



ROBINSON

Smart integration **O**f local energy sources and innovative
storage for flexi**B**le, secure and cost efficient e**N**ergy
Supply **O**N industrialized islands

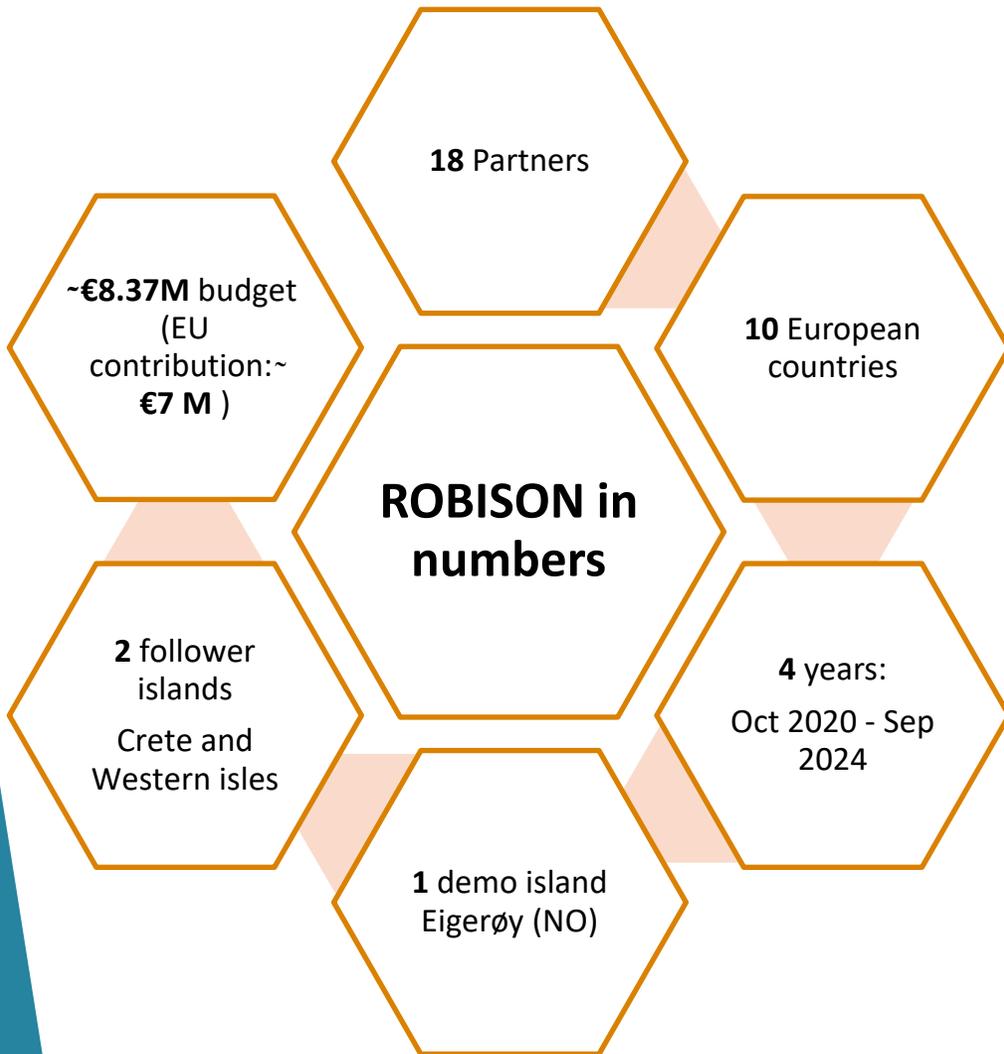
Ugo Simeoni

European Turbine Network



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957752

ROBINSON in a nutshell



ROBINSON aims to help **decarbonize (industrial) islands** by developing an intelligent, robust and flexible energy management system that **integrates technologies across different energy vectors (electricity, heat and gas)**.

The ROBINSON system will be **demonstrated on the island of Eigerøy, Norway**.

