Δήμος Σαμοθράκης
Municipality of Samothrace

Energeia

European Territorial Cooperation Programme
Greece-Bulgaria 2007-2013
INVESTING IN OUR FUTURE
Co-funded by the European Union (ERDF) and National Funds of Greece and Bulgaria

Pilot action in the Municipality of Samothrace

contribution of RES to spa tourism

Under the implementation of project

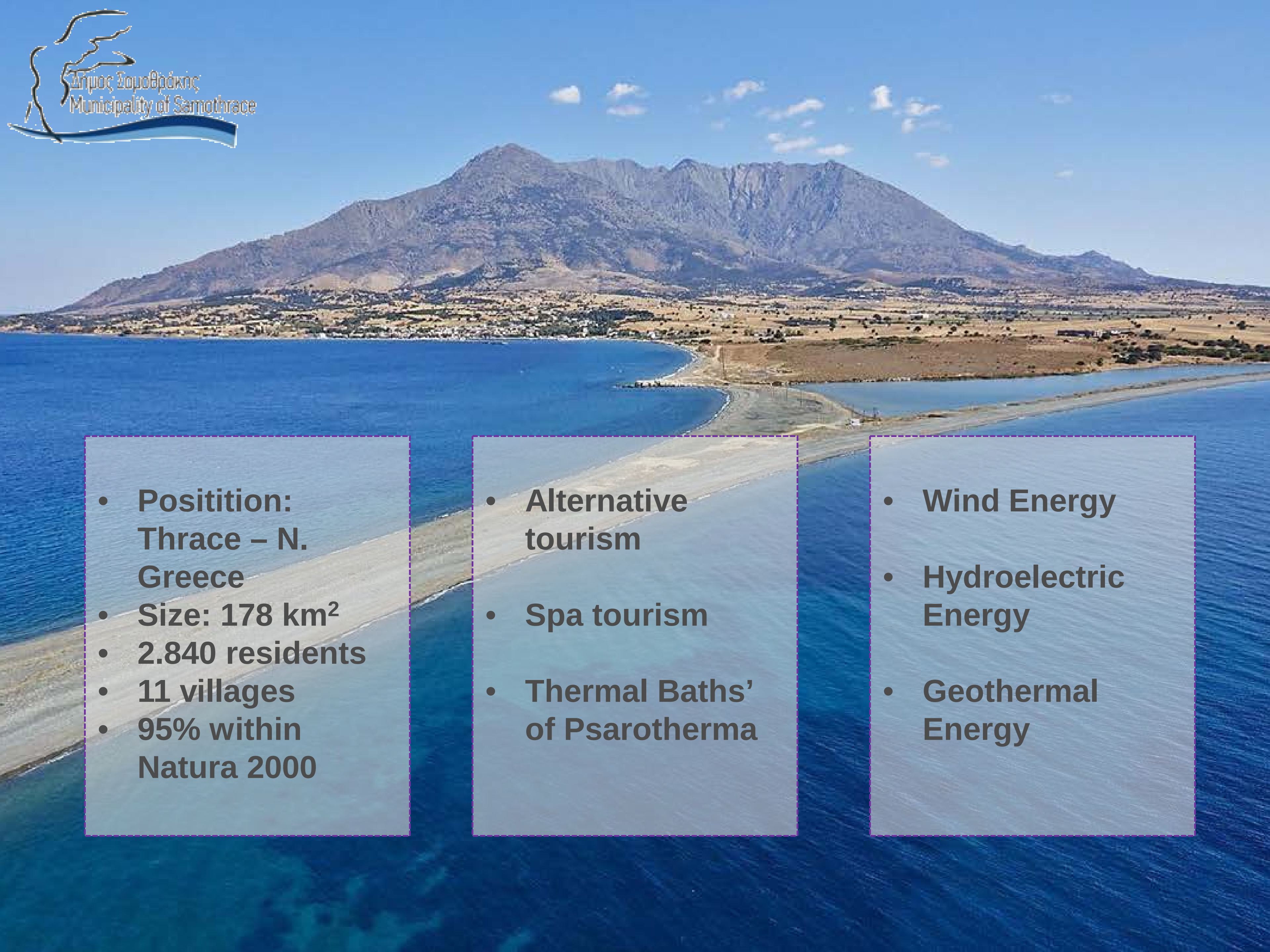
“Fostering the use of low temperature geothermal sources through the development of operational exploitation guidelines and green energy solutions of enterprising” – “ENERGEIA”

