NESOI
EU ISLANDS FACILITY

H_2 in Azores to enhance a green and RES-powered transition

H2AZORES

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"The project addresses the current situation in Azores, where energy production is expensive, fossil-dependent and reliant on external supply"

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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.

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ABOUT THE PROJECT

Project Promoter EDA - Electricidade dos Açores, S.A.

Stakeholders EDA - Electricidade dos Açores, S.A. / Dairy industries / Energy-intensive industries / Food industries / Electricity production: EDA / Public transportation

Country Portugal | **Sector** Hydrogen | **PROJECT VALUE** 14.7 M€

DESCRIPTION

Energy production in Azores is expensive, fossil-dependent and reliant on external supply. Considerable amount of renewable energy is curtailed in São Miguel. Still, the EDA group plans to increase the use of different renewables (geothermal, wind, solar PVs). H2AzoRES will explore the techno - economic feasibility of green hydrogen (H_2) to increase primary energy savings and avoid GHG emissions.

AIM OF THE PROJECT

- To assess the techno-economic feasibility of green H_2 including Power-to-X solutions.
- To identify regulatory gaps and provide recommendations.
- To focus on the potential impacts on the ecosystem.
- To identify financing options and major risks.

FUTURE STEPS

The potential link between the H_2 chain and other energy storage technologies will be further explored after the project.

HOW THE EU ISLANDS FACILITY NESOI SUPPORTS THE PROJECT

1. Analysis of existing planning documentation, identification of the project boundaries
2. Assessment of the key project sizing drivers
3. Identification of suitable technological options given existing project sizing requirements
4. Definition of the required environmental permitting procedures, and Regulatory Framework study
5. Cost benefit analysis and socio economic and environmental impact evaluation
6. Definition of the technical, economic and financial, fiscal project inputs
7. Risk analysis and identification of available mitigation strategies
8. Assessment of existing procurement options (e.g. tender, PPP, etc.)
9. Financial modelling and identification of target scenario, identification of financing/funding options

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***H_2 in Azores to enhance a green and RES-powered transition* - Interview**

INTERVIEW WITH

Luís Miguel Correia Guilherme

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

A: EDA - Electricidade dos Açores, S.A. has been looking for new technological solutions with a view to promote the integration of renewable energies in isolated systems, currently having several investments in Battery Energy Storage Systems (BESS) technology underway. This project is part of a technology diversification strategy towards maximizing the use of renewable energy, since hydrogen can be obtained from renewable resources and allows high flexibility of use in terms of energy, not limited to production of electricity.

Q: What are the challenges of the project?

A: The project's low technological maturity and efficiency, coupled with high investment costs, result in an unfavorable net present value. The NESOI-supported study helped identify potential European funding sources, addressing the significant challenge of high investment costs.

Q: How does the project impact local citizens? And local stakeholders and businesses? How are they involved?

A: The study aimed to identify a solution that would contribute to reducing fossil fuel imports and greenhouse gas emissions and, consequently, to increasing the region's energy autonomy and mitigating climate change. To this end, the feasibility of using green hydrogen to use surplus renewable energy was assessed, either for the production of electricity for the public grid or for use by companies that serve public passenger transport, namely buses.

Q: What are your next steps towards clean energy transition?

A: The preliminary feasibility study has been completed, indicating the need to delve deeper into all dimensions of the project to make a final decision on the investment. As a next step, in terms of green hydrogen, it is intended to seek technical and financial support from external entities to carry out the aforementioned study on the identified solution. On the other hand, other energy storage technologies for daily cycles will be analysed, complemented with demand-side management solutions, and the replacement of fossil fuels with alternatives will be evaluated, such as biofuels and synthetic fuels (biofuels & e-fuels).

THE IMPACT

ON LOCAL COMMUNITY

1. **Local Environmental Conditions**
   Enhanced trade balance less dependent on fuel imports and driven by potential H_2 exports. The industrial competitiveness will be strengthened through lower energy cost. Employment rate increases due to new businesses associated with an H_2 supply chain.

2. **Social Acceptance and Impact**
   Different authorities/stakeholders e.g, industry/transport sectors, renewable energy promoters will be brought together. A set of local ambassadors will increase the stakeholder's network by engaging relevant authorities from other islands (e.g., grid operators).

New Energy Solutions Optimised for Islands
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***H_2 in Azores to enhance a green and RES-powered transition* – Technical Data**

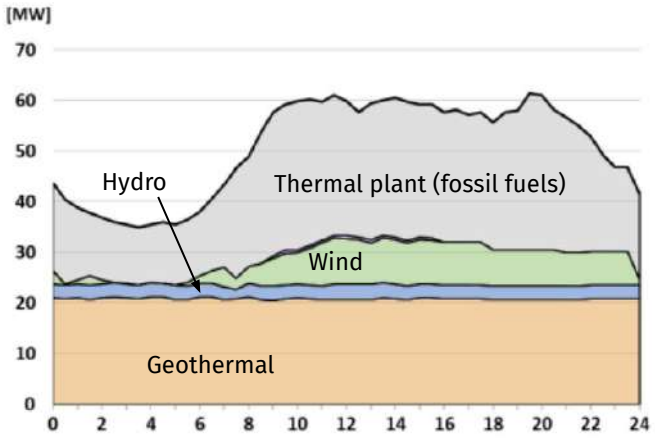
FOCUS ON
DECARBONIZING INDEPENDENT ISLAND GRIDS

All the islands that constitute the Autonomous Region of Azores (RAA), have no electrical connection between each other nor to the mainland, hence, their electrical energy environments are circumscribed to the island boundaries. The island of São Miguel, the archipelago's largest electricity consumer and is characterized by a diversified, complex, and dynamic energy system.

The electricity in São Miguel is produced based on a variety of energy production sources, namely: hydro, geothermal, wind, fossil fuels, and biogas. Currently, renewable energy accounts for 50% of the total net produced electric energy, most of it produced based on geothermal energy. Wind contributes about 4%, but annually, around 8 GWh of wind production is curtailed.

The wind production will increase by 6 MW in the upcoming years, totaling 15 MW by July 2025. Also, the geothermal power plants are planned to be extended in São Miguel. These upcoming changes increase the RE production considerably.

The stability regulation of the grid is currently performed by the Thermal Power Plant of Caldeirão, which is powered by fossil fuels. However, the prominent role of this plant is planned to change in the upcoming years since the installation of a Battery Energy Storage System (BESS) is foreseen.



Typical daily load diagram of São Miguel in the autumn
(Documents sent to NESOI)

Seasonality of energy production in São Miguel

- Geothermal power generation has a prominent role in the energy production mix with no substantial seasonality in the production.
- Wind energy production is considerably higher in autumn and spring, and negligible in summer.
- Hydroelectric power production is fairly constant throughout the year.
- The production of the biogas power plant is negligible due to its small installed capacity and brief operating cycle.

KEY NUMBERS
OF THE PROJECT

Increase in annual local renewable energy generation (primary)

340 GWh/yr
RES-based electrical energy production

14 GWh/yr

6765 tCO_2eq
Amount of GHG emissions avoided per year

REPLICABILITY
IN OTHER ISLANDS

A natural replicability potential exists in a broad set of islands given some aspects in common: renewable energy source surplus in low seasonality, high energy costs, green transition plans. Scalability is technically possible, but its viability is dependent on other factors like the awareness of off- takers, regulatory gaps and environmental issues.

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