SMILE
SMART ISLAND ENERGY SYSTEMS

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Sustainable Places'19

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SMILE overall objective

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European Union Funding
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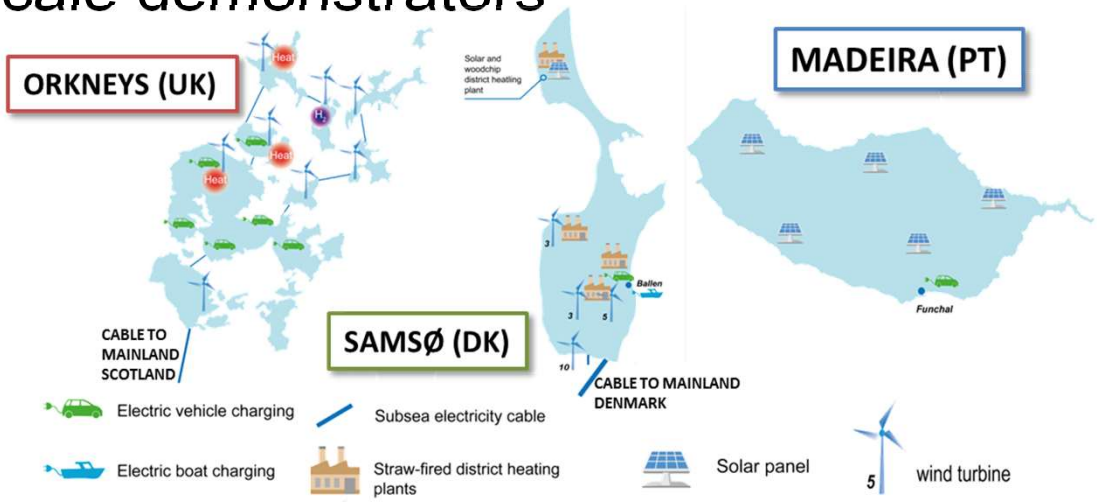
- To demonstrate a set of both **technological and non-technological solutions** targeting the **distribution grid** to enable:
  - **Demand response**
  - **smart grid functionalities**
  - **storage and energy system integration**
- 3 large-scale demonstrators



Impact and island locations

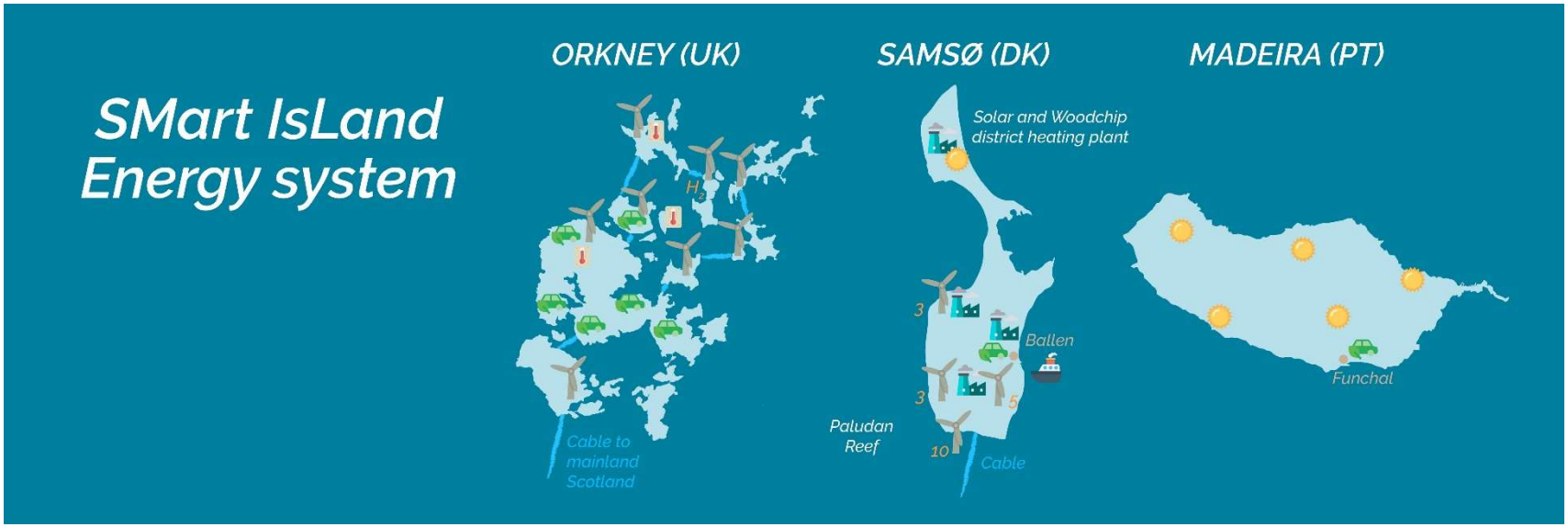
- Island communities can be more easily engaged in the real-life testing of solutions aimed at solving important challenges impacting life on the island
- Constitute ideal candidates for demo activities requiring societal engagement & active residents' commitment.
- The 3 selected case studies:
  - characterised by high shares of RES
  - intend to demonstrate stable grid operation in the context of the adoption of energy storage solutions and/or the connection between the electricity network and other energy networks
  - intend to demonstrate smart integration of grid users from transport and mobility.

