Renewable Energy
for Self-Sustainable
Island Communities

REACT

Renewable Energy for self-sustAinable island CommuniTies
R2M SOlution

Cagliari – 27/05/2019

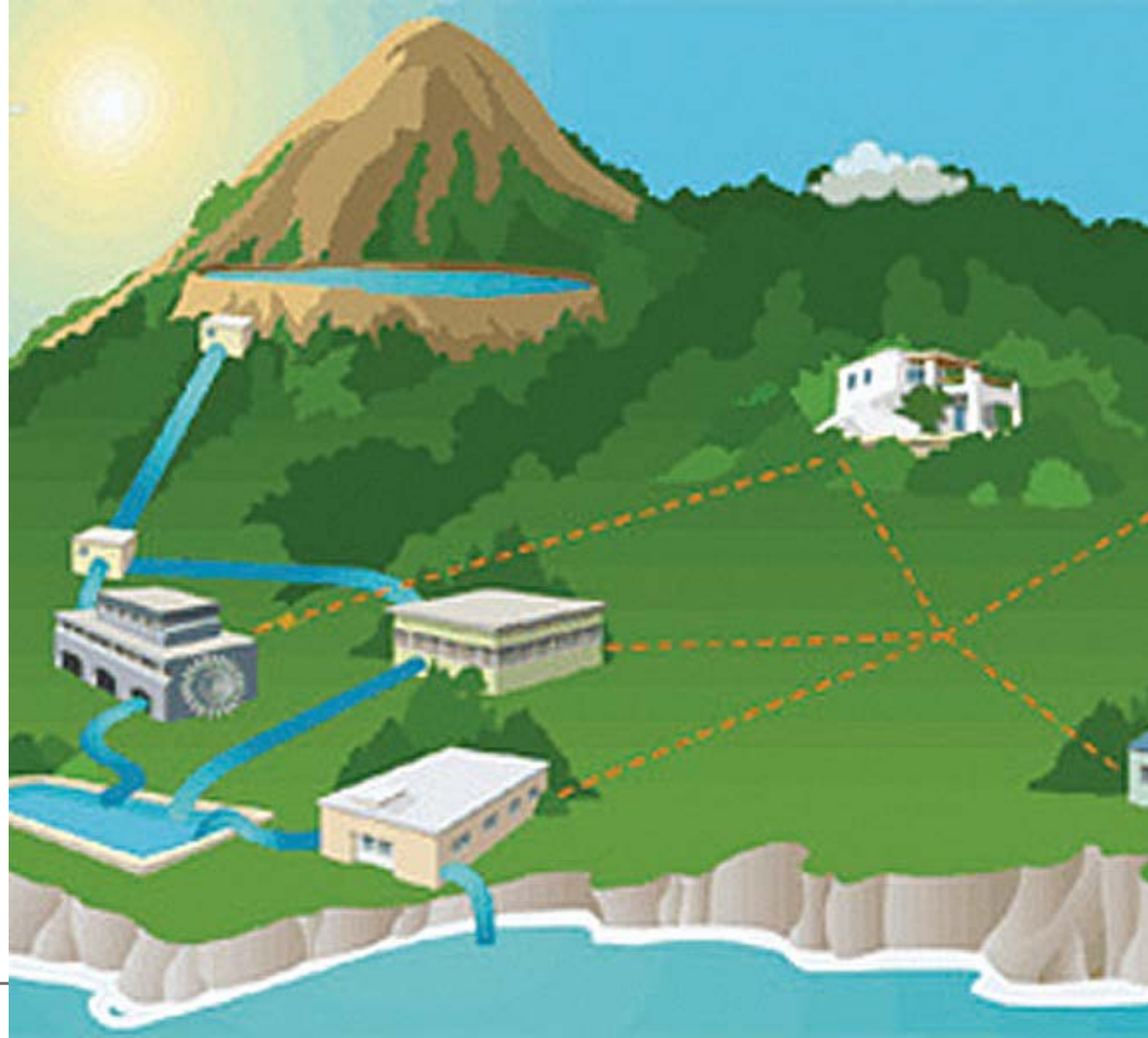
This project has received funding from the H2020
programme under Grant Agreement No. 824395

The Problem

Geographical islands are highly dependent on the mainland energy market:

this affects their energy security and increases energy costs by up to 400% with respect to the mainland.

