Clean Energy for EU Islands - supporting energy transition on islands

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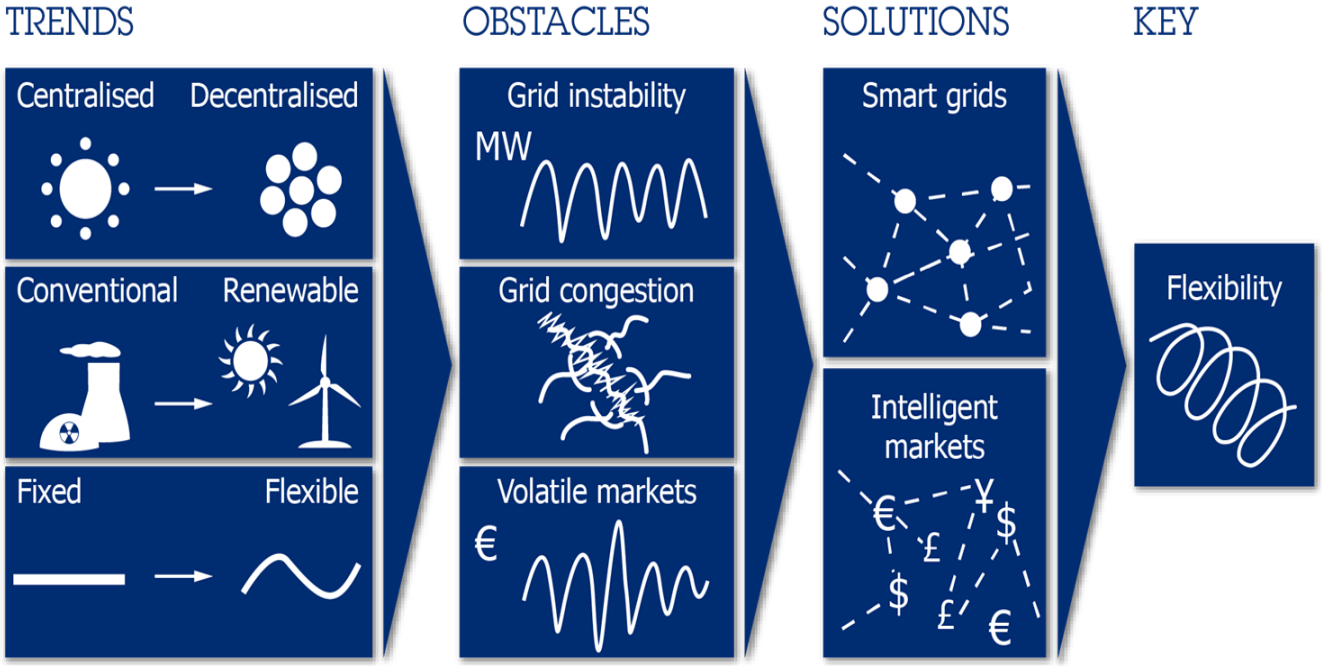
Outline

1. Clean Energy Package
2. Clean Energy for EU Islands – context
3. The Initiative
4. Word on financing
5. Where do we go from here?

Energy transition



Clean Energy 4 All Europeans

- 8 legislative proposals under discussion in the Council and the European Parliament
- Goal: EU becoming a low carbon economy via transformation of its energy system
- putting energy efficiency first
- achieving global leadership in renewable energies
- providing a fair deal for consumers

Islands in Clean Energy Package

- Islands and island regions references specifically in the policy (EC Communication on CE4AE)
- As platforms for pilot initiatives on clean energy transition
- Showcasing island success stories at international level

Political Declaration, Malta

In May 2017 Commission and 14 MS launch 'Clean Energy for EU Islands' initiative to:

- ❑ accelerate the clean energy transition on EU's 2700 islands
- ❑ help islands reduce dependency and costs of energy imports by using RES
- ❑ embrace modern and innovative energy systems
- ❑ improve air quality and lower greenhouse gas emissions

Inaugural Forum Crete 2017

- Strong endorsement and support in the presence of Governors and Presidents of islands and other stakeholders
- 200 participants and close to 40 speakers
- interventions supportive of EU action and facilitation of decarbonisation of islands in its legal, financial and technical dimensions

Expectations

- Islands as **innovation leaders** for integrating local renewable production, storage facilities and demand response;
- Islands **demonstrate** how decarbonisation creates **resilient energy systems** via reduced reliance on fossil fuel imports, the protection of the local environment, and autonomy over its energy supply
- Island show how an **energy transition can be a driver for economic development**, by creating local jobs, new business opportunities and supporting self-sufficiency of the island community.

