CESARE'22
Coordinating Engineering for Sustainability And Resilience
Conference ISSN number is 2788-6204
Irbid, Jordan 6 May - 9 May 2022

COST ACTION CA20109

MODENERLANDS

MODULAR ENERGY ISLANDS FOR SUSTAINABILITY & RESILIENCE

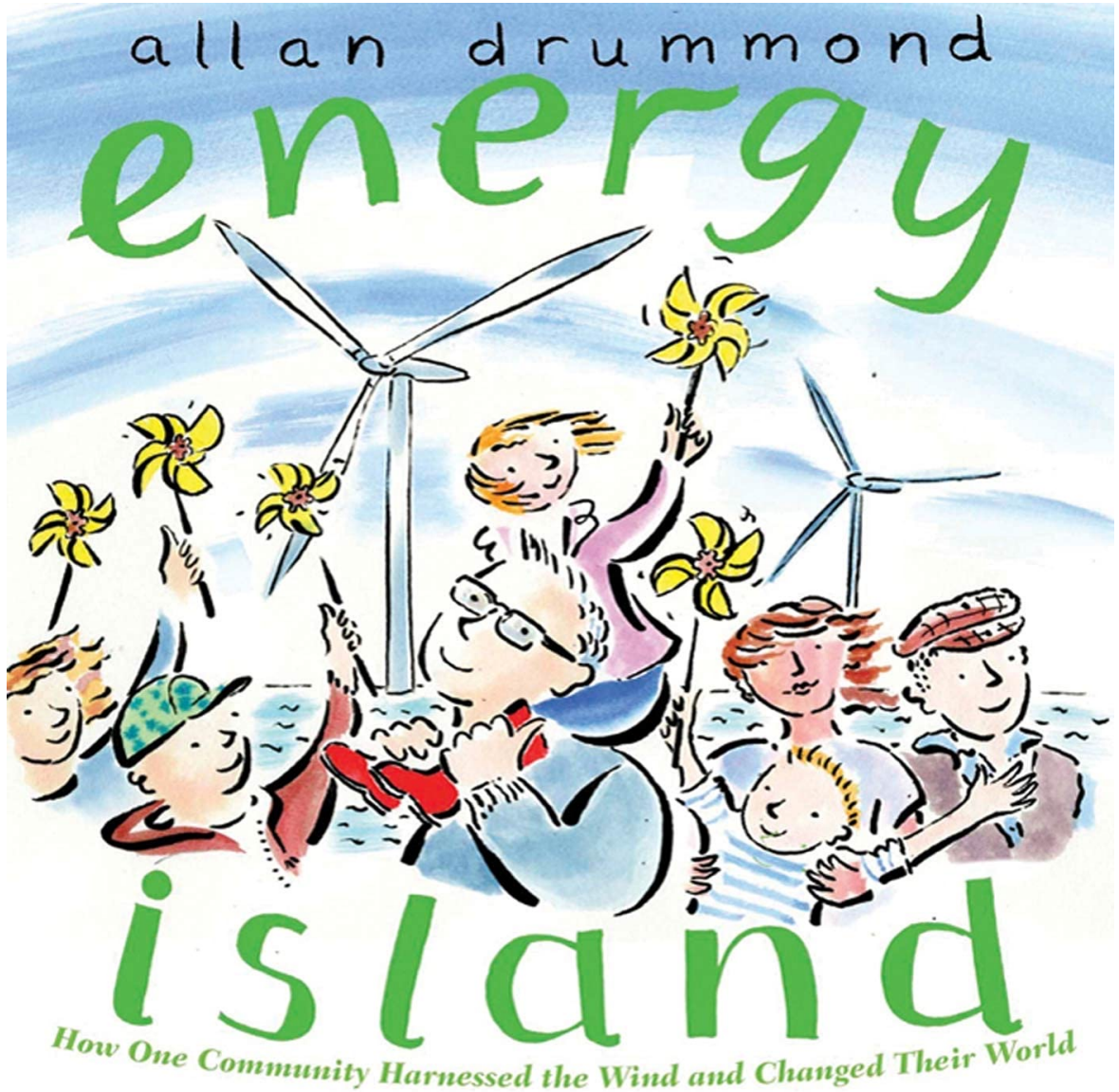
Carlos Rebelo

cost
EUROPEAN COOPERATION
IN SCIENCE & TECHNOLOGY

Once upon a time …

… there was a Island in North Sea named Samsø where the ordinary citizens have accomplished something extraordinary:

in just ten years they have reduced their carbon emissions by 140% and became almost completely energy independent.



Concept

Energy production from different renewable sources on a single place in the ocean

