

Thesis Title	Stirling Engines for Low-Temperature Solar-Thermal-Electric Power Generation
Programme of Studies	MSc in Sustainable Energy Systems
Course	SES 701 Maser Thesis I + II
Area of Study	Sustainable Energy Systems
Student's Name	Theodoros Diavatis
Students Reg. Number	100003252
Supervisor	Dr.-Ing. Paris A. Fokaides, V. Lecturer, Frederick University
Supervisory Committee	Dr. Agis Papadopoulos, Professor, Aristotle University Thessaloniki Dr. George Karagiorgis, Assoc. Professor, Frederick University
Semester	Spring Semester 2018
Short Description	<p>The purpose of this study is the analysis of a novel concept, entitled Low-Temperature Solar-Thermal-Stirling Power Generation (SoS Power). The system consists of a Stirling engine been powered by solar thermal energy produced by an evacuated tube solar thermal collector array. The power regulation is performed by means of an intermediate solar hot water storage tank which controls the heat flow from the collectors to the Stirling engine, aiming to a manageable power production. The waste heat from the Stirling engine can further by utilized in a hot water storage tank, which can be further used for hot water demands. To this end the overall efficiency of the proposed system is increased and the SoS Power concept provides not only the Stirling engine produced electricity but heat as well. The proposed concept is presented in the attached figure. The main idea behind the utilization of an intermediate solar hot water storage tank is to avoid issues of phase change within the heat exchanger in the Stirling engine. Also the presence of this tank enables the comprehensive production managements, by means of a simple automation system, that regulates the heat flow from the tank to the engine.</p> <p>The study investigated the main aspects of the operation of the proposed unit, and performs a comprehensive pre-engineering design of the plant. Case studies in which the plant is applied are implemented, and the energy balance of the plant is presented.</p>