

B-IOS



 **IOS ISLAND**

“Insular areas face challenges when it comes to waste management due to their intrinsic characteristics of isolation and strong seasonality.”



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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.



Promoting green and circular economy through biomass exploitation in Ios

ABOUT THE PROJECT

The B-IOS project will improve the island's environmental conditions by biowaste valorisation and RES production, avoiding GHG emissions, while yielding economic and development benefits to the island.



Project promoter: Municipality of Ios



Country Greece



Sector Biogas



PROJECT VALUE 282,100 €

DESCRIPTION

B-IOS promotes local circular economy by valorising biowaste for biogas production. The starting point for sizing the biogas production plant is the assessment of all biomass resources available. The essence of this process is to explore the possibility of reducing any relevant environmental hazard, while at the same time providing biogas for local energy needs in Ios.

AIM OF THE PROJECT

A biogas production facility including an Anaerobic Digestion (AD) unit and a Combined Heat and Power (CHP) unit will be installed in the premises of a local cheese factory. By-products of cheese making, as well as other agrifood waste (from olive oil mills, wineries and manure) as well as sludge from municipal wastewater treatment, will feed the facility.

FUTURE STEPS

Other island authorities will be invited to act as project followers, learning together in the process and replicating the outcomes in the future. It is foreseen that 30 Greek islands will be able to replicate B-IOS results.

HOW THE EU ISLANDS FACILITY NESOI SUPPORTS THE PROJECT

- 1 Assessment of the key project sizing drivers
- 2 Evaluation of the primary technological solution in comparison with other possible solutions
- 3 Definition of the required environmental permitting procedures
- 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
- 10 Action plan and identification of project monitoring procedures



**B-IOS**

Promoting green and circular economy through biomass exploitation in Ios - Interview



INTERVIEW WITH

Paximadas Stelios, City Council Member at the Municipality of Ios

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

A: B-IOS was initiated by the Municipality of Ios with the aim of energy utilization of organic residues from agro-food processes to promote a circular economy model. Biogas technology was chosen because of its ability to convert this waste into energy, contributing to the area's sufficiency and environmental protection.

Q: What were the challenges? How does NESOI help overcome them?

A: The most basic of the challenges facing the B-IOS project is the stable and uniform supply of biomass, and its management. Equally important challenges are evident in the accurate estimation of the cost and performance of the equipment, the implementation of the plans and the acquisition of the necessary permits for smooth operation of the system to be studied. NESOI helped by providing initial financial resources to enable pre-feasibility studies that will be used as a baseline to further mature the studies with more funding.

Q: What are your next steps towards clean energy transition, beyond this project?

A: B-IOS is in the feasibility analysis stage. With this analysis as a starting point, the application of biogas technology for the production of heat and electricity has been proposed. The proposed unit will have an electrical capacity of 65 kWh. The next steps include seeking further funding to cover the costs of studies and implementation of the project. The completion and successful operation of the present project could be considered as an important step towards the energy transition of Ios, paving the way for possible future initiatives and expansions. To reproduce the B - IOS project, there are several key criteria to consider. Socially, the project must be accepted by the local community and support the local economy. Geographically and morphologically, the project requires a site with sufficient access to biomass and a suitable location for the installation of the processing plant. The legal framework must also support such energy utilization projects. Financially, the project must be economically viable, with the costs of acquiring and transporting the biomass being important factors. Also, potential risks such as unsustainable biomass harvesting, potential community backlash, and technical problems that may arise during plant operation must be assessed and addressed.

THE IMPACT

ON LOCAL COMMUNITY



1 Local Economy

B-IOS will contribute to the local economy with: 2 new jobs created; Reduction of biowaste treatment costs; Reduction of electricity and heating costs as the system will operate in the premises of a cheese factory; Development of expertise in a novel technology in Ios, contributing to the diversification of the island's economy which is mainly based on tourism; Expansion of agricultural practices and new investments to the agricultural production of biofuels.

2 Social Acceptance

B-IOS will contribute to the acceptance of the benefits of biomass valorisation and RES production. Local enterprises have already been engaged, and some will benefit from the produced thermal power. Energy poverty mitigation, direct and indirect employment growth as well as the energy community scheme (allowing broad participation) boost the social acceptance.


B-IOs

Promoting green and circular economy through biomass exploitation in Ios – Technical Data

FOCUS ON

SELECTION OF THE BIOGAS PLANT INSTALLATION SITE

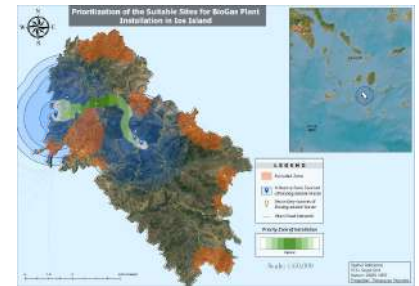
The selection of the B-IOs biogas plant installation site is framed by regulatory and accessibility criteria which both shape the exclusion and priority zones. Both zones target the minimization of the environmental impact and the cost optimum of the biogas plant development.

The accessibility criteria refer to the distance from the sources (biowaste) and the existence of a road network while the regulatory criteria are cited for the land use preserving the urban and natural areas. The analysis was carried out in Geographic Information Systems (GIS) environment, exporting maps for the spatial demonstration of the suitable areas according to the relevant criterion.

The top figure on the right depict the areas of the island that are not permitted to site a biogas plant according to the current legislation. More specifically, buffer zones were created to preserve the land use and the distance to each land use of interest is presented in the legend. The bottom figure on the right prioritizes the sites based on the accessibility criterion targeting the cost optimum installation. The biowaste sources were used to create an influence zone that identified the nearest permitted areas of installation. Next, the main road network defined the areas of priority in combination with the former results, depicted in a colour shade of green.



Excluded sites for biogas plant installation in Ios

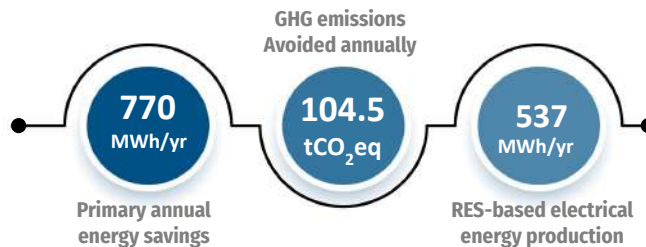


Prioritisation of suitable sites for biogas plant installation in Ios

EXPECTED ENERGY AND GHG SAVINGS

Considering the electricity and thermal production that will be substituted by the biogas unit the primary annual energy savings are estimated around 770 MWh. The annual electrical energy demand on the island is estimated around 16.2 GWh based on data from HEDNO. The expected power to be produced by the CHP plant will cover 4% of the island's electricity needs with renewable energy. The renewable share will increase in heating and cooling as well. GHG emission factors (EF) for biogas and electricity consumption are 0.284 (Ecoinvent) and 0.760 tCO₂-eq/MWh (standard approach) and for heating oil consumption 0.268 tCO₂-eq/MWh (standard approach). The thermal energy consumed by the local cheese factory is 180 MWhth (technical analysis) and is derived from the CHP.

KEY NUMBERS OF THE PROJECT



REPLICABILITY IN OTHER ISLANDS

The B-IOs project and the technology proposed can be easily replicated and adopted by 30 Greek islands with similar characteristics (increased agrifood activity, continuous bio-waste production flows during the whole year) but also by non interconnected islands of Greece with potential to function as laboratories for clean energy solutions. Indicative islands in the same region (South Aegean) with significant replication potential are Naxos, Paros, Tinos, Syros and Mykonos.

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