“Innovative Energy Actions to Increase RES Penetration and Reduce Emissions at the Port of Adamas, Milos”

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EVILION Consultants & Engineers Profile

EVILION PC is a consulting company in the field of energy and environment providing services both in public and private sectors:

* Sustainable Energy and Climate Action Plans (SECAP)
* Support of Municipalities and Regions' participation in the European H2 & Fuel Cells - Regions and Cities Initiative (www.fch.europa.eu)
* Support of Municipalities in the realisation of Sustainable Urban Mobility Plans (SUMP)
* Electric Mobility Action Plans for Municipalities and Regions
* Support of Municipalities participation in CIVITAS Initiative (http://www.civitas.eu/about-us-page) regarding sustainable mobility and innovative technologies in the transport sector

EVILION Consultants & Engineers Profile (2)

We also provide the following services:

INVESTMENT FUNDING SERVICES

Implementations of business plans and funding applications (National and European) in the fields of:

* Hybrid RES - Energy Storage Power Systems in non-interconnected Greek Islands
* Desalination Plants in combination with RES in Greek islands
* Combined Heat and Power Projects
* Tourism investments

PROPOSAL SUBMISSION IN EUROPEAN & NATIONAL FRAMEWORKS

* Proposal design, preparation and project management in the context of HORIZON 2020 in the fields of Energy, Environment and Transport
* Funding applications in the context of National Frameworks in the following categories: 1) innovative business and 2) tourism investments
* Proposal design, preparation and project management in the context of the Call «Research – Creation – Innovation» of the General Secretariat of Research and Technology

Presentation Key Points

* Energy Policy of the Municipality of Milos
* Sustainable Energy Action Plan of Milos Island
* Innovative Energy Actions towards RES penetration increase and CO_2 reduction at the port of Adamas, Milos
* New Technologies and Future Plans

Energy Policy of the Municipality of Milos

Milos Energy System is strongly dependent on fossil fuels, comprising:

* PPC Independent Power Station (ICE gensets)
* A Wind Farm (4 Wind Turbines – 2,65 MW)
* Photovoltaic Power Stations (~600 kW)
* RES penetration ~ 20%

Energy Policy of the Municipality of Milos (2)

Milos has adopted an ambitious energy policy towards higher RES penetration and emissions reduction, supported by its participation in the following initiatives:

* Covenant of Mayors for Climate and Energy
* European H2 & Fuel Cells - Regions and Cities Initiative (www.fch.europa.eu)
* CIVITAS Initiative for sustainable mobility and innovative technologies in the transport sector
* Isle Smart project (funded through ELENA)

Energy Policy of the Municipality of Milos (3)

* The Municipality of Milos participates in National and European R&D proposals in the field of clean energy and environmental protection
* The Energy Policy Framework of Milos is set on the following basic rules:
  * RES installations of small to medium – scale to serve local demand only
  * Geothermal energy to be used only in thermal applications – there is an acceptance to assess low temperature geothermal energy applications

Sustainable Energy Action Plan Targets

* Milos island has submitted a very ambitious Sustainable Energy Action Plan (SEAP) to the Covenant of Mayors targeting up to 2020 to achieve:

  * 41.6% CO_2 reduction
  * 22% Fossil Fuels reduction

Sustainable Energy Action Plan Targets (2)

* Milos SEAP comprises 23 actions in the fields of:
  * Municipality Buildings and Infrastructures
  * Residential sector
  * Tertiary sector
  * Municipality Lighting
  * Transport sector
  * Smart Grids
  * RES and Energy Storage

Focus is given in innovative actions at the port of Adamas

Innovative Energy Actions, Adamas Port

VISION: Adamas becoming a Green Port (including the Marina)

GOALS: High RES penetration, Low Co2 emissions, Zero – emissions transport applications, Reduce fossil fuels consumption

Innovative Energy Actions, Adamas Port (2)

Outline of Programmed Actions:

* Energy Efficient Municipality Street Lighting
* Smart Grid Operation
* Electric Vehicles supported by PV station
* Hydrogen applications (stationary and in the transport sector)
* Hybrid power system (future possibility to support cruise ships as well)
* PV power station installed at the passengers' building (Adamas port)

Energy Efficient Municipality Street Lighting

* Street lighting accounts for ca. 50% of the total Municipality electricity consumption in Milos
* Replacement of all street lighting lamps (including street lighting at the port of Adamas) with energy efficient LED ones
* Total cost~ 900 k€
* Energy saving: 543.1 MWh/yr
* CO2 reduction: 537.7 tons/yr
* Financial benefit: 87 k€ /yr
* Combination with Smart Grid technologies to maximise financial benefit