Energy mix on a sample of islands

1. Greek Islands

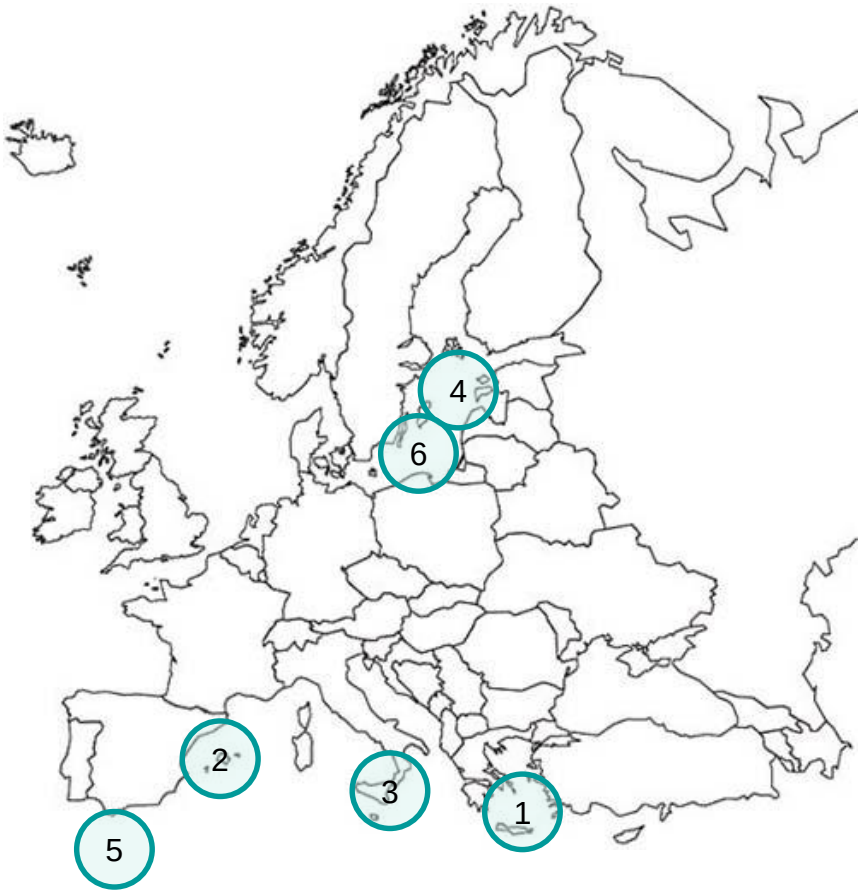
4,788 GWh FF
791 GWh RES

2. Spanish Islands

15,236 GWh FF
1,150 GWh RES
1,232 GWh INT

3. Italian Islands

19,569 GWh FF
6,368 GWh RES
9,298 GWh INT



4. Aland Islands

2.95 GWh FF
65 GWh RES
230 GWh INT

5. Azores Portugal

462 GWh FF
237 GWh RES

6. Gotland Island Sweden

2,434 GWh FF
1,560 GWn RES
450 GWh INT

FF: Fossil Fuels (Local Thermal Generation – oil and diesel)
RES: Renewable Energy Sources
INT: Interconnection Exchange

More concretely

- Whole island concept, covering, electricity, heating, cooling, transport on the island and ferry services.
- A high degree of local participation, local employment and community agreement
- Lower costs, prices and subsidies in comparison to the status quo

Support underway:

