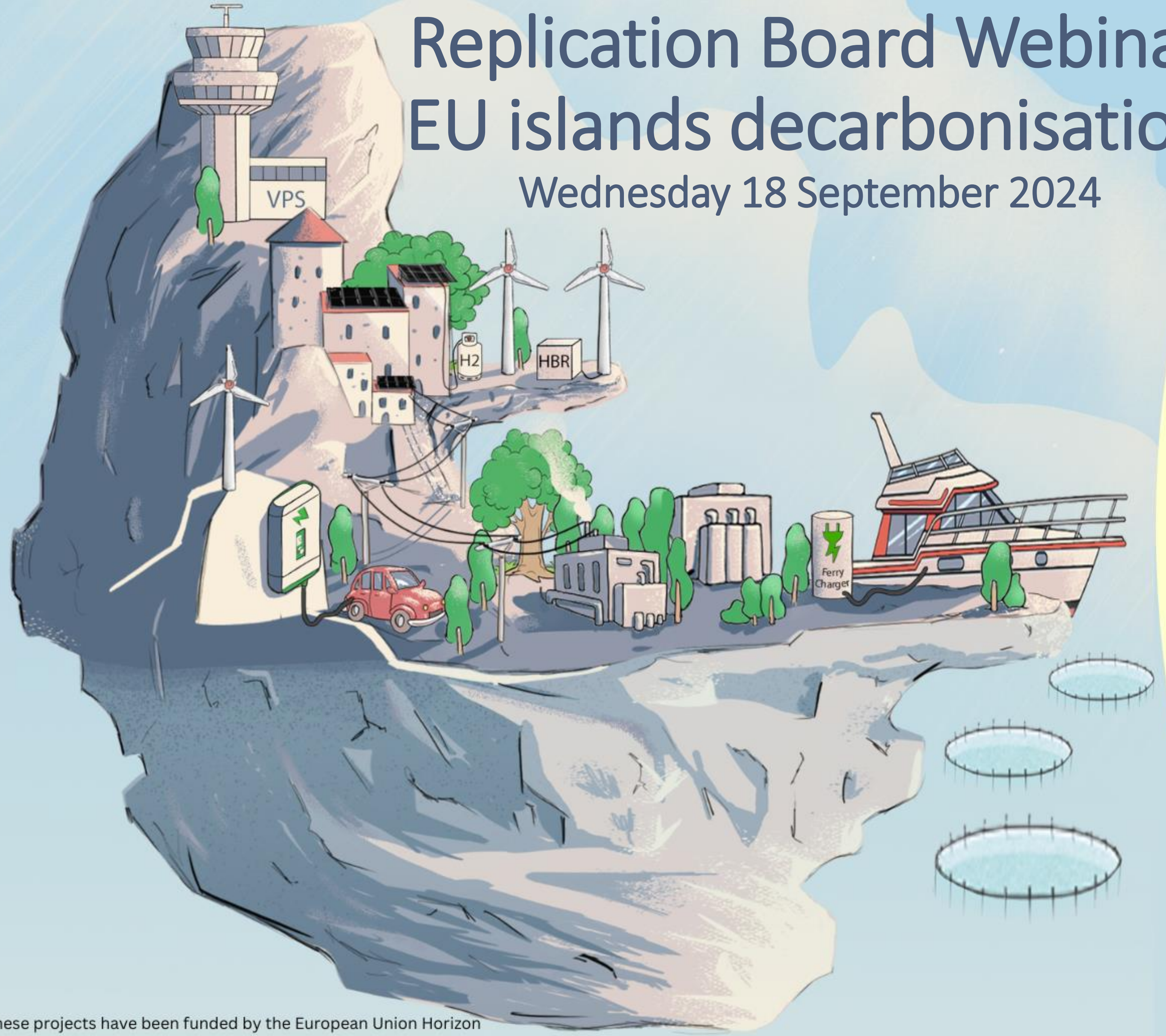
Replication Board Webinar
EU islands decarbonisation

Wednesday 18 September 2024



MAESHA
GREEN HYSLAND
REACT
IANOS
Robinson
GIFT
New Energy Solutions Optimised for Islands
NESOI
EUROPEAN ISLANDS FACILITY
insulae
islander
VPP4ISLANDS
TwInSolar
CRETE VALLEY
Clean energy for EU islands

These projects have been funded by the European Union Horizon 2020 or Horizon Europe research and innovation programme

GEOGRAPHICAL ISLANDS DECARBONISATION

REPLICATION BOARD WEBINAR - AGENDA

18 September 2024

14:00-16:00
VIRTUAL

14:00 INTRODUCTION

Keynote Speech by Riccardo Novo

14:10 PROJECT PRESENTATIONS

14:45 THEMATIC ROUNDTABLES

TOPIC 1: CASE STUDIES AND SUCCESS STORIES FROM PARTICIPATING ISLANDS

Panellists: TwInSolar, MAESHA, GIFT, REACT, VPP4ISLANDS, Insulae.

TOPIC 2 - POTENTIALS AND TOOLS FOR REPLICATION

Panellists: Robinson, Islander, NESOI, Green Hysland, Crete Valley, IANOS.

15:35 Q&A SESSION

15:55 WRAP-UP

MAESHA · REACT · GREEN HYSLAND · IANOS · Robinson · GIFT · insulae · VPP4ISLANDS · islander · TwInSolar · CRETE VALLEY · NESOI (New Energy Solutions Optimised for Islands; European Islands Facility)

Clean energy for EU islands

These projects have been funded by the European Union Horizon 2020 or Horizon Europe research and innovation programme

Keynote speech

Geographical islands decarbonization

REPLICATION BOARD WEBINAR

Online - 18/09/2024

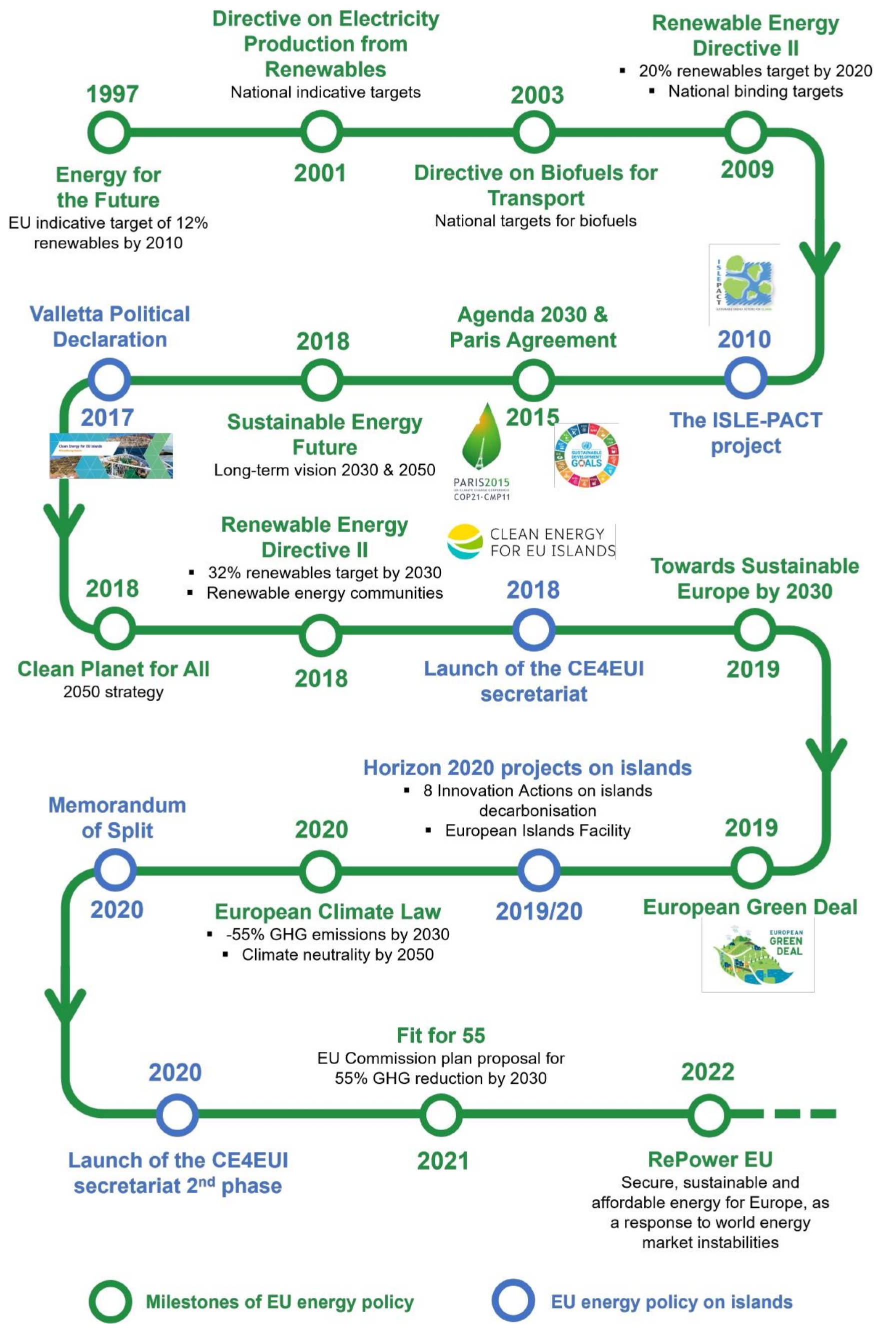
Riccardo Novo (3E)
Clean energy for EU islands
www.euislands.eu | info@euislands.eu

Clean energy for EU islands

#CE4EUislands

Natural test beds for a low-carbon society…

- ❑ Very **expensive electricity supply** (up to 10x) and fuel supply (3x) →**Novel technologies** under development might be **competitive** earlier than on the mainland.
- ❑ **Vulnerable areas** with remarkable natural and scenic heritage → Compromise between **protection of local environment** and **valorisation of local RES**.
- ❑ **Large seasonality** and isolated power systems create **extreme conditions** → scientific and technical challenges.
- ❑ Limited resources required to reach a **(nearly-)100% renewable energy mix** → study of the **"last mile".**



- ➢ Since 2010: EU increased attention on islands specificities in the energy transition.
- ➢ High number of EU-funded R&I Projects focused on islands for the **development/deployment of innovative technologies and processes**.

RES: Renewable Energy Sources

…two sides of the same coin

Potentials

- Large **interest from the R&I institutions and the EU**.
- Considerable **public investments** in many MS to reduce energy dependency from mainland.
- Generally good availability of different variable RES and readiness to a **diversified electricity mix**.
- Suitability for the early implementation of the **"local self-sufficiency" energy archetype**.

Gaps

- Overlay of **multiple restrictions to the development of RES** technologies.
- Widespread **misalignment of environmental and landscape regulations with decarbonisation targets**.
- Price of electricity often made affordable through **supporting schemes for fossil fuels generation**.
- Electricity systems often managed as **quasi-monopoly** local markets.
- Lack of professionals with specialisation in low-carbon technologies.

Turning the gaps into opportunities

PLANNING

- **Participated (urban/rural) planning** to achieve consensus and **limit the negative social impacts of landscape modifications**.
- **Medium-/long-term capacity expansion models to be integrated with short-term simulation** of grid networks.

REGULATION AND INCENTIVES

- Promote **regulatory sandboxes** and tailored legislation**.**
- Progressive **shift of supporting schemes from fossil fuels to RES + storage + EE**.

TECHNOLOGY

- Implementation of **best design** practices and BAT to limit the **impact of RES generation on the environmental components**.
- Deployment and testing of novel technologies at TRL 6-8.

COMMUNITY ENGAGEMENT

- Enhance **participation of citizens** in implementation (REC, co-ownership, crowdfunding).
- Capacity building activities for communities and specialised trainings.

CE4EUI Secretariat

REGULATORY STUDY

- **EU Publication** on connection policies and management of energy systems in non-interconnected islands.

CAPACITY BUILDING ACTIVITIES AND FORUM

- **20 workshops in EU islands.**
- **Annual CE4EUI Forum**

TECHNICAL ASSISTANCE

- Tailored advisory to **30 islands** aiming at a renewable electricity mix by 2030.
- Open to **replication of R&I actions** and further **innovative tools/processes** in the TA provided.

https://clean-energy-islands.ec.europa.eu

REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION

Projects presentation

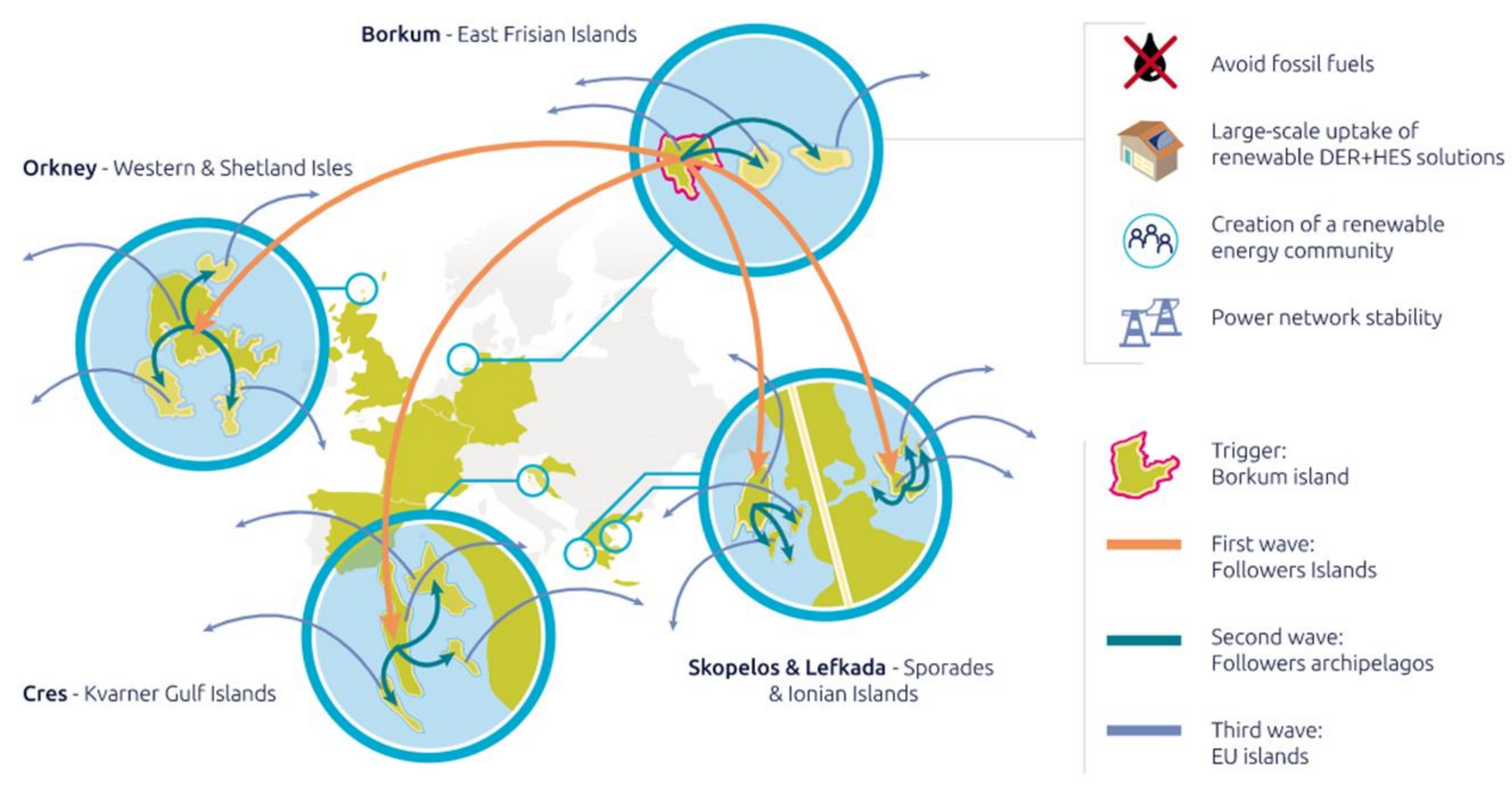
REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION
Projects presentation

islander
ACCELERATING THE DECARBONIZATION OF ISLANDS' ENERGY SYSTEMS

Islander

Imoustafelou@dafninetwork.gr

islander
ACCELERATING THE DECARBONIZATION OF ISLANDS' ENERGY SYSTEMS



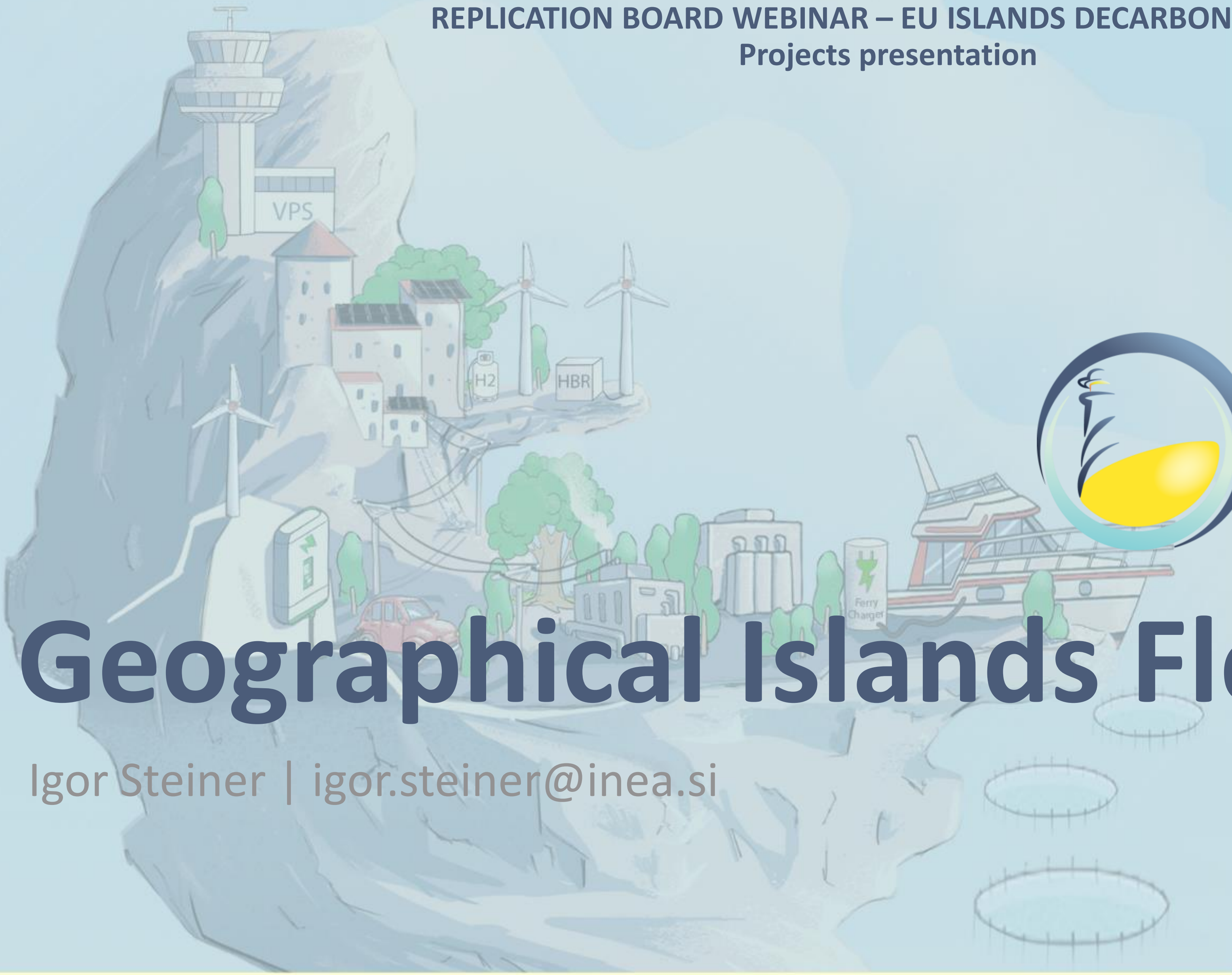
Methodology

islander
ACCELERATING THE DECARBONIZATION OF ISLANDS' ENERGY SYSTEMS

Process

Smart grid solutions for energy management in isolated areas in order to help cover the energy consumption

- **Optimal design of the new systems**
    - Define the infrastructure (optimization mathematical model)
    - Historical data(consumption and production energy, interconnection, costs, weather data)
- **Deployment and digitalization**
    - Choose the best location for the power technology
    - Check the communication protocols
- **Smart IT platform**
    - Monitoring and control of all the island's assets (data collection, send commands)
    - Forecasting predictive model (Artificial Intelligence and Machine Learning)