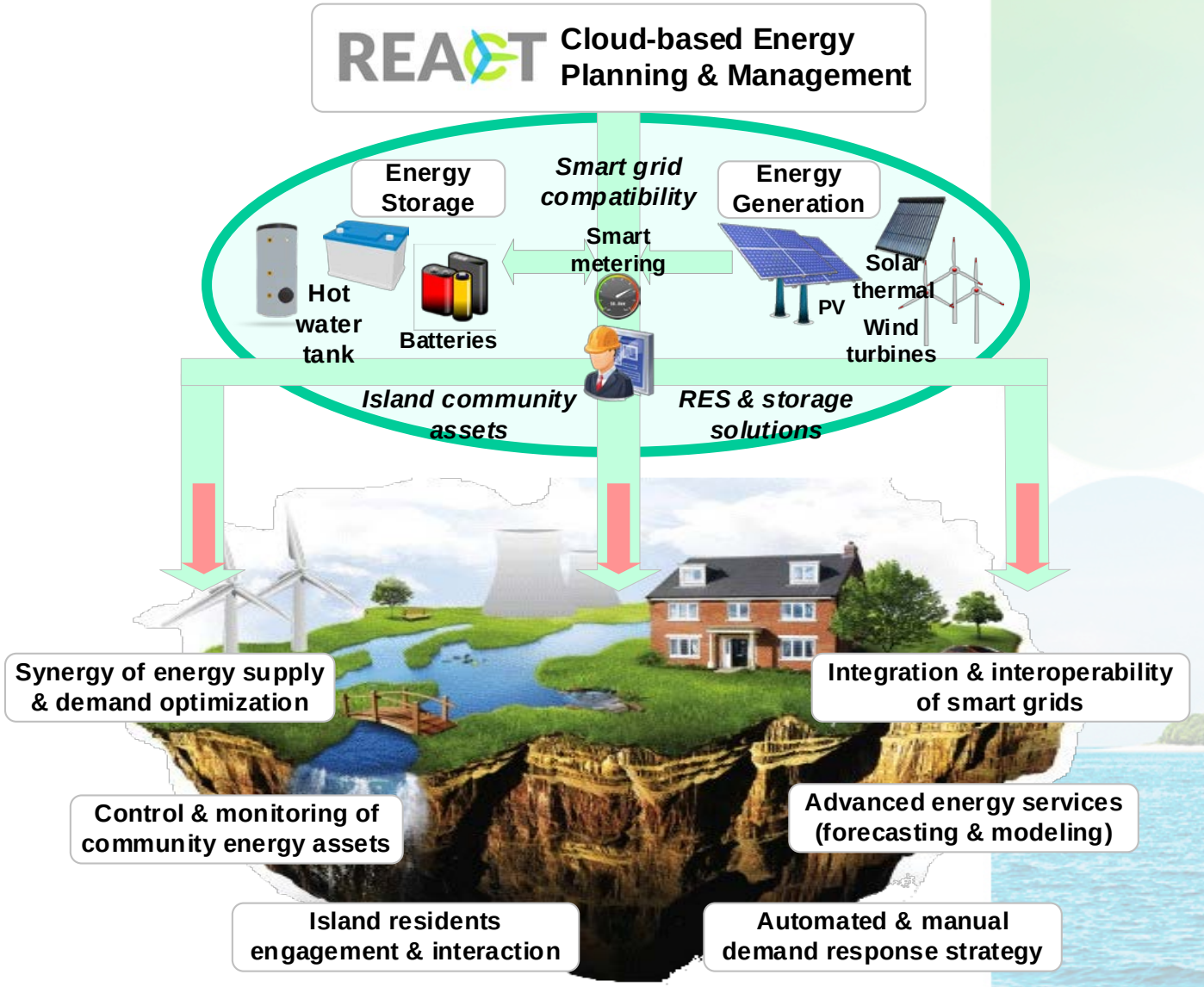
Intermittent energy supply



What we will do to solve it

- Island energy independency through maximal exploitation and integration of existing and emerging **RES** and **energy storage**
- **ICT** cloud-based solution
- **DR** strategy: planning and managing real-time generation and load forecasting