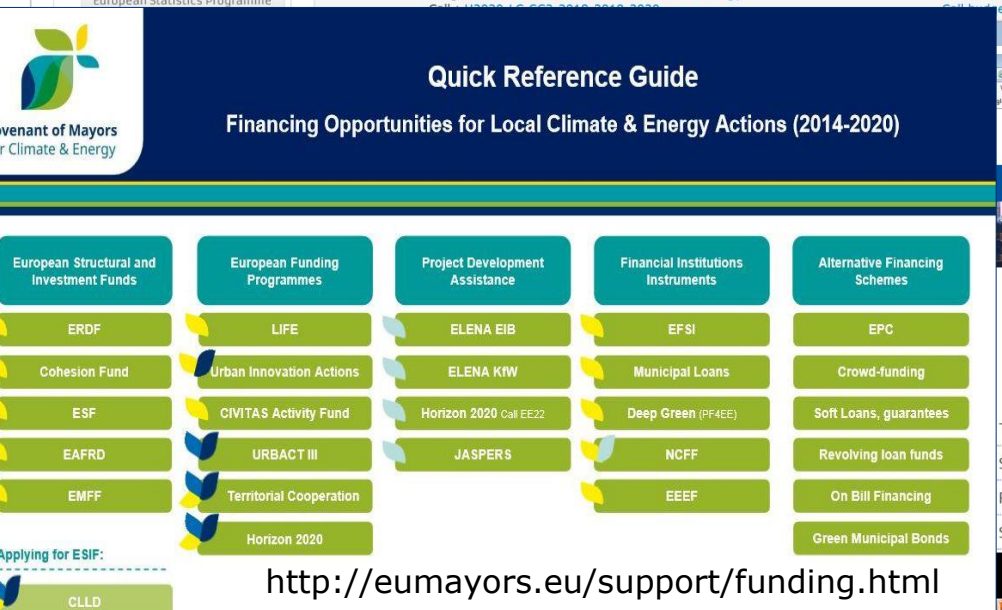
- Secretariat to help launching decarbonisation plans on islands, host a stakeholders' exchange platform, as well as organise yearly forums

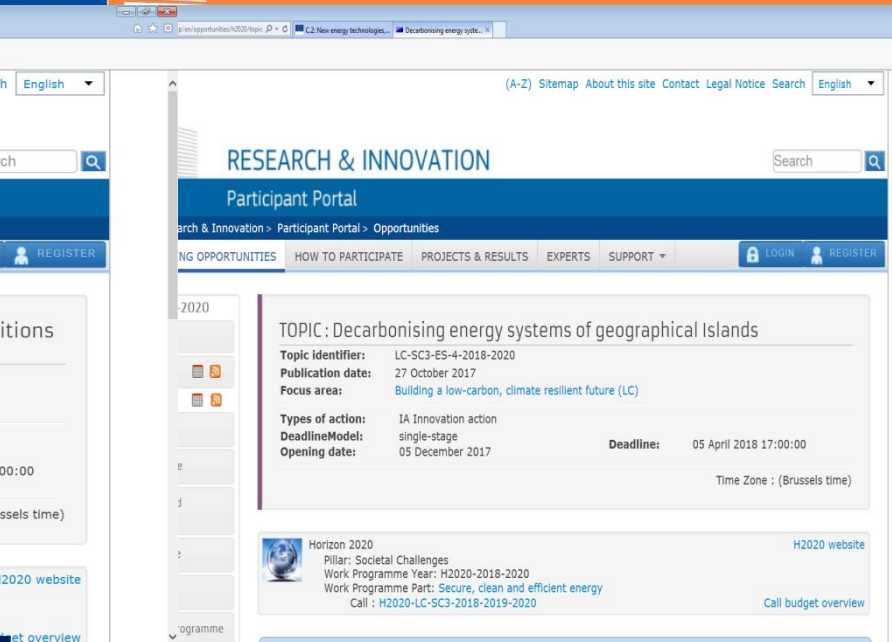
- Island Facility to be set up to support comprehensive energy transition in preparatory and implementation phase under Horizon 2020