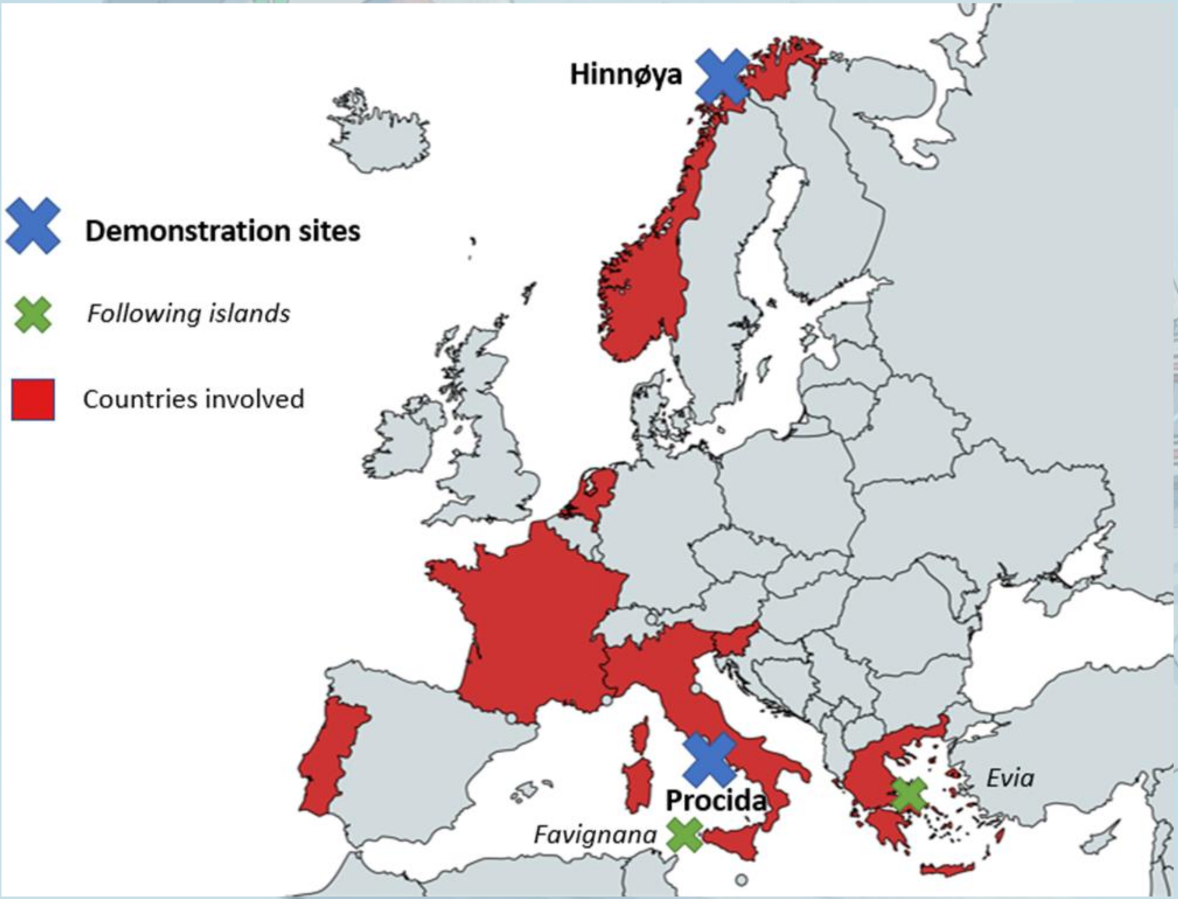


GIFT

Geographical Islands FlexibiliTy

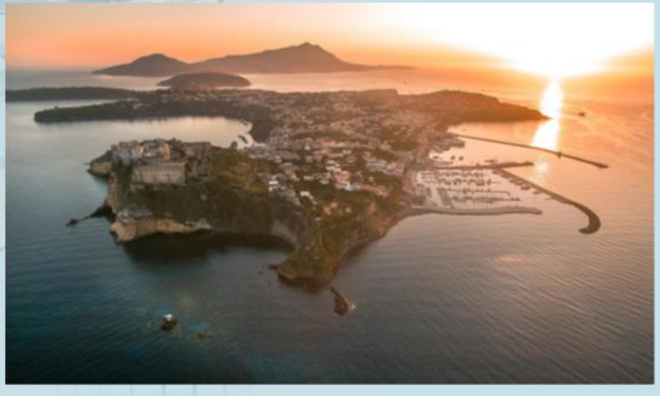
Igor Steiner | igor.steiner@inea.si

Demonstration sites



Hinnøya island cluster

Procida - an Italian small island of the Tyrrhenian Sea



Project Objectives

Specific Objectives	Objectives' indicators	Target	Hinnøya	Procida
SO1	Amount of RES possible penetration (%)	70%	92%	73%
SO1	Increase of renewable penetration compared to before the project (%)	+100%	110%	59%
SO2	Share of the grid with high visibility (V, f) (%)	70%	80%	80%
SO2	Error rate on voltage and current estimations (%)	<10%	<5%	<3%
SO2	Increase of the grid's visibility compared to before the project (%)	+100%	5 new, +100%	4 new, +100%
SO3	Increase of electricity/transport synergy (%)	+100%	(66 kW), +100%	(132 kW), +100%
SO3	Increase of electricity/heat synergy (%)	+100%	(2.2 MWh), +100%	(310 kWh), +100%
SO4	Reduction of fossil fuel use (%)	50%	(14.7 MWh/d), +100%	(3.5 MWh/d), +100%
SO5	Number of islands studying replicability	>15	17 + 4 associations	

REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION
Projects presentation

IANOS

SUSTAINABLE SOLUTIONS
for islands' decarbonisation

H2020-LC-SC3-2018-2019-2020 / H2020-LC-SC3-2020-EC-ES-SCC
EUROPEAN COMMISSION
Innovation and Networks Executive Agency
Grant agreement no. 957810

Check out our latest news and releases at IANOS.EU

And follow us on social media, IANOS H2020 Project

Objectives

- Facilitate seamless adoption of extremely high-RES penetration, by encompassing synergetic operation of energy resources and carriers through a VPP framework, for pro re-active orchestration of energy flows
- Demonstrate specific technology-driven interventions envisioned through 3 TTs and 9 UCs, towards energy system decarbonisation in the project LH Islands
- Successfully guide EU Islands decision makers in the design of cost-effective and feasible action plans for decarbonising their energy systems
- Fully engage EU islanders in the transition towards a low carbon economy, considering them as an active player in the energy system
- Ensure high replication potential for IANOS results, while reaching on a critical mass of EU Islands and renewable energy stakeholders

Key technologies – what will happen and where

Ameland LH#1

iVPP

Solar Farm (6MWp)

Tidal Kite (500kWe)

Biobased Saline Battery (120kWh)

Micro-CHP Systems (5,5kWth)

CH4 Fuel Cells

Hybrid Heat Pumps

Residential PV systems

EV Charging Stations

UCs: 1, 2, 3, 4, 5, 6, 7, 8 and 9

Terceira LH#2

iVPP

Hybrid Transformer (400kVA)

Flywheel (100kW)

V2G EV Chargers (10kVA)

Smart Energy Routers (5kW)

Electric Water Heaters

Residential Electrochemical and Heat Batteries

Residential PV Systems and Gateways

UCs: 1, 2, 3, 4, 5 and 9

Lampedusa will study the feasibility of some of UCs

Targeting a **63% cut of CO2 emissions until 2023**

Highly-replicable UCs: 3, 5, 7, 8 and 9

Bora-Bora is assessing the replicability potential of some of the technologies deployed

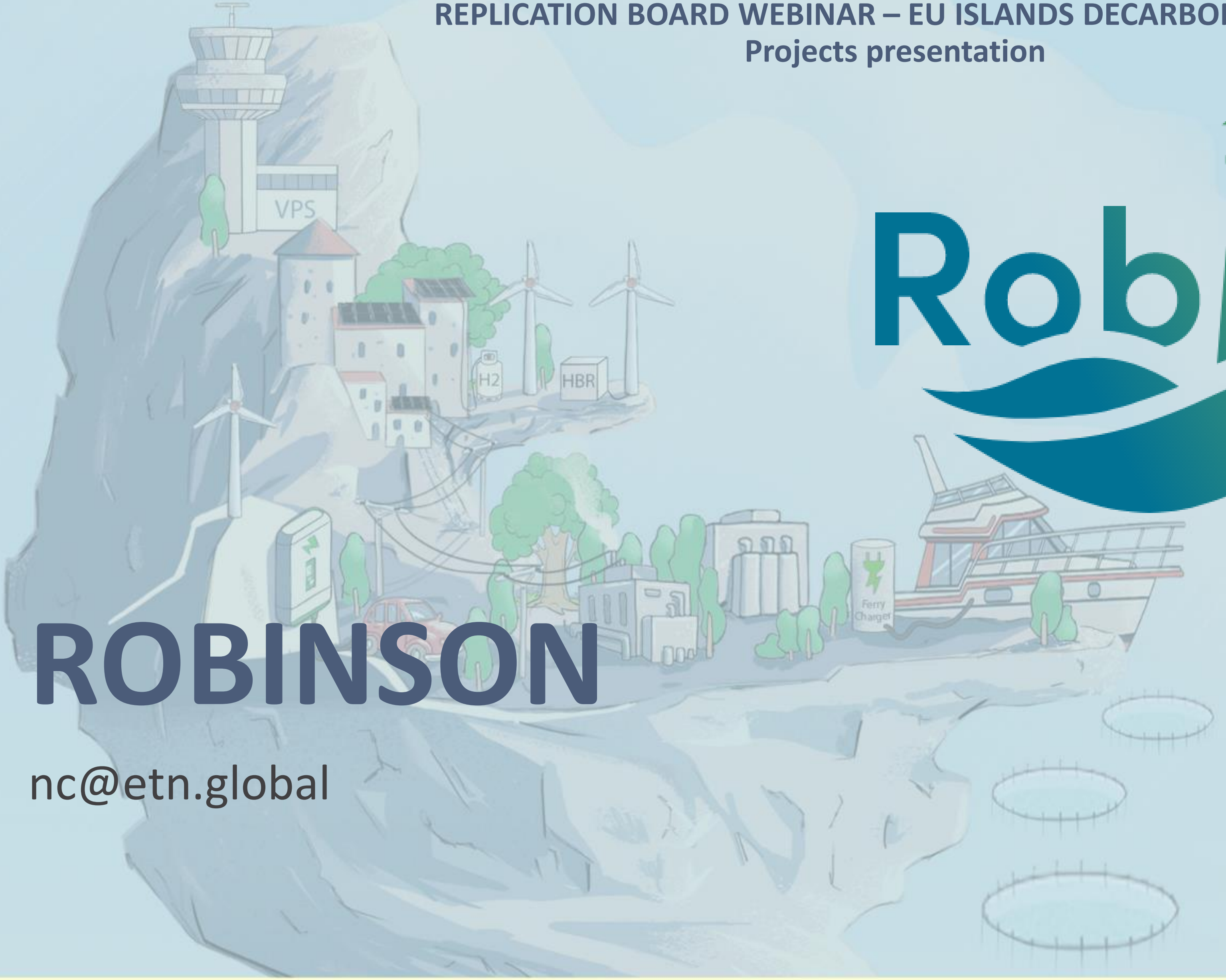
Envisioning to **produce 75% of the island's total energy needs from RES by 2030**

Highly-replicable UCs: 2, 3, 5, 7, 8 and 9

Nisyros will follow-up on IANOS outcomes and evaluate potential scaleup of the project interventions

Aiming to achieve a total of **>800 tCO2eq savings per year**

Highly-replicable UCs: 1, 4, 5, 6, 7, 8 and 9



ROBINSON

nc@etn.global

ROBINSON

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).

ROBISON in numbers

- **18** Partners
- **10** European countries
- **4** years: Oct 2020 - Sep 2024
- **1** demo island Eigerøy (NO)
- **2** follower islands Crete and Western isles
- ~**€8.37M** budget (EU contribution: ~ **€7 M**)

ROBINSON

Main goals:

- *Development of an in**tegrated 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.*

REACT: Renewable Energy for Self-sustainable Island Communities

f.sainz@comet.technology

Energy cost overrun

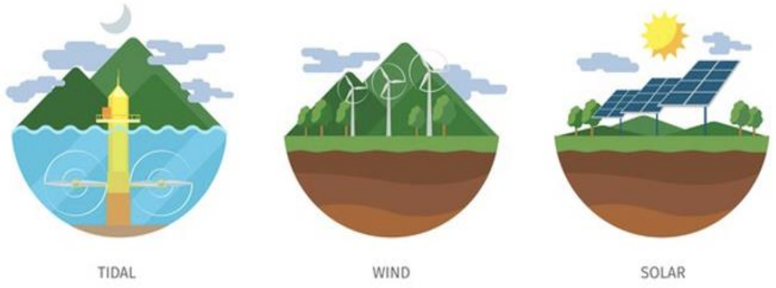
- High dependency on the mainland energy market
- Losses during the transport and distribution of electrical energy (inefficient and costly energy transmission)

Fossil fuel consumption

- Lack of a strong generation/supply infrastructure
- High dependency on the energy import
- High GHG emissions

Variable load profiles

- Significant population fluctuations (tourist and non-tourist season)
- Different market contexts and climate conditions



There is a need to characterize and leverage islands' renewable energy resources (RES) to develop a more sustainable energy model

Aims and objectives

- REACT (*Renewable Energy for self-sustAinable island CommuniTies*) was a 4-year research project (01/01/2019 – 31/6/2023) funded by EU's Horizon 2020 programme that aims for island energy independency
- REACT demonstrated the potential of large-scale deployment of RES and storage assets on geographical islands to bring economic benefits, contribute decarbonizing local energy systems and reduce GHG emissions
- REACT delivered a scalable and adaptable cloud-based ICT platform for planning and management of RES/storage enabled infrastructure, supporting a holistic cooperative energy management strategy at the community level

PILOTS

La Graciosa (SPAIN)
Climate: Marine west coast – Atlantic ocean

22 pre-selected residential dwellings
Reach up to 270 dwellings in La Graciosa & Canary Islands archipelago
Partners: AIE, FEN, ORD, AES.

San Pietro (ITALY)
Climate: Mediterranean - Mediterranean sea

30 pre-selected residential dwellings & community buildings
Reach up to 2,300 dwellings in San Pietro & the Sardinia Region
Partners: CCF, R2M,MID, MERCE

Aran Islands (IRELAND)
Climate: Marine west coast - North Atlantic ocean

24 pre-selected residential dwellings & community buildings
Up to 450 dwellings in Aran Islands & islands along the west coast of Ireland.
Partners: UNG, ESBN, AES, ELE

FOLLOWER ISLANDS

Gotland Island, Sweden
Climate: Humid continental
Baltic Sea
Partner: UPP

Lesbos Prefecture, Greece
Climate: Mediterranean
Aegean Sea
Partner: AEG

Majorca Island, Spain
Climate: Mediterranean
Mediterranean Sea
Partner: FEN

Isle of Wight, UK
Climate: Marine west coast
North Atlantic Ocean
Partner: TEES

Reunion Island, France
Climate: Marine east coast
Indian ocean
Partner: LE2P

VPP4Islands: Virtual Power Plant for Interoperable and Smart isLANDS

Habib.nasser@rdiup.com

VPP4ISLANDS Overview

Exploiting the full potential of intermittent renewable energy sources like the sun and wind has received a helping hand from so-called virtual power plants (VPPs).

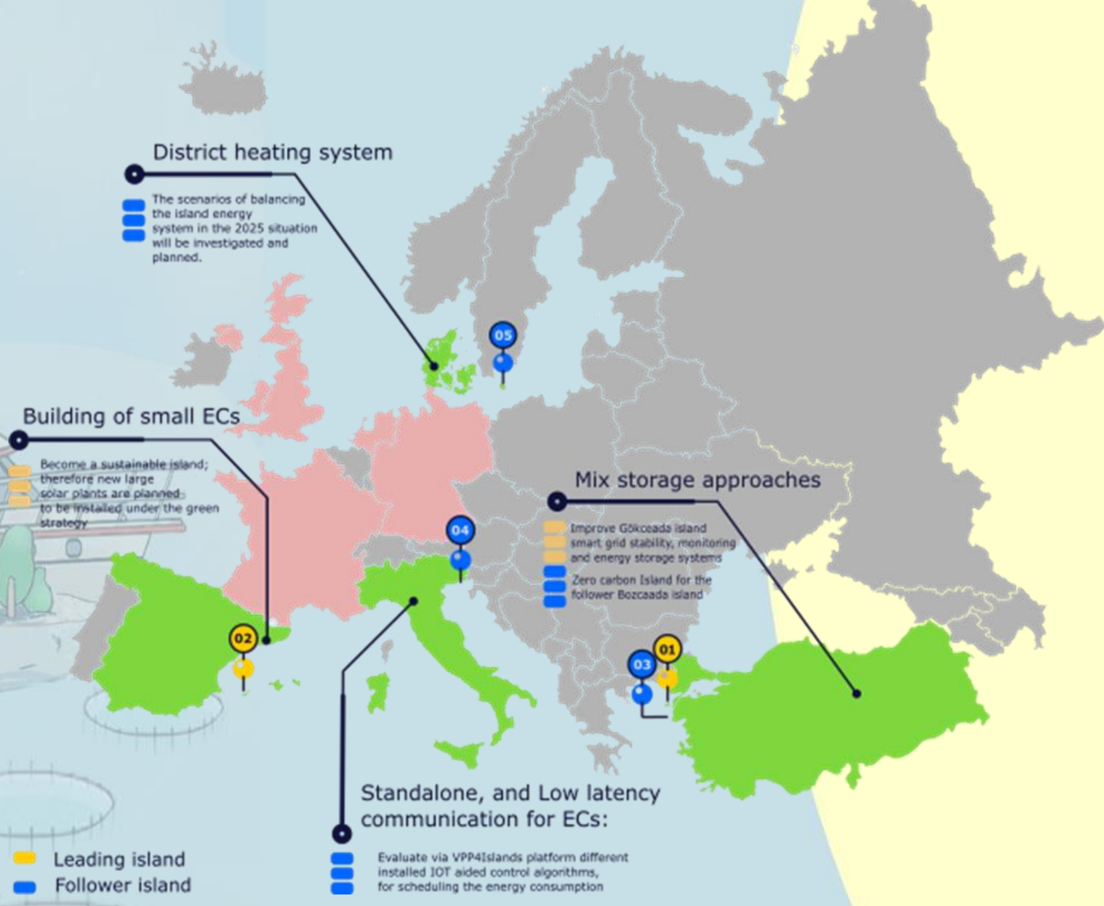
VPPs remotely aggregate distributed energy resources from different physical locations into a network that reliably distributes energy around the clock. Islands face many challenges in terms of energy supply, demand side management and energy security.

The EU H2020 funded VPP4ISLANDS project is revolutionising conventional VPP by integrating virtual energy storage technology, digital twin and distributed ledger technology to enable enhanced VPPs and the creation of smart energy communities on islands.

VPP4ISLANDS

Coordinator
Aix Marseille University

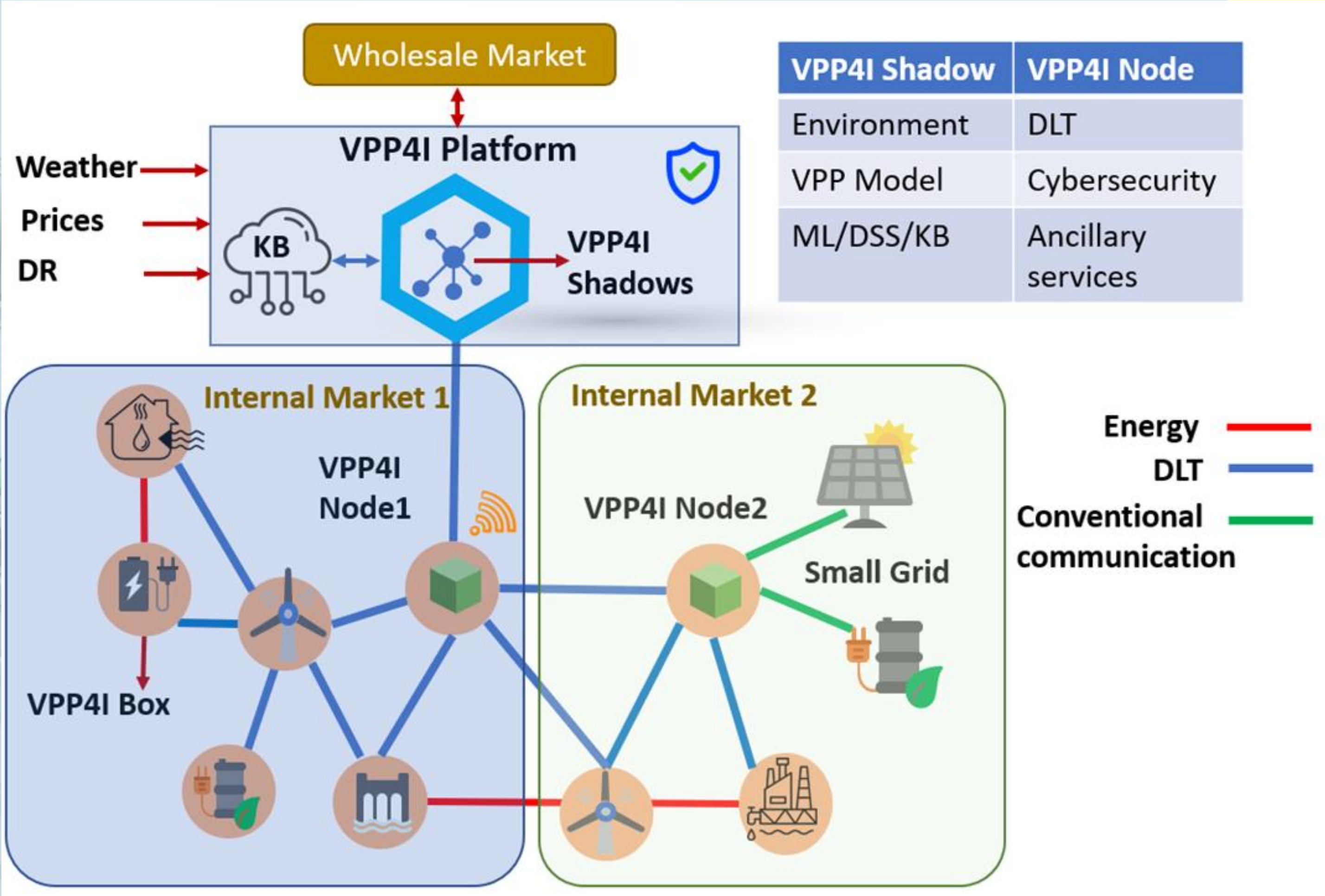
Demonstration MAP



VPP4ISLANDS concept

The concept is composed of three levels:

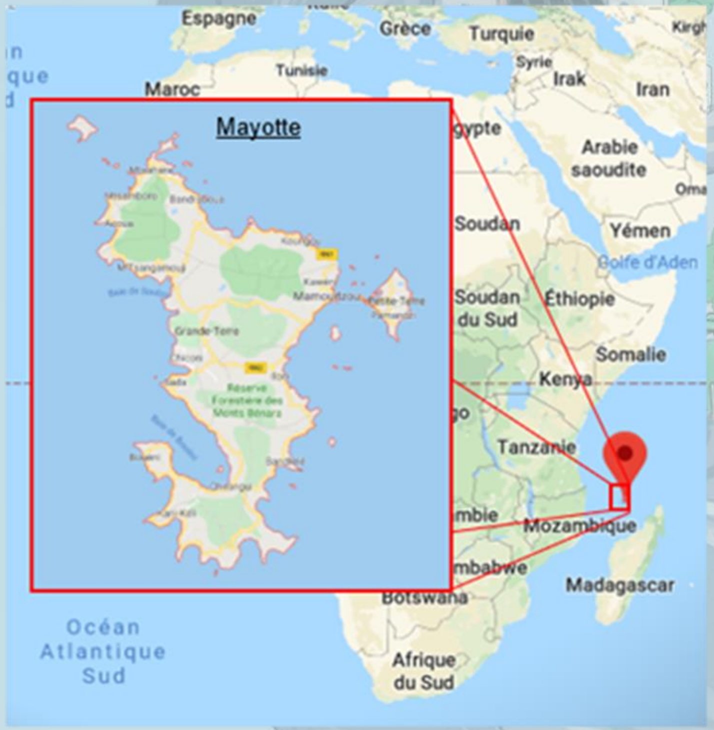
1. *VPP4IBox*
2. *VPP4INode*
3. *VPP4IPlatform*



MAESHA: Demonstration of smart and flexible solutions for a decarbonized energy future in Mayotte and other European islands

projects@ceacc.tu-berlin.de

MAESHA



Start in November 2020

Decarbonize European islands

Horizon 2020 funding programme

Innovation project

11.8 M€ budget

WHAT IS MAESHA?