  Digitalised **smart grids**→ high flexibility, stability, and maximisation of RES
- **User-engagement** & large-scale **replication**



Objectives

Integrate existing and new technologies

Piloting in 3 islands in 3 market conditions in 3 climates

Plan for large-scale replication

Expected Impact REACT

Technological Impact

- Develop and deploy a holistic multi- vector energy planning, management and operating platform targeting **100% Energy Autonomy in Islands**
- Development of innovative energy management algorithms unlocking DR that **will increase the penetration of RES by 50% and defer/avoid grids reinforcement investments**

Economic Impact

- **At least 10% energy savings and 60% energy costs savings** by increasing local RES exploitation, energy efficiency and DR.
- **Allow access to the market** to new participates (end-users, aggregators)
- **Reduce grid maintenance cost** by enhancing assets monitoring

REACT

Environmental Impact

- **Reduce 50% the fossil fuel consumption** by deploying cost-effective RES systems
- **Improve islands air quality** by increasing energy efficiency and RES exploitation
- **Reduce waste** by enhancing energy system utilization

Social Impact

- **Creation of 20-50 skilled jobs** within the project period
- Increase social benefits related to **energy cost reduction**
- **Improve energy system security** by adding assets monitoring and control

Policy and Standard Impact

- **Contribution to 20/20/20 EU objectives** (Renewable Energy, GHG emissions, Energy efficiency)
- **Influence the development and effective implementation of new policies and EU directives** for Islands multi-vector energy grids.

But … How?

Innovation level 1 (IL1) — *Advanced innovative technologies*

- Optimisation
- DR platform
- Design tool
- Forecasting
- Storage
- HPs & PV
- Grid monitoring
- P2G

Innovation level 2 (IL2) — *Technology integration*

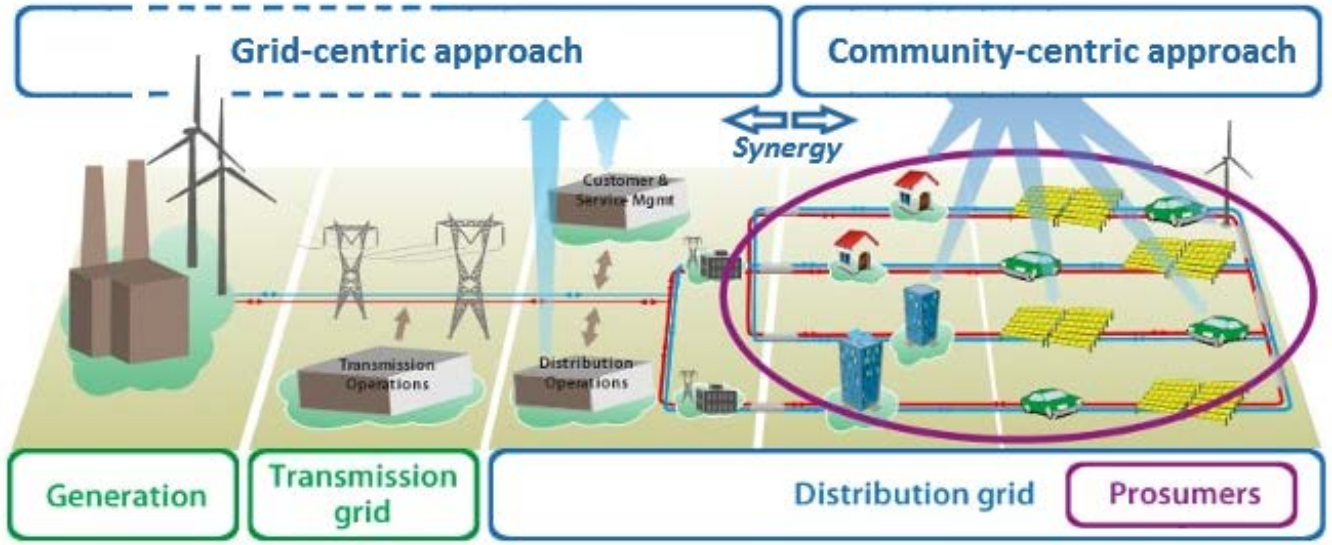
- REACT platform
- HiL testing
- Integrated optimisation