Storage

Transmission to shore

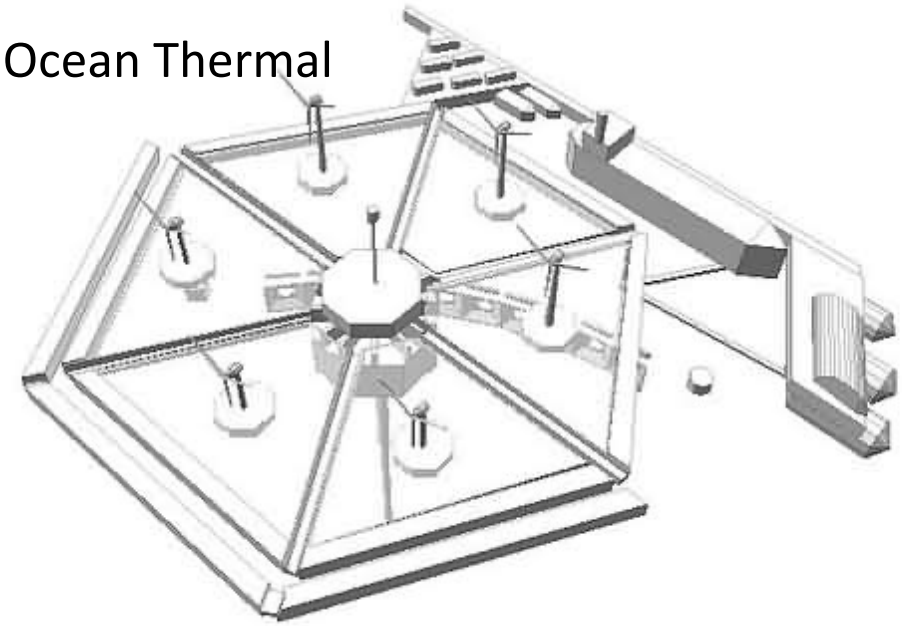
Wind

Solar

Wave

Current

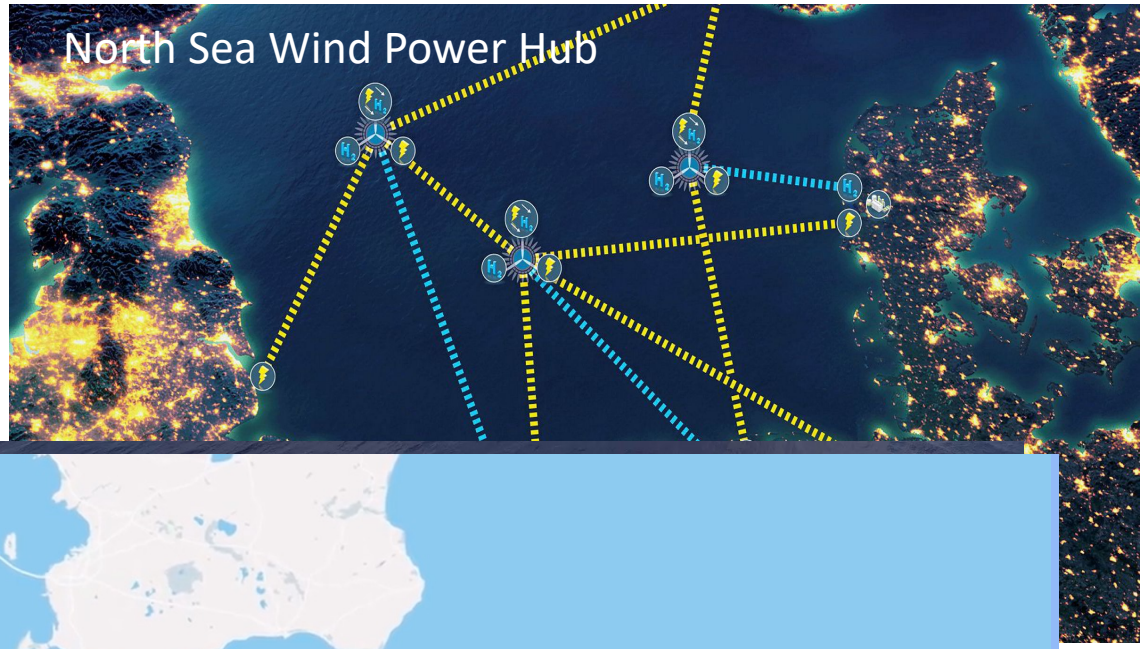
Ocean Thermal

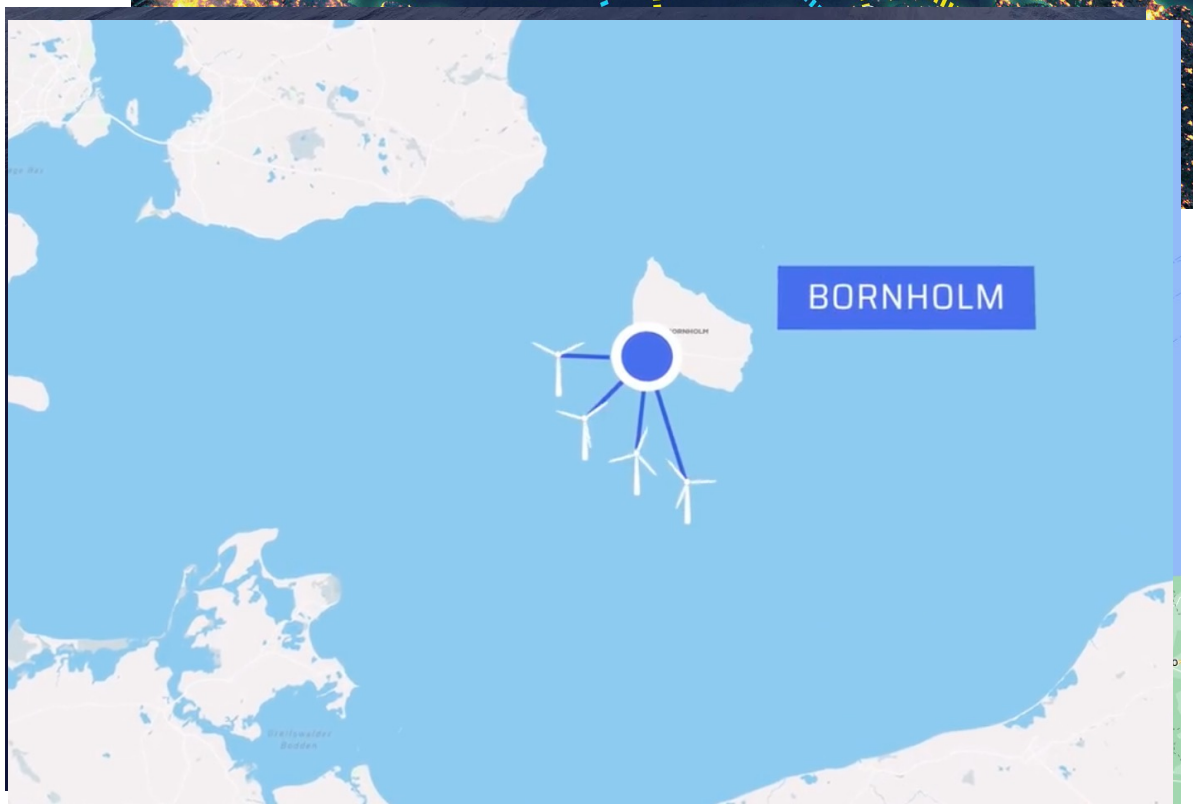


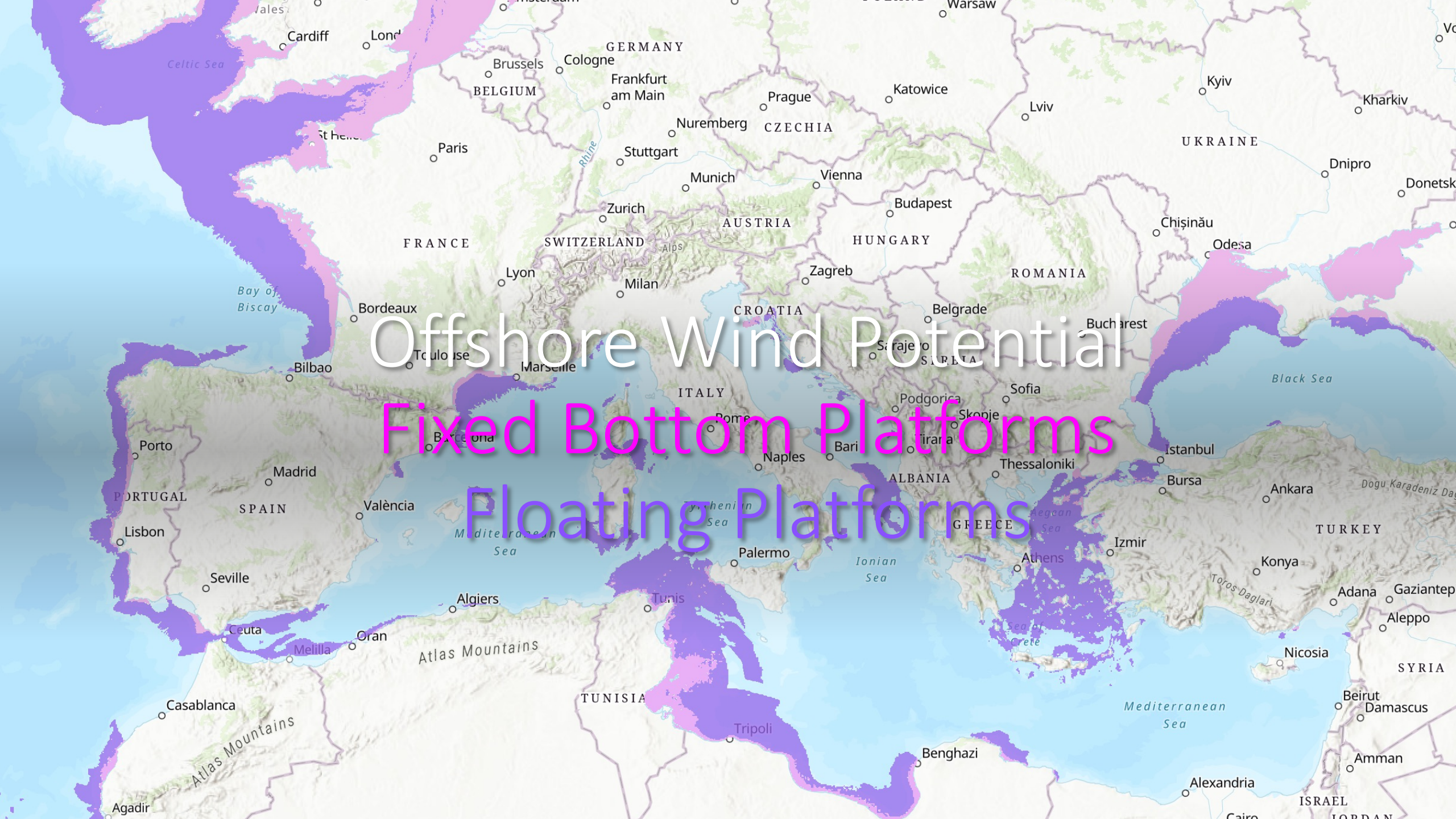
http://www.energyisland.com

Projects/Implementations

- The North Sea Wind Power Hub
  - connecting multiple countries through a hub-and-spoke concept
- Denmark, Belgium, and Germany Step Closer to Energy Island Grid Links
- Denmark's Energy Islands
  - Artificial island in the North Sea
  - Natural island – Bornholm – In the Baltic Sea
- Belgium is planning to construct an energy island in the North Sea to store wind power by 2025