Why island locations?

- Each pilot brings:
  - S**pecific set of challenges**
  - **Technology options**
  - **Energy market conditions.**

- The sites are therefore **effectively representative of the majority of the EU energy** markets and offer excellent demonstration settings which will deliver **maximum impact in terms of replicability**.

Demonstrator Specific Goals



Each case study represents an important energy challenge that is common to several locations in Europe, on islands as well on the mainland.

- Madeira is a total energy island, which means that it is not connected to any other landmass electrically.
- Orkney has some of the highest recorded levels of “fuel poverty” in the UK.
- Samsø’s energy demand is very consistent as it is dominated by the demand from berthed yachts and associated tourism.

Overall Goals - Samsø

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- To make better use of the green electricity produced on the island (minimize the electricity export).
- To make the Ballen marina more attractive for sailors, tourists, and the local citizens.
- To improve the quality of life in order to attract settlers.

Overall objective - Samsø

- To install a battery system (BESS) to level out fluctuations in supply and demand and to test it .
- To install a PV power generation system at the Ballen marina.
- To cover 50% of the heating demand in the harbour master's office using PV electricity and a new heat pump.
- To develop and test an overall control system, which allows for dynamic market prices.
- To set up a new market model

Overall Goals - Orkney

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- Alleviate fuel poverty in Orkney
- Maximising the productivity of the existing generation assets
- Support the rollout of electric vehicles
- Transform a semi-smart grid system (management of generation only) into a full smart system (management of generation and demand)
- Use existing grid infrastructure and integrating new communications and control systems, new control systems, new controllable energy demand for heat and transport

