

**Title of Diploma Thesis**

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Deployment of a Floating Photovoltaic System for Electrical Energy Production in a Lake

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**ABSTRACT**

Solar energy, which reaches the earth's surface as electromagnetic radiation generated by the sun, is practically an inexhaustible, clean source of energy. The direct conversion of solar energy into electricity is performed with photovoltaic cells. For the production of multi-MW electricity from solar energy high-power facilities are required; these facilities occupy large footprint areas. In the case of countries such as Greece, with limited land area, and a significant proportion of arable land and protected forest and other land, the deployment of floating photovoltaic systems for electrical energy production in the water environment presents an attractive, alternative solution.

This diploma thesis aims at the investigation of the deployment of Floating Photovoltaic (FPV) system for electrical energy production in a lake in Greece. Considering the nature and the characteristics of the FPV along with its deployment in the water environment, an extensive review of various criteria is required. These criteria are related to: (a) production effectiveness, construction and maintenance of the FPV, connectivity with the existing electricity distribution network and (b) the legal framework, that refers to the electricity production from Renewable Energy Sources (RES). In light of the above criteria, a suitable lake in Greece is initially selected and its characteristics are analyzed, in order to investigate the deployment of the FPV system for electrical energy production.

After presenting current status of the natural and the human environment of the selected lake's surrounding area, the feasibility, the location and the technology of the proposed FPV system for electrical energy production is analyzed. For the integrated investigation of the deployment of the FPV system for electrical energy production, the geometric characteristics and the production effectiveness of the aforementioned system are calculated and presented, aiming to meet the electricity requirements of the neighboring villages. Finally, a financial analysis is performed, where construction, operation and maintenance costs are calculated, while additionally, the economic performance of the proposed FPV system for electrical energy production is estimated.

**Keywords:** Floating photovoltaics, Lake, Site selection criteria, Production effectiveness, Cost estimation.