Mayotte

Replicable model of smart energy system

End in October 2025

Means "Future" in Shimaore, a dialect of Mayotte

High dependency today on expensive and polluting fossil fuels

16 millions inhabitants

Grid flexibility for intermittent renewable energies integration

2400 islands within the EU

WHY THIS PROJECT?

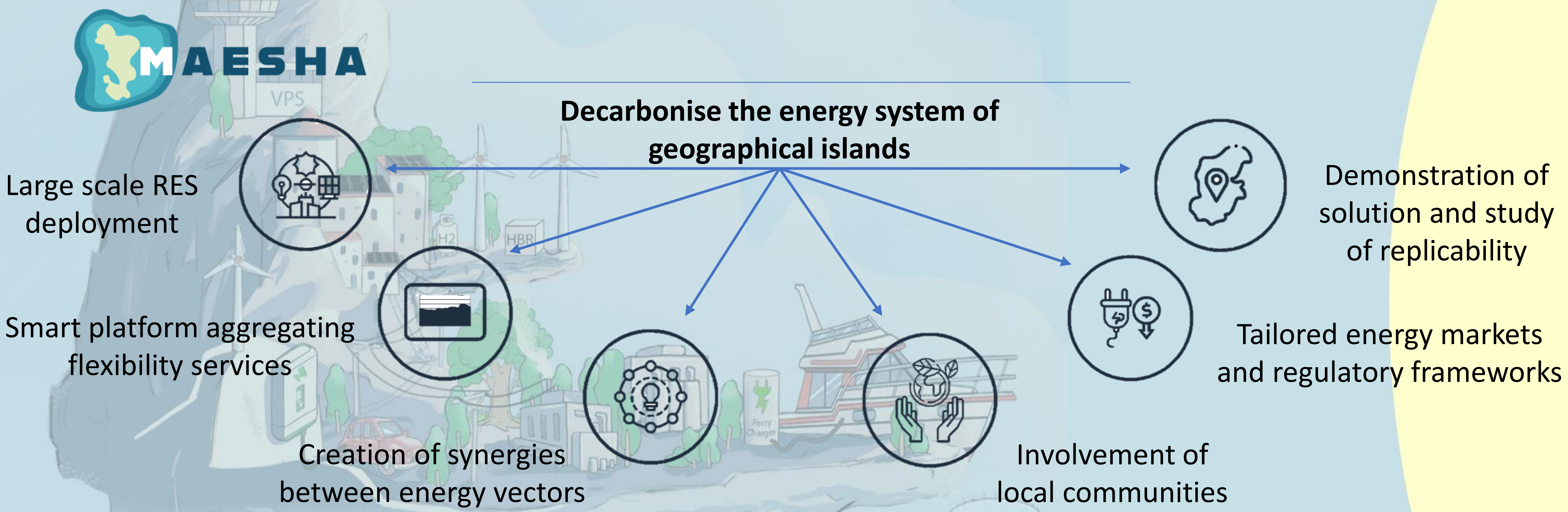
Demonstration in Mayotte (FR)

Combination of solutions towards a smart network

Renewables = Key for islands decarbonisation

Clean energy for EU islands

GREEN HYSLAND · MAESHA · IANOS · insulae · GIFT · REACT · NESOI · CRETE VALLEY · islander · VPP4ISLANDS · RobInson · TwInSolar


MAESHA
Decarbonise the energy system of geographical islands
Large scale RES deployment
Smart platform aggregating flexibility services
Creation of synergies between energy vectors
Involvement of local communities
Tailored energy markets and regulatory frameworks
Demonstration of solution and study of replicability

New Energy Solutions Optimised for Islands

NESOI

EUROPEAN ISLANDS FACILITY

NESOI New Energy Solutions Optimized for Islands

sara.ruffini@r2msolution.com

Goals

1. *Promote investments for energy transition in the islands*
2. *Facilitate the decentralization of energy systems*
3. *Contribute to EU policies and achieving 2030 climate targets*

Actual Results

***Primary Energy Savings**: 1021,4 GWh/yearGHG*

***Emission savings**: 442,2 KtCO2/year*

***RES production**: >22% island share*

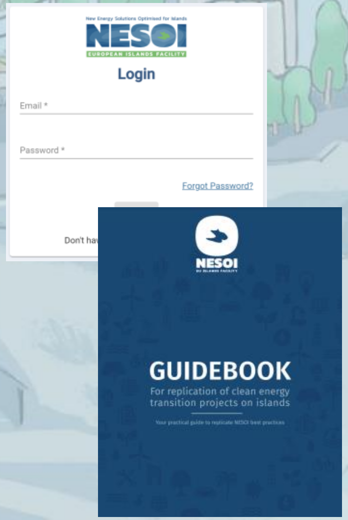
NESOI Solutions

EU level

*Creation of a **NESOI platform for exchange of Best Practices** and communication and dissemination activities*

***Coaching** and **Capacity buildings** for local entities*

Guidebook for Replication



Island level

***€3.1 million** allocated to Local Authorities to finance technical assistance activities (max grant €60k)*

*Complementary offer of **on-site technical assistance** and fund matching by the Consortium (worth €60k)*

REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION
Projects presentation

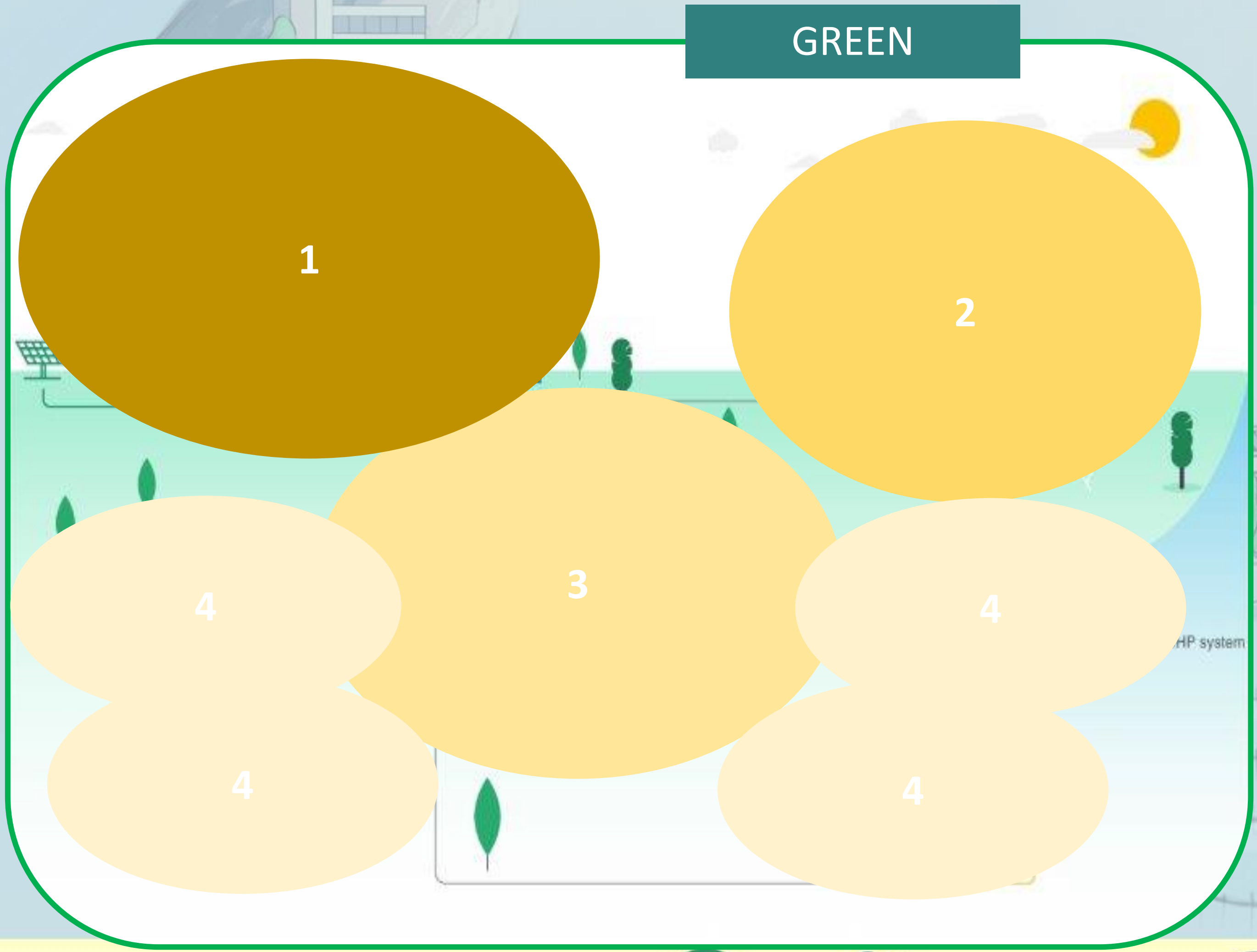
Green Hysland

Communication Leader

Christian Galletta

Christian.galletta@fedarene.org

Overview of GREEN HYSLAND



Highlights

- **Beginning**: 1st Jan 2021
- **End:** 31st Dec 2025 (extended minimum 6 months)
- **Co-funding:** 10 mln Clean H2 Partnership (23 mln total)

The valley in pills

Overview of GREEN HYSLAND

GREEN

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The valley in pills

1 The green **H2 production plant** located on CEMEX land in Lloseta

Overview of GREEN HYSLAND

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1. The green **H2 production plant** located on CEMEX land in Lloseta
2. **Hydrogen Refueling Station (HRS)** + 5 FC buses.

Overview of GREEN HYSLAND

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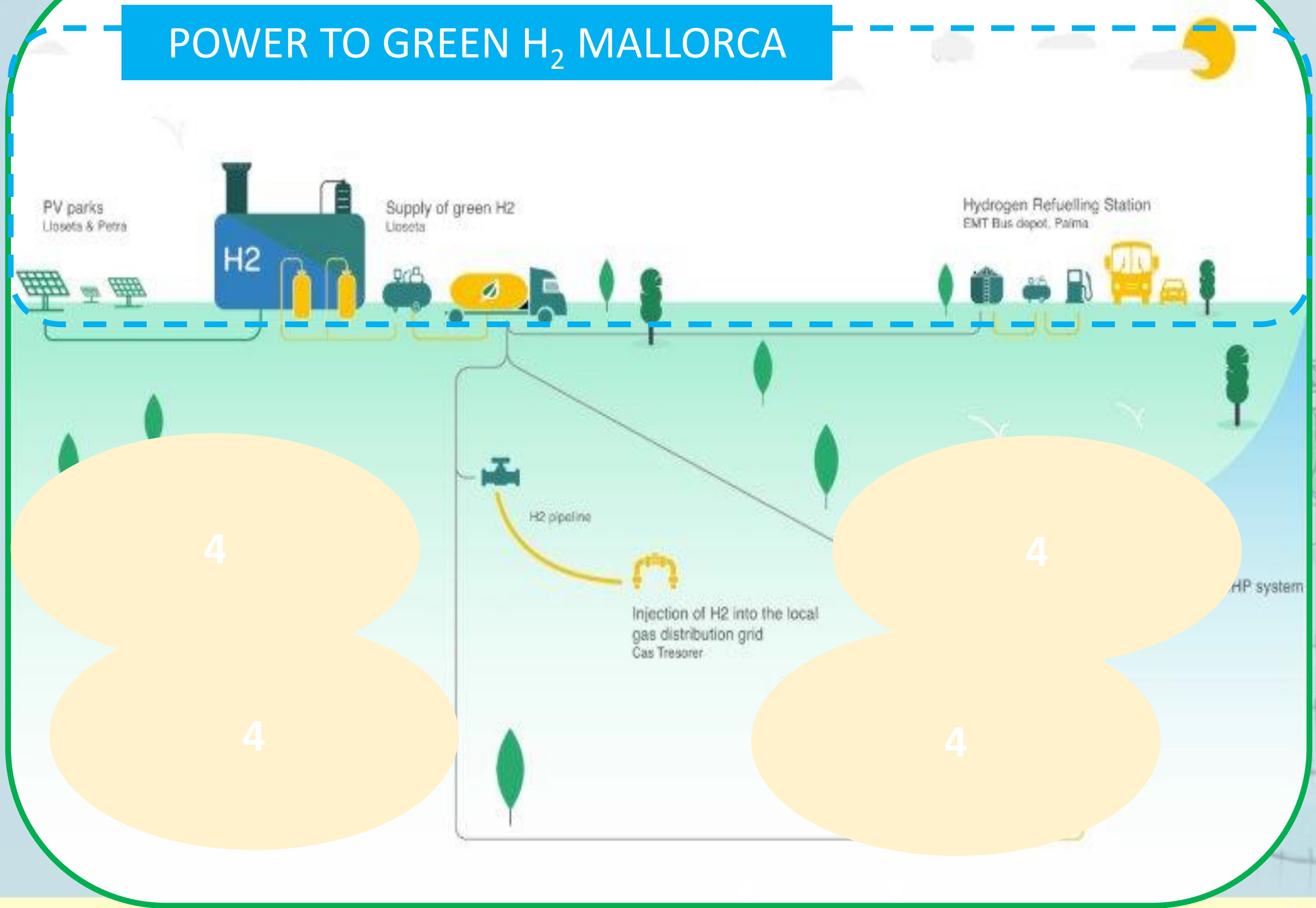
Clean energy for EU islands

Overview of GREEN HYSLAND

GREEN



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3. The **H2 pipeline** and **the injection point** (to blend part of the H2 into the NG pipeline)

Clean energy for EU islands

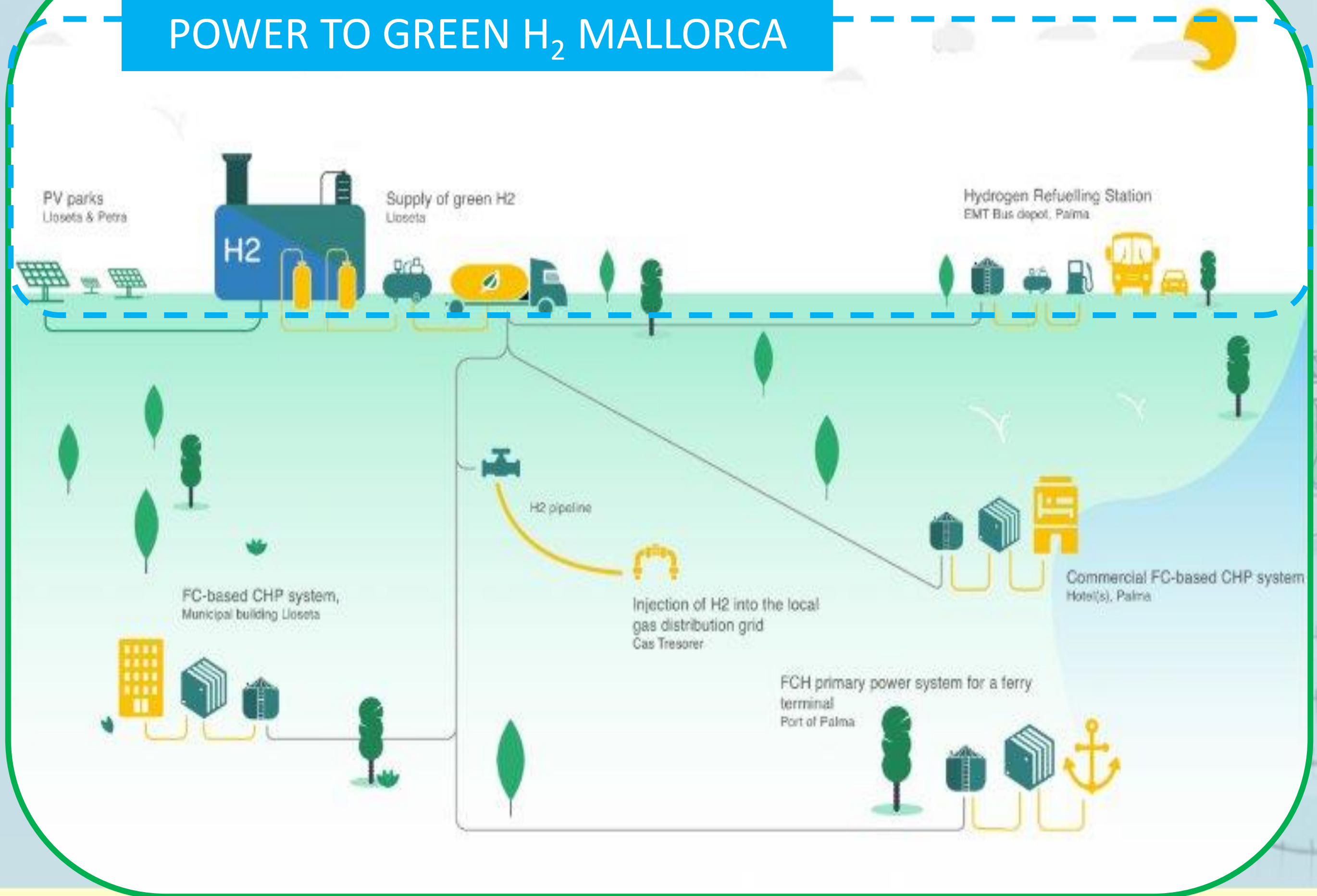
GREEN HYSLAND

MAESHA GIFT NESOI islander Robinson IANOS insulae REACT CRETE VALLEY VPP4ISLANDS TwInS

