NESOI
EU ISLANDS FACILITY

Comprehensive hydrogen applications on island

CHYAO

VENTOTENE

"To kick off the green hydrogen (GH_2) use, a new attraction for the isla will be investigated: a GH_2 scooter sharing service, the first of its kind in Italy."

This project is supported by the EU Islands Facility NESOI.
NESOI has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°864266

NESOI
EU ISLANDS FACILITY

CHYAO

The European Islands Facility NESOI aims to unlock the potential of EU islands to become the locomotives of European Energy Transition. To do so, NESOI aims to mobilize more than €100 million of investment in sustainable energy projects to give EU islands the opportunity to implement energy technologies and innovative approaches, in a cost-competitive way. NESOI has selected 56 such projects across the European Union and provide them with financial resources and technical support.

Comprehensive hydrogen applications on island

ABOUT
THE PROJECT

Project Promoter ANCIM Associazione Nazionale Comuni Isole Minori (ANCIM)

Stakeholders ANCIM; Municipality of Ventotene; Local community; Port authority; E-Distribuzione (DSO); The association of regional municipalities

Country Italy | **Sector** Hydrogen | **PROJECT VALUE** 2 M€

DESCRIPTION

The project aims at developing a comprehensive feasibility study to foster the green hydrogen (H_2) uptake in small islands, with a focus on the Italian context. Green H_2 is foreseen as the main future energy vector able to couple multiple sectors with a strong decarbonizing effect. CHyAO addresses green H_2 use especially in the transport sector.

AIM OF THE PROJECT

- Techno-economical analysis of production and use of green H_2.
- The study of available regulations and restrictions into hydrogen technologies.
- Investigation into using green H_2 in a ferry boat system connecting Ventotene and Santo Stefano.

FUTURE STEPS

A meeting about green H_2 and the burning of waste will be held in 2024 to encourage students and local economic actors to get involved. The CHyAO project showcases how ANCIM is promoting green H_2 more than PV for islands, they believe it's a technology with huge potential.

HOW THE EU ISLANDS FACILITY NESOI
SUPPORTS THE PROJECT

1. Assessment of the key project sizing drivers taking also into consideration local constraints
2. Identification of suitable technological options given existing project sizing requirements
3. Definition of the required environmental permitting procedures given the identified project options
4. Cost Benefit analysis and socio economic and environmental impact evaluation
5. Definition of the technical, economic and financial, fiscal project inputs
6. Risk analysis and identification of available mitigation strategies
7. Assessment of existing procurement options (e.g. tender, PPP, etc.)
8. Financial modelling and identification of target scenario
9. Identification of financing/funding options, action plan and identification of project monitoring procedures

CHYAO

Comprehensive hydrogen applications on island - Interview

INTERVIEW WITH

Giannina Usai, ANCIM (Associazione Nazionale Comuni Isole Minori)

Q: How was the project initially designed? Why choose this specific technology / sector?

A: The CHyAO project was designed around a white paper which ANCIM (Associazione Nazionale Comuni Isole Minori) launched two years ago, entitled "Isole minors between sun, sea and wind," focusing on alternative energy sources like hydrogen. The study, conducted with university professors, found that minor islands are ideal for testing hydrogen intervention. The first island tested was Ventotene, and more will follow. A public event in October 2023 raised awareness among the population, municipalities, economic and social forces. The study also highlighted the potential of hydrogen production from seawater and waste, which could be used for ferries or private boats. ANCIM coordinated with 35 municipalities in smaller islands to ensure project replicability. The white paper also discussed streaming procedures, highlighting the revenue-generating sector and the unique needs of the Mediterranean islands. This is why hydrogen was chosen as the CHyAO technology.

Q: What is the project's impact on local citizens and the local economy?

A: The project had a positive impact on elementary and middle schools, who expressed knowledge of hydrogen and waste burning, but less about PV. Students and local economic forces were involved in the integrated project team, and citizens showed interest in the city conference. In 2024, we shall continue engaging the local citizens to encourage them to get involved more directly with the long-term adoption of hydrogen in islands.

