Towards clean, affordable and reliable energy in insulated areas: the cases of SMILE and INSULAE projects on Greek islands”

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About Us
DAFNI, a non-profit organization is a network of island local and regional authorities. It’s comprised of 43 Municipal and 4 Regional members.

DAFNI promotes sustainable development in Greek islands through integrated actions in the fields of energy, environment and culture.

It is a founding member of the Pact of Islands initiative promoting sustainability in European islands through local energy planning.

DAFNI is member of ISLENET; CPMR’s informal network of island technical organisations.

DAFNI is the coordinator of the Smart Islands Initiative promoting islands as ideas areas for innovative projects.
Governing structure

• General Assembly

• Board of Administration
  • Georgios Iliou – Deputy Mayor of Kythnos, President
  • Andreas Babounis, Mayor of Sifnos, Vice President
  • Fotios Maggos – Mayor of Leipsoi, Secretary
  • Konstantinos Adamidis – Vice Governor of Region of North Aegean, Member
  • Gerasimos Damoulaki – Mayor of Milos, Member
  • Nikolaos Fostieris – Mayor of Amorgos, Member
  • Michalis Chatzikalymnios – Deputy Mayor of Kos, Member

• President – Georgios Iliou

• General Director – Kostas Komninos

Benefits for DAFNI Members

➢ Islands Policy – Networking

➢ Technical support – Capacity building

➢ Consulting – Publicity
Examples of projects under development

• **Energy retrofitting of public buildings**: Audits, technical studies, financing.

• **Energy efficiency in street lighting**: LED lighting and smart control applications.

• **EV infrastructure**: Installation of EV charging stations and promotion of EV market.

• **Biogas plant, Naxos**: Feasibility study for the exploitation of the local farming residuals.

• **Desalination with RES**: Promotion of systems combining desalination plants with installation of RES plants.

• **Energy Communities**: Technical assistance to local authorities.

• **Municipal wind park, Lesvos**: Repowering and extension of a licenced wind park with parallel operation of an environmental and RES park.

• **Geothermal district heating, Lesvos**: Reoperation and extension of a geothermal pilot district heating network to heat private houses, a poultry farm and several greenhouses.

• **Sustainable tourism project in multiple islands**: Hiking trails, Biking trails, Trails of cultural heritage, Digital applications.

• **UNESCO Geopark of Cyclades**
EU projects in a nutshell

Past projects
• ISLEPACT, IEE (2009-2011)
• PROMISE, IEE (2012-2014)
• Smart Grids in 5 Greek Islands, ELENA Fund, EIB (2011-2014)
• SMILEGOV, IEE (2013-2015)

On-going projects
• Kythnos - Smart Island
What is special about Islands

Energy planning based on **seasonality**

**High reliance on hydrocarbons**, high potential for emissions reduction

Obstacles to reduce emissions for interconnected islands due to **low capacity cables** that do not allow high RES penetration

Obstacles to reduce emissions for non-interconnected (NI) islands due to technical restrictions in the **grid that does not allow high RES penetration**

First line of defence and **most severe impact from climate change** compared to continental regions

**Difficulty to introduce natural gas** in the islands’ energy market

**Cost of energy** is significantly higher due to transportation costs

Often **scarce water resources** – Energy intensive desalination plants

Structural handicaps related to energy
Opportunities for Islands

• Local CO2 Emmisions Production
• Local Utility Infrastructures
• Innovation In Islands Matters
• Islands As Test-Beds
• Replicability Potential
✓ H2020-LC-SC3-2018-ES-SCC Call
✓ Innovation Action
✓ EU Funding 12.160.234,50 €
✓ Duration 48M
✓ Coordinator CIRCE
✓ 27 partners
The main goal of INSULAE is to foster the deployment of innovative solutions aiming to the EU islands decarbonization by developing and demonstrating at three Lighthouse Islands a set of interventions linked to seven replicable use cases, whose results will validate an Investment Planning Tool that will be then demonstrated at four Follower Islands for the development of four associated Action Plans.
Objectives, concept and expected outcome

Specific goals

☑ To create an Investment Planning Tool

☑ To carry out a complete demonstration program in three Lighthouse Islands

☑ To ensure a large project replication of the seven uses cases

☑ To engage islands inhabitants as an active player in the energy system

☑ To protect the islands ecosystems preserving its biodiversity and cultural heritage

