Proteas (Platform of Research, Observation and Technological applications in Solar Energy)

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Background

Cyprus is a small island state, with an isolated electricity grid, which relies almost exclusively on imported heavy fuel oil for its electricity production. Also, Cyprus' semi-arid climate necessitates seawater desalination to provide adequate fresh-water resources to its population. Climate projections indicate both an increase in temperatures as well as a decrease in precipitation by the end of the century, further increasing the strain on the electricity and water resources of the island. The case of Cyprus is not unique; several countries in the Middle East and indeed around the world face similar circumstances.. Therefore, it is crucial to produce technically sound and economically feasible solutions for covering part of the electricity and water demand of the region. Solar energy is an appealing source of energy to power desalination, especially since water scarcity and high solar irradiation coincide in many regions in the Mediterranean.

Aims and Goals

PROTEAS mission is to pursue research, development of solar technologies, as well as testing of renewable Energy Sources with emphasis on Concentrating Solar Thermal (CST), Thermal Energy Storage (TES) and Thermal Desalination of seawater (DSW) for bridging the gap between fundamental research and industrial needs.

Actions taken

The first major experiment at PROTEAS concerns the co-generation of electricity and disalinated water from from Concetrated Solar Panels (CSP). Specifically, the experimental plant consists of a heliostat central-receiver system for solar harvesting, thermal energy storage in molten salts ("solar salt", 60-40% b.w. of NaNO3-KNO3), followed by a Rankine cycle for electricity production and a Multiple-Effect Distillation (MED) unit for seawater

desalination. These technologies were selected after an extensive technical and economic study lead by The Cyprus Institute, which concluded that they are the most suitable for the particular conditions of grid-isolated island communities in general and Cyprus in particular. The experimental plant is meant to verify the concept, modeling and component behavior of a prototype design of a commercially viable plant.

Main Achievement to date

PROTEAS is also mobilizing civic engagement, corporate social responsibility, and green innovation on the island worldwide with the “Adopt a Heliostat Scheme”. This is an open invitation to sponsor one or more of CyI’s high-yield heliostats and help advance research in renewable energy sources and materialize the vision of the Nexus approach. PROTEAS is continuously expanding its vision for collaborative scientific excellence by has participating array of EU local projects and is continuously cultivating regional and international collaborations to expand its effort of scientific research excellence and initiating change on a socioeconomic level.

Lessons, replicability and scalability potential

In terms of lessons, we have focused on using the EU funds as leverage to then mobilize investment from the private industry with contract for testing and demonstrations. We are also realizing the benefits of using the pilot for public engagement and awareness on the need to save water and energy. We have been opening our doors to visits from schools, policy makers, scientists and businesses.

In terms of scalability, we are envisioning to build a greenhouse for vegetable production and connect it to the connect the PROTEAS plant, thus going from focusing on the connection between water and energy towards the water-energy-food nexus.

The PROTEAS facility is the largest research infrastructure in Cyprus and specializes in the development and testing of technologies relating to concentrated solar power (CSP) and solar seawater desalination. PROTEAS offers a unique environment for testing in realistic coastal-island conditions solar technologies. The PROTEAS experimental plant consists of a heliostat central-receiver system for solar harvesting, thermal energy storage in molten salts followed by electricity production and a unit for seawater desalination. These technologies were selected after an extensive technical and economic study lead by The Cyprus Institute, which concluded that they are the most suitable for the particular conditions of grid-isolated island communities in general and Cyprus in particular.

Name
Georgiou, C. Marios

Affiliation
The Cyprus Institute

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Total funding
1M - 5M €

Environmental
High

Social
Medium-Low

Technological
High

Financial
High

Institutional
High

SDGs

YouTube

https://www.youtube.com/watch?v=SWeTCvqmLYM

Featured Image

Website
https://proteas.cyi.ac.cy/

E-mail address
m.c.georgiou@cyi.ac.cy

Nexus Dimensions
Energy
Water

City
Limassol

Visibility
Public