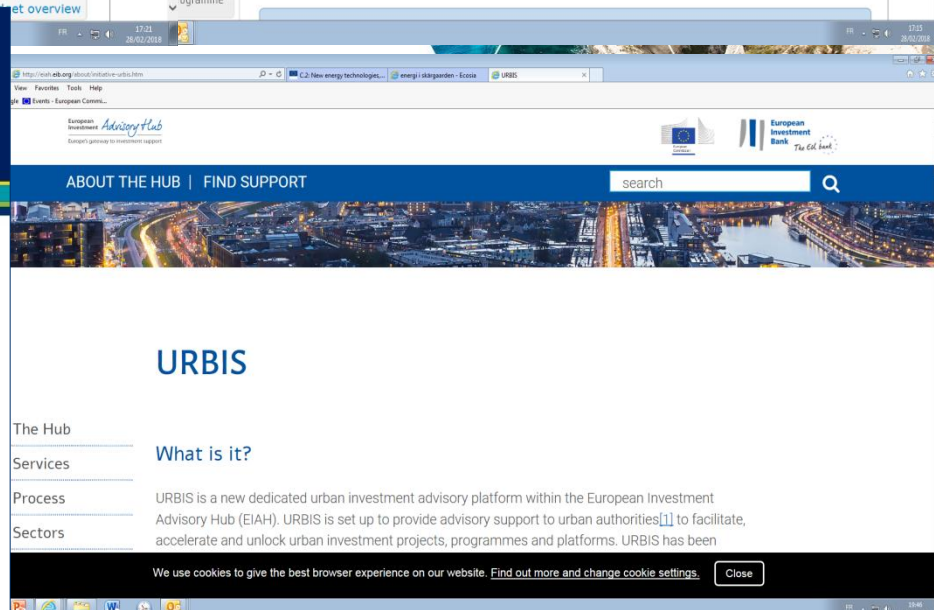
Secretariat tasks

- Capacity-building on the design, development and financing of integrated decarbonisation plans;
- Benchmarking study on energy systems on islands
- Awareness raising and communication;
- Organisation of Forums and island technology fairs;
- Creating and maintaining the Islands Initiative web portal

EXAMPLES OF FINANCING







http://eumayors.eu/support/funding.html

Where do we go from here?

- Clean Energy Package: upgrade the legal framework (RES, consumers and stability for investment)
- Engagement with stakeholders
- Provide technical assistance via the Secretariat and Islands Facility
- Provide financial assistance for demonstration projects under the new EU budget

Island Association meeting 5-6 March 2018

- Constraints/barriers to decarbonisation among your members/in your region? If yes, what are they in the order of priority?

- Is the legal framework adequate for RES development on your islands? If not what should change?

- Do you have access to expertise to develop projects and design adequate solutions?

- Is financing available from national programmes or private sector?

- Do you have suggestions as to how the island initiative should be developed to be most useful?

Windpower station on the island of Lilla Båtskär in the Åland archipelago.
Photo: Kraftnät Åland Ab; Source: Nordic Investment Bank

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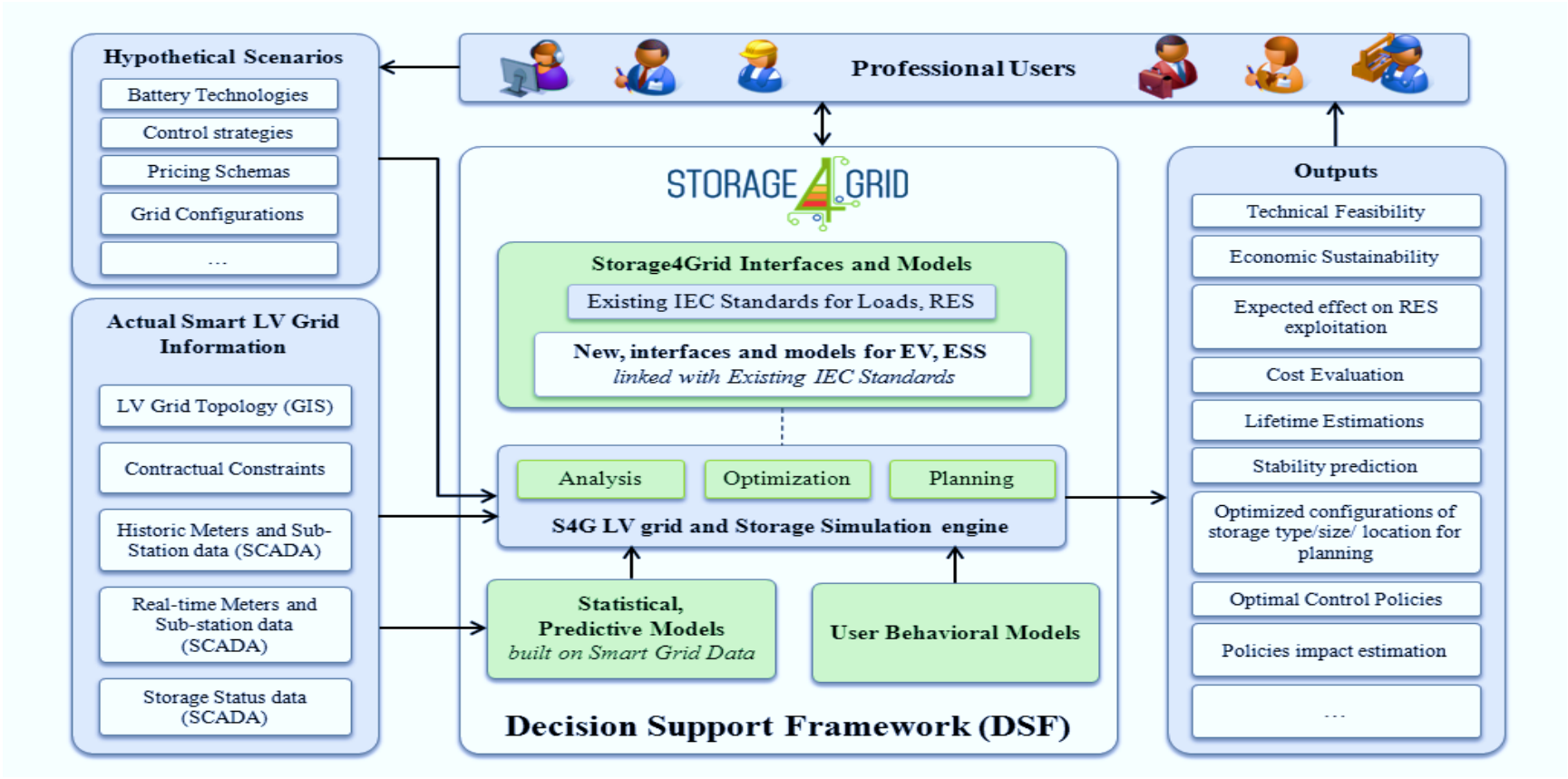
och

