



CIRCIE 2019

Challenges for the Islands in the era of the Circular Economy

*The challenges of the Energy Transition for the
Islands of Greece*

Markos Damasiotis



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**Challenges
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Two main
challenges of
the Energy
Transition for
the Greek
Islands

Interconnections of Non
Interconnected Islands

Intelligent and Energy Islands

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	Electricity system of Greek islands
Current situation	<ul style="list-style-type: none">• There are almost 6.000 islands in Greek Seas most of them in Aegean and most of them inhabited.• The electricity market of NII consists of thirty-two (32) autonomous systems. Some of them consist of several islands (islands' clusters), where in charge of the operation and management of the relevant Markets and networks is the Hellenic Electricity Distribution Network Operator (HEDNO S.A.)• The size (peak demand)<ul style="list-style-type: none">– Nineteen (19) "small" autonomous systems with peak demand up to 10 MW.– Eleven (11) "average size" autonomous systems with peak demand from 10 MW to 100 MW.– Two (2) "large" autonomous systems with peak demand exceeding 100 MW, i.e. Crete (with peak demand over 600 MW) and Rhodes (peak demand~ 200 MW).• Oversizing of power plants / pollution from oil / black outs during summer periods / expensive electricity systems
Energy Mix / Electricity Cost	80 % oil – 20% res ~ 250 € /MWh





Challenges

Plans

	Interconnection of Non Interconnected Islands (NII)	Intelligent and Energy Islands
Challenges	<ul style="list-style-type: none"> Maximum exploitation of insular RES the Interconnection of NII islands among them and then to the continental system makes feasible the exploitation of the vast wind potential of the Aegean Sea Greener islands Improved energy security Independence from imported oil and the fluctuation of oil prices Decrease of electricity bills charges imposed by Public Services Obligations <i>levy on electricity bills currently used to fund the costs of certain services that the State deems essential to; reduce emissions of greenhouse gases to meet national targets for emissions reductions, secure supply of electricity, and promote the development and use of indigenous sources of energy - PSO, ~ €600-800 million/ year, oil prices dependent (source RAE)</i> 	<ul style="list-style-type: none"> Electrification of naval and road transportations Installation of charging stations using RES Energy Storage Renewable Energy Sources (wind, pv, geothermal) Energy Efficiency Energy storage Microgrids / Demand response systems Greener islands Improved energy security / Independence from imported oil and the fluctuation of oil prices / Decrease of electricity bills charges imposed by Public Services Obligations
Plans	<ul style="list-style-type: none"> The Operator of the Hellenic Electricity Transmission System, (ADMIE) has already planned the interconnection of Cyclades to the continental system The interconnection of Crete is also under planning <p>Cost: 4-5 billion Euros</p>	<p>Examples</p> <ul style="list-style-type: none"> Agios Efstratios (CRES), Tilos (Technological Education Institute of Piraeus + 15 European partners) , Ikaria (wind + water pumping and storage) Kastelorizo, Simi, Astipalea (Hellenic Electricity Distribution Network Operator – HEDNO / ΔΕΔΔΗΕ has the possibility to implement specific pilot projects for maximum exploitation of RES) Initiative ‘Energy Islands’ Ministry of Environment and Energy in constant contact with the Directorate General for energy of the European Commission, for drawing up a list of criteria, as well as the candidate Islands to join the program Pilot hybrid plants for Karpathos and Gavdos (PPC) Exploitation of geothermal fields of Nisyros, Lesvos and Milos - Kimolos- Polyaiagos complex and exploitation of waste.





Agitos Efstratios (Ai Stratis) Intelligent + Green Island

RES Hybrid System

- 1,0 MW RES power plant, WT 800-900 kW, PV 150-250 kW
- BESS 1 MW/2,5 MWh
- Grid interconnection infrastructure

District Heating (D.H.)

