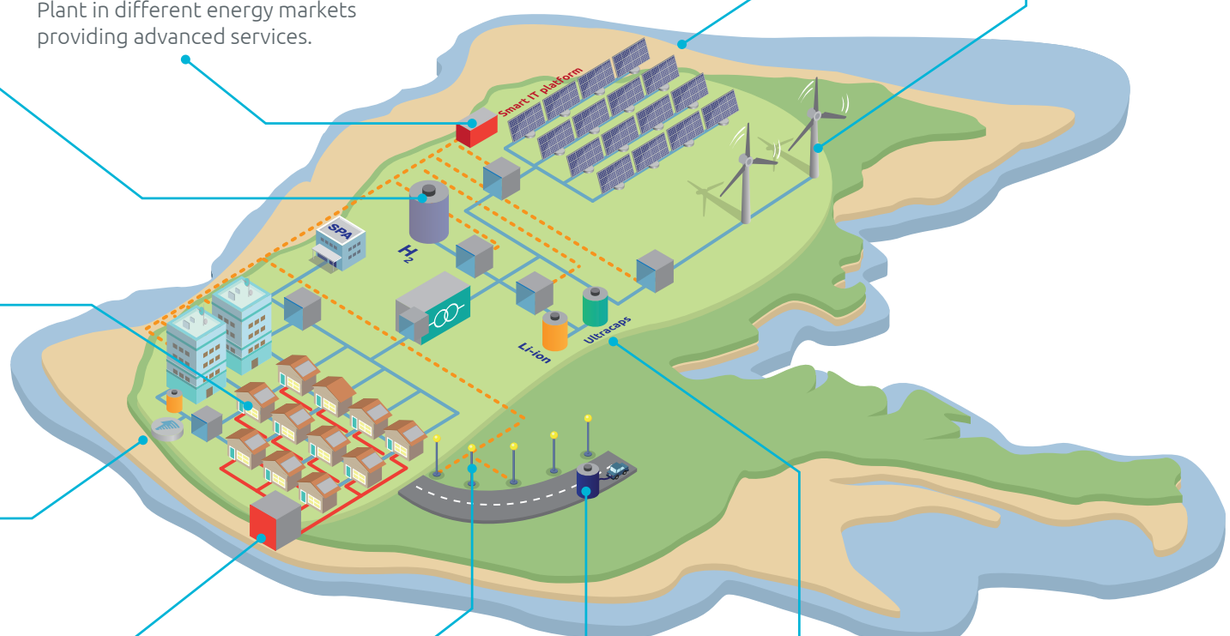
The app seeks to incentivize consumers to follow the most convenient consumption patterns considering current and forecasted status of the island's electrical grid (for instance, expected renewable generation, energy stored, etc.)

PV + battery solutions for households and buildings

Each solution is composed of photovoltaic roof installations, a Li-ion battery set, related power electronics (inverter, protections, etc.), a smart meter, a building management system, and connection ready for its aggregation to the central smart IT platform.

Seawater district heating network

The system is based on a heat exchanger and a heat pump, which use the heat content of seawater for heating residential units in winter and for cooling in summer.



Street lighting network

Electric vehicle charging stations

Power Intensive Energy Storage System

A Power Intensive Energy Storage System (PI-ESS) buffers variations of energy production occurring on a short time scale for an optimized power network operation. In Islander, the PI-ESS consists of two complementary technologies: Ultracapacitors for charge/discharge periods of about a few seconds and Li-ion batteries for periods beyond 1 minute.

IMPACTS

ISLANDER will:

- **Demonstrate in a real pilot how to reduce fossil fuel consumption**, by developing systems based on renewable energy (including heating, cooling and energy storage) allowing EU islands to reach full decarbonization targets in a shorter time frame.
- **Apply IT to renewable energy installations to optimally manage and operate electrical grid** with controllable and non controllable loads.
- **Support the large-scale uptake of validated solutions** on the same geographical island and on other geographical islands with similar challenges.
- **Facilitate the creation of local renewable energy communities** that will actively support the energy transition process of EU islands.
- **Enhance stability of the power network** for islands that are grid-connected with the mainland.
- **Develop new business models** and contribute to create new sustainable jobs that will benefit the local community.
- **Create new scientific knowledge** and inputs for regulations supporting the decarbonisation process of EU islands.