Smart Metering and Grid Operation

* Milos participated in the ISLE SMART project funded by ELENA instrument aiming to install smart meters in 5 islands
* It is foreseen to install 10,000 smart metering devices on the island of Milos
* Co-operation with street lighting
* Total Cost~ 600,000€
* Energy Saving: 1.68 GWh/yr
* CO2 reduction: 1,663 tons/yr
* Financial benefit: > 260,000 €/yr

Electric Vehicles Supported by PV station

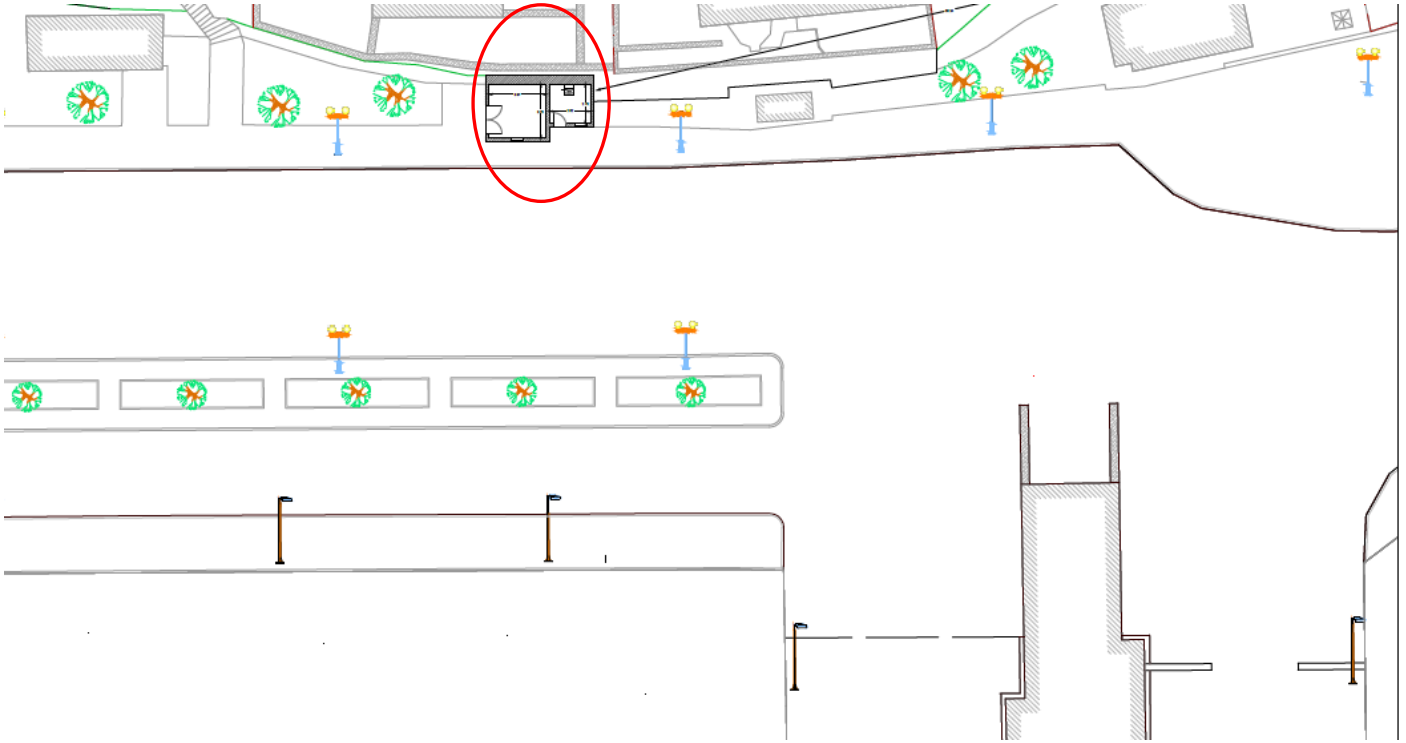
* Two electric vehicle charging stations supported by PV power systems are foreseen (in Adamas and Pollonia ports)
* Charging stations at pilot operation will serve 5 electric scooters and 2 electric vehicles
* Total cost 30,000 €
* Energy Saving: 10 Mwh/yr
* CO_2 reduction: 2.49 tons/yr
* Financial benefit: ~1,700 €/yr