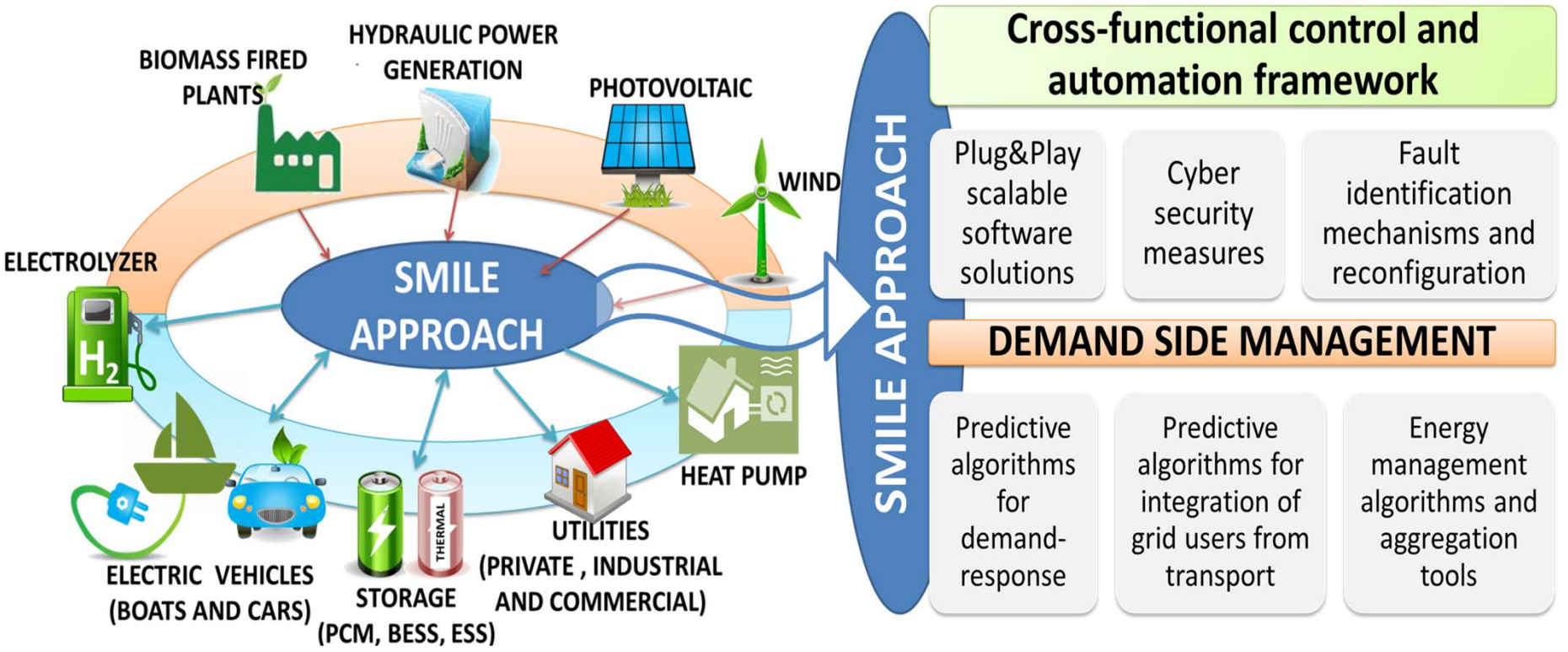
Overall Goals - Madeira

- Roll out of **smart metering systems** generating a significant quantity of data which will feed into a new **control system** enabling smartening of the grid.
- This, coupled with **demand side management** techniques (including market mechanisms such as dynamic pricing) and **storage technologies**, will help to:
  - address the increasing **strain on the grid**
  - facilitate significant **additional solar capacity** in the future – taking advantage of the island's natural renewable resources.