Innovation level 3 (IL3) — *New synergies*

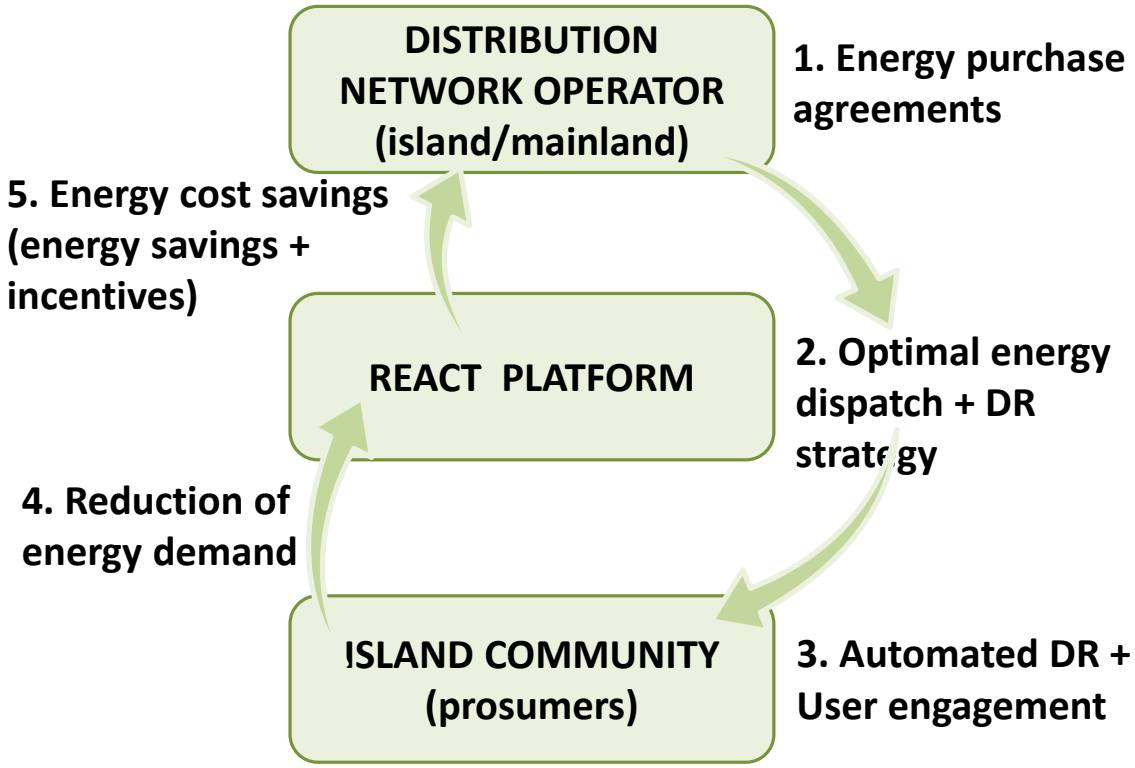
- Water
- Transport (EV)
- Electricity
- Heat
- Gas

Innovation level 4 (IL4) — *User engagement & Business models*

- Raise awareness
- Innovative business plans
- Behavioural change



What is the Business Model here?