1st Electric Vehicle Charging Point supported by PV under construction at the Port of Adamas

* The Municipality of Milos has already started permitting process and construction of the 1st EV Charging Station supported by a PV station at the port of Adamas (full operation expected June 2017).
* Equipment offered as a sponsorship by Eurosol P&M GmbH (www.eurosol.eu)
* PV station with a nominal capacity of 2.04 kW (8 panels)
* Inverter SMA Sunny Boy 2500 HF
* Grid connected system (net metering)

1st Electric Vehicle Charging Point supported by PV under construction at the Port of Adamas (2)

* General Layout of the building at the port of Adamas to host the PV electric vehicle charging station



Hydrogen Stationary Applications at the Port of Adamas port

* The following PV-hydrogen stationary application has been programmed to be installed at the port of Adamas:
* Operation as UPS and/or cover part of lighting needs
* PV capacity: 12 kW
* Reversible PEM type electrolyser/fuel cell: 10 kW
* Total energy storage capacity: 120 kWh
* Energy saving: 14.6 MWh/yr
* CO_2 reduction: 16,8 tons/yr
* Financial Benefit: 2,300 €/yr

Hydrogen Transport Applications at the Port of Adamas port

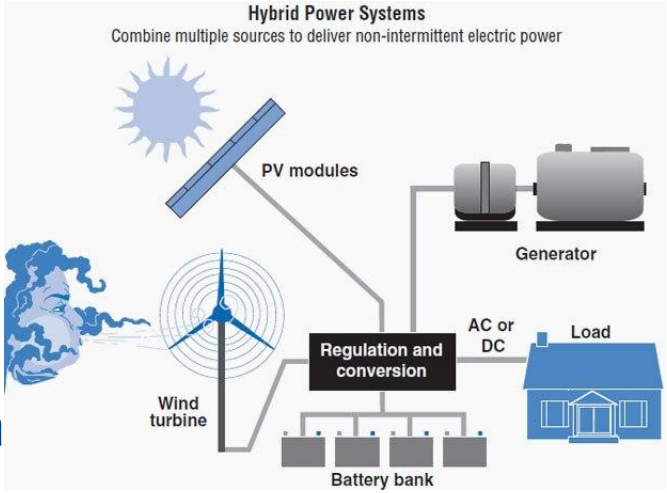
* The following hydrogen application for the transport sector has been programmed to be installed at the port of Adamas:
* Hydrogen refueling station for fuel cell vehicles
* 5 H2 scooters and 2 small vehicles to operate on the island
* Energy Saving: 10 MWh /yr
* CO2 reduction: 2.49 tons/yr
* Financial Benefit: ~ 1700 €/yr

PV Power Station at the passengers' building, Adamas Port

* The Municipality of Milos will install a PV power station at the rooftop of the passengers' building of the port:
* A 20 kW PV station will be installed to operate with the "net-metering" approach
* Total Cost: 22,000 €
* Energy Saving: 31.94 MWh/yr
* CO2 reduction: 36.7 tons/yr
* Financial benefit: 4,150 €/yr

Hybrid Power System

* It is foreseen to install a Wind – PV – battery hybrid system at the island of Milos targeting to increase RES penetration and security of energy supply
* Basic architecture of the hybrid power system comprises:
* Wind turbine(s): 1.6 MW
* PV station: 400 kW
* Advanced batteries (NaNiCl2 or similar) with a total storage capacity of 11.5 MWh



Hybrid Power System (2)

* Guaranteed power: 750 kW
* Total guaranteed energy: 750kW x 8h x 365 d = 2,190 MWh
* Total cost 7,5 – 8 M€ (Private Investment)
* Energy Saving 4,700 MWh
* CO2 reduction: 5.400 tons /yr
* Financial benefit (for the private investor): ~820 k€
* Subsidies through the New Greek Investment Law are available

Hybrid Power System (3) – Benefits and Future Potential

* The hybrid power system will increase RES penetration at the energy system of Milos at a percentage of 8-10%
* Small footprint of the battery containers, no major civil works required
* The hybrid power plant could serve electrification needs of cruise ships aiming to turn off their engines
* The only way to "put" Wind Turbines on ships and reduce environmental impact for islands
* The hybrid power plant can also serve other island needs such as desalination plants energy consumption

THANK YOU FOR YOUR ATTENTION!!!