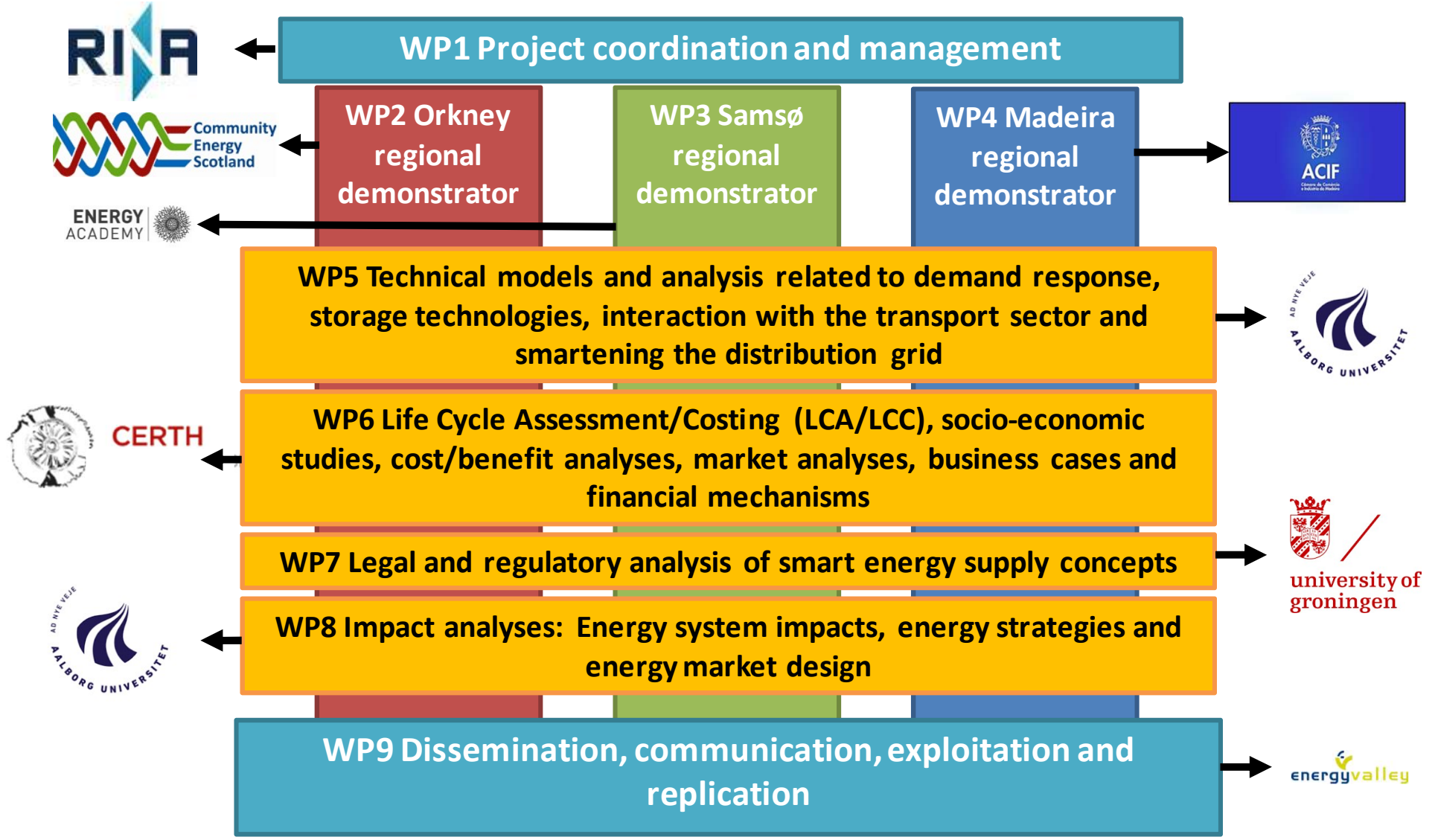
Replication

- Each case study is **representative of an important energy challenge common to several** locations in Europe, on islands as well on mainland.
- **Orkney Islands and Samsø are electrically connected to the mainland network** and can therefore be representative of **smart grids located on the mainland as well**
- **Madeira is the only case of a total energy island**, not connected to the mainland network.
- Mutual learning approaches
- Replication (DAFNI/Greek islands)

Overall concept, objectives and technologies



Overall structure of the workplan



Project Objectives

- Develop innovative management structure
- Increase local RES exploitation also thanks to storage, electric vehicles and smart H&C
- Promote local business models and contractual arrangements
- Guarantee a reliable and secure RES based grid
- Develop a multi-criteria decision tool for the ranking (strengths and weaknesses) of solutions
- Active participation in BRIDGE initiative

The challenges of the first phase of the project

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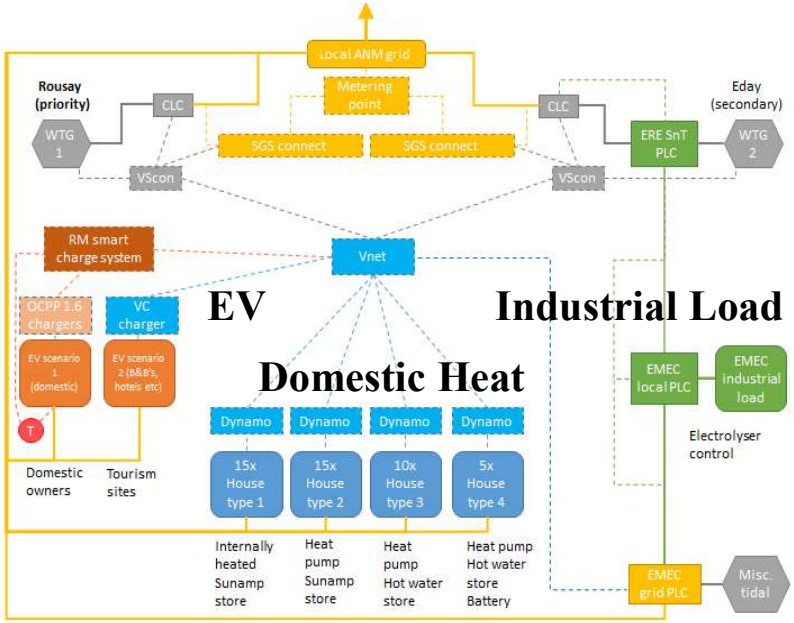
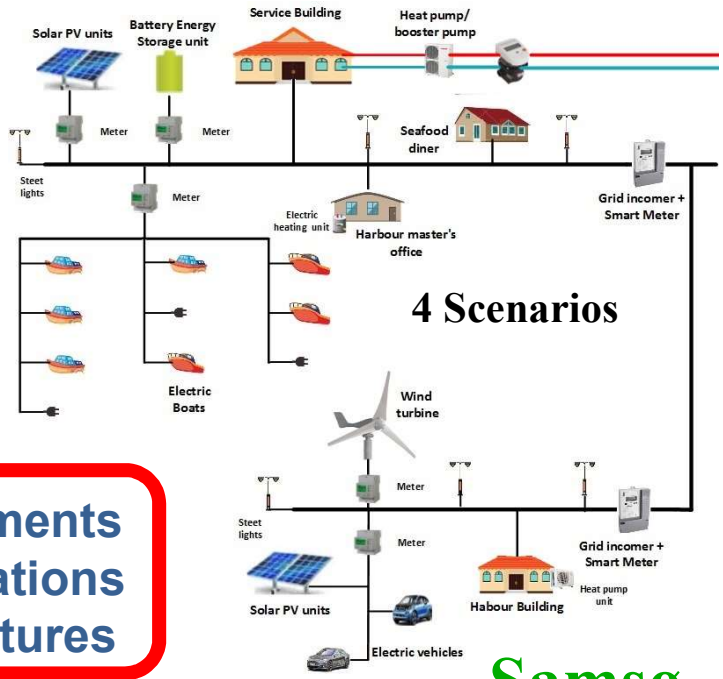
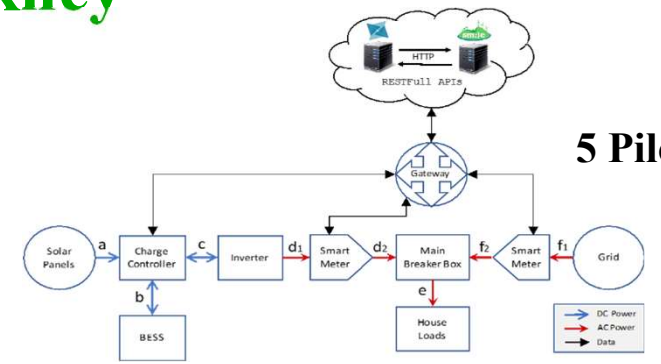