Offshore Wind Potential
Fixed Bottom Platforms
Floating Platforms
Cardiff
Celtic Sea
Brussels
Cologne
GERMANY
BELGIUM
Frankfurt am Main
Prague
Katowice
Kyiv
Kharkiv
Lviv
Nuremberg
CZECHIA
UKRAINE
Paris
Rhine
Stuttgart
Munich
Vienna
Dnipro
Donetsk
Zurich
Budapest
AUSTRIA
Chișinău
Odesa
FRANCE
SWITZERLAND
Alps
HUNGARY
Lyon
Zagreb
ROMANIA
Milan
Bay of Biscay
Bordeaux
CROATIA
Belgrade
Bucharest
Toulouse
Marseille
Bilbao
ITALY
Black Sea
Sofia
Podgorica
Skopje
Porto
Barcelona
Bari
Naples
Istanbul
Thessaloniki
Madrid
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Bursa
Ankara
PORTUGAL
SPAIN
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Algiers
Tunis
Aleppo
Ceuta
Oran
Melilla
Atlas Mountains
Crete
Nicosia
SYRIA
Casablanca
TUNISIA
Beirut
Damascus
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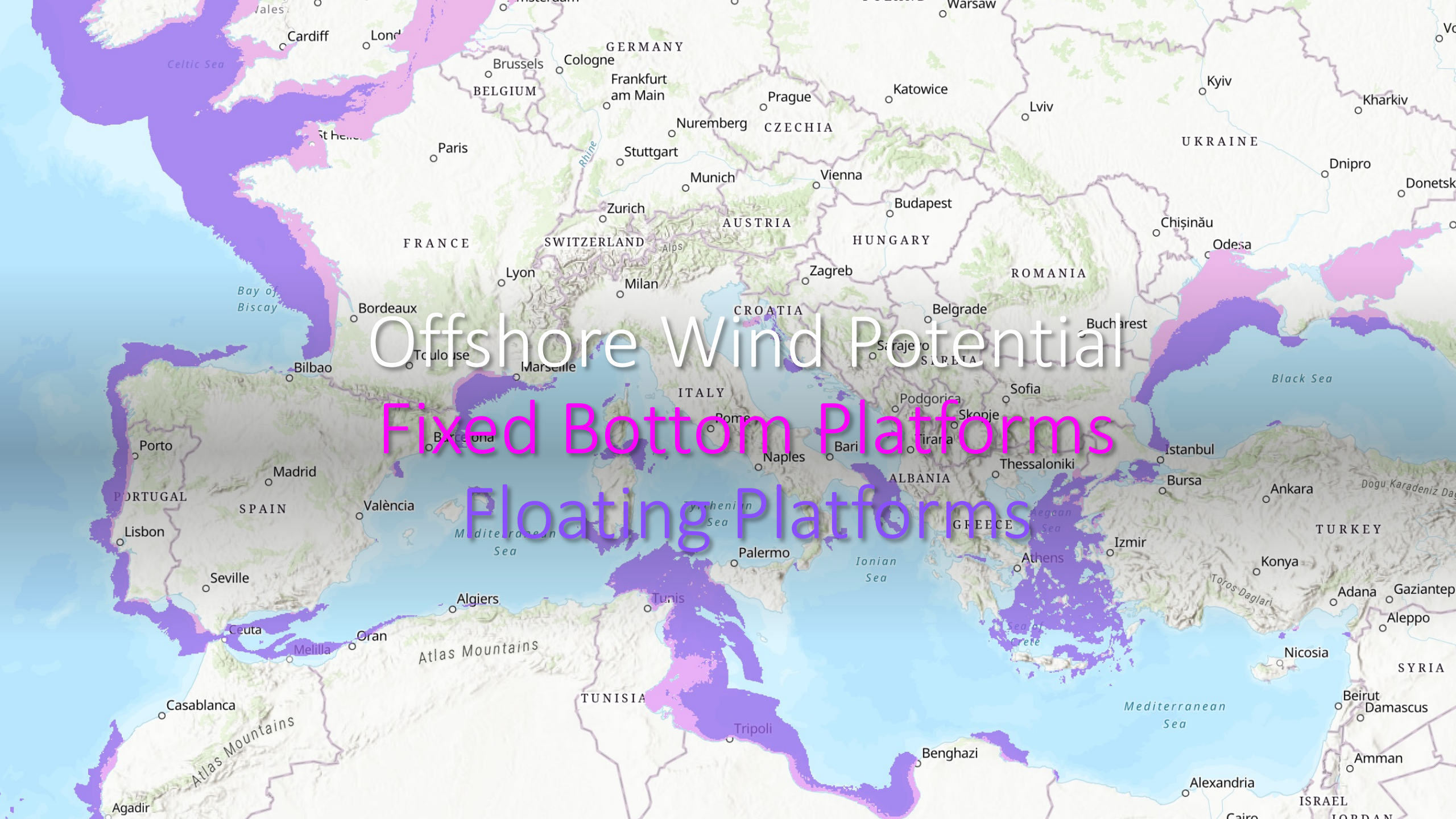
Tripoli
Benghazi
Amman
Alexandria
Agadir
ISRAEL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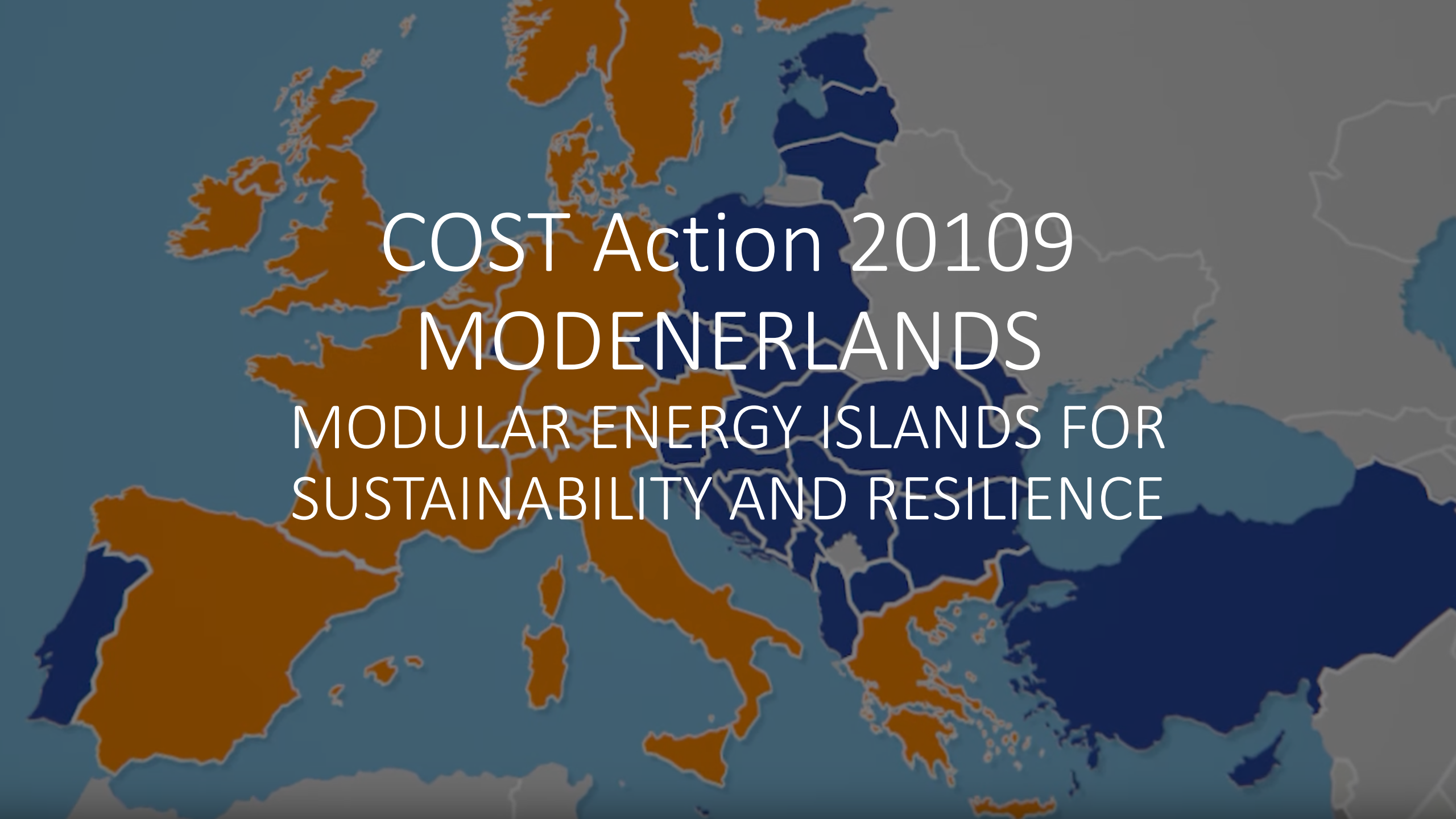
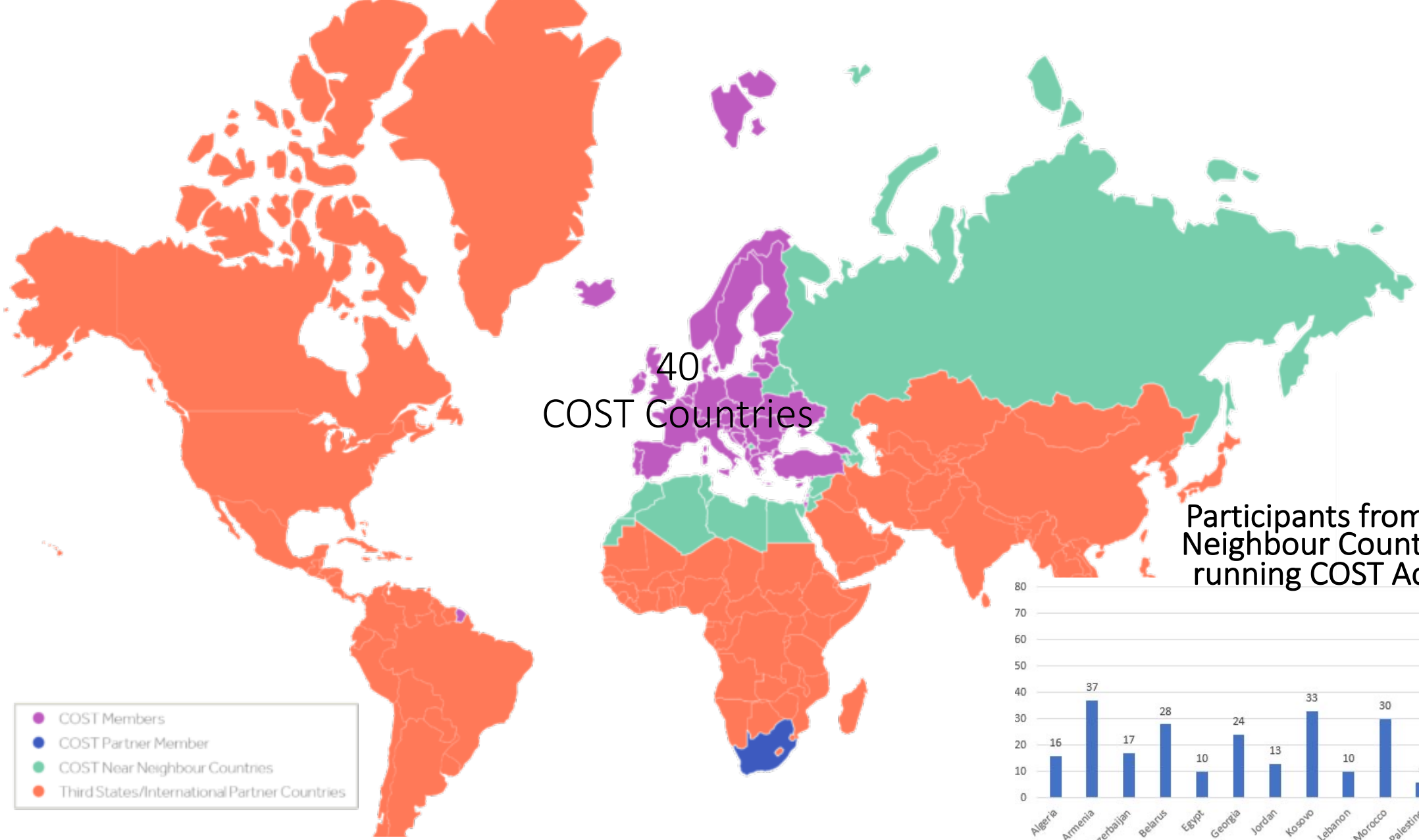
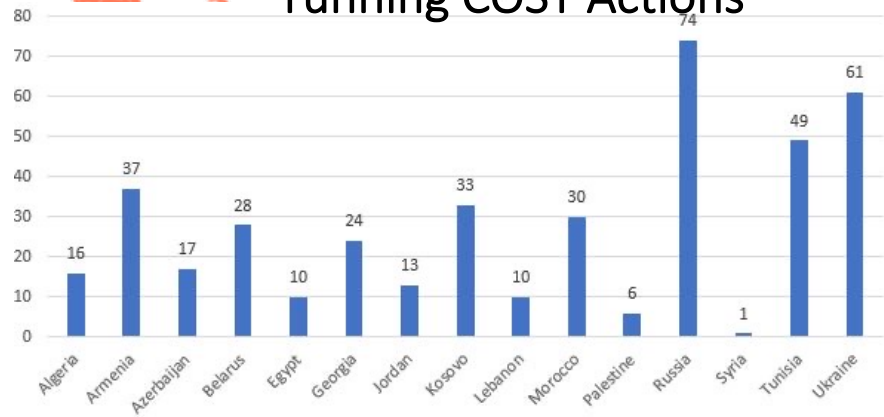