Overview of GREEN HYSLAND

GREEN

POWER TO GREEN H_2 MALLORCA



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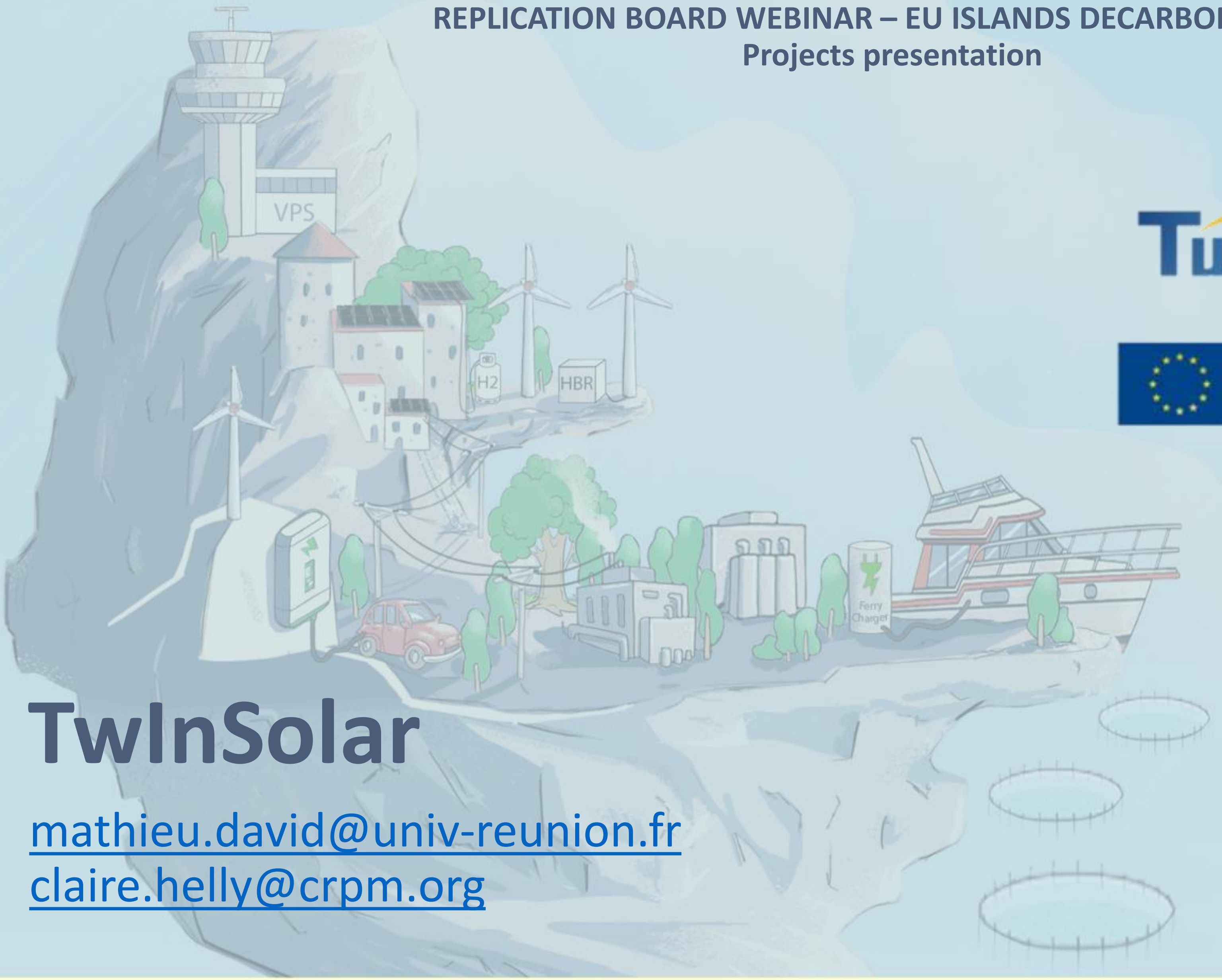
2. **Hydrogen Refueling Station (HRS)** + 5 FC buses.
3. The **H2 pipeline** and **the injection point** (to blend part of the H2 into the NG pipeline)
4. **4 End Users:** 1 Port terminal, 1 Hotel, 1 Municipal building, multiple natural gas users (H2 blended)

Clean energy for EU islands

REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION
Projects presentation



Funded by the European Union

TwInSolar

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claire.helly@crpm.org

Clean energy for EU islands

TwInSolar — Funded by the European Union

www.twinsolar.eu

Improving research and innovation to achieve a massive integration of solar renewables

A 3-year Horizon Europe project, with a 1,48 M€ budget, funded by the European Commission

Solar and load forecasting

Energy management

Design, modelling and sizing of energy systems

Case study:
Designing an innovative and affordable solution to supply Terre-Sainte Campus with 80% of renewable energy

In addition to research, TwInSolar aims at:

- **Building partnerships and reinforcing capacities**
- **Capitalizing on best practices** with other insular territories facing similar challenges

CRETE VALLEY

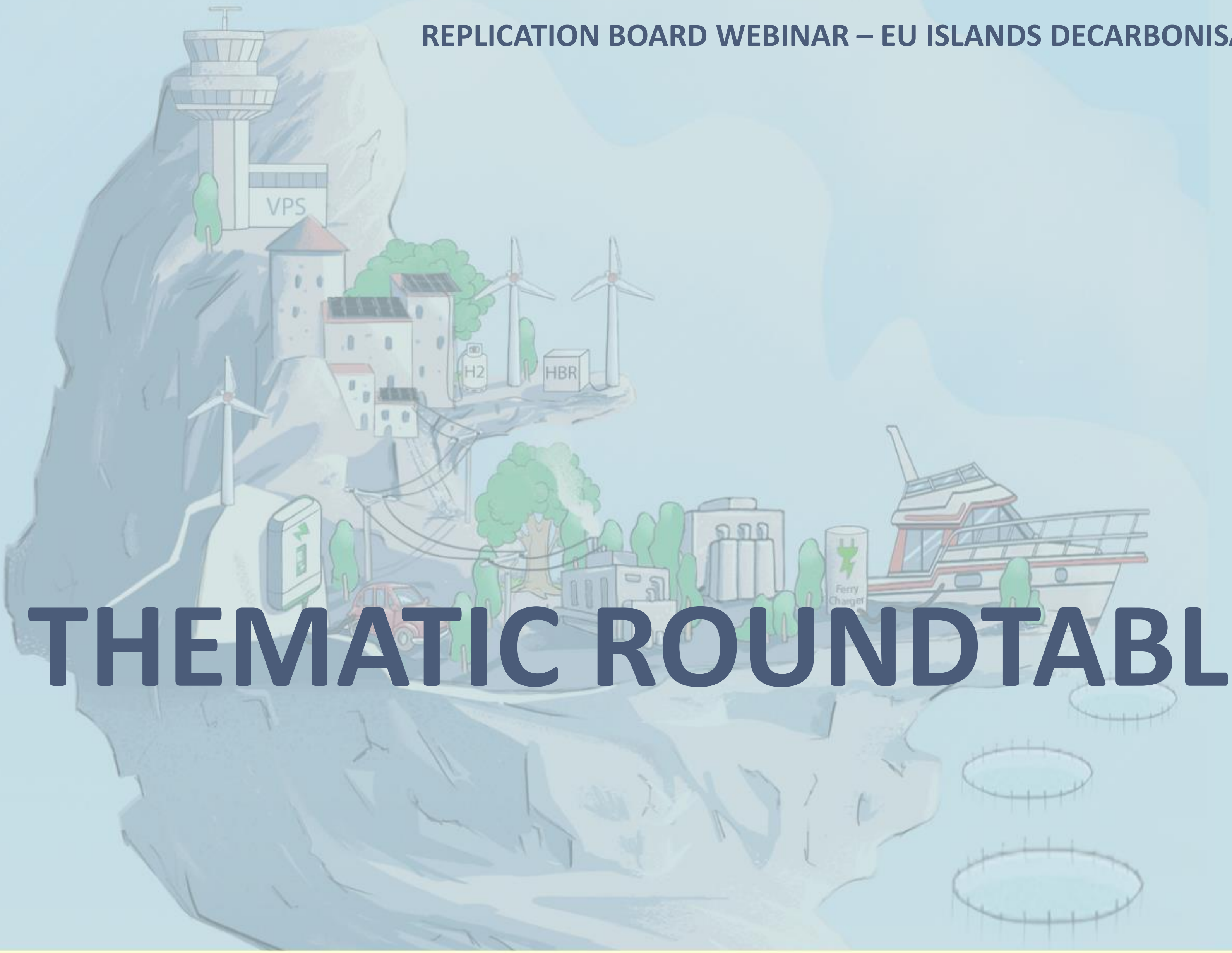
Crete Valley: Transforming Crete into a renewable, secure and independent energy system for all

Please insert a contact email

Crete Valley's approach to RE Valleys

CRETE VALLEY is a Horizon Europe project that will turn Crete into a **sustainable, decentralised energy system**, enabling the island to meet its energy needs through renewable sources.

- **41** partners
- **4** Community Energy Labs (CELs)
- **6** Renewable Energy Sources
- **320+** Facilities and households benefiting
- **5Y** duration



THEMATIC ROUNDTABLES

Topic 1 – Case studies and success stories from participating islands

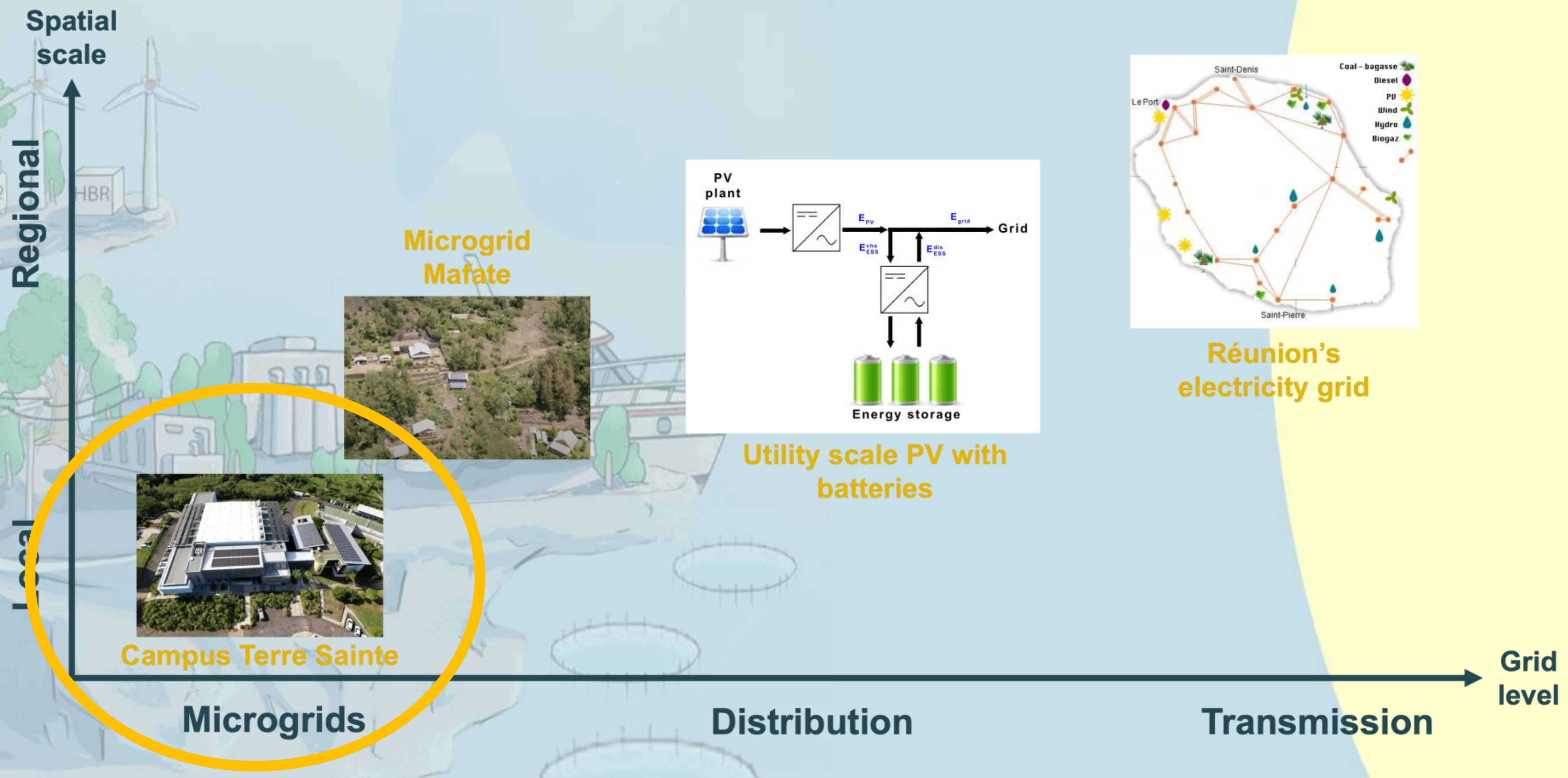
Roundtable

TwInSolar

La Reunion (FR): a living lab to support knowledge transfers, innovation and research

La Reunion: a living lab to support knowledge transfers, innovation and research

- *100% renewable electricity almost reach in 2024*
- *Path toward autonomy*
- *A set of operational solutions already implemented*
- *Data freely available for various systems*



Terre Sainte Campus microgrid: Maximisation of self-sufficiency and affordable energy supply

20 000 m^2 of floor area

Weather station

EV charging

1.2 GWh/year electricty demand

Restaurant

University buildings

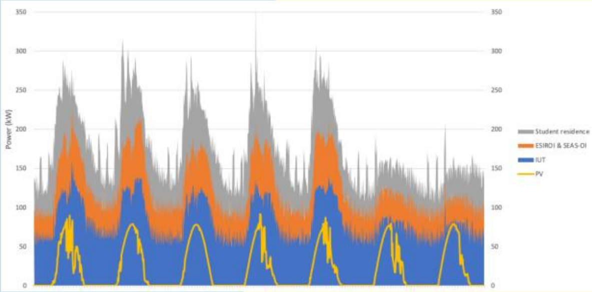
Student residence

Solar DHW

Fully monitored

Actual: 160 kW PV
16% self-sufficiency

Potential: 1 MW PV
80% self-sufficiency



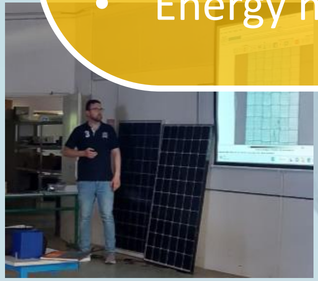
Freely accessible data: https://github.com/Laboratoire-Piment/TwInSolar_consolidated_data

TwInSolar

Terre Sainte Campus microgrid: knowledge transfer, research and innovation

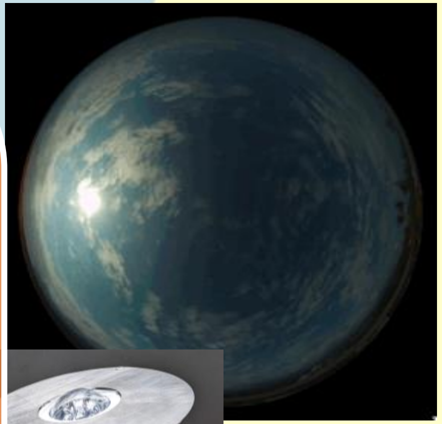
Knowledge transfer
based on collected data
and european leaders in field of energy

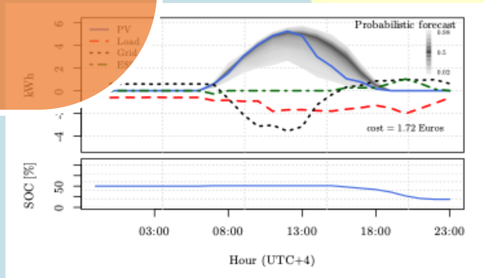
Workshops and summer schools:
- PV modeling
- Failure diagnosis
- Energy forecasting
- Hybrid Power Plant sizing
- Energy management



Research and innovation
based on local specific issues

- ERMESS – multicriteria technology selection and component sizing for microgrids
- High resolution probabilsitic forecast with sky imagers (collaboration Fraunhofer ISE)
- Predictive Energy Management System (EMS) based on probabilistic forecast and optimization (collaboration DTU)





MAESHA, an ambition for Mayotte (FR)

MAESHA

MAESHA, an ambition for Mayotte

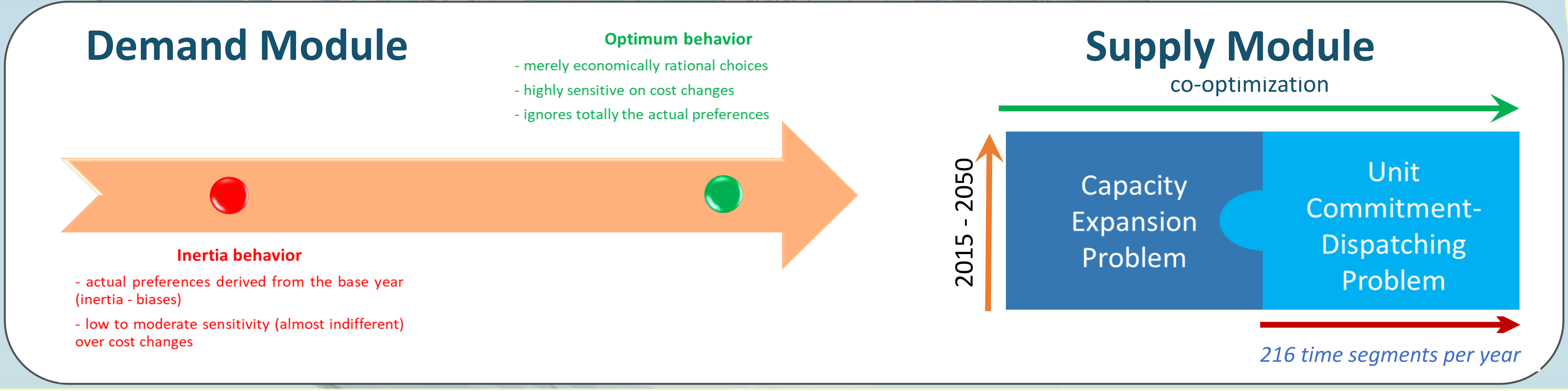
Modelling energy systems & performance forecasting in island scale

- Short-term machine learning forecaster of electricity demand and PV generation
- Power grid modelling tool for short- to medium-term frequency stability studies
- Island-scale economy-energy modelling framework to explore long-term energy transition pathways (E3-ISL)

MAESHA, an ambition for Mayotte

Modelling approach for long-term energy planning – E3-ISL model

- capture island specificities (full energy system, seasonal & intra-day load variation, constraints, etc.)
- adequate sectoral disaggregation (industry, households, services, transport);
- engineering-based representation of the power sector – optimization;
- behavioral representation of economic agents (preferences of consumers over different types of energy forms);
- inter-linkages between energy demand, supply and energy prices by sector – price elastic behavior of consumers

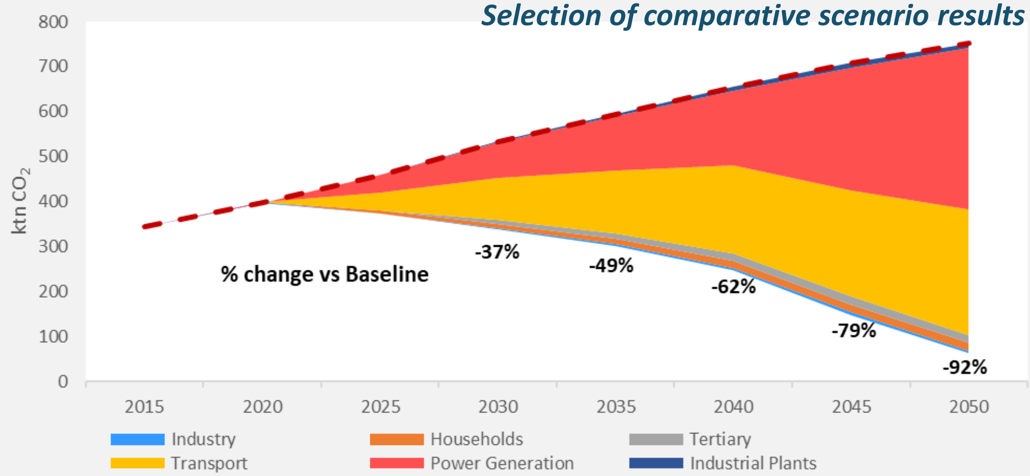


MAESHA, an ambition for Mayotte

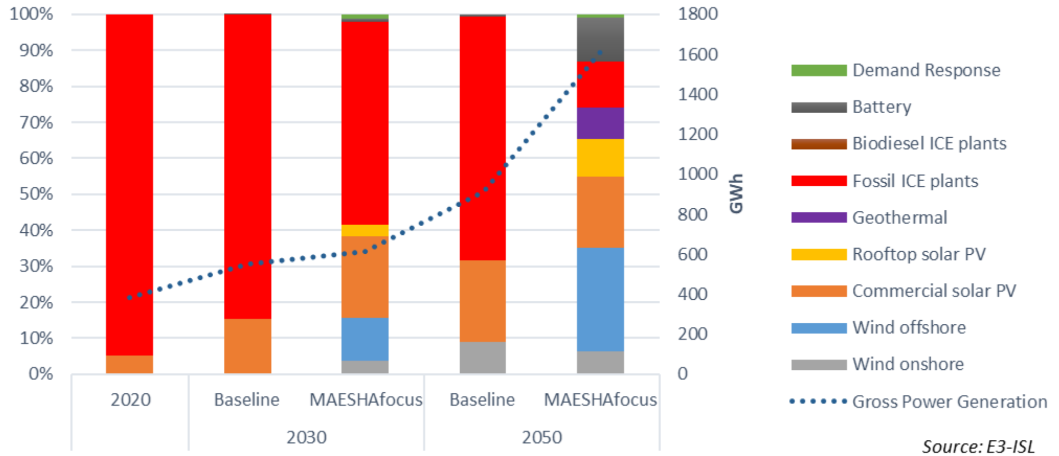
We have developed **long-term scenario-based energy assessments** for Mayotte till 2050:

- **Baseline**, four **(4) decarbonisation** scenarios, differentiated by their ***policy, technology, and temporal scope***
- ***Key levers***
  - **Electrification** combined with **high RES deployment** and **flexibility** options such as **battery storage & demand response.**
  - **Reserves** could be ensured by e.g. fuel switching of existing diesel plants to biodiesel.
  - **Local energy communities** could unlock the untapped efficiency potential on the demand side and largely contribute to carbon neutrality, via behavioral changes.

Selection of comparative scenario results



Source: E3-ISL



Source: E3-ISL

MAESHA, an ambition for Mayotte

LOCAL ENERGY COMMUNITIES (LECs)

MAESHA, an ambition for Mayotte

First... What is a Local Energy Community?