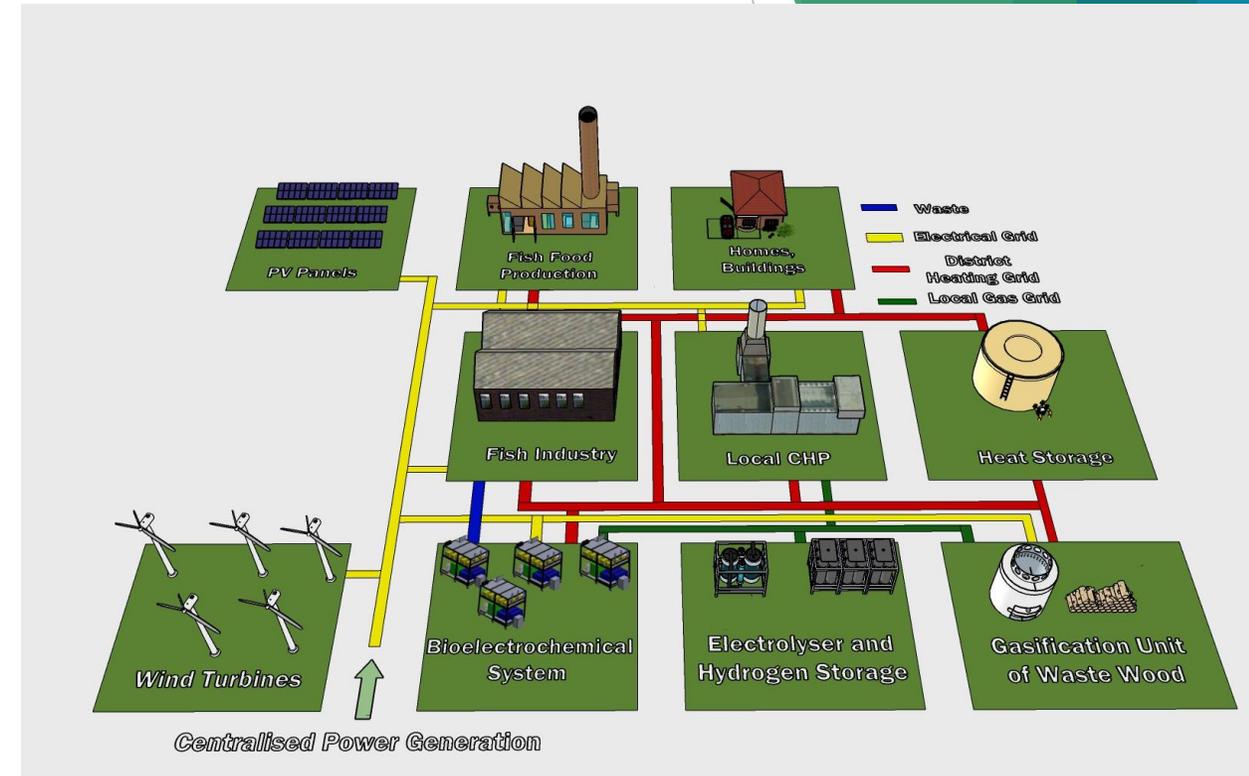
Virtual demonstrations will be conducted for **Crete (Greece) and the Western Isles (Scotland)**.



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Main Goal

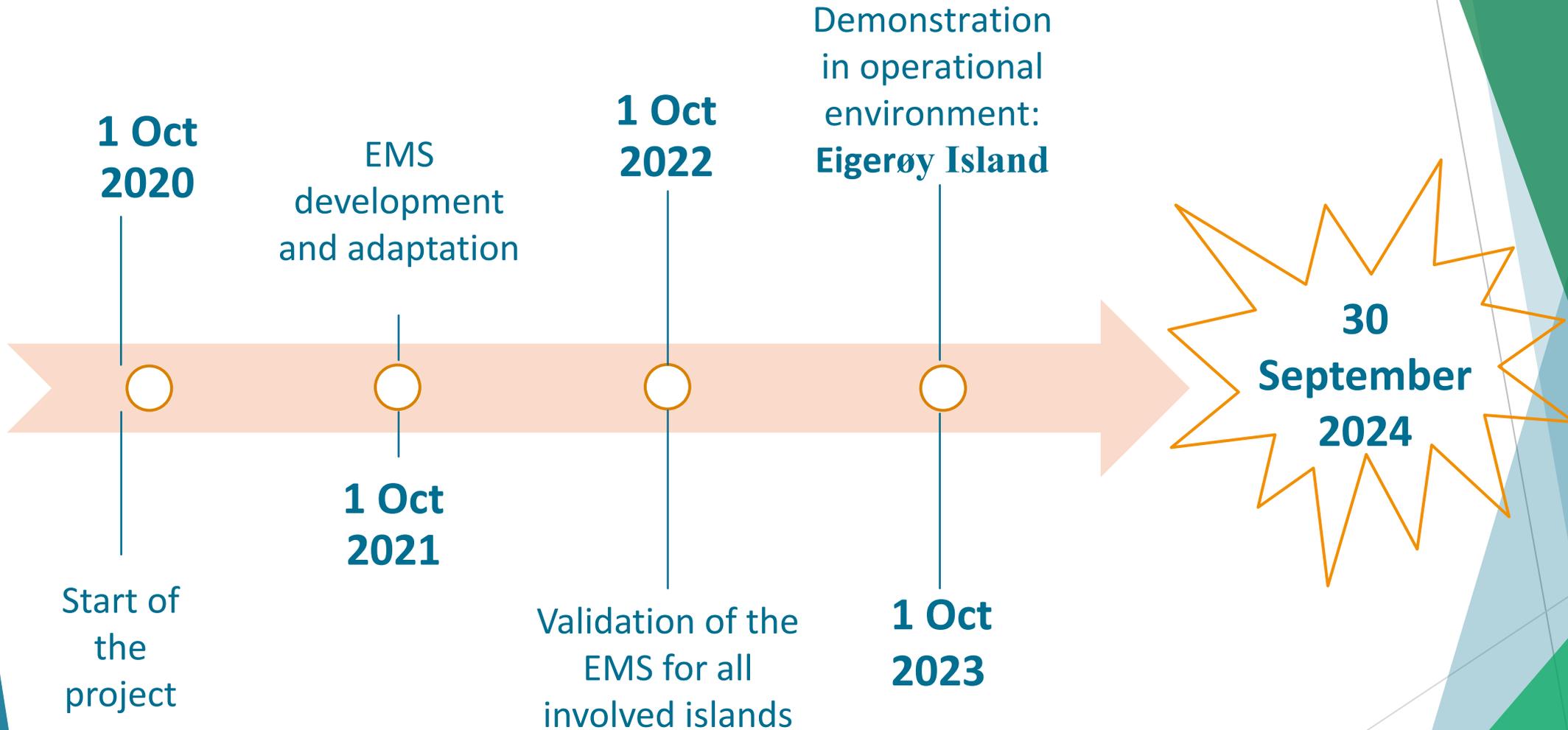
- Development of an **integrated energy system tailored to islands** with industrial activities. A **flexible and modulable system** that can answer to the different needs of the environment.
- **Couple** locally available **energy sources**, electrical and thermal networks and innovative storage technologies, thus increasing energy efficiency and security of supply.
- **Technological innovation:** development and demonstration of several new technologies that will unlock new energy sources and a new energy integration system.
- **Cover the energy demand** while **reducing the use of fossil fuels** and the islands' emissions.