COST Action 20109
MODENERLANDS
MODULAR ENERGY ISLANDS FOR SUSTAINABILITY AND RESILIENCE



40
COST Countries

Participants from Near Neighbour Countries in running COST Actions

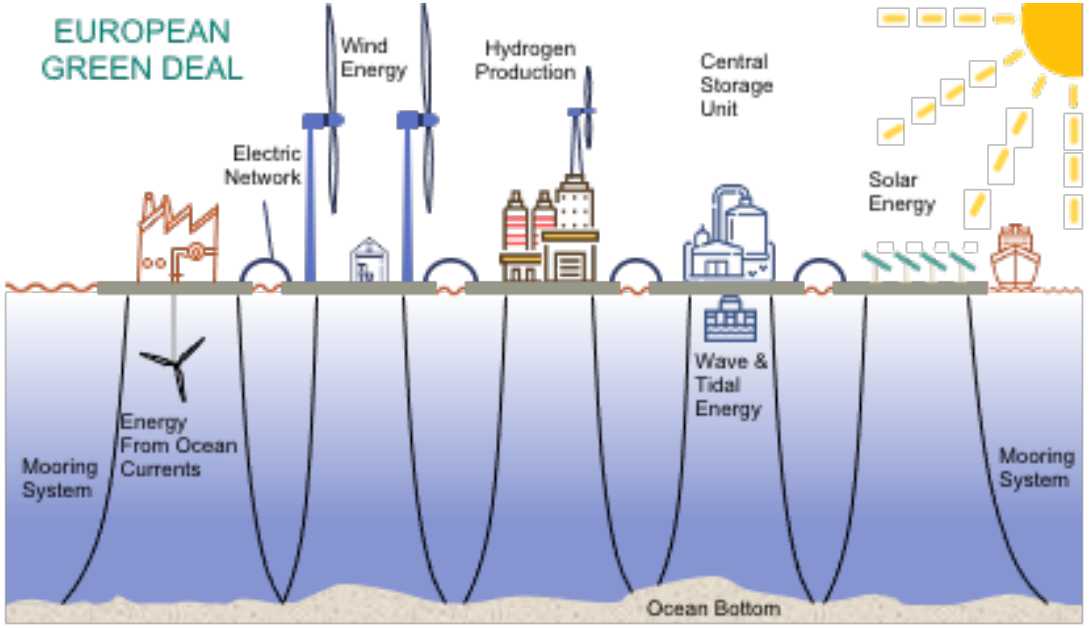


MODENERLANDS Challenge

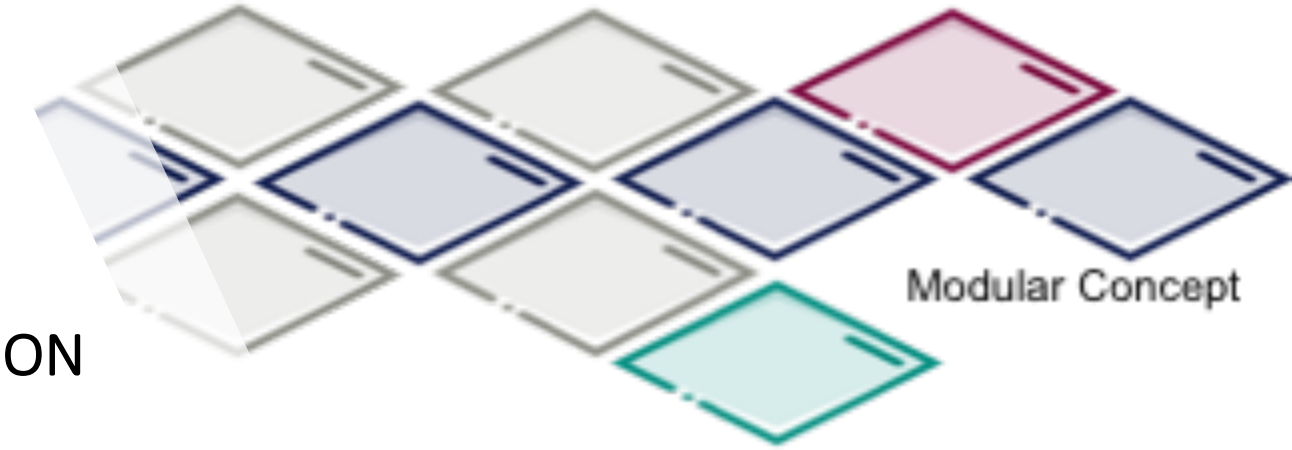
Merge and systematise the efforts of the European R&D groups and stakeholders working on **Sustainable Energy** by promoting the relevant synergies to work on the concept of