- According to the EU, Local Energy Communities are citizen-driven energy actions that contribute to the clean energy transition, advancing energy efficiency within local communities
- Legal entities that empower citizens, small businesses and local authorities to produce, manage and consume their own energy
- They can cover various parts of the energy value chain, including production, distribution, supply, consumption, and aggregation
- Under EU law, energy communities can take the form of any legal entity including an association, a cooperative, a partnership, a non-profit organisation or a limited liability company
- In the MAESHA project, we've widened the legal definition of a LEC, due to the restrictions of the local context of Mayotte

MAESHA, an ambition for Mayotte

Our work:

We have implemented 4 LECs in Mayotte:

- Student energy community
- Solar mamas
- Social Housing
- E-mobility

How...?

- Community-based approach

MAESHA

MAESHA, an ambition for Mayotte

What benefits do they bring?

- They contribute to increasing public acceptance of renewable energy
- They make it easier to attract private investments in the clean energy transition
- They can be an effective means of re-structuring our energy systems, by empowering citizens to drive the energy transition locally and directly benefit from better energy efficiency, lower bills, reduced energy poverty and more local green job opportunities
- They increase values such as trust, identity, and sense of community, helping to build stronger communities

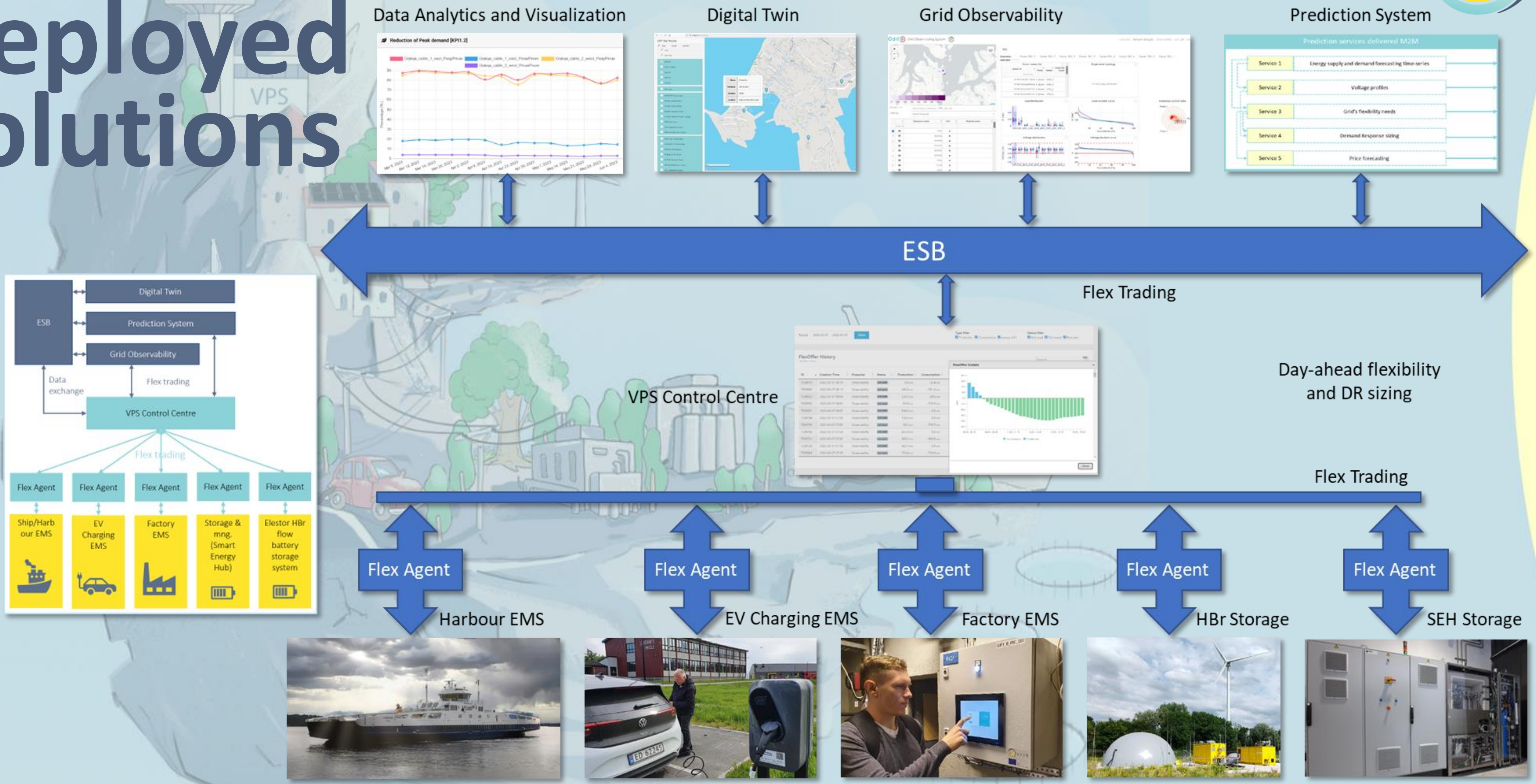
REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION

Thematic roundtable #1: Case studies and success stories from participating islands

GIFT

Hinnøya (NO) and Procida (IT)

Deployed Solutions



GIFT

Activation of Flexibility

Two schools (boilers, EV chargers)
Flex potential 1080 + 1350 kWh/day

Kindergarten (heating cables)
Flex potential 210 kWh/day

Hålogaland Kraft HQ (HVAC)
Flex potential 480 kWh/day

Wholesaler (two large freezers)
Flex potential 930 kWh/day

REACT

REACT: a succes story for small islands

- A holistic approach for targeted energy dispatch control actions (automated & manual).
- Real-time generation and load forecasting for optimal grid balancing.
- Innovative heat pumps and PV systems to be managed at community level.
- Energy storage: Deployment of high-capacity and environmentally friendly lithium-ion and aluminum-carbon batteries and conventional vented and valve-regulated lead-acid batteries and power-to-gas solutions.

Participants

- Most participants didn't know about demand response
- They all perceived themselves as knowing about energy savings but not much about energy management and storage.
- All were concern about energy prices
- In San Pietro environmental protection and savings - both economic and energetic- were mentioned as some of the positive aspects of the technology
- La Graciosa, first reluctant to participate and then very satisfied with the energy independence results.

REACT solution validation

Positive attitude towards the REACT solution in all four areas explored by the survey in all three islands:

- Perceived usefulness
- Perceived Ease of Use
- Attitudes Toward Technology Use
- Intention to use

Minor differences were encountered among the three pilots

User Engagement & Business Models

REACT engaged and involved the island residents in demand reduction and time-shifting activities

Innovative business models and exploitation plans will be developed and deployed to increase the penetration of RES, reduce fossil fuel consumption, allow for large-scale replication and enhance autonomy for islands

REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION

Thematic roundtable #1: Case studies and success stories from participating islands

VPP4ISLANDS

Formentera (ES) Replication by using SPT

Clean energy for EU islands

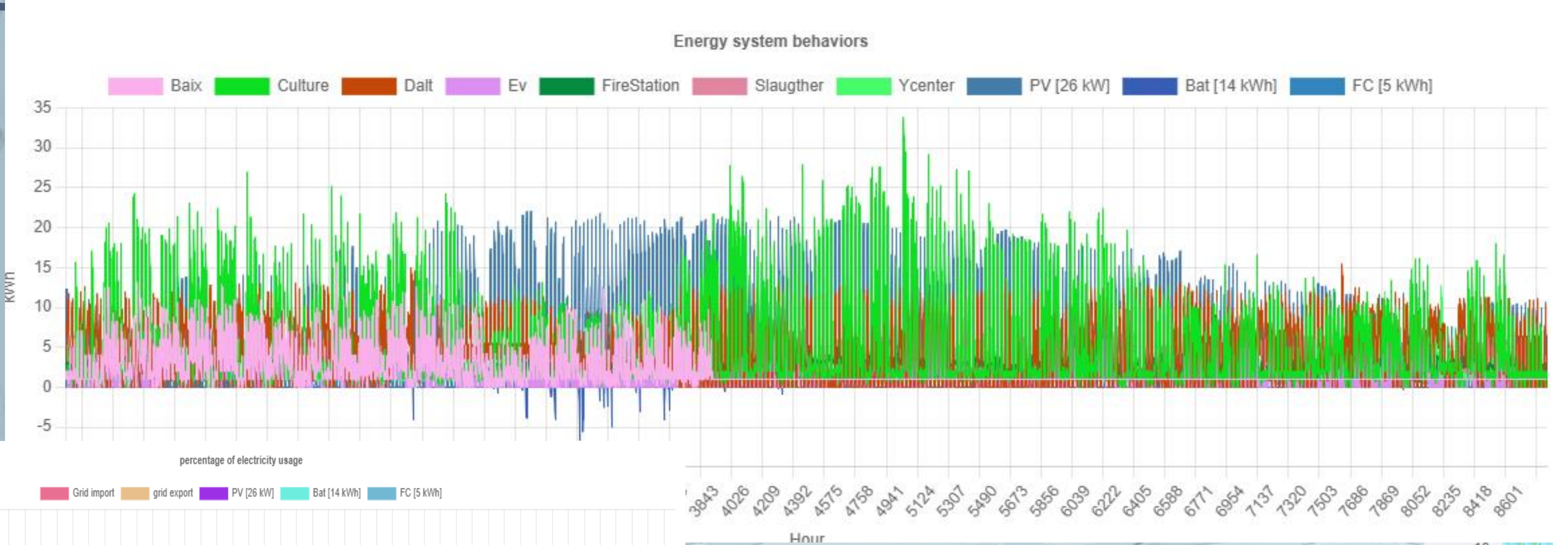
GREEN HYSLAND MAESHA IANOS insulae GIFT REACT NESOI CRETE VALLEY islander VPP4ISLANDS Robinson TwInSolar

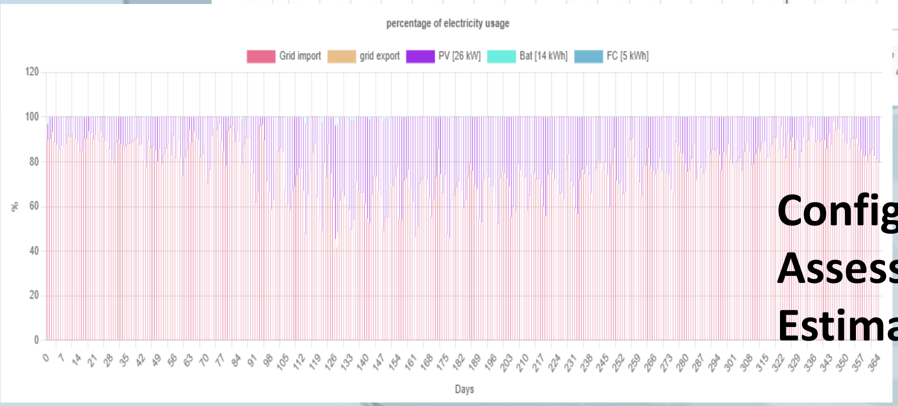
Formentera Replication by using SPT

Three replications have been studied and developed by optimizing and installing, such Formentera replication:

- *BESS, 14.4 kWh*
- *FuelCell 4 kW*
- *Electrolyzer 7.2 kW*
- *PV facilities 26 kW*

Simulation of existing Formentera Island energy systems





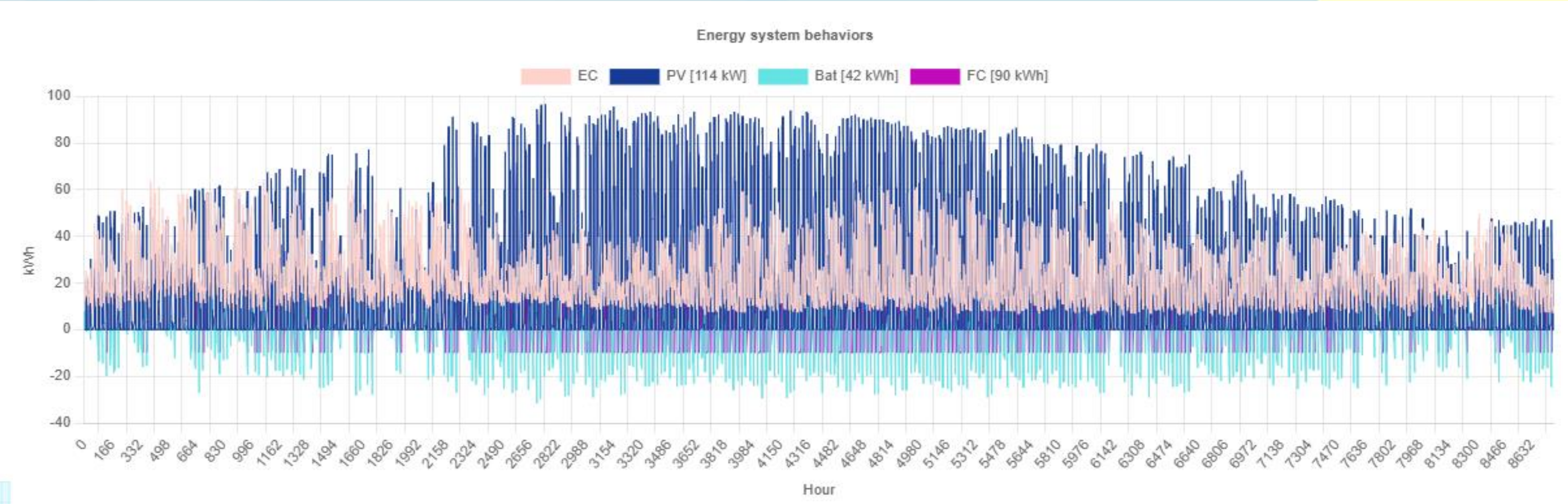
Configure Loads + Generators + storages
Assess profitability and sustainability
Estimate energy surplus

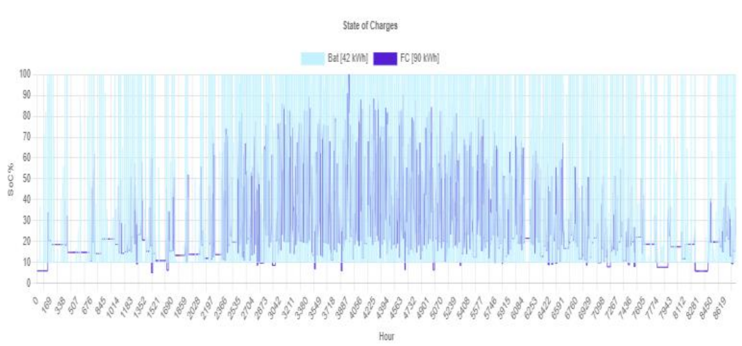
VPP4ISLANDS

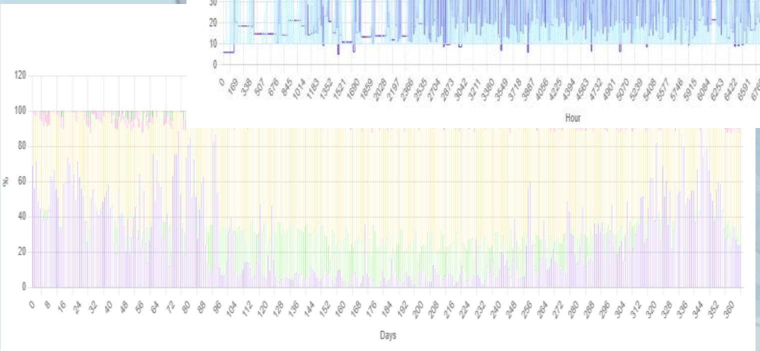
Optimization scenarios

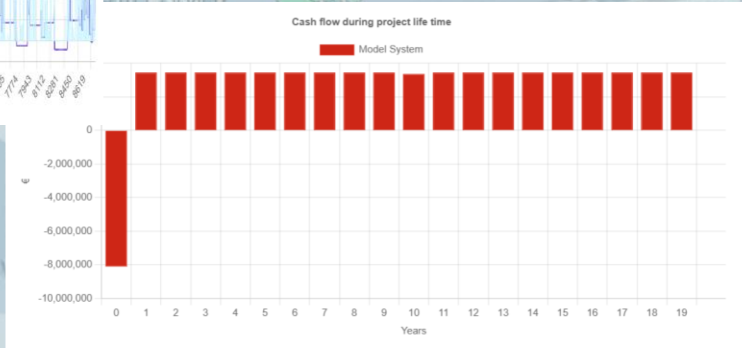
Optimized sizes of energy assets

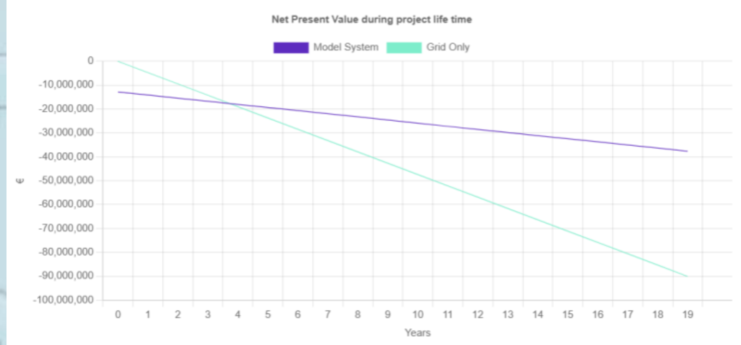
In a self-consumption energy community











VPP4ISLANDS

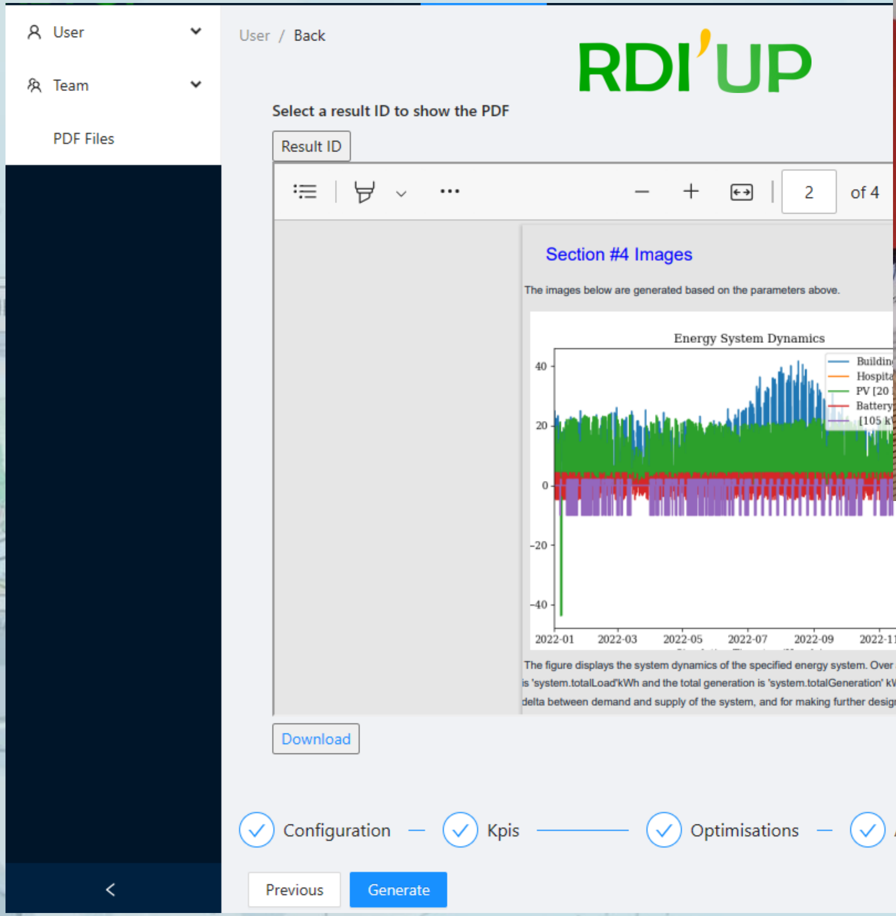
Replication plan generation

PDF Report Including :

- *Inputs/results*
- *Best practices*
- *Lesson learnt*

The optimization depends on :

- *Self-consumption*
- *Trading*
- *Flexibility provision*
- *Savings/decarbonization*



Topic 2 – Potential and tools for replication

Roundtable

ROBINSON replication tools

ROBINSON replication tools

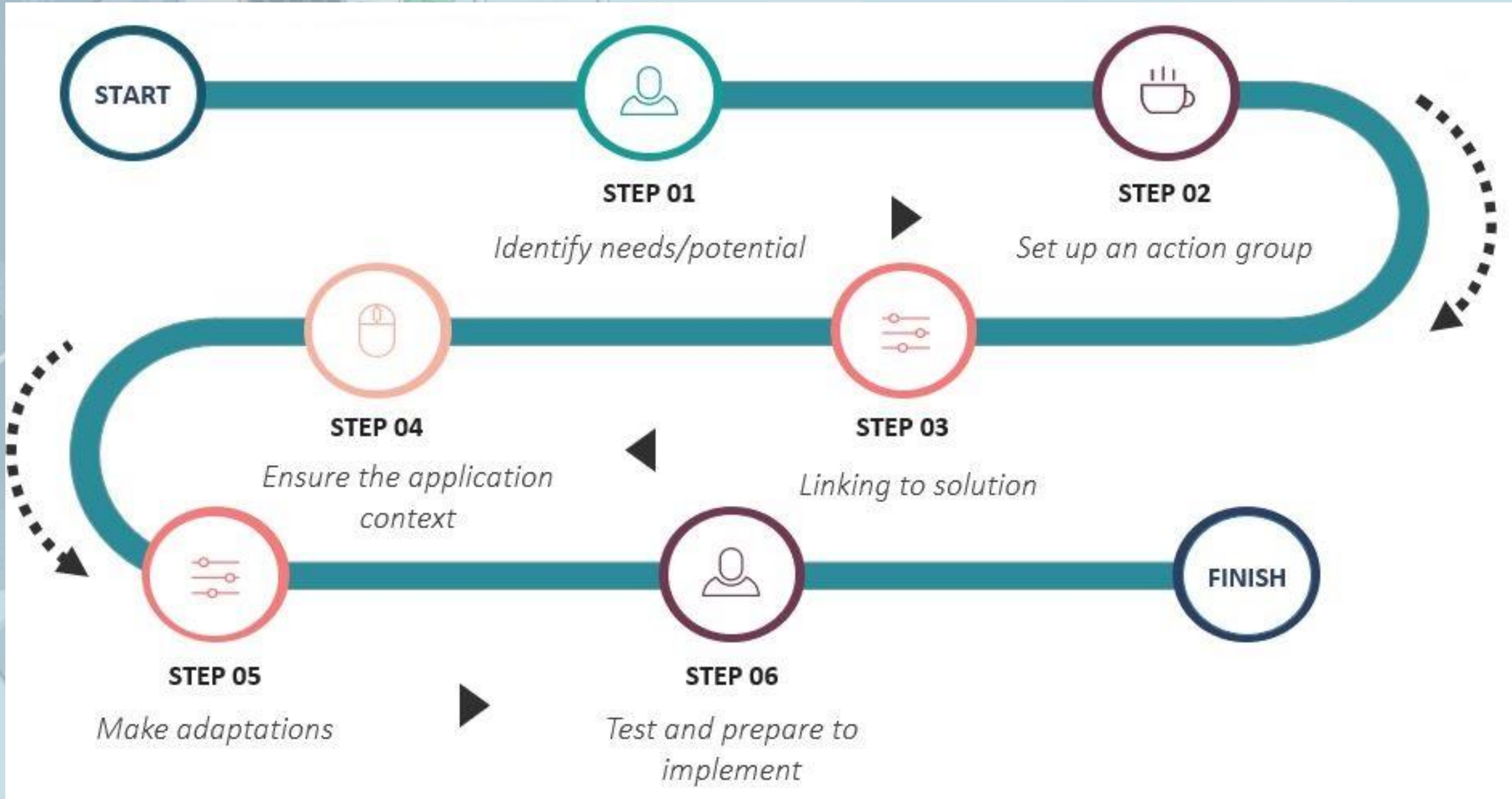
The ROBINSON Consortium has been developing two relevant tools to enable the replication of its technological solution:

1. The **ROBINSON Web Evidence Base** encompasses data and knowledge developed so far to augment the potential for creating channels for solutions up-scale and uptake. The Evidence Base can be used by external decision makers and for preparing the replication plans, exploiting the project results.