**KEY ELEMENTS:
TECHNOLOGY & INTEGRATION!**



Project timeline



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Project Objectives



Optimise, validate and integrate innovative technologies
Develop and validate a modular and flexible Energy Management System (EMS)

Technological



Demonstrate the large-scale applicability of the ROBINSON system

Demonstration



Replication of the modular EMS and the concepts
Wide dissemination

Replication



Human health and the environment
System cost-competitiveness
Business model

Impacts



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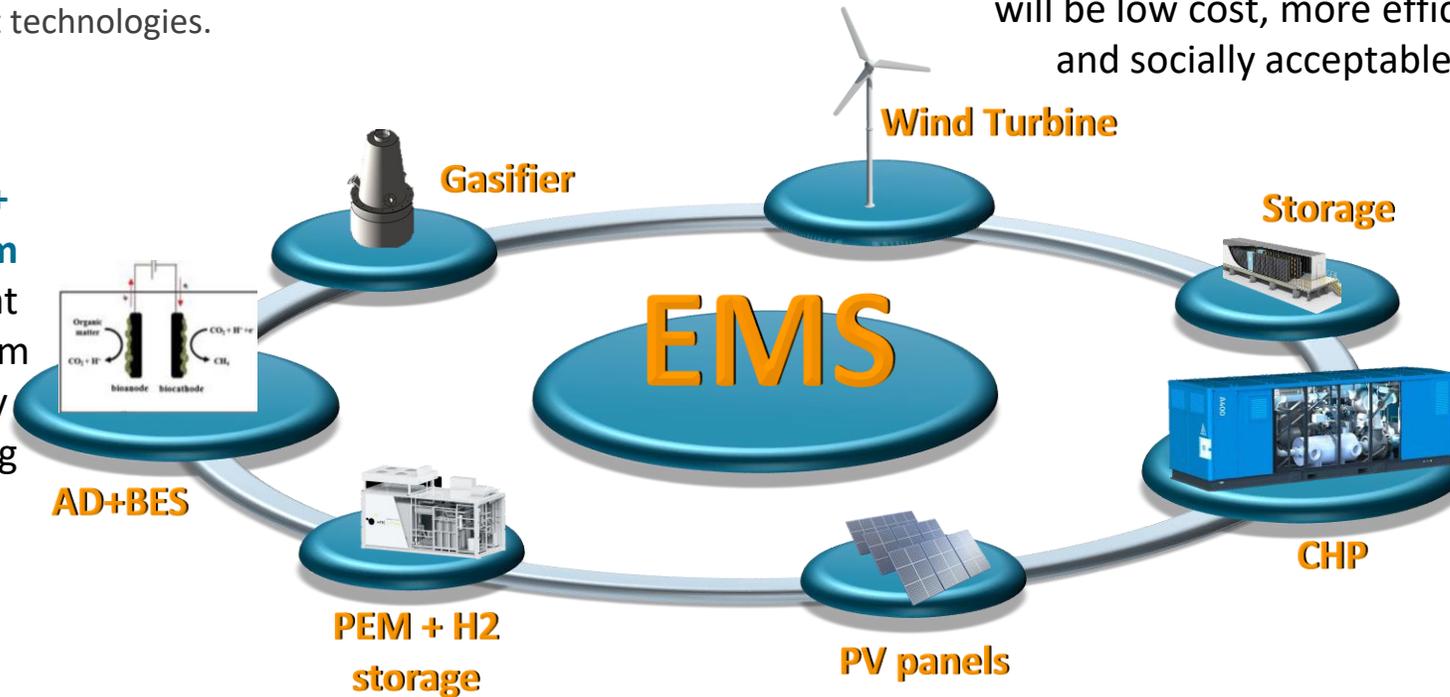
Technologies Development

The key element of the ROBINSON project is the development, adaptation and demonstration of different technologies.



The innovative **Wind Turbine** will be low cost, more efficient and socially acceptable.

The **Anaerobic Digestion + Bio Electrochemical System** will allow to efficiently treat the process wastewater from Eigerøy island fish industry and, meanwhile, converting its organic matter into biomethane.



The **Combined Heat and Power** system will be an advanced gas turbine with a combustion kit upgraded to burn hydrogen and syngas.