Floating Modular Energy Island

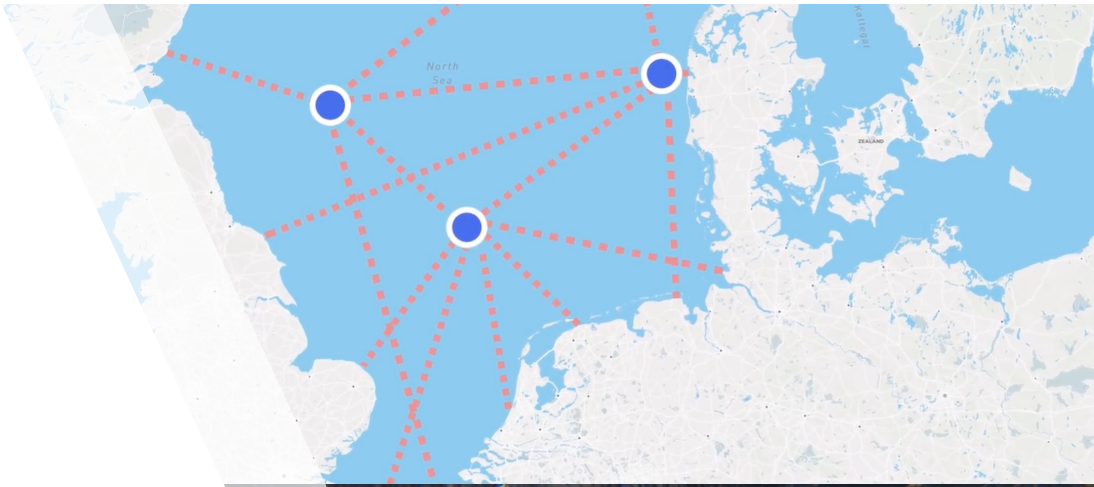
Collecting Renewable Energy, Conversion and Storage or Transmission to shore



Questions addressed (1)

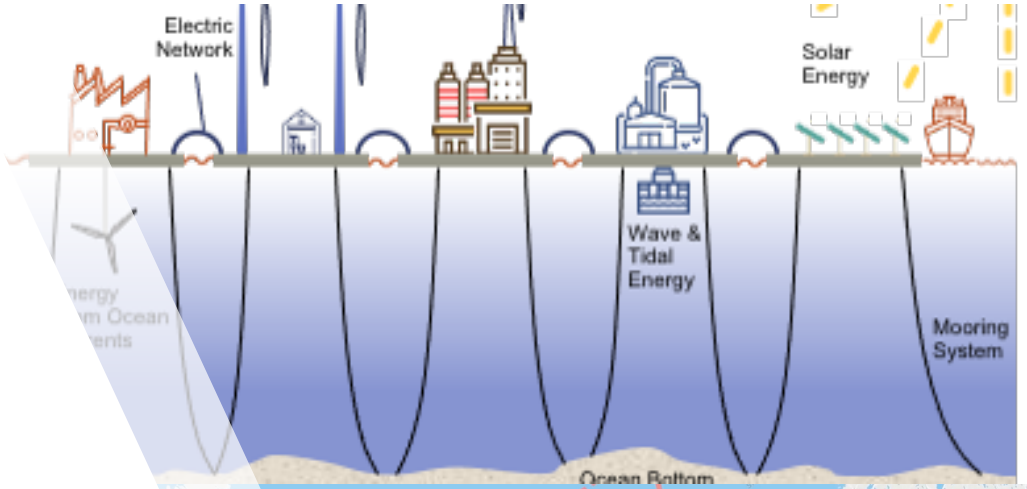


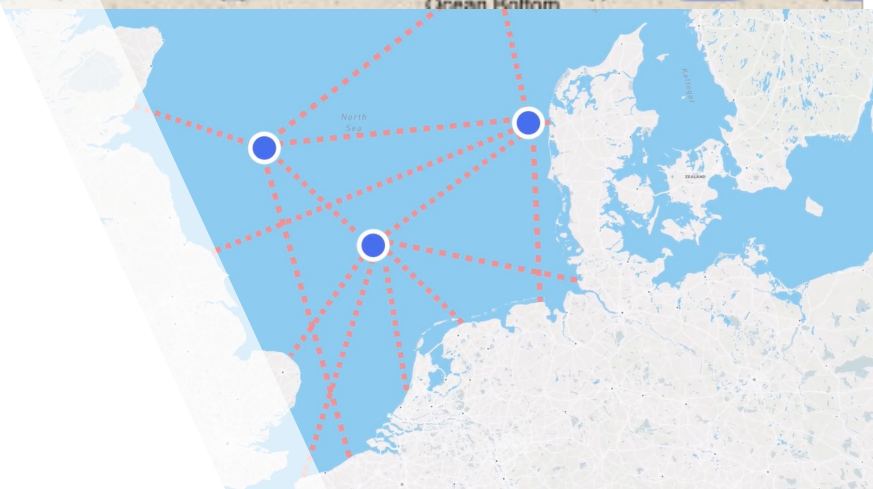
- RESOURCES ASSESSMENT and INTEGRATION
- Renewable energy resource assessment
- Assessment of the impacts of climate change in renewable energy resources, production and consumption
- Physical and ecological restrictions and conditions
- Systematization of modular concepts for Energy Islands based on multiple offshore energy clusters (Energy Archipelagos)
- Assessment of offshore locations suitable for installation of large infrastructure for energy collection from multiple sources and distribution to multiple connection points at shore
- …



Questions addressed (2)

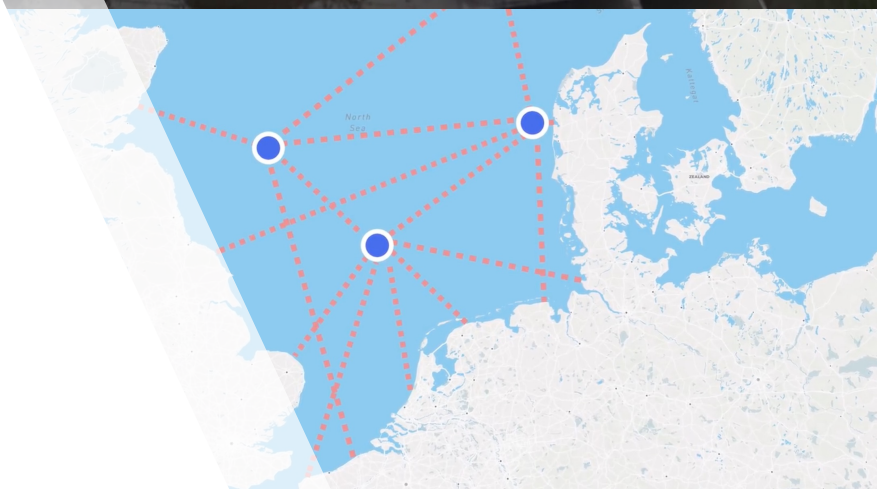
- MODULAR OFFSHORE FLOATING PLATFORMS
- **Technological challenges and solutions** addressing the aspects of modularization and industrial feasibility as well as the structural reliability and the design process
- **Floating Offshore platforms** concepts
- Floating systems technology development for energy platforms, minimizing wave and wind actions on platforms
- Role of **Modular Construction** and of the spatial distribution of production and storage
- Operational functionality, structural health and condition monitoring
- …