2. A **Replication Roadmap Tool** is also provided as part of the Evidence Base, to support the end users on ROBINSON concept decisions (technology, methodology, results, lessons learnt, legal framework). It provides exploitable replication plans to the end-user, based on a six-stage analysis.

ROBINSON replication tools

The six-stage analysis of the ROBINSON Replication Roadmap Tool



New Energy Solutions Optimised for Islands

NESOI

EUROPEAN ISLANDS FACILITY

Guidebook for Replication

New Energy Solutions Optimised for Islands
NESOI
EUROPEAN ISLANDS FACILITY

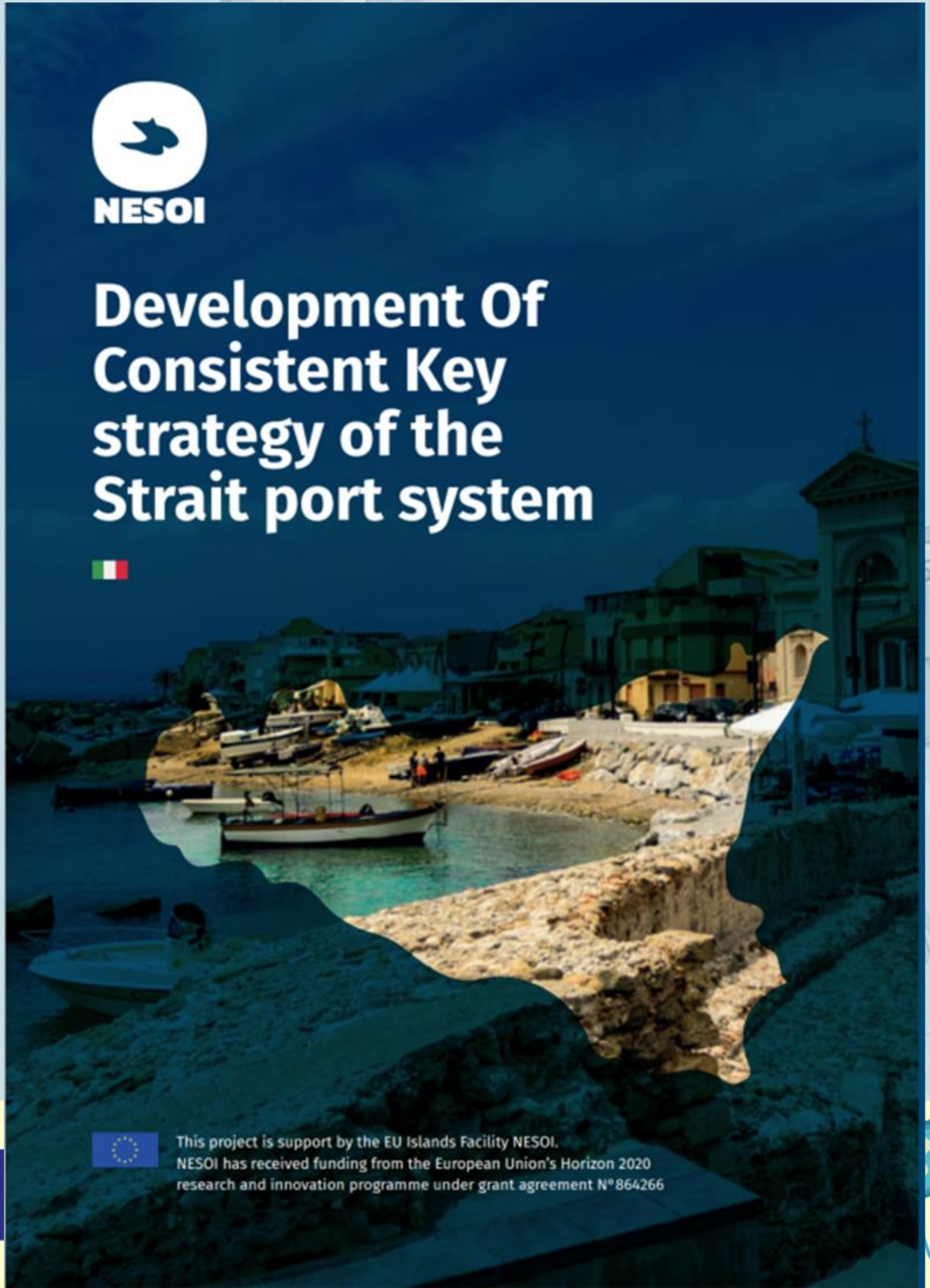
Guidebook for Replication

The ***Guidebook for Replication*** *is designed to help the stakeholder to* ***choose between FIVE thematic areas of NESOI Best Practices***

- Energy Community
- Renewable Energy Sources
- Hydrogen
- Energy Planning
- E-Mobility

REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION

Thematic roundtable #2: Potential and tools for replication



ENERGY PLANNING

Key Project Data

Maturity Level
Entry level

Beneficiary/ies
Autorità di Sistema Portuale dello Stretto di Messina

Geographical area
Western Mediterranean
SICILY, ITALY

Area of Intervention
Energy auditing and analysis, Energy planning

Financial Leverage Factor
1,060.0

Technical Assistance Menu
Planning Docs

Mobilized investment
128,384,000

45

Guidebook for Replication

New Energy Solutions Optimised for Islands
NESOI
EUROPEAN ISLANDS FACILITY

Guide you through the Best practices and the NESOI technical assistance

SHORT PROJECT DESCRIPTION

The objective of the Project was to draft the Environmental-Energy Planning Document of Port Systems (DEASP) for the ports of Messina, Milazzo and Tremestieri, in Sicily, owned by the Port Authority of the Strait of Messina (AdSP). The obligation to draft a DEASP was introduced by Legislative Decree 169/2016. It concerns each Italian Port Authority, in accordance with the guidelines published by the Ministry of the Ecological Transition. Since the Port Authority also owns the ports of Reggio Calabria and Villa San Giovanni (located in Calabria on the Italian mainland), the DEASP also includes sections focused on these ports, but these sections were drafted by the Port Authority using its own funds and not with NESOI's technical assistance.

The DEASP defines strategic guidelines for implementing energy transition measures, in order to improve energy efficiency, promote the use of renewable energy in the port area and introduce measures that will deliver environmental benefits for the citizens of neighbouring regions as well as for the port users.

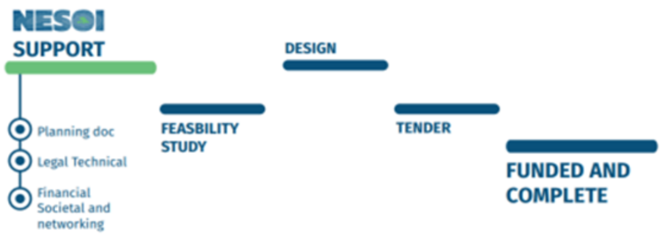
Depending on the envisaged objectives and measures, it is expected to reduce the primary energy demand by 30 GWh/y and avoid 24.373 tCO2e/y in GHG emissions (corresponding to 58% of GHG emissions of the ports in 2020– excluding the refinery and the thermal power plant in Milazzo). The positive impacts expected from its implementation will also affect other areas such as air quality, employment growth, even in related industries and a higher share of renewable energy, particularly photovoltaic and tidal energy.

The investments connected with these measures can be estimated at approximately €130 million for construction work already financed and at various stages of completion, in addition to €60 million covering work for which government loans have already been requested. Out of this total amount, the envisaged investments are: €90 million for constructing the LNG platform (POT 2020-2022, approved on 07/08/2020), €10 million for operating the tidal power plant, €8.2 million for installing new photovoltaic systems on building roofs and parking canopies, €20 million for cold ironing systems, plus additional investments for enhancing the energy efficiency of buildings, public lighting and for new electric vehicles and associated charging infrastructure.

WHY IS NESOI SUPPORTING THIS PROJECT?

The project was implemented as a collaboration between local consultants and NESOI's programme partners who offered technical and financial expertise. The Port Authority has entered into further Grant Agreements with local consultants (University of Reggio Calabria, ENEA and CNR-ITAE).

The support was conducted by analysing the baseline situation of the ports in terms of socio-economic and environmental context, infrastructure, assets, traffic, and from analysing and mapping regional, national and European planning tools in order to ensure consistency across planning actions within the current framework.



NESOI Assistance: tailored solutions provided

AT LEGAL-REGULATORY LEVEL

Analysing local, regional, national, and European regulatory context

Conducting the analysis in line with the guidelines of the Italian Ministry for Ecological Transition

AT TECHNICAL LEVEL

Assessing energy balance and carbon footprint of the ports

Conducting high-level climate change risk assessment

Identifying and studying potential energy transition measures (energy efficiency of buildings and public lighting, electric vehicles, LNG storage and supply to vessels, renewable energy generation – PV and tidal power, etc.)

AT FINANCIAL LEVEL

Conducting high-level cost-benefit analysis

Identifying potential funding options

AT SOCIETAL & NETWORKING LEVEL

The activities of the D.O.C.K.S. project was presented by the of the Port Authority's CEO at the "Green Salina Energy Days" event on 9 September 2021, Port&Shippingtech2021 on 7 October 2021 in Genoa, and at several seminars as well as many press releases.

Guidebook for Replication

GREEN HYSLAND
MAESHA
IANOS
insulae

REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION
Thematic roundtable #2: Potential and tools for replication

Guidebook for Replication

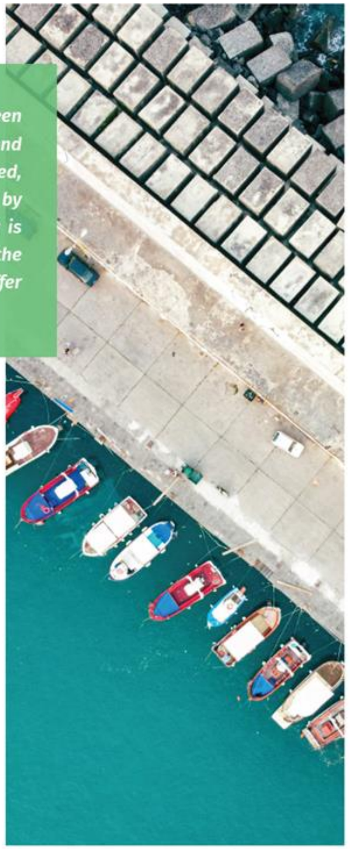
RRL

Points (0=min, 3=max)

Total *2.4*

Geographical	There is no replication constraint for the project since every island has a port	3
Technological	Most of the technologies included in the energy plan have a high replicability in different contexts	3
Legal	In Italy port energy plans are now mandatory, but this is not the same across the entire EU, thus the replicability is slightly lower. In any case, if it is mandatory, as in Italy, it will be a driver for the project. Where there are no legal barriers, it would be a voluntary process.	2
Social acceptance	The project can have a high social acceptance since it benefits the community, there may be different levels of social acceptance, depending on the specific technologies selected to achieve decarbonisation	2
Funding raising/ investment actractivity	Port authorities are generally able to call on significant investments through public and private fund streams, but if in different contexts the situation is different and there is no obligation to develop port-level energy plans, the replicability potential could be lower.	2

The Z-156 Port-level energy planning project has been assessed as having a moderately high replicability and operational potential, with a score of 2.4/3. Indeed, the project builds upon a methodology developed by the Italian Ministry for Ecological Transition that is applicable to all ports, whether on islands or on the mainland, with technological features that may differ from port to port depending on local conditions.



This means that replicability is very high from a geographical and technological perspective since no barrier has been identified under these categories. On the other hand, the replicability potential is moderate for legal, social acceptance and investment attractivity: indeed, on one hand the absence of an obligation to carry out port-level energy plans could prevent the replication and the funding of the project, while on the other hand the specific technologies selected for port decarbonisation could have different levels of social acceptance.

GREEN HYSLAND

WP6 Scaling up and Replication of H_2 island ecosystems across the EU and beyond

GREEN HYSLAND

Replication of H_2 ecosystems to other EU island territories and beyond

Increasing the market size by creating economies of scale

Increase the value of international cooperation.

Dynamic simulation

- **of the energy flows and financials of the system**, to better study the replicability potential to other EU islands.

A **replication study**

- carried out in Green Hysland context in close collaboration with all EU follower partners i.e. Achill, Ameland, Rhodes, Madeira, Tenerife; and Chile

Followers participate in

- the **definition of end-user requirements** and **energy demand** across different sectors (e.g. industry, transport, heat and power, adapted to each follower country/region), and existing and planned electricity and gas infrastructure to facilitate replication to their respective territory

The model assessment

- will take into account scenarios with and without public support e.g. support for CAPEX, OPEX and other potential public subsidies.

GREEN HYSLAND

HTP Tool

Implementation of a **Frontend (Excel)** and **Backend (Python)** development approach.