The **Energy Management System** will integrate the existing system with new installed distributed technologies and end-users across different energy vectors (electricity, heat and gas)



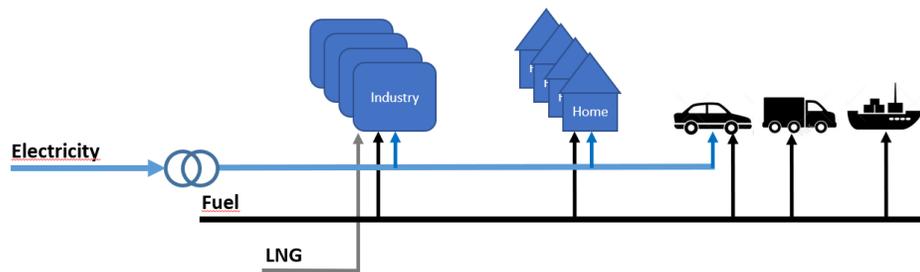
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The demo island I

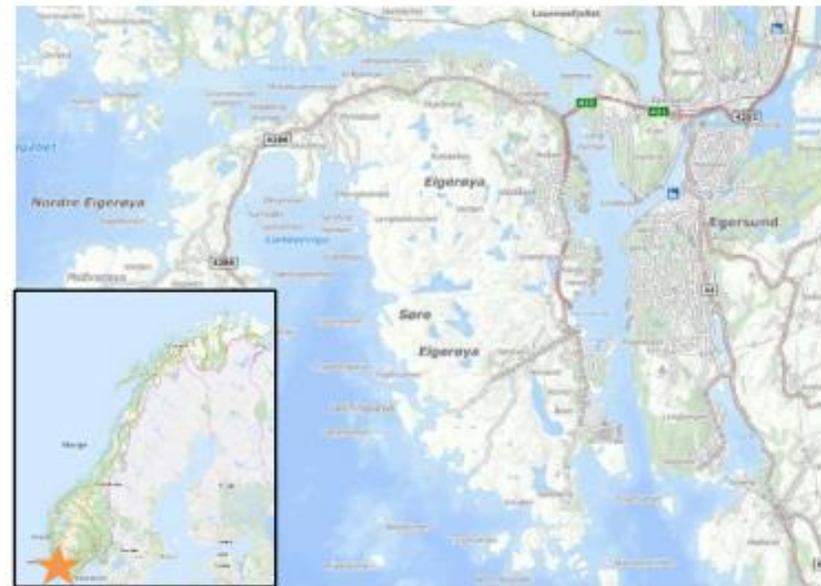
ROBINSON's demo case will be developed on the island of Eigerøy, in Norway.

Eigerøy's current energy profile

- ▶ **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)
- ▶ **Thermal:** 6950 MWh liquid fuel; ~ 26500 MWh/year LNG



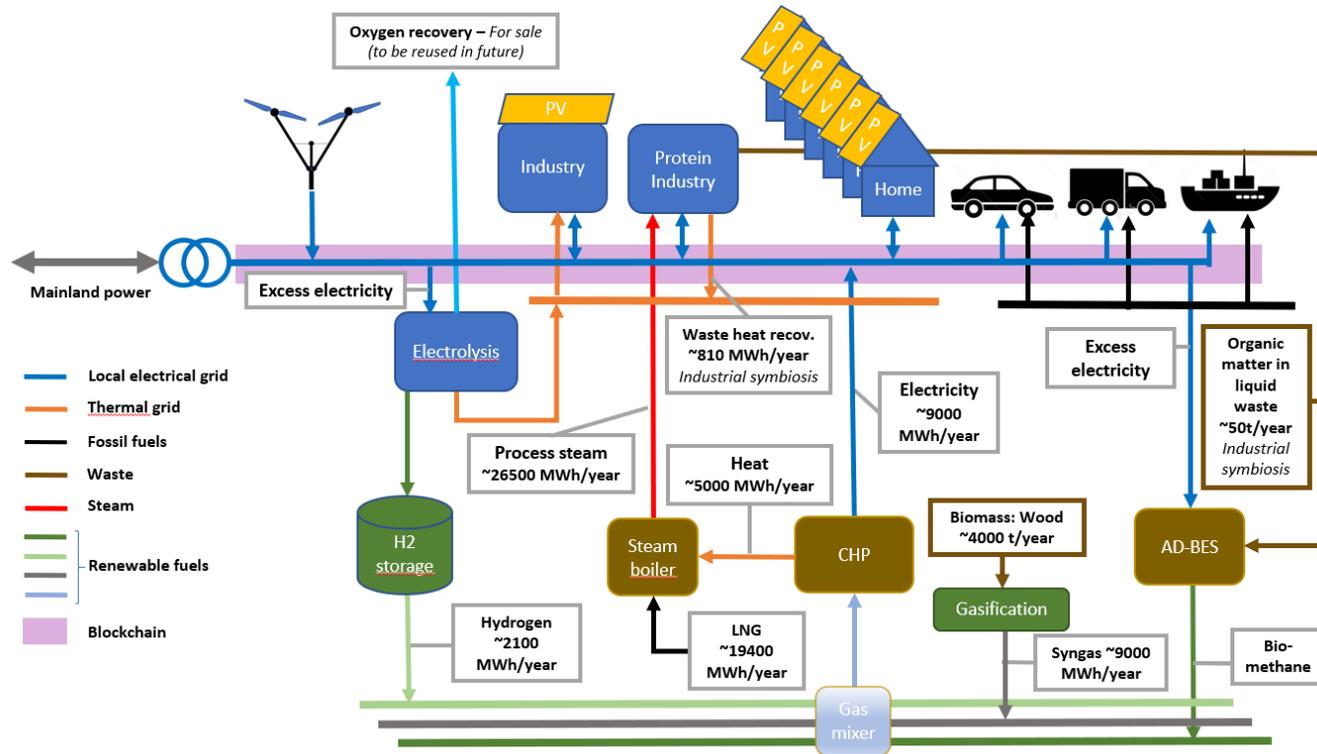
Basic facts	
Size	20 km ²
Population	~2500 (about 800 households)
Climate	Relatively high temperatures in winter and low in summer; relatively high wind speed
Industrial profile	A new fish industry has been implanted in January 2019, increasing the island's need for electricity and steam. Moreover, new 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.