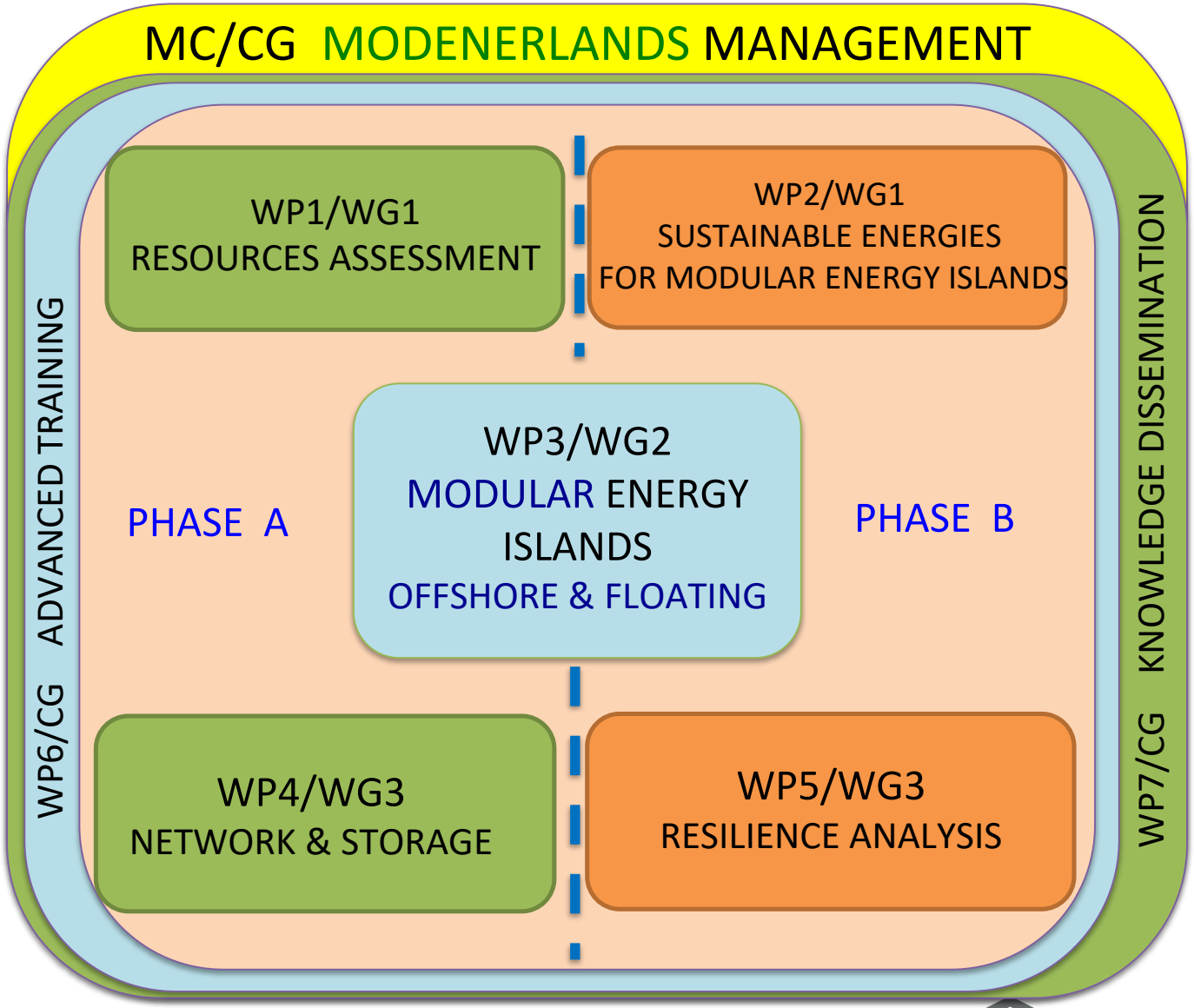


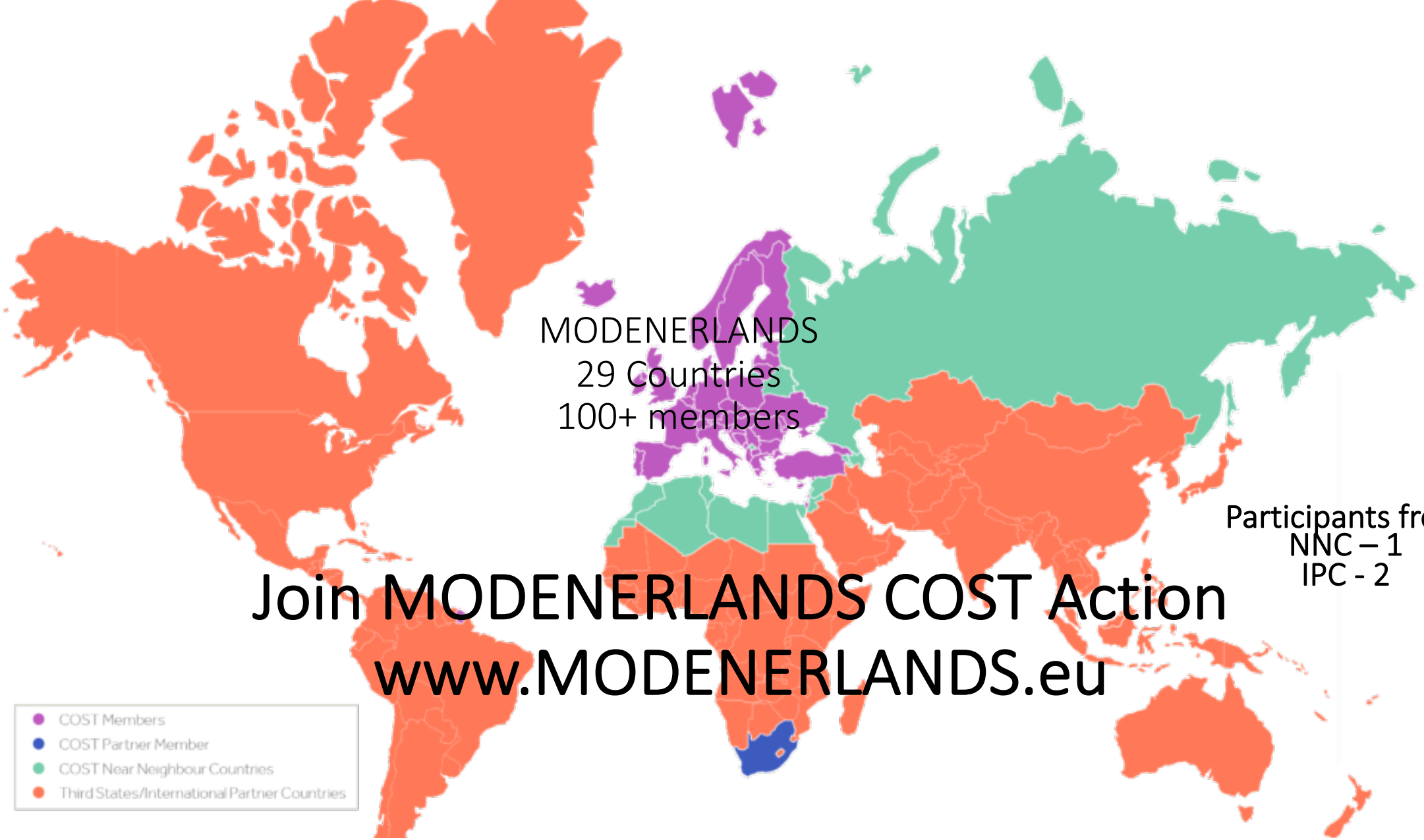
Questions addressed (3)

- NETWORK, ENERGY STORAGE and RESILIENCE
- **Combination of renewable generation sources** such as solar PV, hydro or storage technologies,
- Energy **storage** vs energy **transmission:** Electric vs H2 **network**
- Emerging technologies: role of **Green hydrogen**: production and storage/transmission
- **Feasibility and Risks** for environment and ecological systems
- **Life cycle aspects** in Energy Islands, including the use of materials and eco-materials;
- **Achievements concerning EU goals** established by the European Green Deal and technology transfer
- …