LEARN MORE HERE

https://h2territory.eu/replicability-tool/

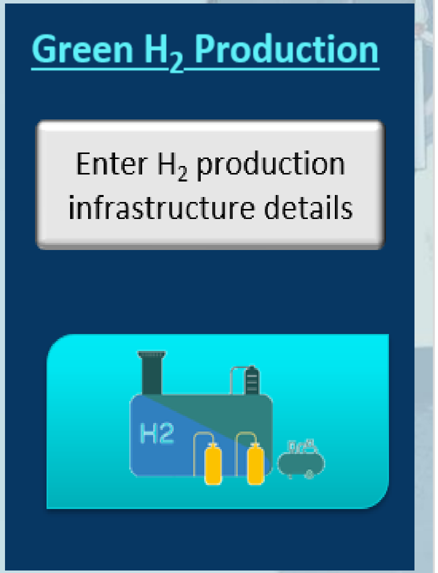
Clean energy for EU islands

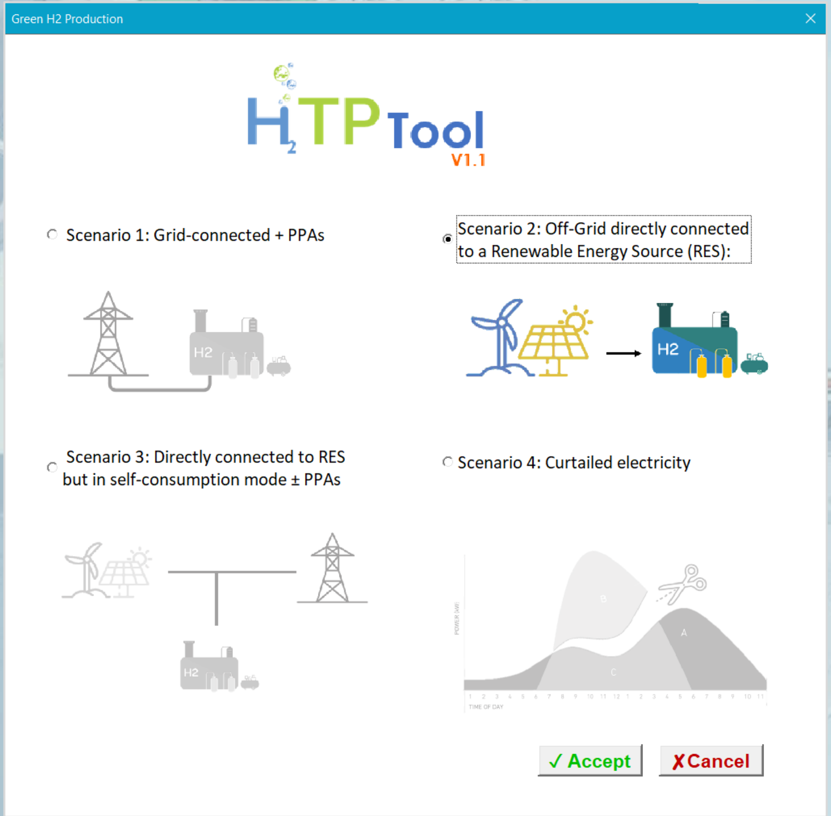
GREEN HYSLAND

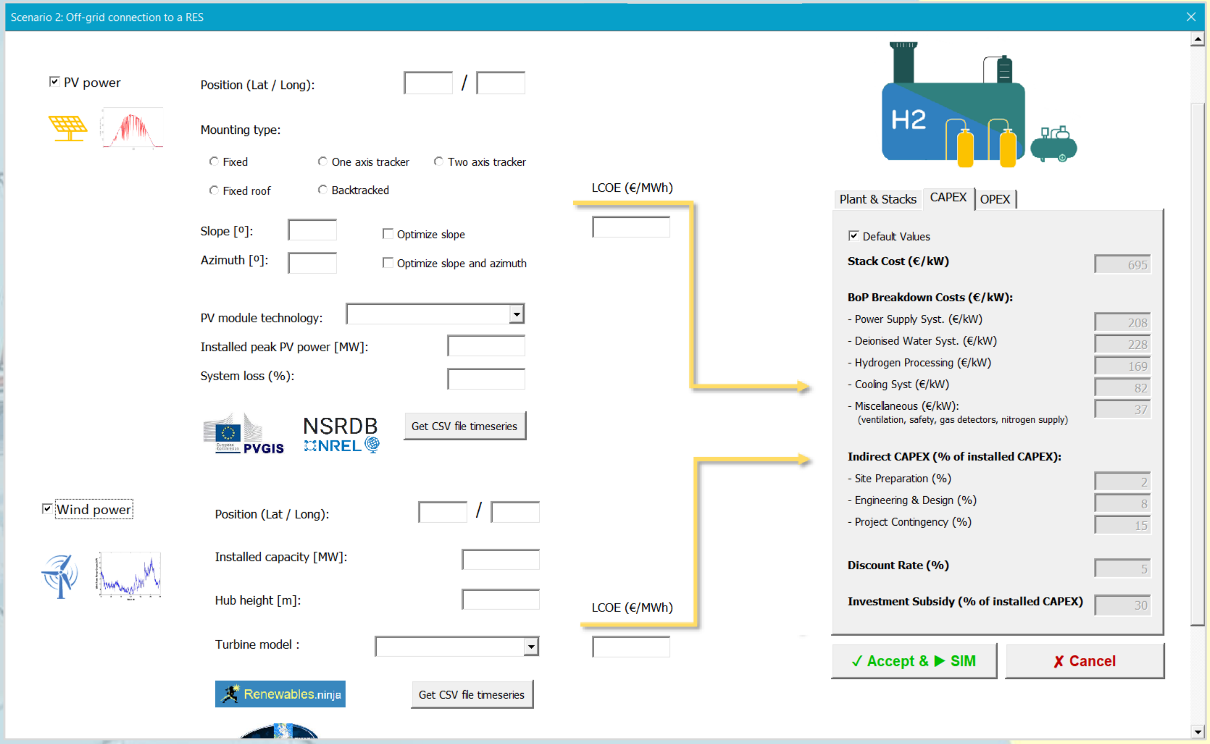
GREEN HYSLAND

Green H2 Production Plant

Simulation of green H2 production



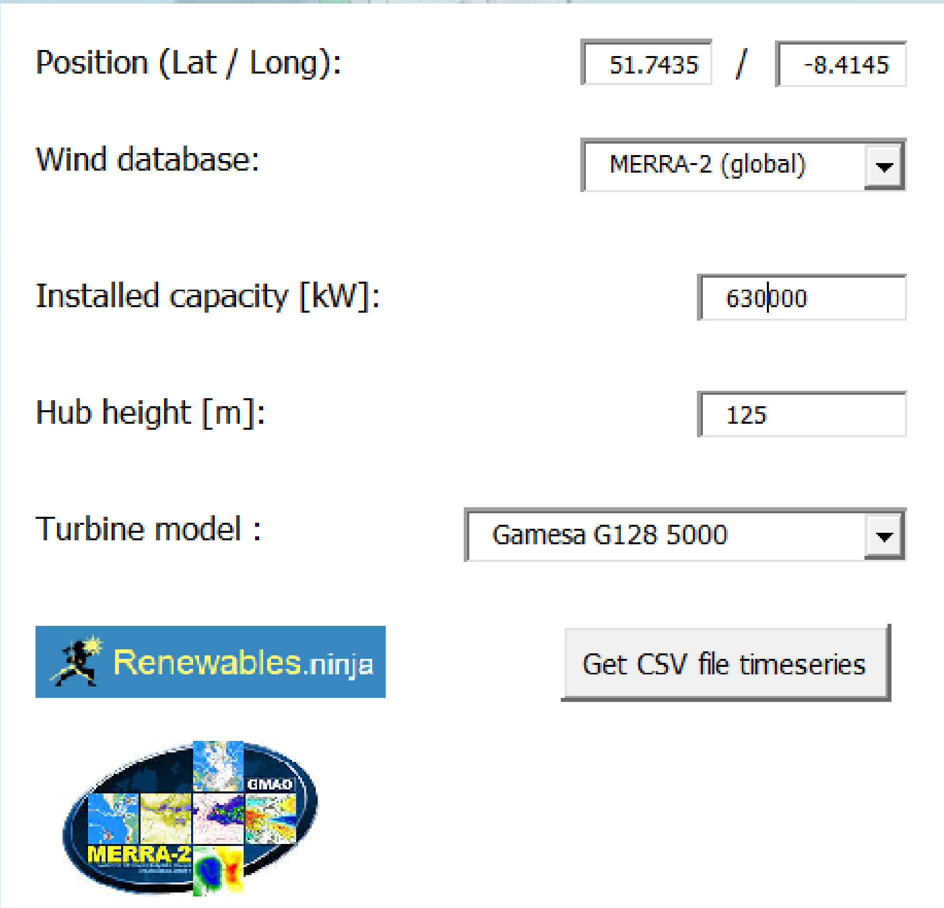


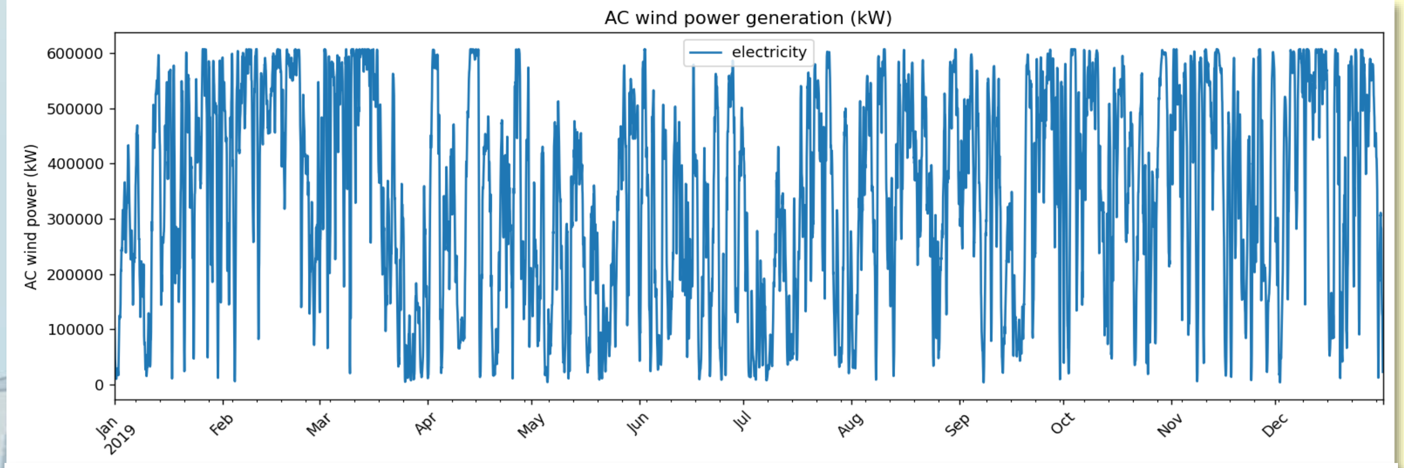


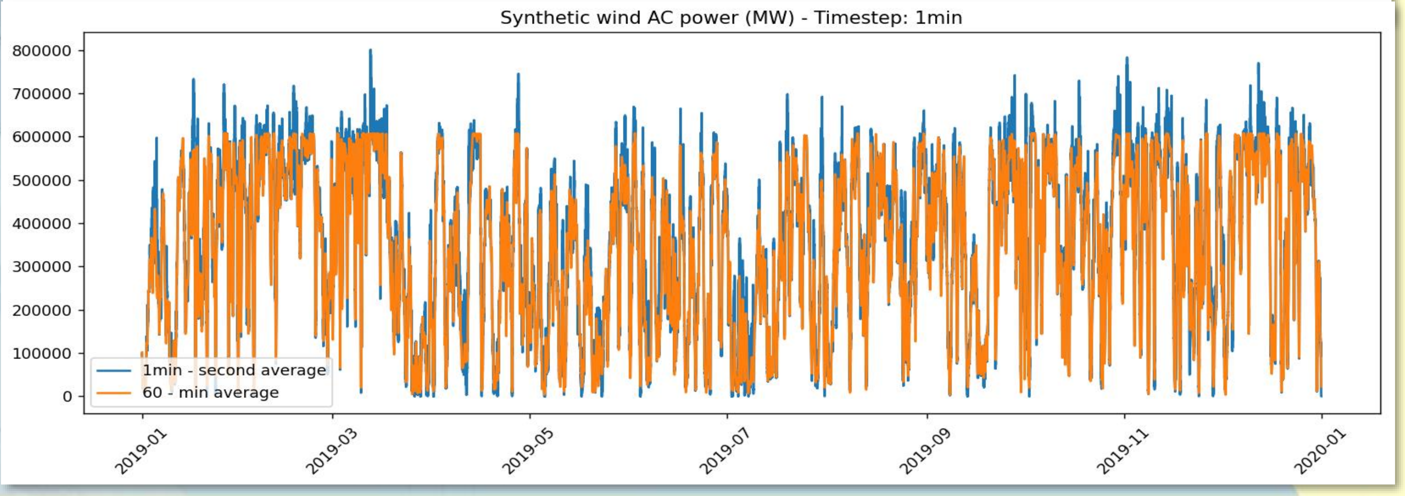
Use of open-source databases to get PV and wind power in the territory

GREEN HYSLAND

Achill island case of study



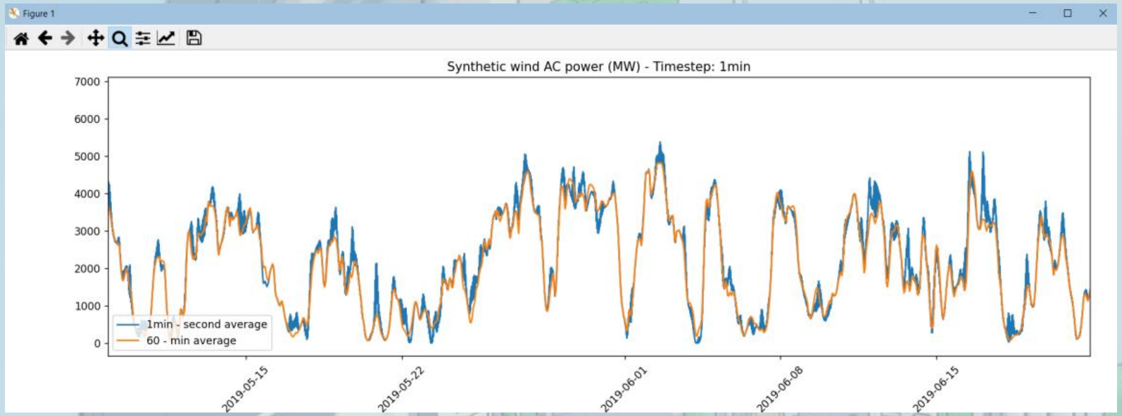


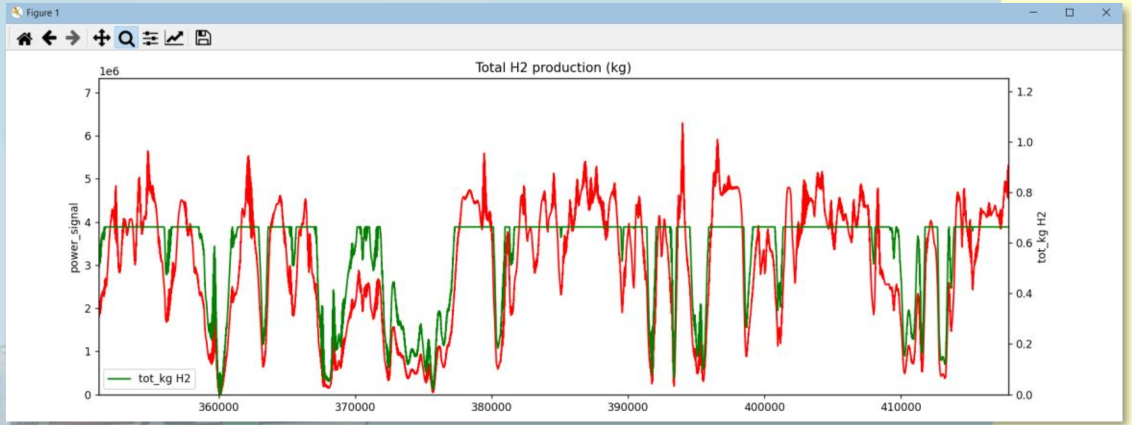


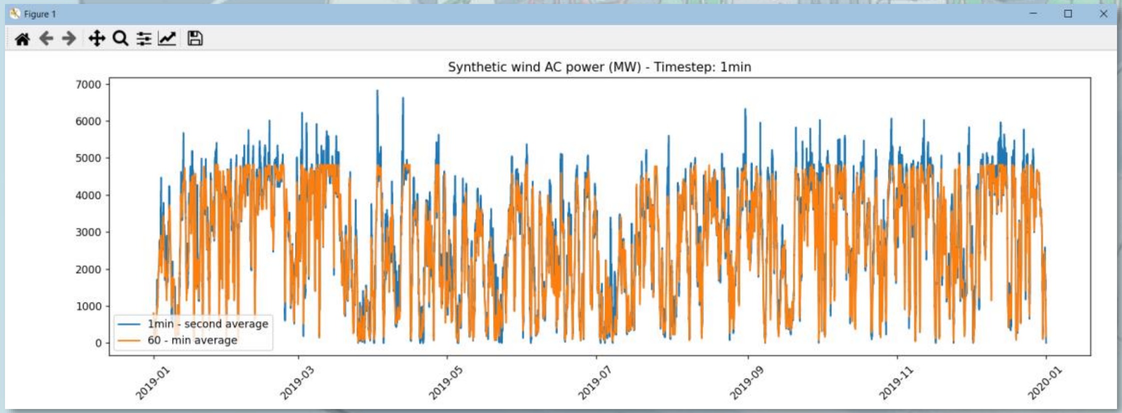
GREEN HYSLAND

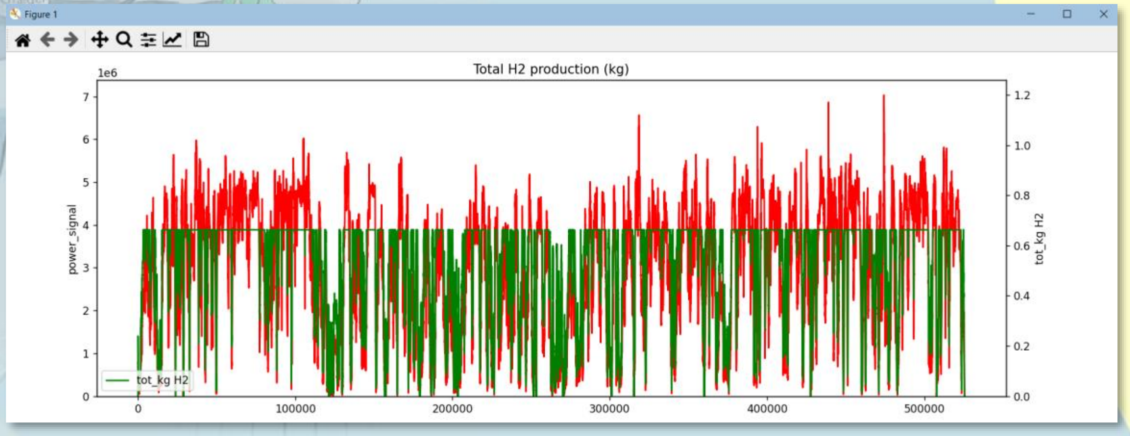
Accuracy in the results

Optimisation of timesteps to obtain most accurate results





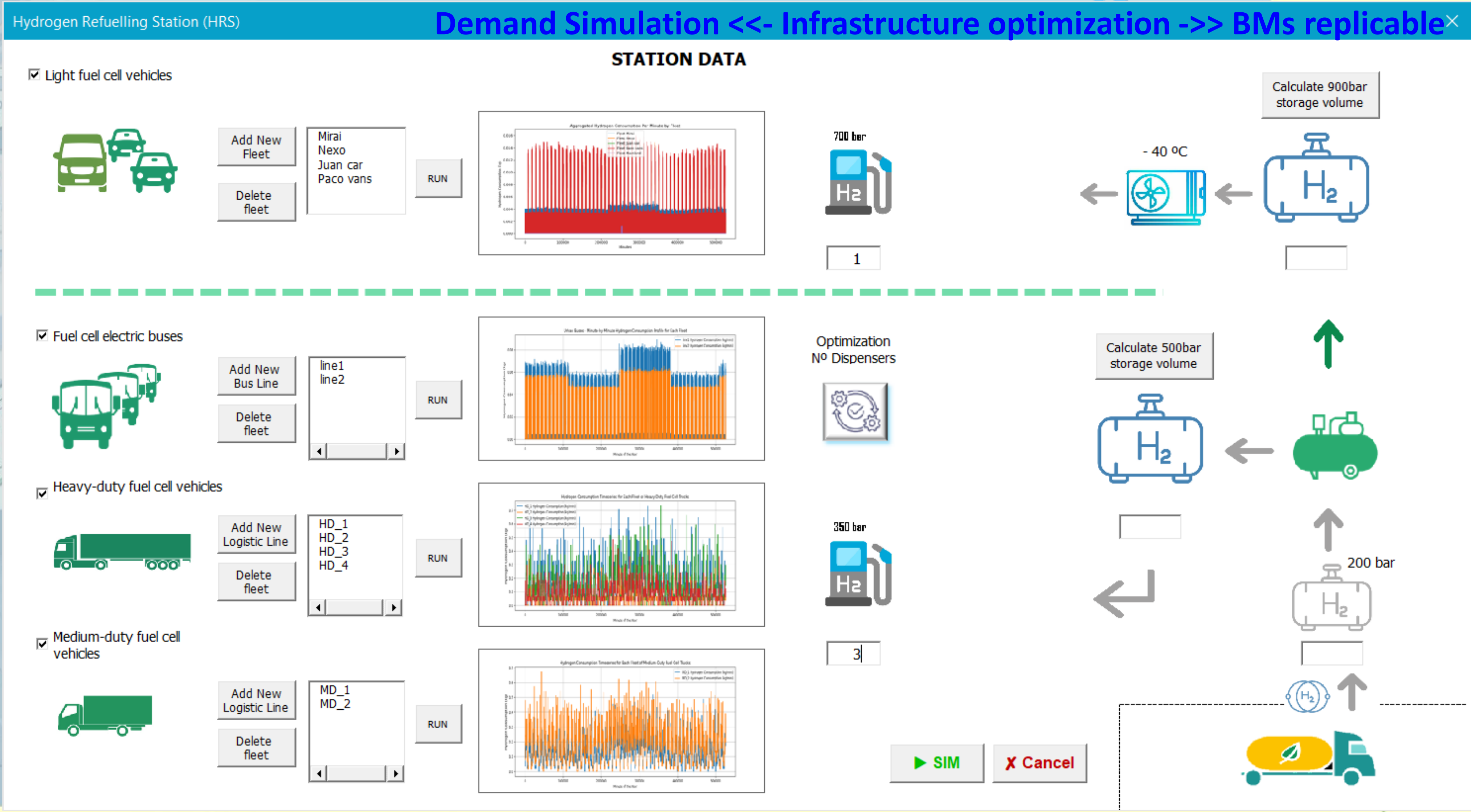




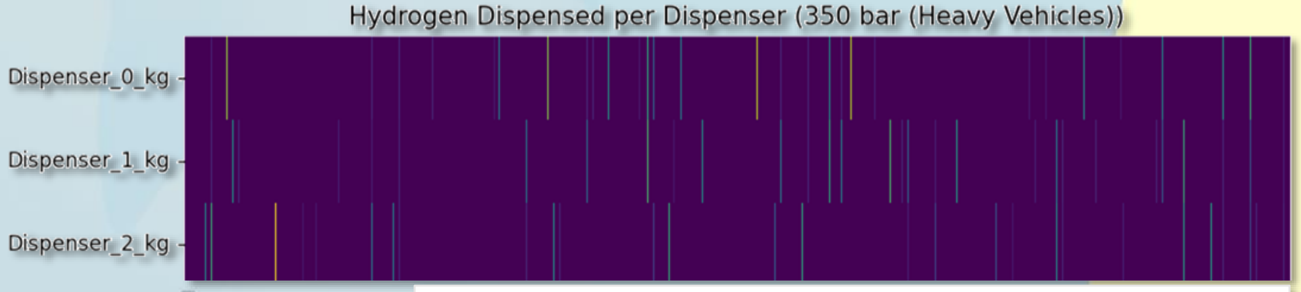
GREEN HYSLAND

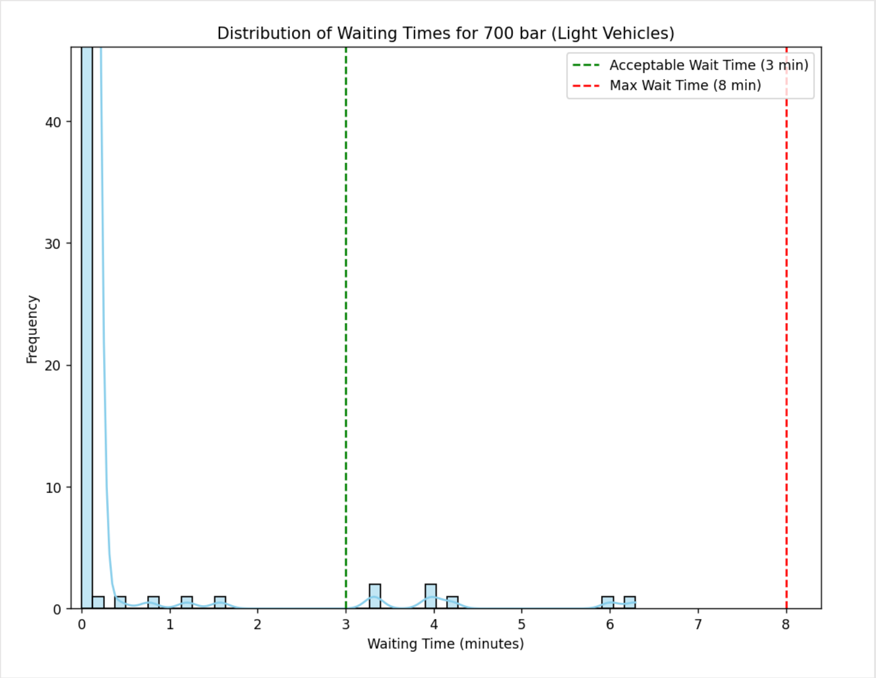
New BMs, New features

New BMs, New features



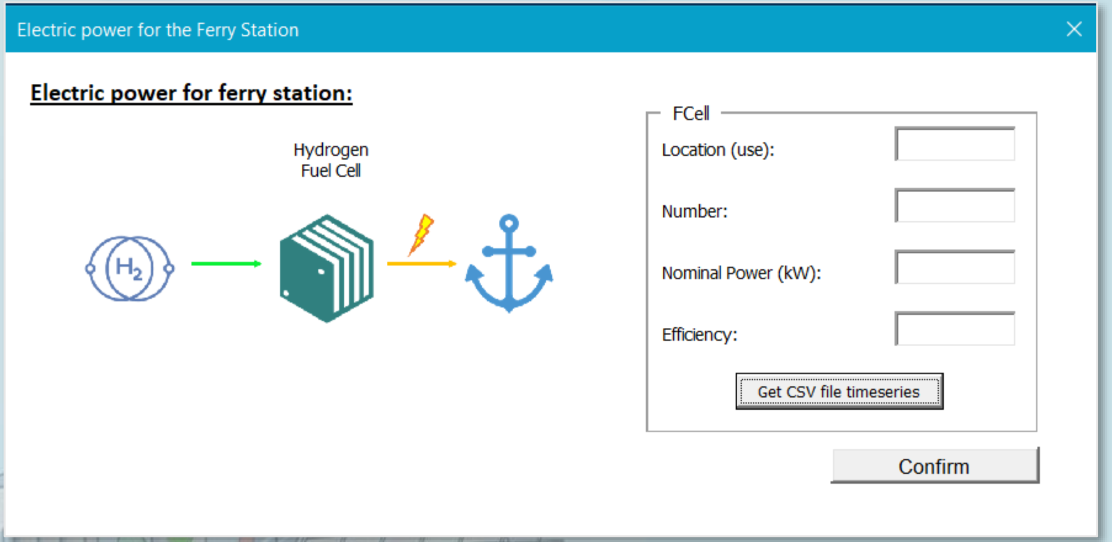
New BMs, New features

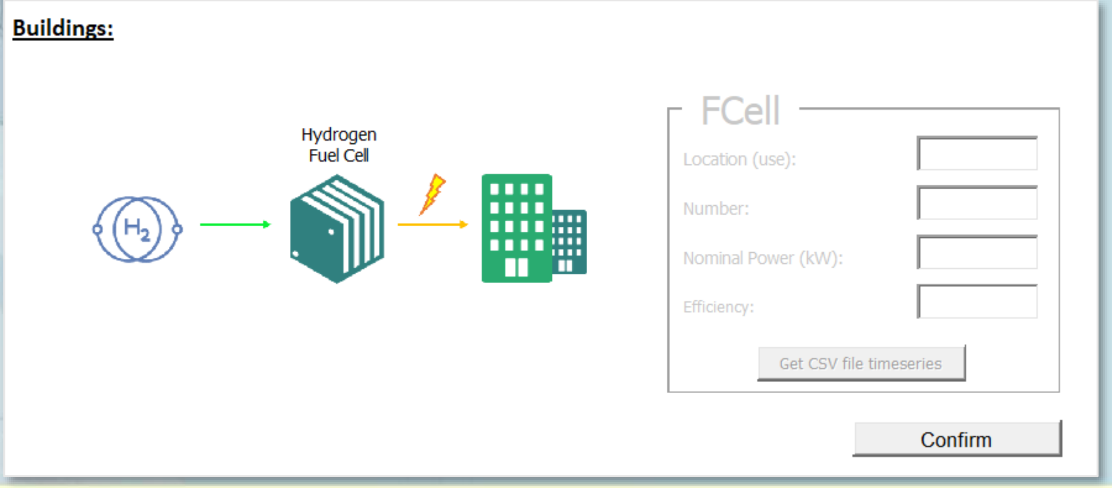




New BMs, New features

Green H_2 End-Users Demands





GREEN HYSLAND

Thank you for your attention!