Q: Within your views, what are the key factors for replication of this project?

A: The population and small areas must be identified, and the legal and financial framework streamlined. Additionally, more funds are needed for this type of technology to be highly replicable. That said, I believe these are the key replication factors for the CHyAO project.

THE IMPACT

ON LOCAL COMMUNITY

1. **Local Economy**
   The actual grid relies on diesel generators only, but increased RES penetration can be enabled thanks to hydrogen storage. The local economy can benefit from a new business model based on HRS services.

2. **Social Acceptance and Impact**
   High social acceptance is expected due to reduction in air pollution, but attention is focused on the site installation integration with the local landscape. For this reason, particular attention will be given to the location and related safety regulations.

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CHYAO

Comprehensive hydrogen applications on island **– Technical Data**

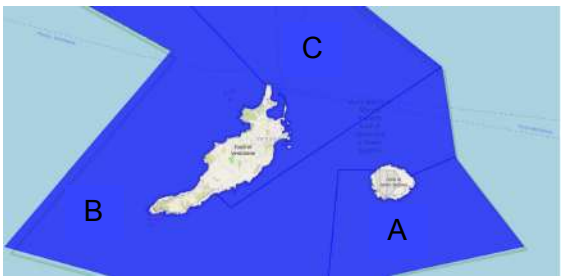
FOCUS ON
DECARBONIZING SMALL ISLANDS

Ventotene island has an area of 1.74 km^2 and 700 permanent inhabitants. It is not connected to the mainland power grid, has strong seasonal tourism, and is part of a natural park. Similar conditions are shared with many Italian minor islands.

The installed power on the island is composed of 1,6 MWe from diesel generators, 150 kWp PV power (650 kWp forecasted in 2026) and 600 kWh Li-ion storage. There is already a fleet of 35 shared electric scooters and is planned also an e-bike service. Two electric charging stations have been installed in 2023, one for road vehicles and one for maritime traffic.

The local green hydrogen will be used to decarbonize local maritime traffic and waste disposal for pyrolysis activated with hydrogen, offering a new service to locals and tourists. Namely the CHYAO explores the possibility to fuel a ferry with local hydrogen to transport people between the neighbouring islands Ventotene and Santo Stefano with zero emissions.

The challenge to decarbonize maritime is very difficult, not only due to the scale of emissions but also due to uncertainty over the technologies. Commercially available fuel cells for Maritime applications are few. For instance, Ballard's 200kW system, FCwave™, is designed to provide zero-emission power to vessels. The system is scalable from 200kW to MWs to suit a broad range of vessels operating on short or longer and demanding routes. The FCwave™ is usedin the Norvegian ferry HYDRA.



Natural protection area regions near Ventotene and Santo Stefano (Documents sent to NESOI)

HYDRA, which belongs to Norway's Westcon Shipyard, is set to become the world's first ferry to operate on hydrogen

EXPECTED
ENERGY SAVINGS

Diesel costs in Ventotene are 21% higher than the mainland average. Producing green H_2 on the island cuts the fuel transport costs and, potentially, also the cost of mobility in the island.

KEY NUMBERS
OF THE PROJECT

357 MWh	546 tCO_2eq	4 M€	5 jobs
Amount of energy saved each year*	Amount of CO_2 emissions avoided per year	Annual financial savings	Local jobs created*

** Based on the comparison of green H_2 with primary energy consumed by diesel powertrains.*

REPLICABILITY
IN OTHER ISLANDS

The replicability on other islands is strongly foreseen since ANCIM has an extended network related to small islands representing 35 municipalities and more than 200,000 inhabitants. The CHyAO can also be adapted to different areas on the mainland especially remote, rural or especially coastal areas.

RINA

NESOI contact:
Bruno Marcos Sodiro
bruno.sodiro@rina.org

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