Project Partner 6 – Municipality of Samothrace

Konstantinos Lymperopoulos
Mech. Engineer
NTUA, M.Sc.

klympero@kriton-energy.com
www.samothraki.gr

Δήμος Σαμοθράκης
Municipality of Samothrace



- Positition: Thrace – N. Greece
- Size: 178 km^2
- 2.840 residents
- 11 villages
- 95% within Natura 2000

- Alternative tourism
- Spa tourism
- Thermal Baths' of Psarotherma

- Wind Energy
- Hydroelectric Energy
- Geothermal Energy

Thermal Baths’ of Psarotherma

Δήμος Σαμοθράκης
Municipality of Samothrace

Psarotherma

- Known from Byzantine period
- Village “Therma”, 14km from port
- Hot sulfur springs
- 1920 first building facilities
- Therapeutic properties

- **92^{o}C thermal water**
- **11m^3/h aver. Supply**
- **Water used in 37-38^{o}C**

Facilities

- Building of 458 m^2
- 13 personal baths
- 2 swimming pools
- Lockers
- WCs
- Waiting room

Visits

- 5.500 tickets – swimming pools
- 1.870 tickets – personal baths
  (3 yrs aver.)
- Operation period: June - October

Pilot action: Innovative utilisation of geothermal energy for heating and domestic hot water of the facilities of Thermal Springs of Samothraki

Idea !

- Utilisation of waste heat of thermal fluid
- Extending the operation period of the thermal baths.

Objective

- Retrofit to achieve nearly zero energy building

Evaluation of current situation:

- **No insulating protection on the building envelope**
- **No heating/cooling system**
- **Inadequate hot water from installed solar collectors**
- **Low thermal comfort levels inside the building**
- **High amount of heat rejection (thermal fluid)**

Proposal from DUTH:

Pilot hybrid heating and domestic hot water system utilising photovoltaics and geothermal energy

Δήμος Σαμοθράκης
Municipality of Samothrace

Pilot action: Innovative utilisation of geothermal energy for heating and domestic hot water of the facilities of Thermal Springs of Samothraki

Issues

- Formation of deposits due to sulfur content of thermal fluid

- Increased humidity inside the swimming pool rooms due to high temperature of thermal fluid

- **Utilisation of old swimming pool**
- **Thermodynamic calculation and design of a specific water to water heat exchanger**
- **Heat exchanger constructed by copper pipes Φ35mm of 27m**
- **Ease of disassembly and cleaning of copper pipes**

- **Design of new HVAC system in accordance with VDI 2089 regulation**
- **Evaporation of water is 11 kg/h from each pool**
- **Requirement of 3.000 m^3/h fresh air**

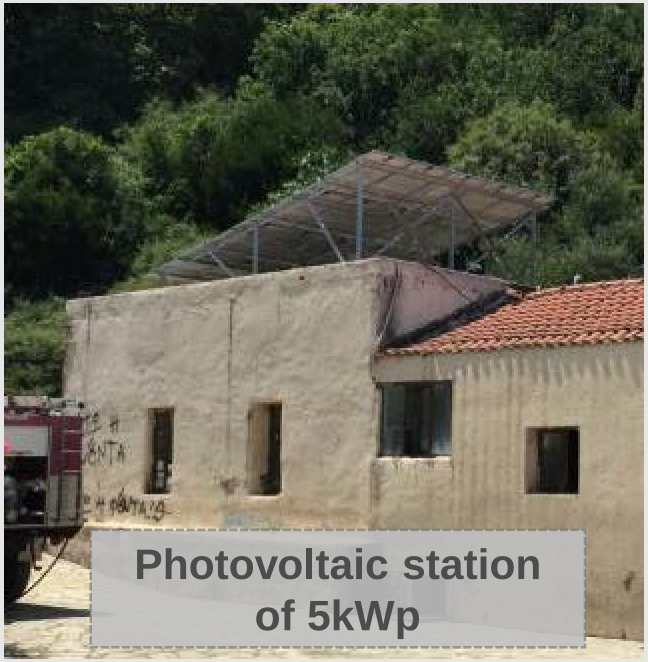
Pilot action: Innovative utilisation of geothermal energy for heating and domestic hot water of the facilities of Thermal Springs of Samothraki