Action Structure





MODENERLANDS
29 Countries
100+ members

Participants from
NNC – 1
IPC - 2

Join MODENERLANDS COST Action
www.MODENERLANDS.eu

CA 20109 Working Groups

WG 1

ASSESSMENT OF SUSTAINABLE ENERGIES RESOURCES FOR ENERGY ISLANDS

WG 2

MODULAR OFFSHORE FLOATING ENERGY ISLANDS

WG 3

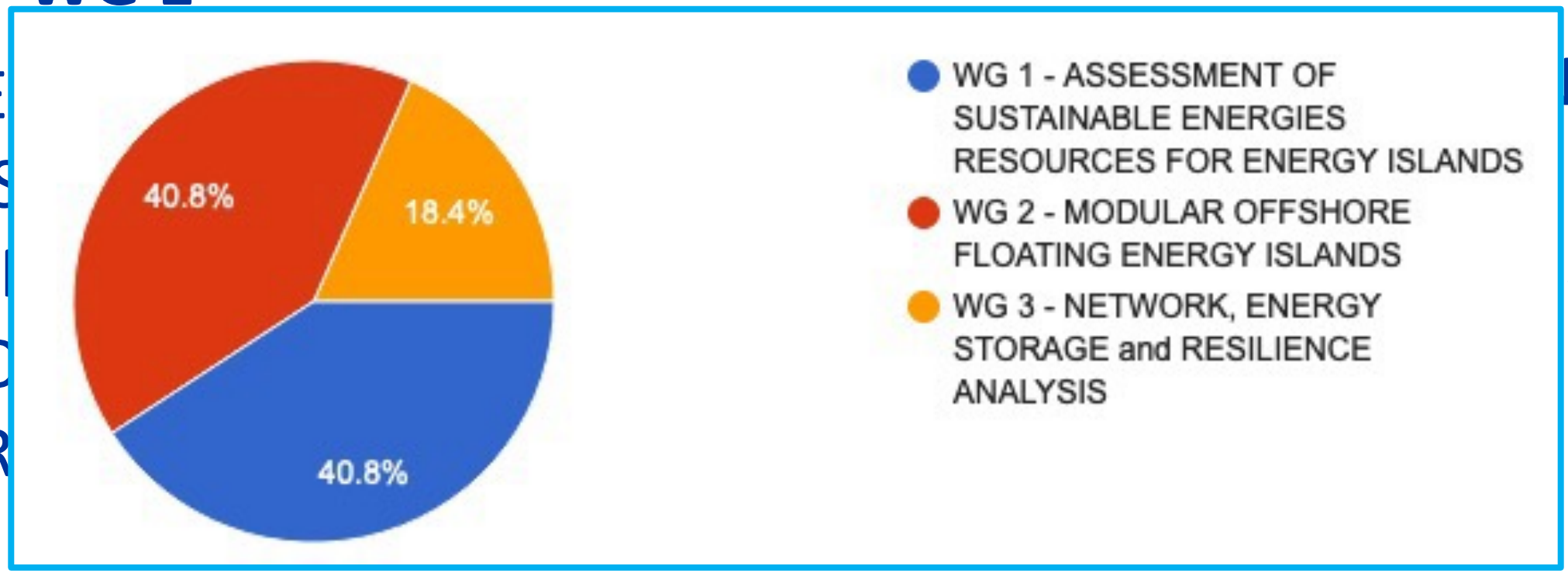
NETWORK, ENERGY STORAGE and RESILIENCE ANALYSIS

CA 20109 Working Groups

WG 1

WG 3

ASSE … IERGY
SUS … nd
EI … ALYSIS
RESO
ENER



FLOATING ENERGY ISLANDS

MODENERLANDS

Research Coordination Objectives

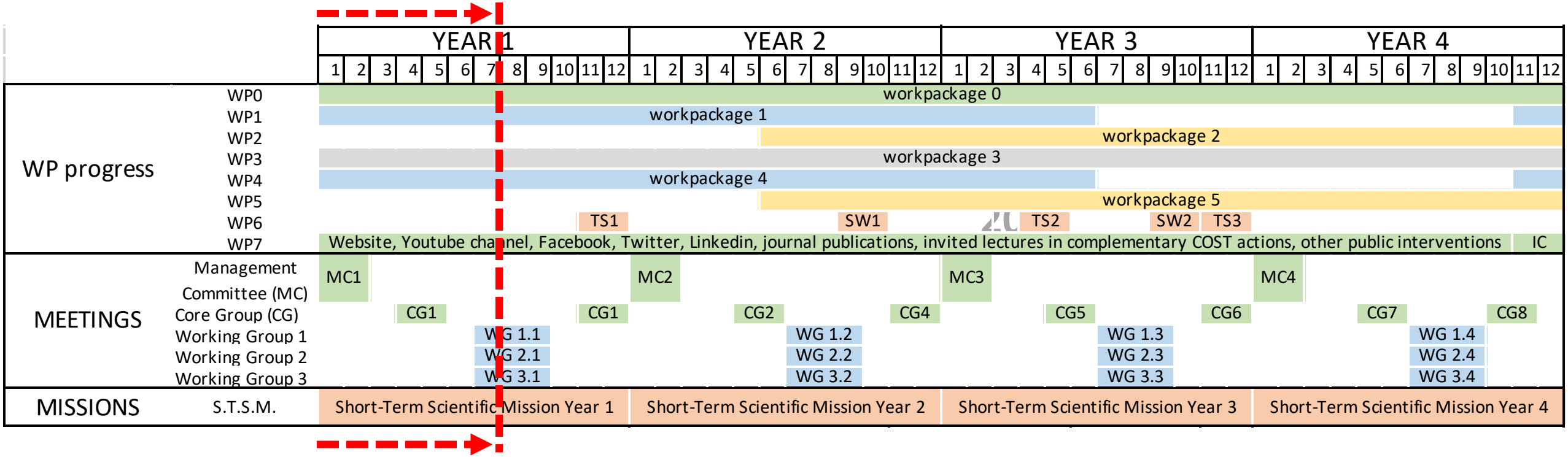
- **Coordinate the activities on the floating Sustainable Energy Islands** systematizing them to achieve main goals related to WG developments
- **Coordinate the collection and systematisation of the existing theoretical frameworks** including contributions on Climate Change impact and on design of floating offshore platforms
- **Foster the scientific and technical discussion within the Working Groups** on the means and strategies to promote Sustainable Energy islands, by organising technical group meetings, Strategic Workshops, and the final MODENERLANDS International Conference
- **Disseminate the research results** to partners, stakeholders, researchers across Europe and around the globe, and training of a new generation of Early Career Investigators (ECIs), engineers and other stakeholders.

MODENERLANDS

Capacity Building Objectives

- **To facilitate sharing of Knowledge of new technologies** and potentials related to the Modular Sustainable Energy Islands perspectives
- **To train Early Career Investigators** to become technical and policy Experts by developing Advanced Training activities on all scientific, engineering, socio-ecological and technoeconomic topics related to Sustainable Energy harvested by Floating Energy Islands
- **To create and reinforce the network of professionals** able to tackle emerging sustainable energy challenges
- **To foster continued collaboration and synergies** beyond the completion of the MODENERLANDS Action and act as a transnational stakeholder platform

Action Planning



University of Coimbra, Portugal

Founded in 1290 with approx. 23000 students

Faculty of Science and Technology

- 8000 students, 600 lecturers, 11 departments

Department of Civil Engineering

- 6 Scientific Areas
- 3 Bachelor courses
- 8 Master Courses
- 7 Phd programs

https://visit.uc.pt/en

Learn more about the University of Coimbra

https://www.youtube.com

isise Institute for Sustainability and Innovation in Structural Engineering

WG meeting
11-12 April 2022
Hybrid
Coimbra, Portugal

50+ Participants

WG1 - ASSESSMENT OF SUSTAINABLE ENERGIES RESOURCES FOR ENERGY ISLANDS

- Assesment of wind farming energy potential
- Quality of data and data assimilation techniques
- Wind farming monitoring
- Development of solar PV map
- Wind-excited energy harvesters
- Assessment of wind and solar energy potential, using multi-criteria decision making methods
- Geospacial technology for modeling
- Hybrid renewable power systems
- Polygeneration systems for Energy Islands

Hassan Hemida

Anina Glumac

WG2 - MODULAR OFFSHORE FLOATING ENERGY ISLANDS

- Technological challenges and solutions addressing the aspects of modularization
- Floating systems technology development for energy platforms
- Wind/wave/current structural interaction and loading of floating platforms (FSI problems)
- Fabrication and execution aspects
- Operational functionality, structural health and condition monitoring
- Regulatory and standardization