Orkney

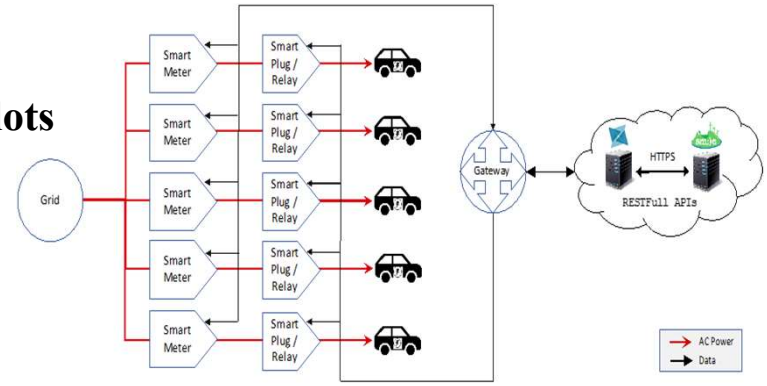


Samsø

Requirements
Specifications
Architectures



5 Pilots



Madeira

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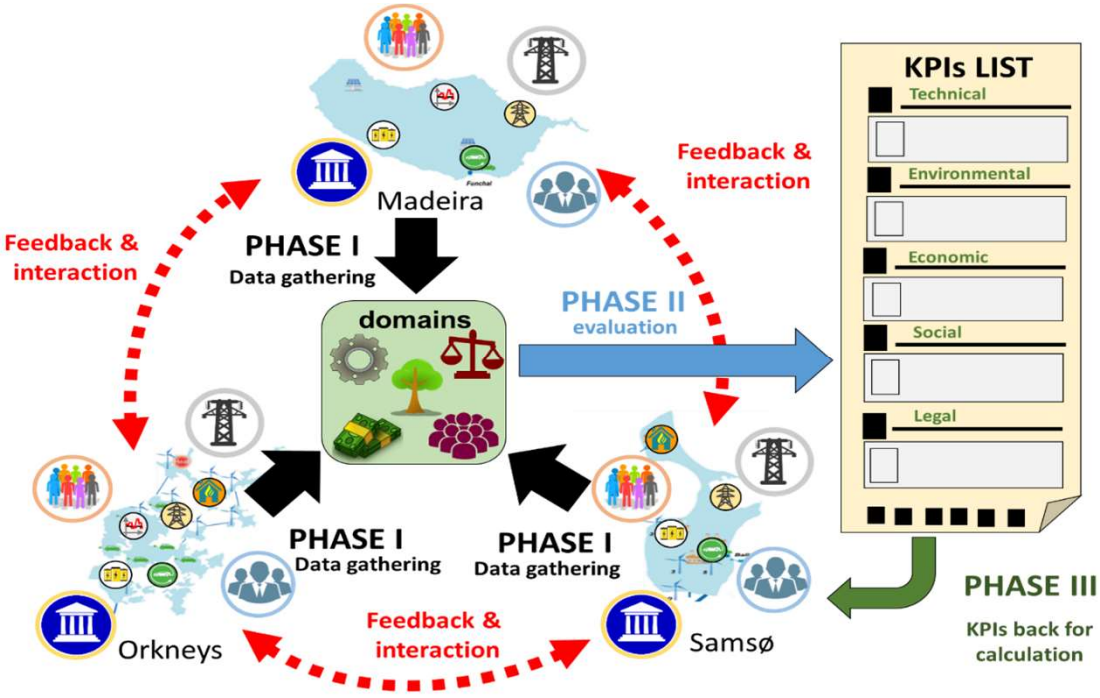