The demo island II

The pilot plant will be installed at the premises of the ROBINSON partner Prima Protein (PRIMA), which is the island's main consumer of fossil fuel (in 2019 consumption equivalent to 30GWh: ~80% of fossil fuel consumption in Eigerøy).

On Eigerøy, the pilot system, managed by the validated EMS, will reach TRL 7.



Thanks to ROBINSON, Eigerøy will move from being fully dependent on mainland and fossil fuel to an integrated, independent and low-carbon energy system!



The replication islands

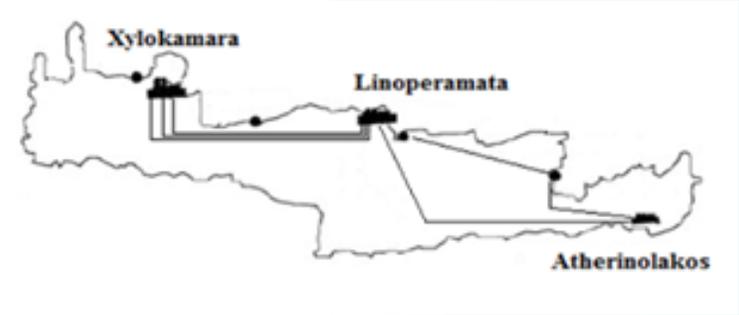


Crete

Basic facts	
Electricity generation	≈3TWh in 2018 (≈80% -> 3 fossil fuel power plants);
RES penetration	17% Wind; 4,6% Solar; 0,01% Hydro; Bio not used
Interconnection	280MW by 2020; 1000MW by 2022
Industrial profile	2 industrial parks planned
Seasonality	Intense energy consumption due to tourism

ROBINSON'S CONTRIBUTION:

- Waste valorisation
- Energy storage
- Increase share of RES

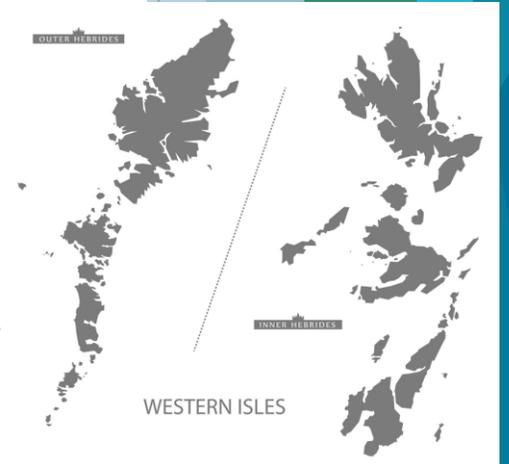


Western Isles

Basic facts	
Electricity generation	778GWh in 2013
RES penetration	74GWh
Interconnection	AC subsea cable limited to 22MW
Industrial profile	Major industrial energy users on Isle of Lewis
Seasonality	5GWh back up power concentrated in July and from Nov to Feb

ROBINSON'S CONTRIBUTION:

- Possible replicability of integration of onshore wind, storage and hydrogen production;
- Reduction of fuel poverty