Δήμος Σαμοθράκης
Municipality of Samothrace

Pilot action: Innovative utilisation of geothermal energy for heating and domestic hot water of the facilities of Thermal Springs of Samothraki

Ext. th. insulation - new double glazed frames


HVAC of 3.000 m³/h


Photovoltaic station of 5kWp


New LED lighting


HVAC of 3.000 m³/h

Energeia

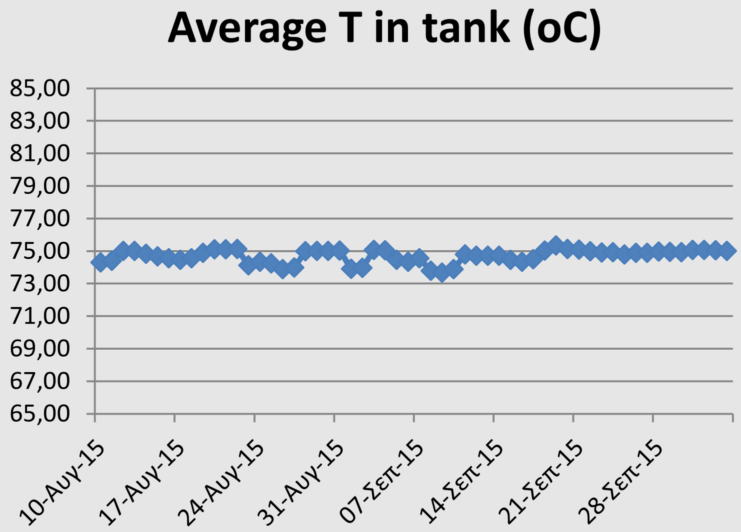
Δήμος Σαμοθράκης
Municipality of Samothrace

Results of pilot operation

10/8 to 4/10

Heat exchanger

- 151 m^3
- Average ΔT: 10^{o}C
- **Geothermal energy consumed 1.720kWh**
- **Electrical energy consumed from pilot heating system: 95kWh**
- **Energy savings due to LED lighting: 410 kWh$_{el}$**
- **100% electrical energy fed by the new PV station**



Yearly (estimat.)

- **Geothermal energy consumption 20.000kWh/year**
- **100% coverage of thermal needs by geothermal energy**
- **100% coverage of DHW needs by geothermal energy**
- **73% coverage of electrical needs of pilot application from PV station**

Conclusions - Future steps

Conclusions

- Extension of operating period of the thermal baths without additional energy costs
- Increased thermal comfort inside the building
- Hybridization with PV technology offers the development of zero energy heating systems
- Increased potential for further exploitation of the geothermal energy of the site

Future steps

- Solve geothermal well cleaning requirements
- Install absorption chiller to complete HVAC system
- Investigate the profitability of new low carbon SPA facilities capitalizing on the results produced by ENERGEIA project

Absorption chiller

Δήμος Σαμοθράκης
Municipality of Samothrace

Energeia

European Territorial Cooperation Programme
Greece-Bulgaria 2007-2013
INVESTING IN OUR FUTURE
Co-funded by the European Union (ERDF) and National Funds of Greece and Bulgaria

Thank you for your attention!

Konstantinos Lymperopoulos

Mech. Engineer

NTUA, M.Sc.

klympero@kriton-energy.com

www.samothraki.gr