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Green Hysland's Website

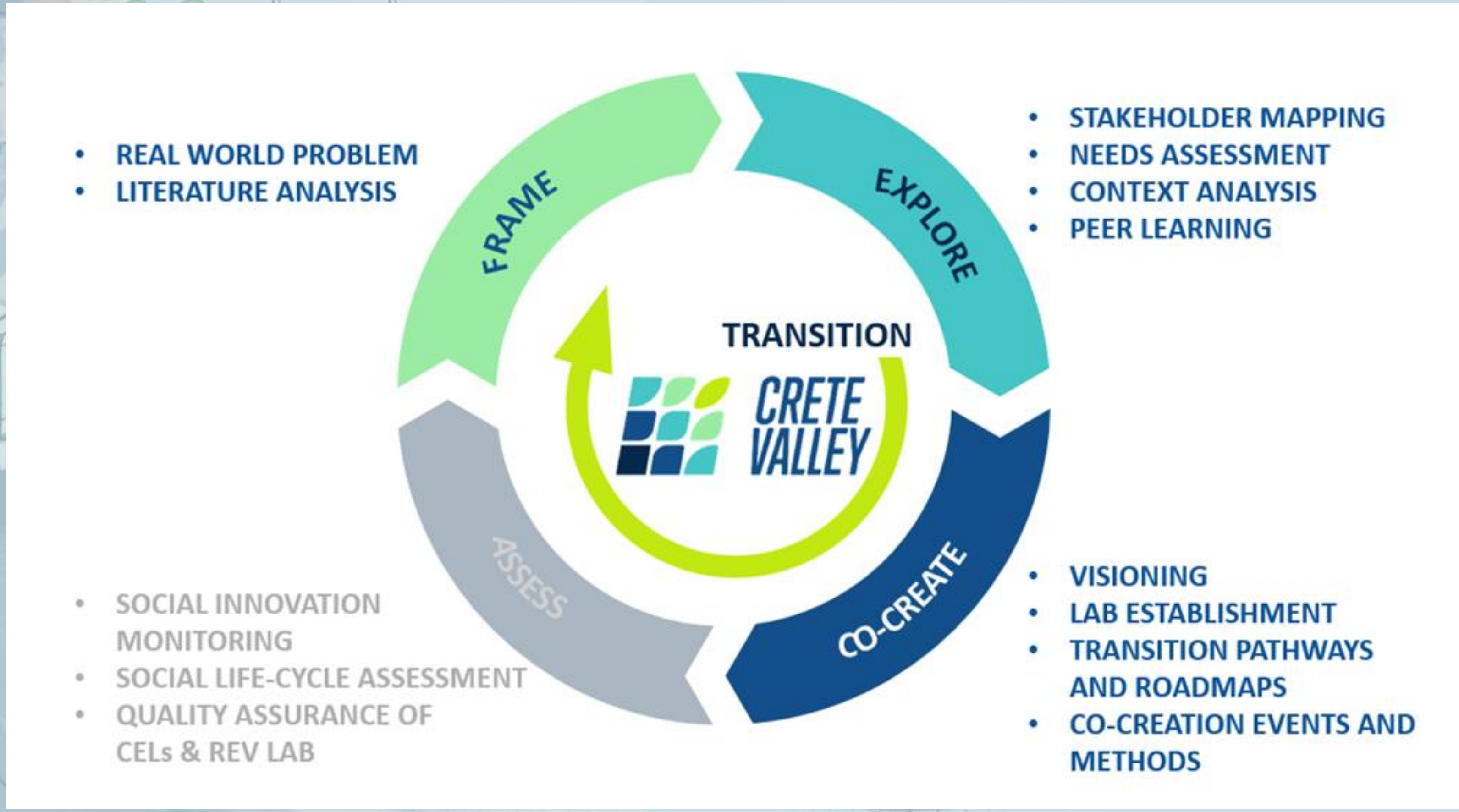
REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION

Thematic roundtable #2: Potential and tools for replication

CRETE VALLEY

A handbook for energy valleys

A handbook for energy valleys



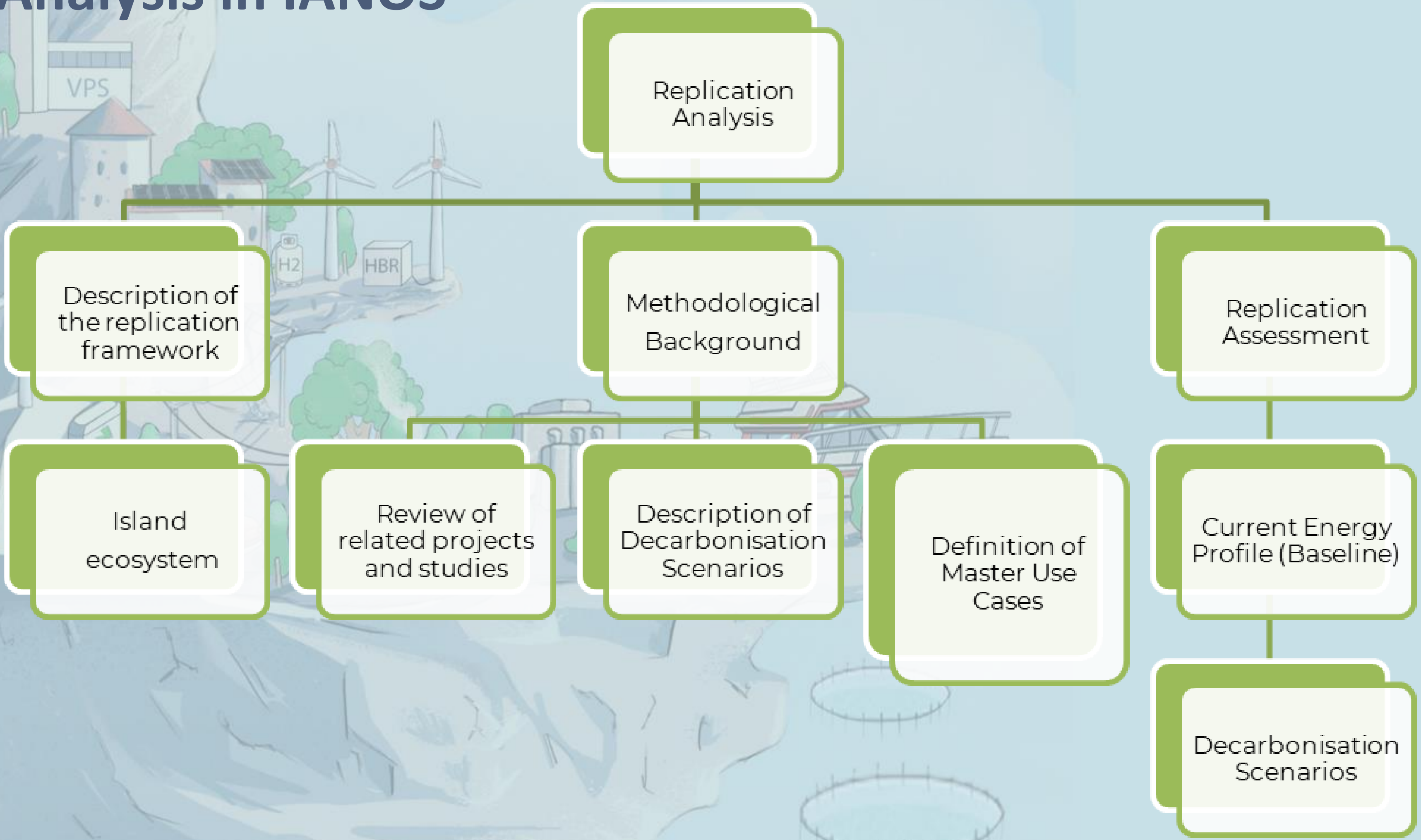
REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION
Thematic roundtable #2: Potential and tools for replication

IANOS
SUSTAINABLE SOLUTIONS
for islands' decarbonisation

Replication Analysis in IANOS

Clean energy for EU islands

Replication Analysis in IANOS



IANOS Island Energy Planning and Transition (IEPT) suite

INTEMA.grid (INTegrated Energy MAnagement tool)

Grid modelling and simulation tool which can analyse various energy management and operational strategies, taking into consideration various RES and storage integration scenarios as well as promoting the decarbonization of the current energy mix.

VERIFY-D (Virtual intEgRated platform on LIFe cycle analYsis)

- Lifecycle Assessment (LCA) module: measure indicators regarding energy savings, fossil fuel consumption and greenhouse gas emissions, as well as primary energy demand and consumption
- Lifecycle Cost (LCC) module: assess the direct, indirect, internal, and external costs of selected technologies at every point during the course of a project and during lifetime i.e., the capital, operation and maintenance (O&M) and end-of-life costs in terms of LCC.

CBA Component (Cost Benefit Analysis tool)

Evaluate the overall advantages anticipated from the green energy/smart grid interventions in the IANOS demonstrators. It gives stakeholders and investors with an analytical approach that offers quantified insight into whether a smart grid intervention exceeds the current baseline scenario in terms of costs and benefits.

REPLICATION BOARD WEBINAR – EU ISLANDS DECARBONISATION
Thematic roundtable #2: Potential and tools for replication

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ACCELERATING THE DECARBONIZATION OF ISLANDS' ENERGY SYSTEMS

Smart IT Platform

Clean energy for EU islands

GREEN HYSLAND MAESHA GIFT NESOI islander Robinson IANOS insulae REACT CRETE VALLEY VPP4ISLANDS TwInSolar

Smart IT Platform

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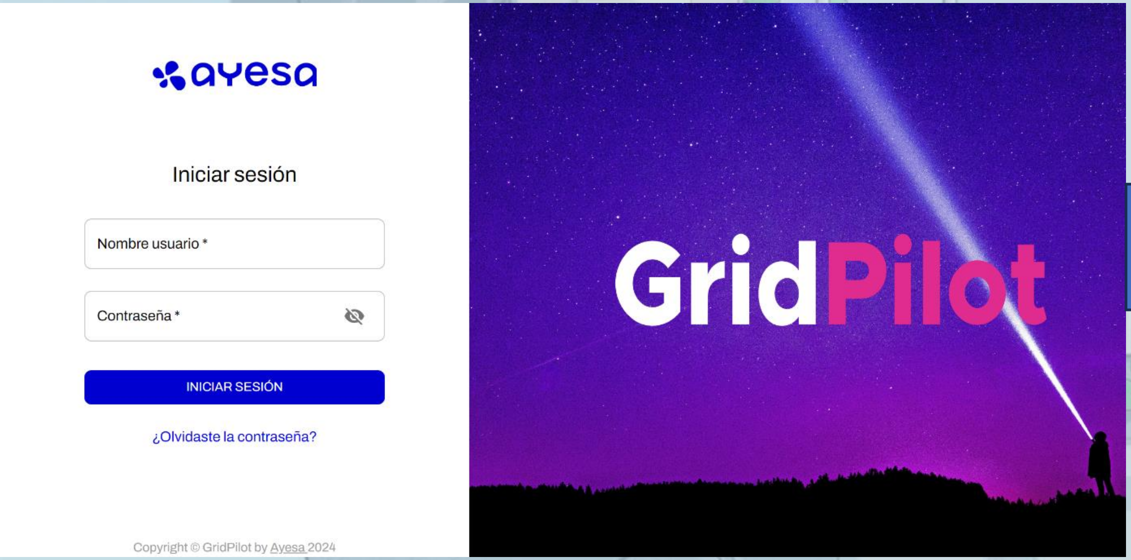
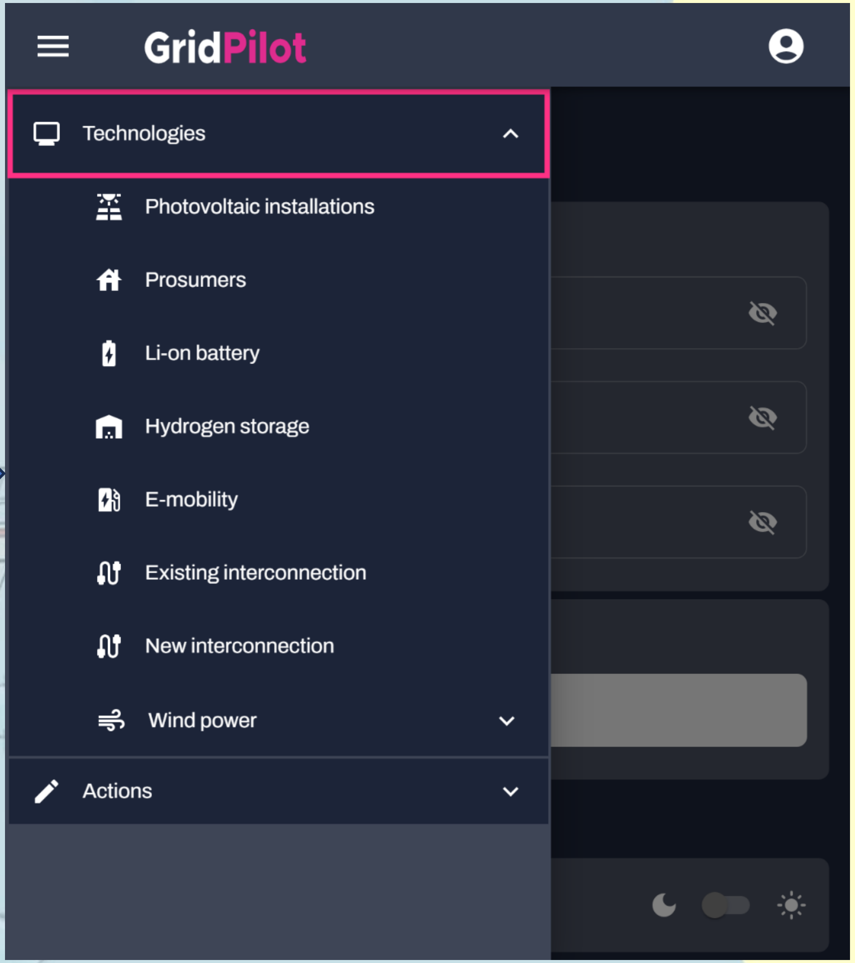
ACCELERATING THE DECARBONIZATION OF ISLANDS' ENERGY SYSTEMS



Fill technology parameters



Smart IT Platform

GridPilot

Photovoltaic installations

Maximum panel power *	0,25	kW
Guaranteed minimum performance *	0,8	%
Panel lifespan *	25	years
Temperature gamma coefficient *	0	%/°C
Installed power *	0	kW
Installation cost *	403,8	€/kW
Maintenance cost *	0,02	€/kWh
Space per kW *	0,1	m²/kWh
Installation space *	1000000	m²

RESET SAVE

Run optimization

GridPilot

Run optimization

- [x] Photovoltaic installations
- [x] Prosumers
- [x] Li-on battery
- [x] Hydrogen storage
- [x] E-mobility
- [x] Existing interconnection
- [x] New interconnection
- [x] Onshore wind turbines
- [x] Offshore floating wind turbines
- [x] Offshore foundation wind turbines

Data needed for the algorithm

Please select a file named data.csv, it must contain the following columns with ; as separator

- date: Date with format yyyy-MM-dd HH:mm:ss
- cost:
- temperature: Temperature in ºC
- irradiance: Irrandiance in W/m²
- wind: Wind speed in m/s
- cons:
- urban_services_vehicles:
- tourists_vehicles:
- inhabitants_vehicles:
- driving_percentage: Percentage of time vehicles are driving normalized to one
- charging_percentage: Percentage of time vehicles are charging normalized to one
- parked_percentage: Percentage of time vehicles are parked normalized to one

CHOOSE FILE

▶ RUN OPTIMIZATION

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Smart IT Platform

REPLICA
Them

Results

GridPilot

Review results

Nº PV modules

PV plant	1,704,601
Prosumers	0

Nº Wind turbines

Onshore	4
Offshore floating	8
Offshore foundation	0

Size of Li-ion batteries

System	1,700 kWh
Prosumers	0 kWh

Size of H2 storage

Tank	3,022.02888 kg

New interconnection

Capacity	10,000 kWh

Existing interconnection

Capacity	1,000 kWh

Nº EV chargers

Slow charging	1,038
Fast charging	1

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LANDS' ENERGY SYSTEMS

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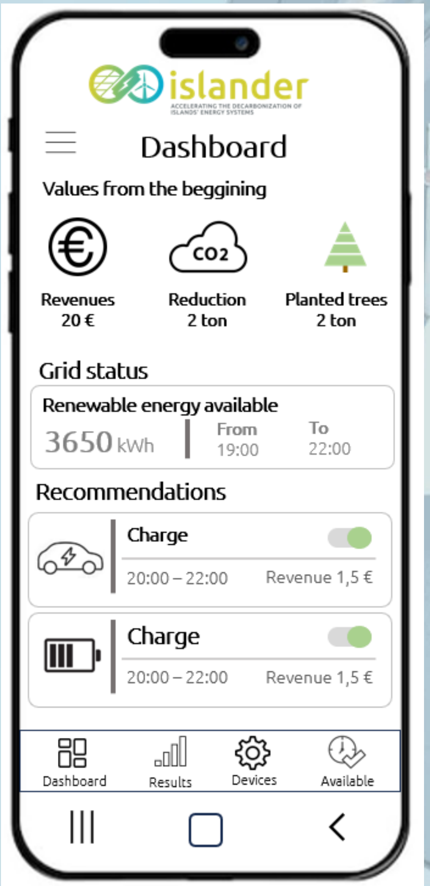
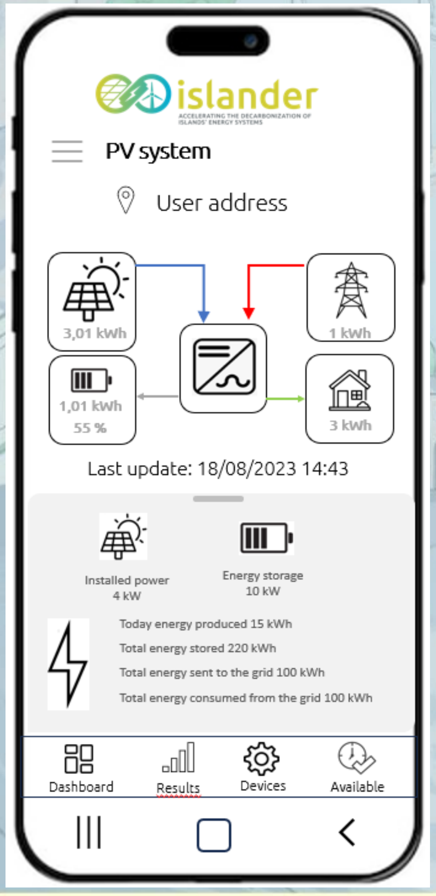
Demand response app





Q&A Session

WRAP-UP

THANK YOU!

For any questions:

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