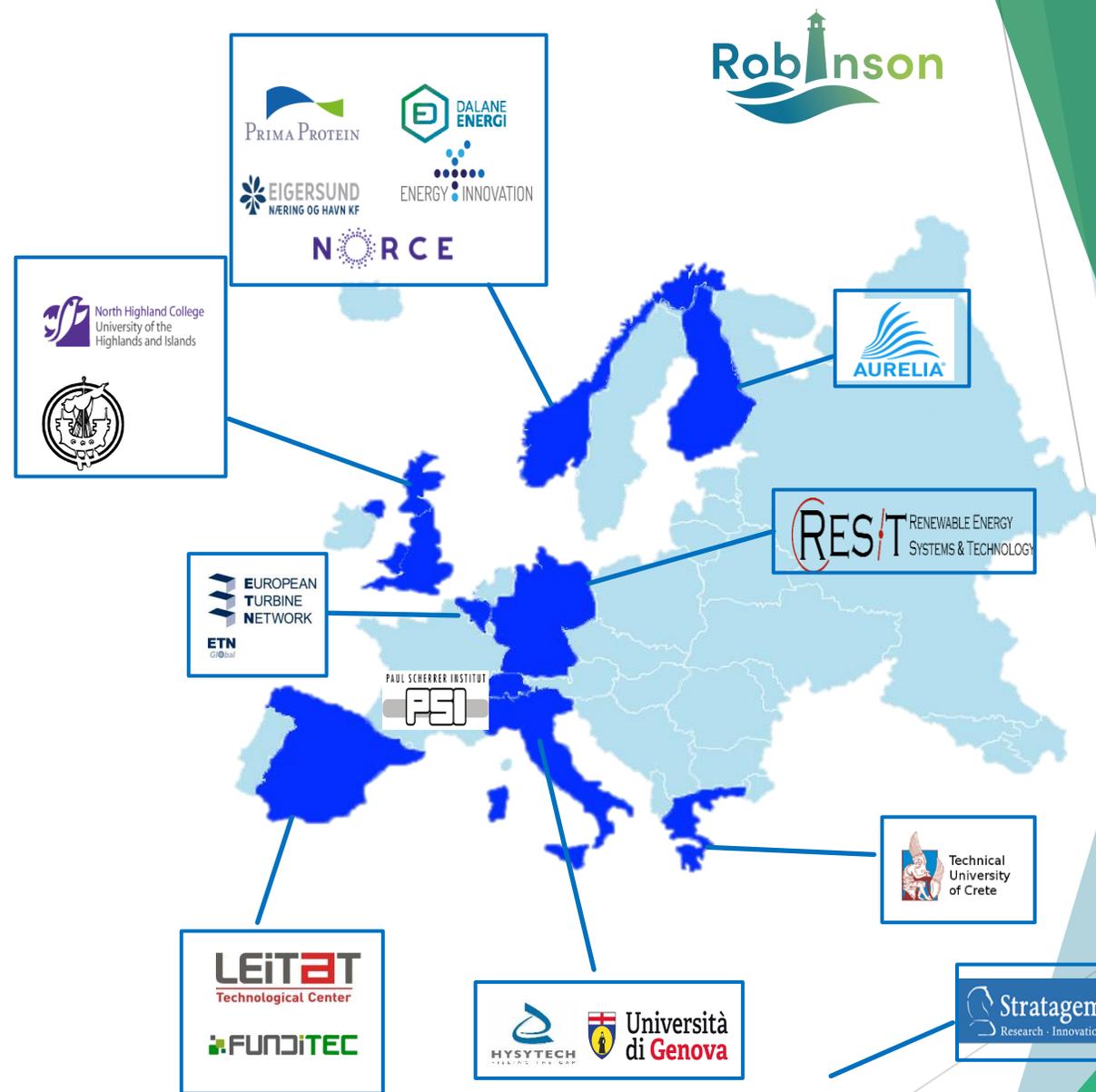


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Consortium

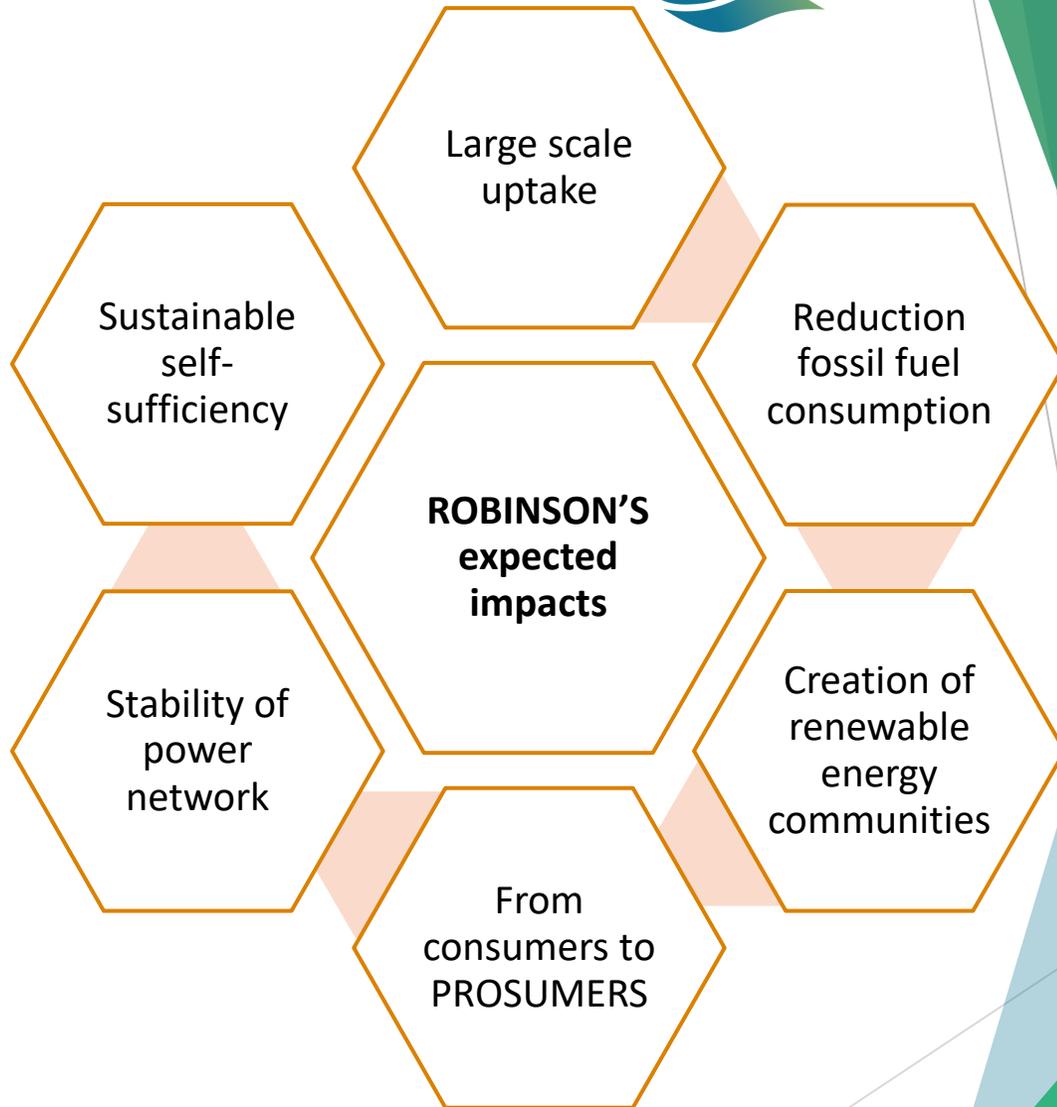