https://ec.europa.eu/energy/en

Modelling, planning, integration and operation of distributed Energy Storage System

Testing sites Bucharest, Bolzano, Island of Fur (Denmark)

EU CONTRIBUTION €3.6 m



Smart Islands projects – HORIZON 2020

- ***11 projects*** *having demonstration sites on different islands*
  - *3 projects: focus on energy storage*
  - *8 projects: focus on smart grids*

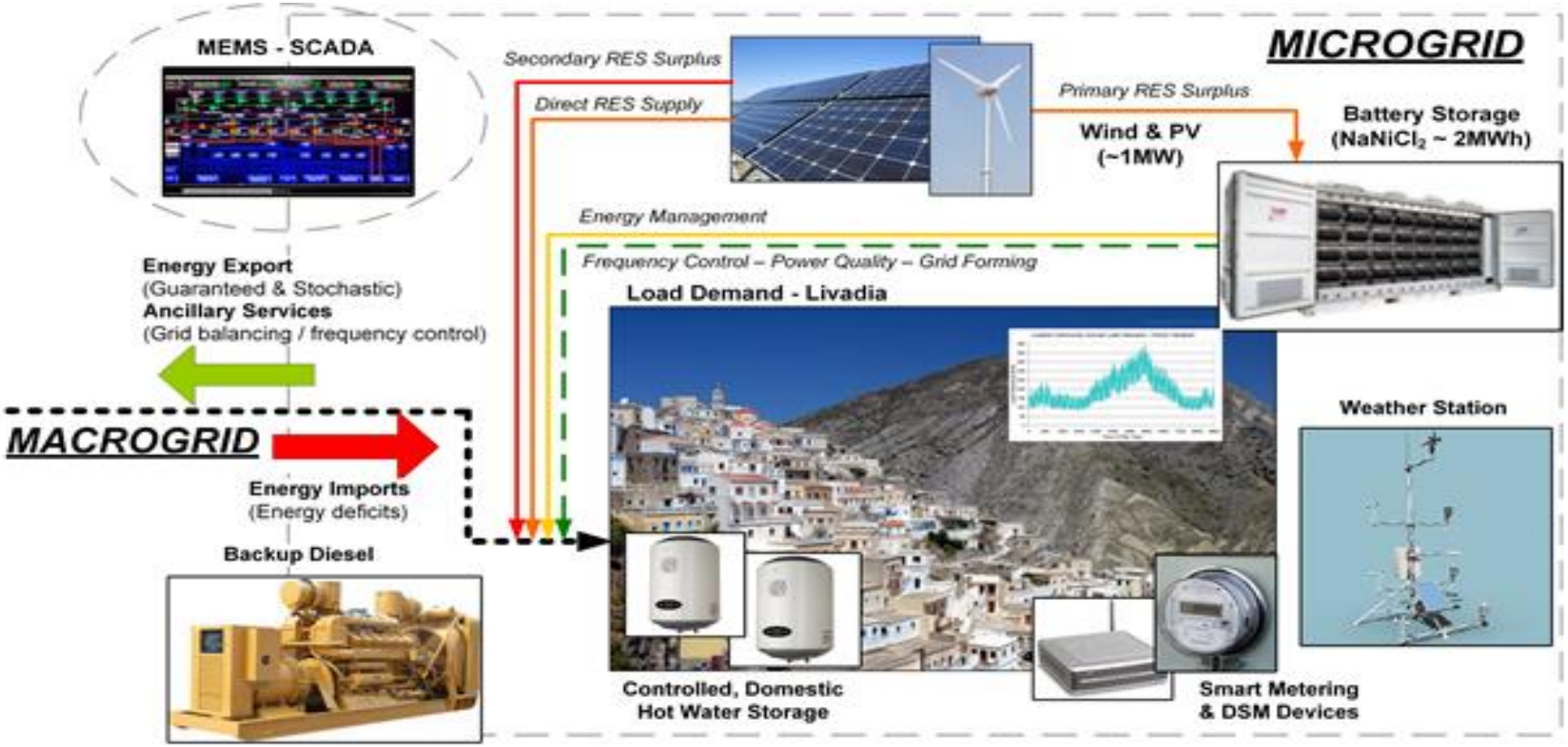
- ***2 types of islands:*** *interconnected and non-interconnected*