Enzo Marino

Michaela Gkantou

WG3 - NETWORK, ENERGY STORAGE and RESILIENCE ANALYSIS

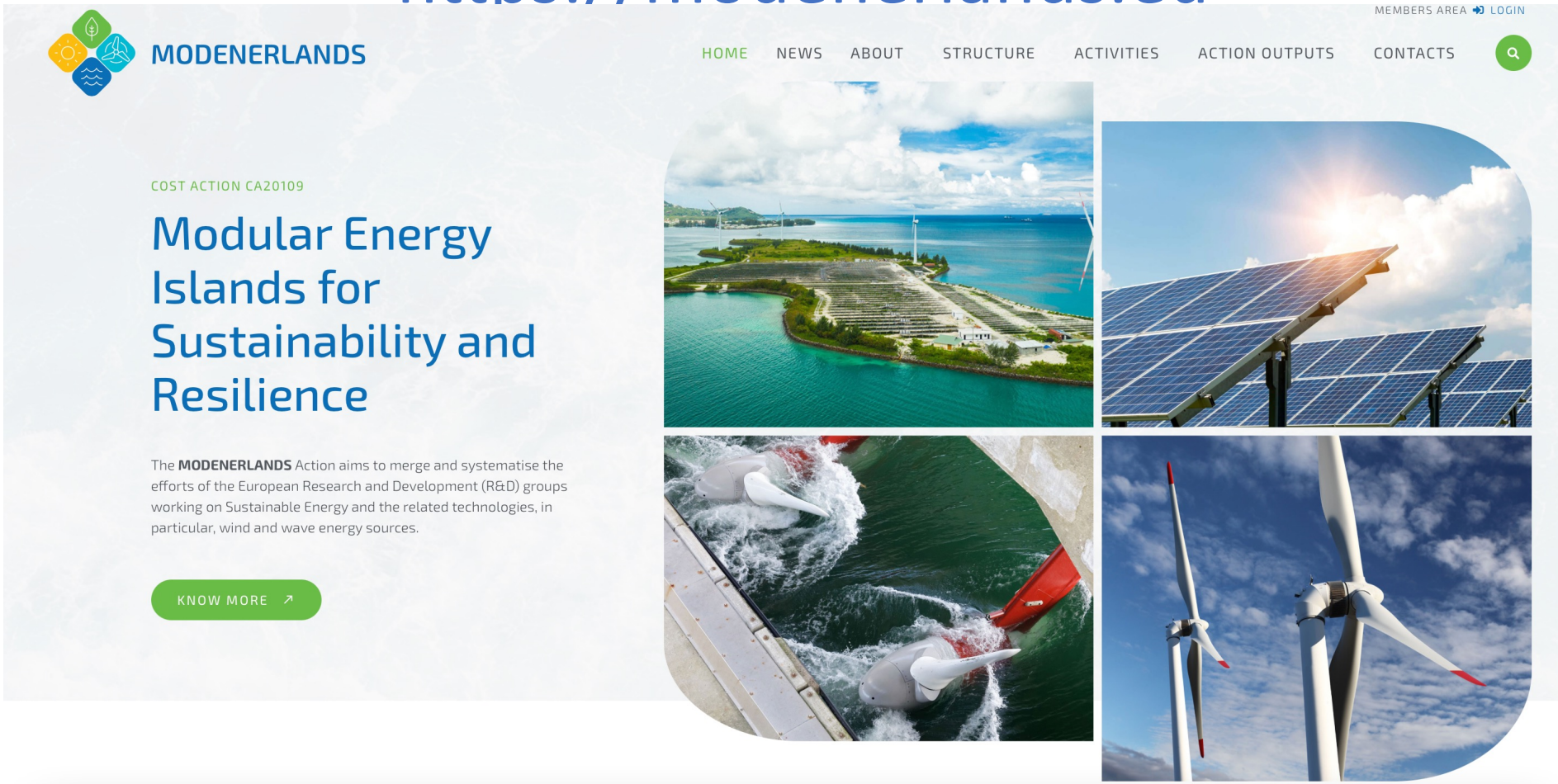
- Feasibility analysis of Energy Islands projects including techno-economic analyses and social-ecological constraints and policies;
- Risk analyses and safety in the context of Energy Islands construction and operation;
- Life cycle aspects in Energy Islands, including the use of materials and eco-materials and development of strategies to overcome scarcity of resources including construction materials;
- Achievements concerning EU goals established by the European Green Deal and technology transfer;

Ruben Paul Borg

José Correia

Website

https://modenerlands.eu

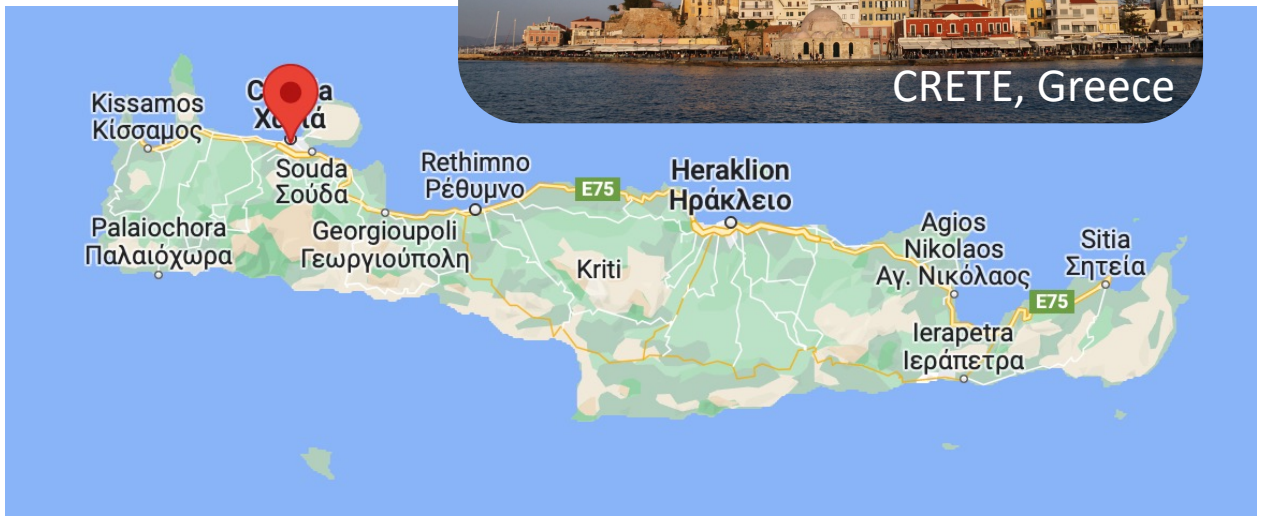


Upcoming Events

TRAINING SCHOOL

MODULAR ENERGY ISLANDS FOR SUSTAINABILITY AND RESILIENCE

CHANIA, Greece
26-29.09.22



Deadline for submission of applications **20.06.22**

Selection and confirmation **08.07.22**

TRAINING SCHOOL

Training School 2022

Please fill this form and submit it not later than **Monday 20th June 2022 (23:59 CET)**. Applications sent after this date will not be considered.

APPLICATION FORM

https://modenerlands.eu/activities/events/training-school-2022-2/

NAME *
Your First and Last Name

EMAIL *
Your Email Address

DATE OF BIRTH *

NATIONALITY *

OCCUPATION *
Your occupation

CURRENT INSTITUTION *
Organisation you represent

MOTIVATION TO JOIN THE TRAINING SCHOOL *
Insert text here (2000 words in total)...

EDUCATIONAL BACKGROUND AND EXPERIENCE *

HOW?
If applicable...

ITC COUNTRY* *
YES NO

* Albania,Bosnia and Herzegovina, Bulgaria, Cyprus, Czech Republic, Estonia, Croatia, Greece, Hungary, Lithuania, Latvia, Malta, Moldova, Montenegro, Poland, Portugal, Romania, Slovenia, Slovakia, Republic of North Macedonia, Republic of Serbia and Turkey.

WHICH COUNTRY
If applicable...

By submitting this form you are accepting our privacy policy

SEND

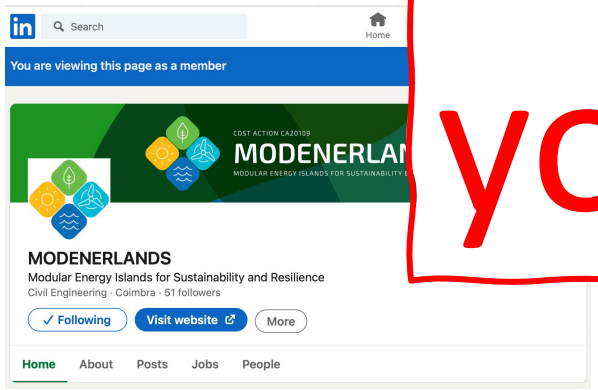
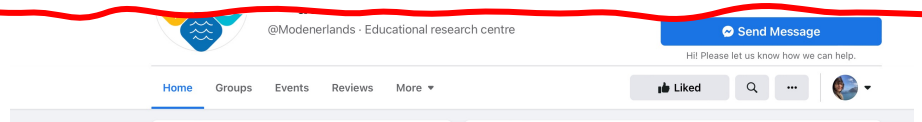
GRANTS

MODENERLANDS
MODULAR ENERGY ISLANDS FOR SUSTAINABILITY AND RESILIENCE

- Short Term Scientific Missions
- Virtual Mobility Grant
- Dissemination Conference Grant
- ITC Conference Grant
- Virtual Networking Support Grant

https://e-services.cost.eu/activity/grants/add

Channels

Link

Thank You for your attention