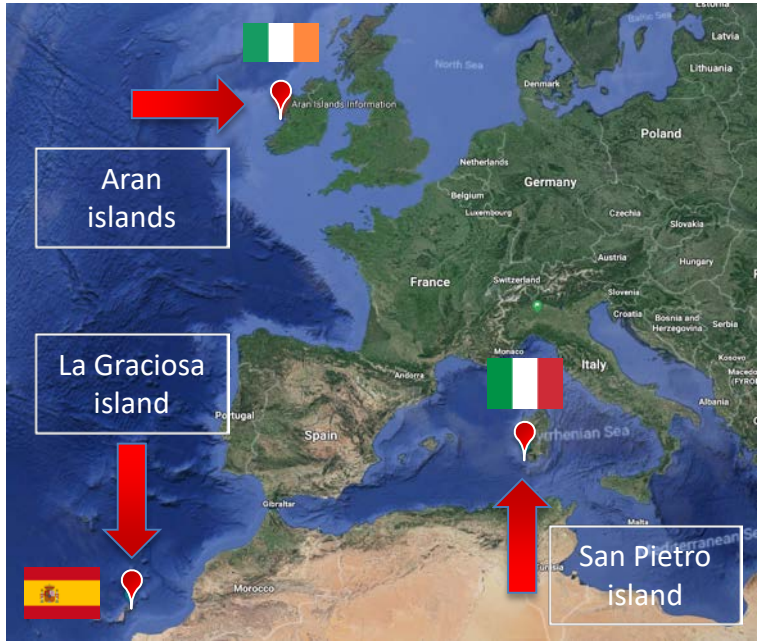


The Islands

General information

- n.03 project demo sites will be deployed and validated as part of the project activities → **demo islands** preselected
  - *similar in size*
  - *different in RES supply share in satisfying the total energy demand*
- Demo sites were chosen for providing a diversity of opportunities for project demonstration:
  - *different geographical locations and climatic zones*
  - *varied underlying energy systems*
  - *diverse energy requirements,*
  - *population densities (seasonal fluctuation)*

Relevant pilot information is listed in the following slides …



La Graciosa – Demo activities

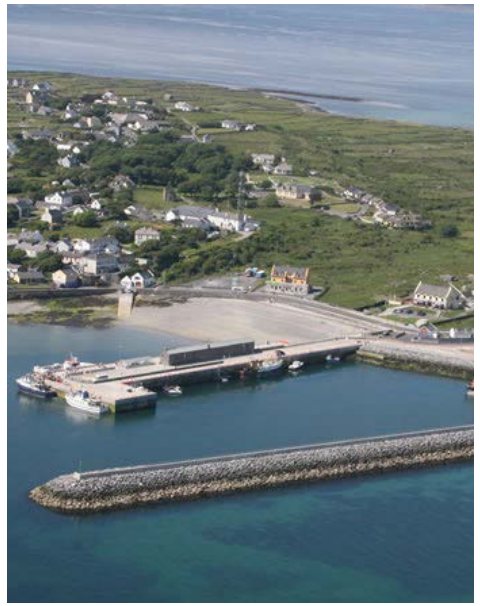
- **PV generation system** integrated with **high-scale battery system for buffer**
- **Different battery technologies** will be deployed and tested
- **System** will be **fully integrated with local micro-grids**
- **Shifting of cooling demand** through automatic control actions and involvement of the end consumers.

San Pietro – Demo Activities

- Integration with NASCA power plant (combined PV and wind turbines) of **High-capacity battery system**
- **Fully controllable Heat-pump technology** to match with RES generation
- Thermal energy storage
- Entire **system** will be **verified for satisfaction of both electrical and thermal energy demand under designated DR strategies**.

Aran Islands – Demo Activities

- Hybrid power PV/ST generation and optimisation
- **High-capacity battery system integrated with underlying electricity grid**
- Local micro-grids existing on the island will be considered for testing different implicit and explicit **DR strategies**
- **Small-scale pilot unit of power-to-gas system** operated to balance the grid
- Existing **EV fleet will be integrated in the optimization process**.