- ***Main objective:*** *to reduce energy costs and increase RES penetration*
  - *for non-interconnected islands: to maximise the power capacity and ensure additional backup systems*

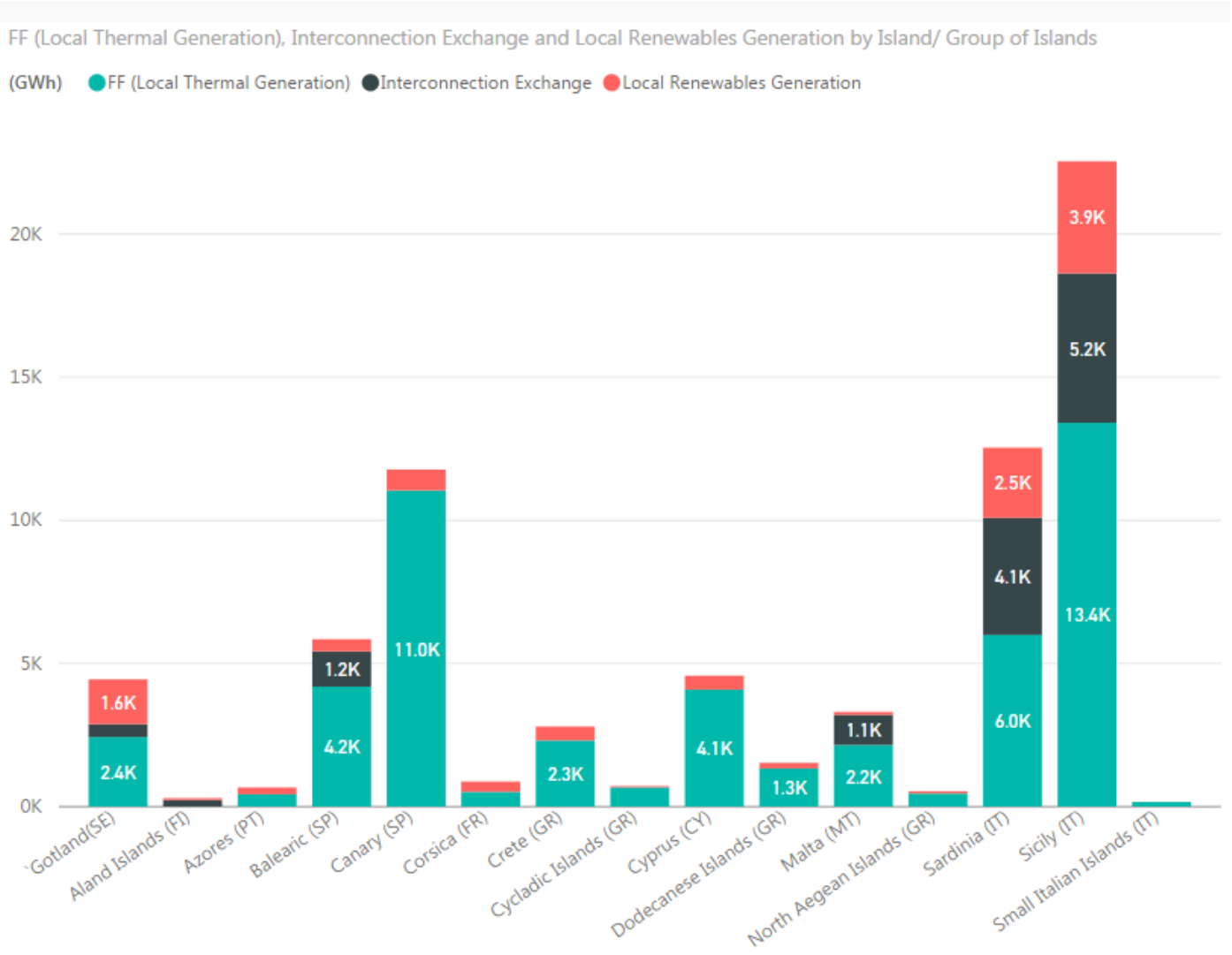
- ***Geographical distribution:***
- *EL (5), DK (2), DE, NO, PT, SE, UK*