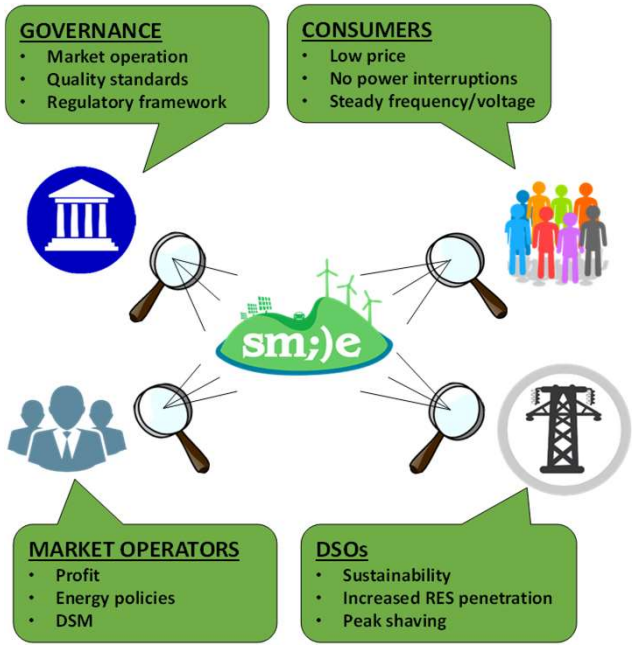

Key performances indicators

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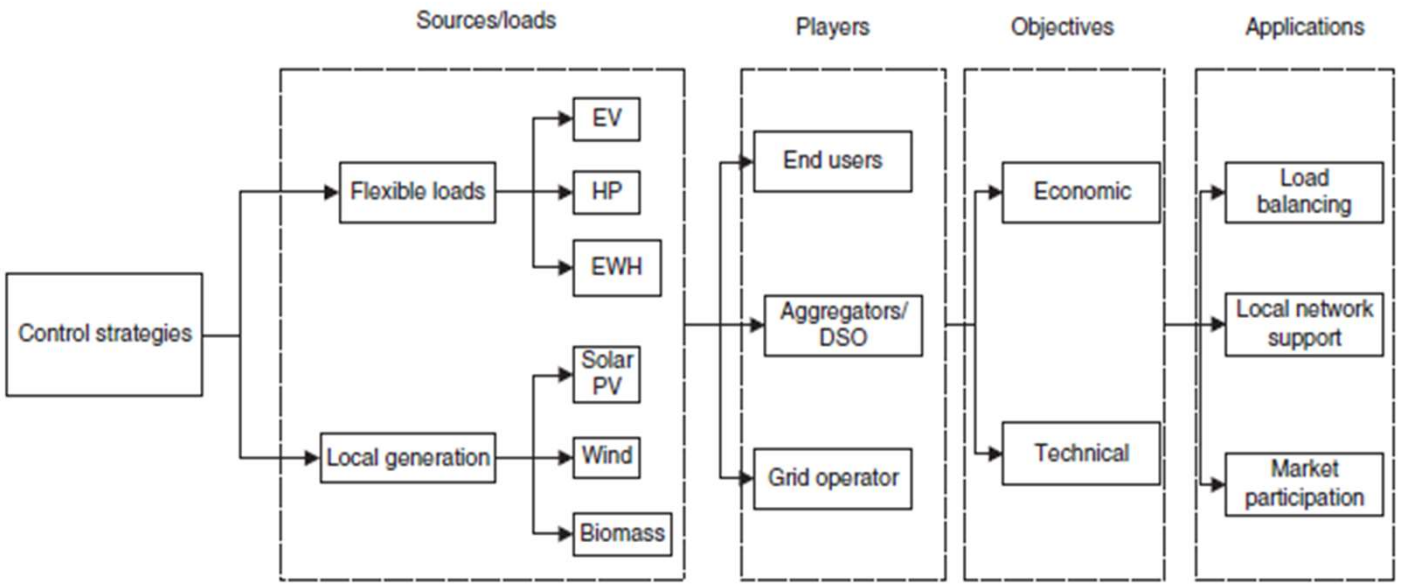