Lesbos


La Reunion


Majorca

Follower Islands

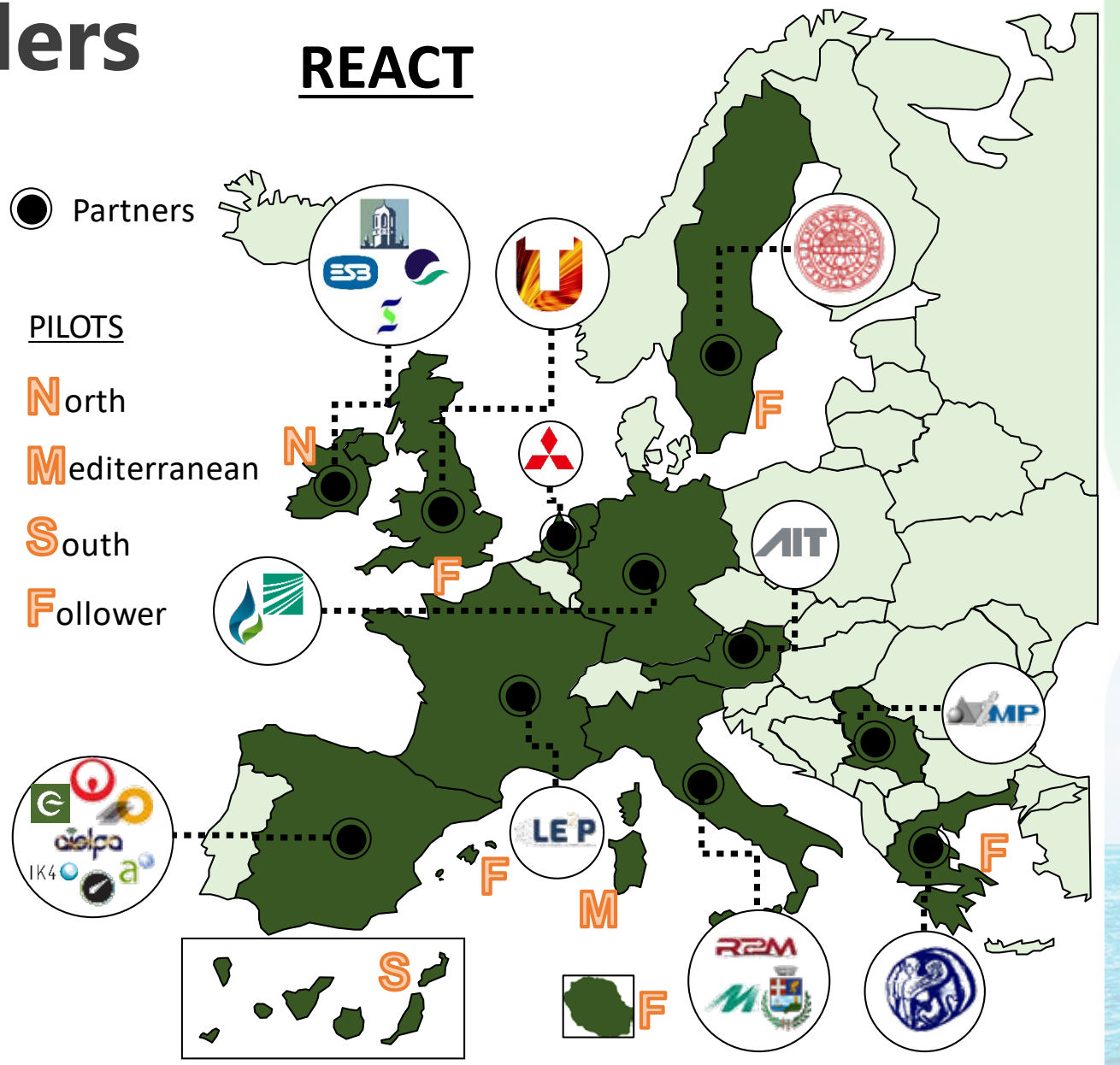
Larger islands were chosen as suitable for scale-up and large-scale replication of REACT solution


Gotland


Isle of Wight

The stakeholders

- The DSO
- Energy Communities
- Technology Providers
- The ESCOs
- The inhabitants
- RTOs/Universities
- Regulatory bodies



Main Challenges for REACT

- Social and technical barriers to the deployment of RES and its integration.
- Unlock DR and flexibility potential to maximise the use and storage of intermittent RES
- Engagement of end consumers as active participants in DR strategy and modelling.
- Piloting the REACT solution demonstrating its potential to maximise energy autonomy, reduce GHG emission and energy (> 60%), achieve at least 10% of energy savings.
- Develop viable plans and business models for the large-scale replication on 5 follower islands

THANK YOU FOR YOUR ATTENTION

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