Tilos island (Greece) – electricity self-sustainable system

EU CONTRIBUTION: €11 m



THE ENERGY MIX ON A SAMPLE OF ISLANDS



Categorization of EU islands

EU Islands

Main indicators

RES penetration (%)

- **Low** RES penetration (<10%) – e.g. Balearic and Canary Islands
- **Medium/ Low** RES penetration (10-25%)- e.g. Azores, Greek NII, Sicily and Sardinia
- **Medium/ High** RES penetration (25-75%)- e.g. Corsica, Faroe islands and Madeira
- **High** RES penetration (>75%) - e.g. Aland islands and Gotland

Level of interconnection

- **Fully-** e.g. Greek interconnected islands of the Ionian Sea (OUT OF SCOPE)
- **Weakly-** e.g. Aland islands, Balearic islands, Gotland, Corsica, Sardinia, Sicily
- **Non-** interconnected- e.g. Azores, Canary islands, Faroe islands, Greek NII, Madeira

Seasonality

- **Yes**: Azores, Balearic islands, Canary islands, Corsica, Gotland, Greek NII, Madeira, Sardinia, Sicily
- **No**: -

Size based on peak load demand (MW)

- **Very small** (0-10 MW): 19 Greek NII systems (see Table 14), El Hierro (7.5 MW), Porto (7.9 MW)
- **Small** (10-100 MW): 11 Greek NII systems (see Table 14), Faroe islands (48 MW)
- **Medium** (100- 700 MW): 2 Greek NII systems (Crete 627 MW, Rhodes 200 MW), Gotland (220 MW), Madeira (164 MW), Corsica (500 MW)
- **Large** (700- 1,700 MW): Balearic islands (1,300 MW), Sardinia (1,700 MW)
- **Very large**: (>1,700 MW): Sicily (3,180 MW)

Research and Innovation for islands

Challenges and barriers affecting the (transition of) energy systems of islands

- Lack of economies of scale
  - For generation and T&D infrastructure
- Limited fuel supplies
  - Difficulty to use gas → relies strongly on liquid fossil fuels
- Reliability more costly
  - Adequacy
    - Relative capacity margin more important
  - Security
    - More difficult to balance and stabilize the system
- Limited space in some cases
  - Land use for generating facilities competes with other needs

Issue	Criticality for fossil-fuel-based energy systems	Criticality for RES-based energy systems
Lack of economies of scale	**Important challenge** (large power plants are more efficient than small power plants)	**Minor challenge** (scale effects for wind turbines, but minor scale effects for PV and for battery storage)
Limited fuel supplies	**Important challenge**	**Challenge irrelevant for purely RES-based energy systems**, but the limited fuel supplies could impact the decarbonisation of the generation system (difficulty to provide flexibility with gas)
Adequacy	**Minor challenge** (for liquid fossil fuel generators, the OPEX is much more important than the CAPEX)	**Important challenge** (no possibility to share capacity with neighbours → storage needed to ensure adequacy)
Security	**Minor challenge** (limited variability, synchronous generators, flexible generators)	**Important challenge** (variability of RES, common-mode changes of RES output, power electronics)