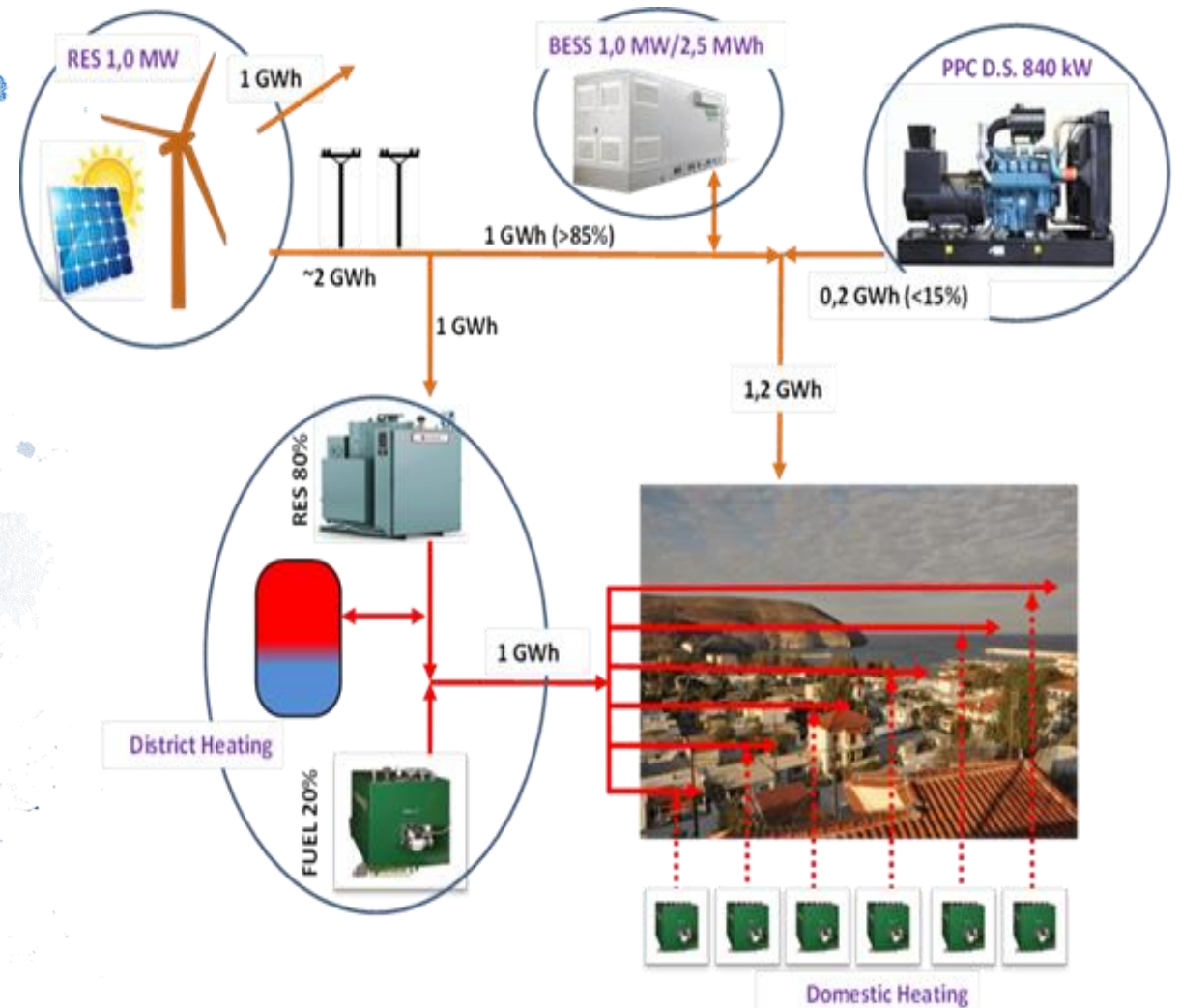
- D.H. plant (electricity-to-heat units + back up thermal unit)
- Insulated hot water storage tanks
- Distribution network and consumer substations

Demonstration of RES charged electrical vehicles

Upgrading the energy efficiency of all municipal buildings

Results

- High RES penetration (>80%) in the electricity system
- Yearly reduction of GHG equal to 1,25 kt CO₂eq



Thank you for your attention



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