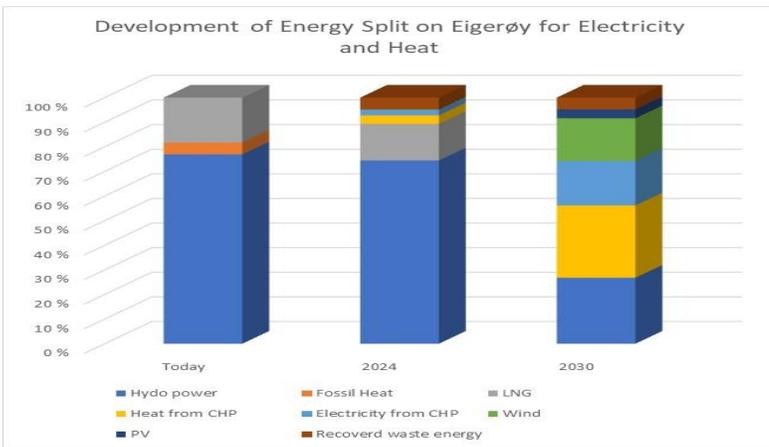
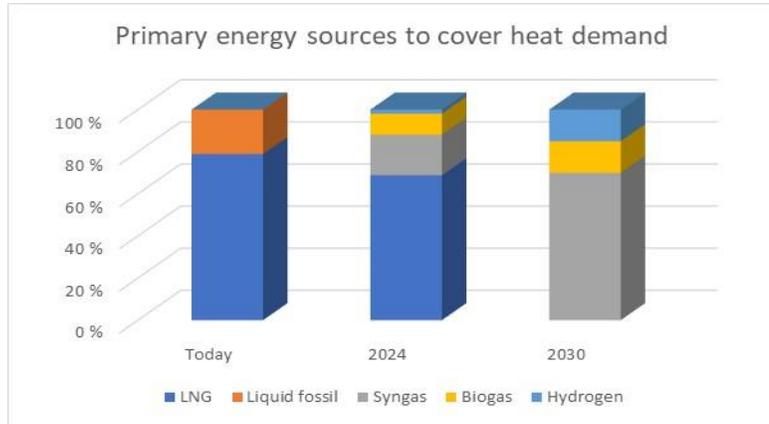
A consortium that involves the whole society/stakeholders with complimentary expertise:

- Public sector: 3 municipalities representing 3 islands
- Companies: 4 Small and medium enterprises, 3 Large enterprises
- Academia: 4 Research and Technology organisations, 3 Universities
- Other: 1 association

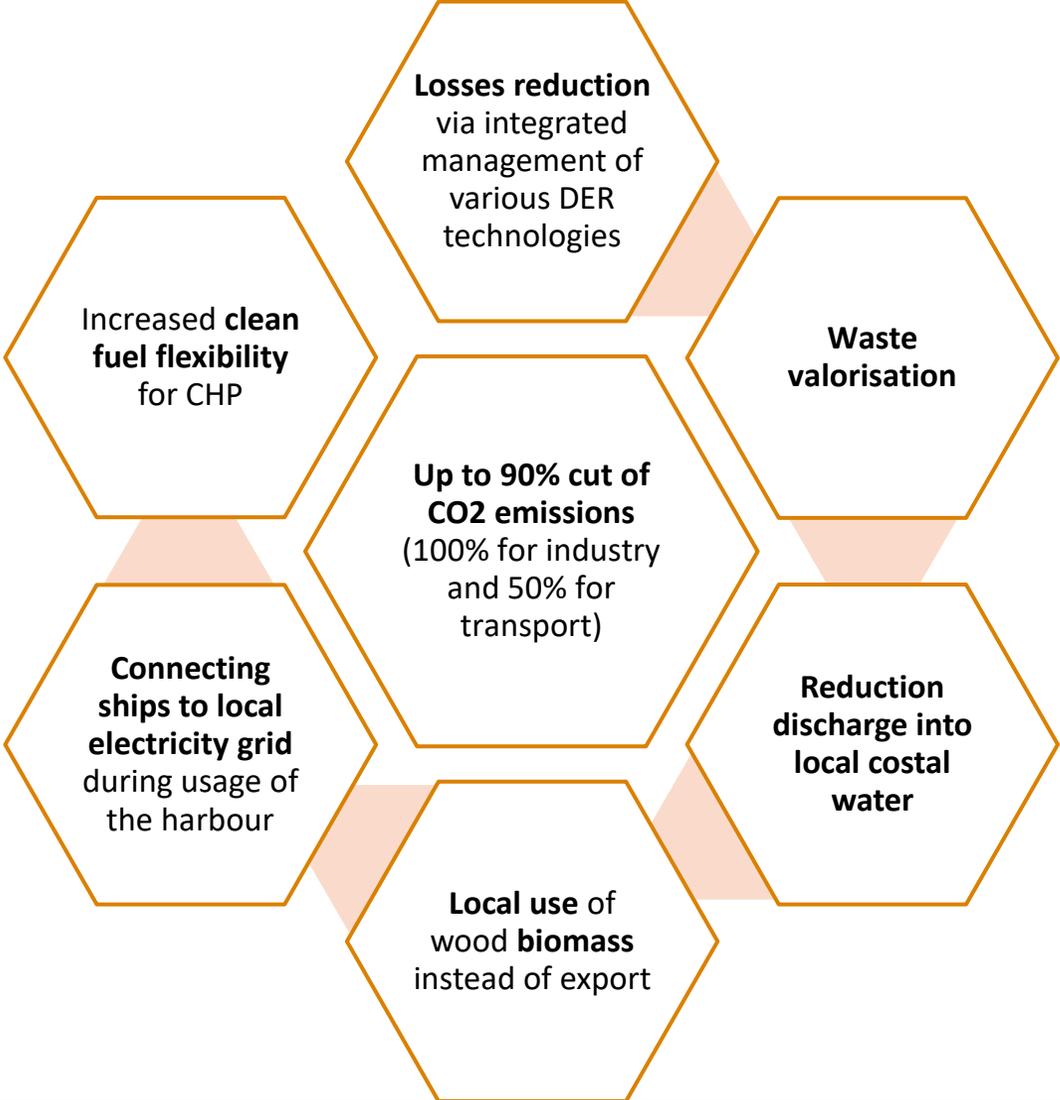


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Expected impacts

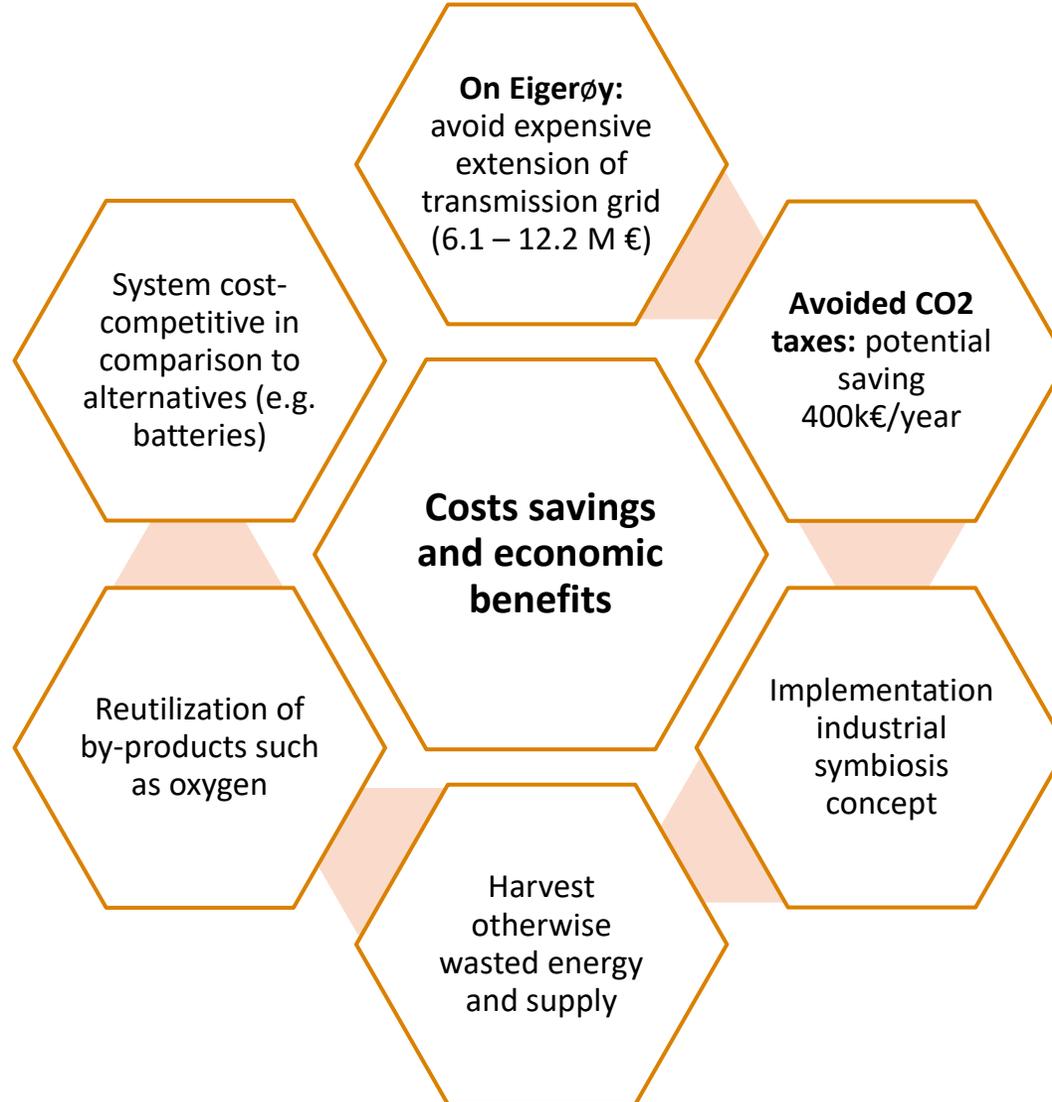


Environmental impact (at 100% coverage)



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Economic impacts



Thank you



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