EU Islands overview

- 'An island is a tract of land completely surrounded by water and not large enough to be called a continent'.
- EUROSTAT definition
- A minimum surface of 1 km^2;
- A minimum distance between the island and the mainland of 1 km;
- Population of more than 50 inhabitants;
- No fixed link (bridge, tunnel, dyke) between the island and the mainland;
- Not house an EU capital

- Key characteristics
- range from small (0.4 km^2) to large (25,000 km^2- Sicily)
- can be close (1 km) or far from the main land (1,600 km- the Canary islands)
- often have a very specific economy, with high seasonal changes (tourism)
- are often non-connected or weakly interconnected with the mainland
- have remarkable RES potential (wind, solar, geothermal)
- often generation based on carbon intensive sources
- usually have high costs for energy (even 15-20 times higher than in mainland), requiring state intervention to maintain fair prices

Key conclusions: Research and development

- R&I projects are addressing the main challenge: reliability
  - How to ensure the load/generation balance at any time?
- Solutions are evolving
  - Demand Response
  - Improved control of RES generators
  - Storage (batteries, but not only)
  - Coupling between different energy systems
    - ❖ EVs
    - ❖ Thermal storage

- Challenges less addressed:

- Management of the uncertainty
  - ❖ Forecast errors still exist
  - ❖ Optimal management of flexibility resources: must consider forecast accuracy

- Systems dominated by inverter-based generators
  - ❖ Dynamic stability issues, selectivity problems for protection systems, degradation of the power quality
  - ❖ H2020 project “MIGRATE”: focus on transmission system → what about energy island systems?

Key conclusions: policy action

Regulatory measures

- Guidance for creating Islands Sustainable Energy Action Plans (ISEAPs)
- Promotion of ISEAPs
- KPIs for monitoring progress
- Address monoplies and design incentivising energy market conditions
- Consider specific support schemes for islands to incentivize clean energy- and infrastructure development
- Facilitate local investments

Funding

- Assure funding for R&D and demonstration projects
- Promote project aggregation to ensure economies of scale
- Support viable self-sufficient business models
- Assure funding for knowledge transfer and best practice

European Framework for Islands

Cooperation

- Promote cooperation of authorities of various levels
- Strengthen the role of island authorities by f.ex. promoting one-stop shop for RES investments
- Foster local stakeholder engagement and energy cooperatives

Know-how transfer

- Transfer knowledge across European islands and share best practices across Europe
- Set up specific programs to train skilled young people to work in the energy sectors of their native islands
- Social awareness campaigns

This slide and the following one outline initiatives on islands currently undertaken by the Commission services and at international level, could be removed

DG REGIO Cohesion Fund– clean energy transition for EU islands – 983m€

Objectives:
promote the accelerated development of RES active coordination among competent Public Administration Bodies, Technology Centres and Universities of the different Regions

DG MARE *e*stimates suggest that ocean energy could meet 10% of the EU's power demand by 2050.

strategic roadmap for the ocean energy sector provides analysis of what the industry considers as necessary conditions for further development towards industrial phase in the medium term.

work streams for Environment & Consenting, Finance 1 Technology

In 2017 launch 1,5m€ call for proposals studies & research.

Recent Projects on ocean energy:

WaveRoller, AW-Energy: Peniche, Portugal
Budget 10M€ EIB
Project capacity: 350KW, 1st phase
Grid connected: Yes
completion: 2017

MeyGen: Pentland Firth: Scotland
Finance was secured through a mix of debt, grant and equity finance
Project capacity: Phase 1A 6MW – at completion 398 MW
Grid connected: Yes
Completion: 2016

Wave4Energy: Pantelleria, Italy
Project capacity: 200kW
Grid connected: Yes
Completion: 2015

DGENER – Horizon 2020

- *Pilot projects for islands to integrate local renewable production, storage facilities to achieve a high degree of autonomy.*
- *TILOS, EMPOWER or NETFICIENT > 25 m€ EU funding.*
- *In the new programming period a call dedicated for projects on clean energy transition*