☑ To exchange knowledge within the BRIDGE Initiative

☑ To create a critical mass of professionals ready to replicate INSULAE
Lighthouse Islands
UNIJE Island

Location and general description

The Island of Unije

- Surface: 16.83 km²
- Coastline: 38.012 km
- the island peak: 138 m.a.s.l
- Unije, only settlement
- 85 people
- 47 households
- 292 objects
- No cars on the island
- Small sea port and airport

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USE CASES

#1 - Joint management of hybridized RES and storage

#2 - Smart integration and control of water and energy systems

#3 - Empowerment of islands’ energy communities through 5G and IoT technologies for flexibility services
BORNHOLM Island

Location and general description

• 40000 inhabitants; 588.3 km²
• Approx. 1% of Denmark (size and population wise)
• Touristic/historical attraction; presence of industry
• Self-sufficient community
• Target to be 100% carbon neutral by 2025
• Pioneer in smart grid projects
USE CASES

#4 - Transition to DC grids

#5 - Local bio-based economies supporting the electrical, thermal and transport systems integrated management
Madeira Island

Location and general description

- 262,000 inhabitants; 801 km²
- 1000 km away from Lisbon
- Economy is mainly based on tourism and agriculture Self-sufficient community
- Counts with a Sustainable Energy Action Plan
Madeira Island

USE CASES

#6 - Electrification of the islands’ transport looking to grid frequency and voltage regulation

#7 - Storage and power electronics for the stabilization of weak grids and microgrids
CREATE ACTION PLANS FOR DECARBONIZE THE ISLAND USING THE IPT
Role of DAFNI

- Our member, Municipality of Psara is one of the 4 Follower islands and DAFNI will support it during the application of IPT
- As coordinator of Smart Islands Initiative, DAFNI will spread the knowledge produced to all EU islands that support the Initiative
- DAFNI is responsible for the stakeholders and citizens engagement processes in the Lighthouse islands
- DAFNI provides the relevant KPIs, from its long-term experience in islands, for the island typologies definition and parameterization
- DAFNI is the leader of WP10: Communication and dissemination activities
WP10. Specific objectives:

- To disseminate the project results to external stakeholders.
- To prepare the visual identity and promotion materials.
- To carry out engagement and interaction activities with key external stakeholders.
- To enable a showcase at each demo-site for dissemination and training purposes.
- To contribute to common information and dissemination activities to increase the visibility and synergies between H2020 supported actions.
SMILE
SMART ISLAND ENERGY SYSTEMS
Overview of the project and objectives
Geographic distribution

- 19 partners from 6 different European Countries
The SMILE project aiming to demonstrate, system-wide in real-life operational conditions, a set of both **technological and non-technological solutions** adapted to local circumstances targeting the **distribution grid** to enable:

- Demand response
- Smart grid functionalities
- Storage and energy system integration

3 large-scale pilot projects in 3 regions with similar topographic characteristics but different policies, regulations and energy markets
SMILE scope and main goals

- Demonstrate 9 innovative technological solutions in large-scale smart grid demonstration projects in 3 islands:
  - Pumped hydro
  - EVs / Electricity stored on vessels
  - Aggregator approach to DSM
  - Integration of battery technology
  - Power to heat
  - Power to fuel
Overall Concept

Cross-functional control and automation framework
- Plug&Play scalable software solutions
- Cyber security measures
- Fault identification mechanisms and reconfiguration

DEMAND SIDE MANAGEMENT
- Predictive algorithms for demand-response
- Predictive algorithms for integration of grid users from transport
- Energy management algorithms and aggregation tools
Why island locations?

- Island communities can be more easily engaged in the real-life testing of solutions with measurable impact

- 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:
  - Specific 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**.
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)
The role of DAFNI in SMILE

❖ Communication and dissemination
  – EU Sustainable Energy Week 2018 & 2019 in Brussels
  – Local workshops in Greek islands
  – B2B sessions
The role of DAFNI in SMILE

❖ Replication
  – DAFNI will develop replication roadmaps for the transferring of tested technologies and business models to three identified islands in Greece that share similar characteristics with the SMILE pilots

❖ Policy & Regulation
  – Building on the Smart Islands Initiative (supported by +200 islands and networks of islands), DAFNI provides SMILE with insights regarding barriers and opportunities associated with the energy transition of islands across Europe, i.e. regulatory, market, technological, financing
Thank you!