Most Appropriate DR Services for each demonstrator

The challenges of the first phase of the project

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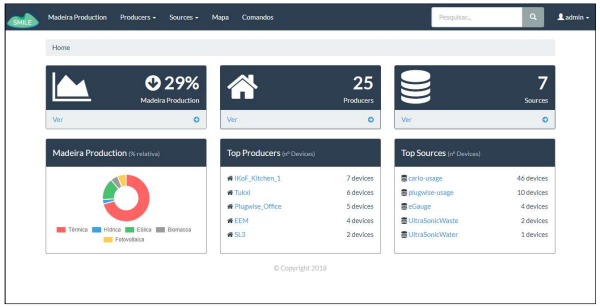
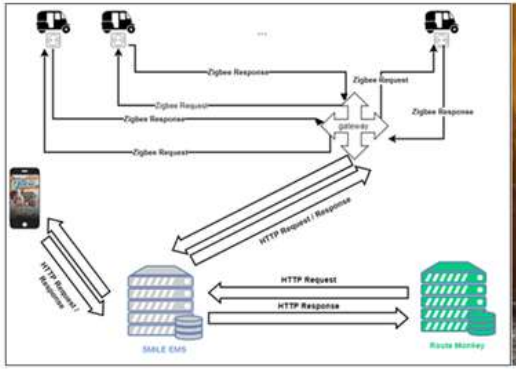
PCM Heat Battery



EMS

BESS

OVO Components & Load Controller



Predictive Algorithms

Development of enabling technologies

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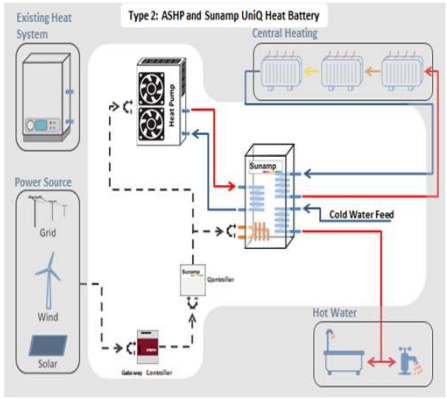

