

Master Thesis Brief Description

Thesis Title	Numerical Modelling of Seasonal Solar Thermal Energy Storage
Programme of Studies	MSc in Sustainable Energy Systems
Course	SES 701 Maser Thesis I + II
Area of Study	Computational Building Physics – Whole Building Energy Analysis
Student's Name	Phivos Koumides
Students Reg. Number	100005912
Supervisor	Dr.-Ing. Paris A. Fokaides, V. Lecturer, Frederick University
Supervisory Committee	Dr. Efrosyni Giama, V. Lecturer, Aristotle University Thessaloniki, Greece Dr. Constantinos Hadjiyiannis, V. Lecturer, Frederick University
Semester	Spring Semester 2020
Short Description	The implementation of seasonal solar thermal energy storage for heating or cooling purposes can be of great benefit to energy efficiency and renewable expansion. The study of such thermal systems is fairly complex, due to the interaction of various systems and their dynamic nature. Such complex dynamic systems require the development of dynamic models to effectively replicate and simulate their performance. The development of a novel dynamic model under the MATLAB environment will be demonstrated, capable of precisely assessing the behaviour of a seasonal solar thermal energy storage system, used for space heating purposes. The validity of this model will be demonstrated, based on experimental published results. The developed model has the strength and flexibility to be applied and adapted under a great variety of conditions. Such variables include the climatic conditions, type, number and configuration of solar collectors, type and configuration of thermal storage and type, shape and size of building to be heated. Beyond the flexibility of the developed model, it will be demonstrated that it can be of great benefit to the optimization of such thermal system during the design process, taking into consideration the thermal performance and financial characteristics.