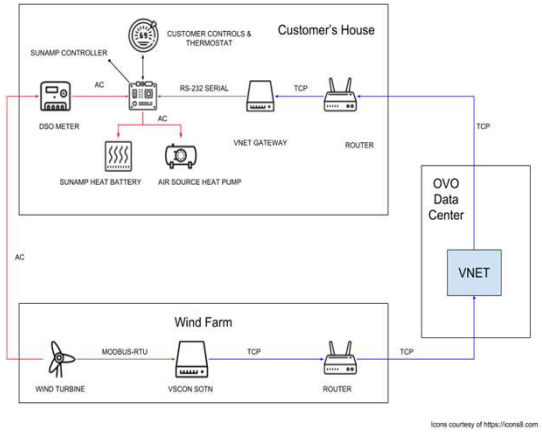

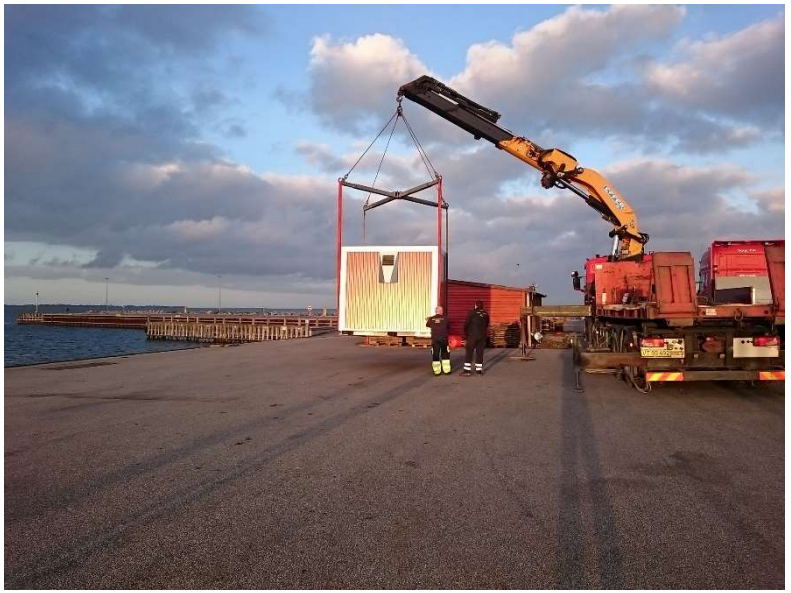

Final design and starting of deployment/implementation

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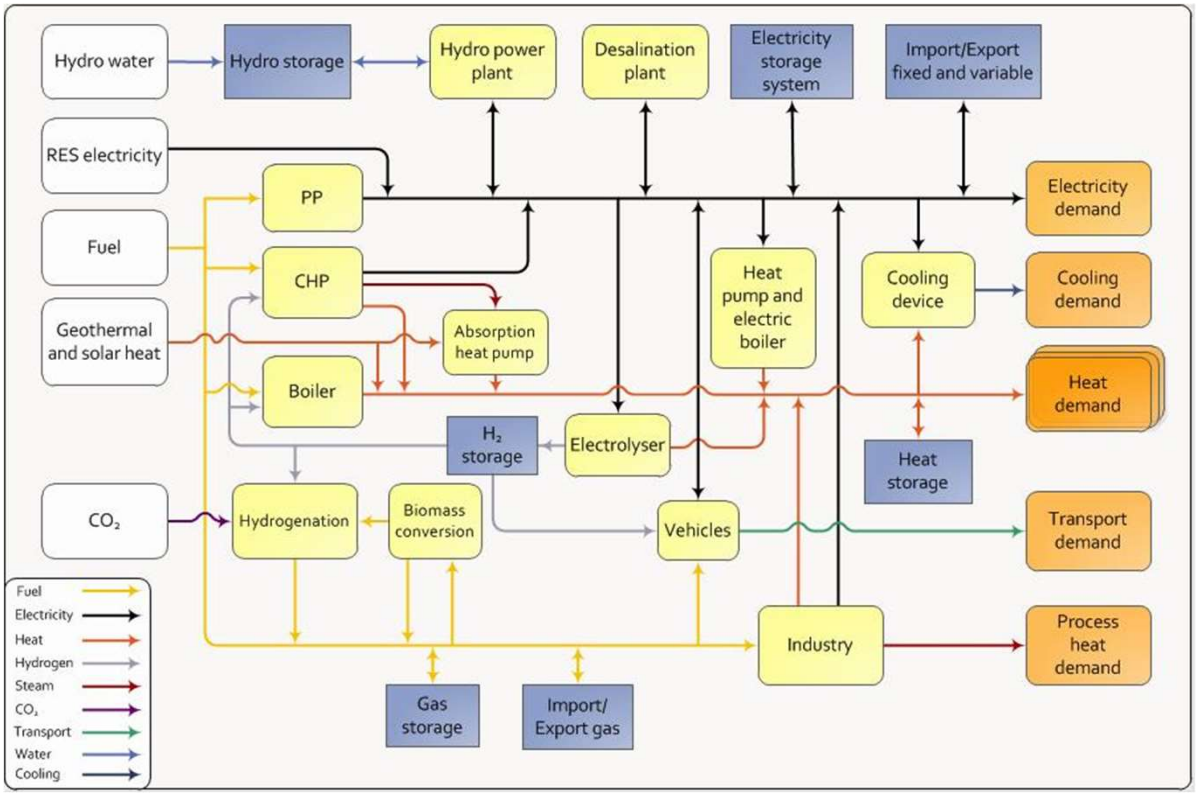

Reference energy simulation models for the three pilot islands

The challenges of the last 6 months

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Communication and Dissemination Plan

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Thank you for your kind attention!

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